

Abstract Book of the 8th International Triennial
Conference on Healthcare Systems Ergonomics
and Patient Safety (HEPS) 2025

HEPS 2025

Healthcare Systems Ergonomics & Patient Safety

Safer Better Healthcare By All For All

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Editors

Siobhán Corrigan,
Centre for Innovative
Human Systems, Trinity
College Dublin, Ireland

Liam M. Chadwick,
Irish Centre for Applied
Patient Safety and
Simulation & 1Unit

John Fitzsimons,
Children's Health Ireland
(CHI) and National Quality
and Patient Safety, HSE,
Ireland

Tamasine Grimes,
School of Pharmacy &
Pharmaceutical Sciences,
Trinity College Dublin,
Ireland

Peter Lachman,
Royal College of Physicians
(RCPI), Dublin, Ireland

Marie E. Ward,
St James's Hospital, Dublin
& Centre for Innovative
Human Systems, Trinity
College Dublin, Ireland.

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HEPS2025 is endorsed by the International Ergonomics Association and the Irish Human Factors and Ergonomics Society.

Foreword

This Book of Abstracts is from HEPS 2025, the 8th edition of the triennial conference on Healthcare Systems Ergonomics and Patient Safety endorsed by the International Ergonomics Association (IEA) and initiated by the IEA's Technical Committee Healthcare Ergonomics. The conference theme of this 8th edition is 'Safer Better Care, By All for All'.

This theme promotes the importance of bringing together Patient and Public Involvement, Healthcare Professionals and Human Factors Ergonomics (HFE) expertise to address the problem of healthcare safety.

"Safer Better Healthcare" speaks to the aim to address patient safety and a functioning health system that seeks to optimise human wellbeing (both patients and staff), system performance and safety.

"By All" speaks to the aim of inclusivity, involving all contributors (patients and carers, healthcare providers, healthcare workers, healthcare academics, decision and policy makers and regulators and HFE novices, practitioners and academics) and all levels of healthcare (primary, secondary and tertiary care) and

"For All" speaks to the aims of access and equity.

The 3-day HEPS2025 conference program offers four keynotes and 30 sessions of workshops, panel discussions and oral and poster presentations. This book presents the abstracts of the presentations, panel discussions and workshops in the different sessions.

We sincerely thank all the authors, reviewers, members of the National and International Organising and Scientific Committees for their contribution to this book and making HEPS2025 a success.

National Organising Committee HEPS2025

Siobhán Corrigan	Paula Hicks	Rory Carrick	Tamasine Grimes
Marie E. Ward	Liam Chadwick	John Fitzsimons	Peter Lachman
Angela O'Dea	Veronica O'Hanlon	Maureen Nolan	Eva Doherty
Allan Goldman			

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HEPS Plenary Sessions

We are delighted to present four plenary sessions over the course of the conference. These sessions are designed to bring together the voices of our three key stakeholder groups; Patient and Public Involvement, and Healthcare Professionals and Human Factors Ergonomics (HFE) expertise to solve the problem of healthcare safety; in addressing the challenges that together we all face in healthcare safety. The plenaries are set up such that one person, an expert in their field, will deliver a thought provoking address on a key challenge; a HFE expert moderator will then support a panel of healthcare professionals and patient and public partners to respond to the points raised about this challenge. The HFE moderator will at the same time attempt to draw out the ways in which the science of HFE could be leveraged to help address this global challenge. Our Patient and Public Involvement (PPI) partner for the conference is Patients for Patient Safety Ireland (PFPSI), formed 11 years ago under a World Health Organisation programme. As defined by the WHO, PFPSI aims to engage and empower patients and families to be active partners and advocates in their own care. The aim is to work in partnership and collaboration with health professionals and policy-makers to make health services safer in Ireland and enable the patient voice to be heard fully (<https://www.who.int/initiatives/patients-for-patient-safety>).

Representatives from PfPSI will participate in all our plenary sessions.

Day 1 Plenary: Innovating for Advances in AI and Digital Health Technologies

Speaker: Dr Sujoy Kar, Apollo Hospitals, Delhi, India

Panel: Dr John Sheehan, Blackrock Clinic, Dublin Ireland

Ms. Maureen Nolan, Representative from Patents for Patient Safety Ireland

Mr Tibbs Pereira, Representative from Patents for Patient Safety Ireland

HF Moderator: Prof. Gyuchan Thomas Jun, Loughborough University, UK & The Chartered Institute of Ergonomics and Human Factors

Keywords: AI, Digital Health Technologies (DHT), system change and improvement, Learning Health System (LHS)

Overview

Rapid advances in AI and Digital Health Technologies (DHT) offer enormous potential to healthcare if adopted and implemented in a way that supports human wellbeing (both that of healthcare professionals and patients and their families and carers) and overall system performance. This plenary will set the scene for discussing how we all need to have a voice in shaping the future use of AI and DHT in healthcare. Dr Sujoy Kar will deliver the keynote address. Sujoy is the Chief Medical Information Officer and the Vice-President of Apollo Hospitals, previously Medical Director of Apollo Gleneagles Hospitals, Kolkata. He is a Clinical Microbiologist by background with subsequent post graduations from Indian Statistical Institute and MIT Sloan School of Management. He is an Adjunct Faculty for Healthcare Analytics and Management at IIM Calcutta, IIT Kharagpur and Apollo University, Chittoor.

Prof. Thomas Jun will be our HFE moderator. Thomas is a Professor of Sociotechnical System Design at Loughborough University. He has been promoting systems thinking to safety incident investigation through award-winning animation/film production (www.systemsthinkinglab.com) and recently involved in training over 800 patient safety specialists in the NHS on system safety/resilience engineering. He is currently leading an NIHR-funded research project developing human-

centred AI for people with learning disabilities and multiple long-term conditions (2022–25), DECODE.

Dr John Sheehan will be the healthcare professional on this panel. John is a Consultant Radiologist whose expertise transcends medical imaging, reaching into the vanguard of digital health innovation and transformative healthcare leadership. With fellowships at Northwestern Memorial Hospital in Chicago, John's clinical acumen is matched by his strategic roles at Blackrock Health, Dublin, Mobile Medical Diagnostics (MMD), and xWave Technologies. His leadership roles as Clinical Director at MMD, Clinical Advisor at xWave, and Vice Chair of Ireland's Digital Health Association, highlight his commitment to AI-driven diagnostic advancements and the betterment of community healthcare. John champions a healthcare ethos centered on accessibility, equity, and integration. His contributions to MMD and xWave are a testament to his dedication to leveraging digital innovations to remove patient care barriers and drive transformative change.

Day 2 Plenary: Designing for Human Wellbeing & Overall System Performance

Speaker: Prof. Mary-Beth Privitera, University of Cincinnati, USA

Panel: Dr Andy Phillips, REO, HSE South
West, Ireland

Ms. Maureen Nolan, Representative
from Patents for Patient Safety Ireland

Children's Health Ireland (CHI) Youth
Advisory Council

HF Moderator: Prof. Melissa Baysari, The University of Sydney, NSW, Australia

Keywords: Design, Human-Centred Design, Medical Device Design

Overview

The science of HFE involves the deliberate design of systems, technology, tools, devices such that they support human wellbeing and overall system performance including quality and safety. This plenary will discuss the role of HFE design in healthcare and how important it is to take account of the voice and perspective of all stakeholders in the design process. Prof. Mary-Beth Privitera will deliver the keynote in this session. Mary-Beth is the Co-Chair & Faculty on the Association for the Advancement of Medical Instrumentation Human Engineering Committee. She is a Professor in the Department of Biomedical Engineering, University of Cincinnati and an Honorary Professor, University of Nottingham. Mary-Beth was a Fulbright Scholar US-UK in 2022-23.

Prof. Melissa Baysari will be our HFE moderator. Melissa leads the Digital Health Human Factors Group at the University of Sydney, Australia. Her team apply HFE methods and approaches to evaluate and optimise health technologies to support healthcare work and improve patient safety. Melissa's work seeks to understand and improve the interactions between healthcare providers, health technologies and organisations, and she is particularly interested in evaluating and ensuring the usability and safety of health technologies, and minimising unintended consequences following implementation. She has published widely (>175 publications) in the areas of medication safety, electronic medical record systems and decision support, she has secured over AUD \$25Mill in research funding, and

her research has resulted in a number of significant changes being made to clinical information systems, as well as to hospital policy and work practices.

Dr Andy Phillips will be the healthcare professional on this panel. A Welshman, Andy comes to the HSE from his role as Acting CEO of Safer Care Victoria, Australia. He has worked in clinical, operational and strategic executive leadership roles in healthcare for the past 37 years. Andy maintains his clinical qualification as a consultant clinical scientist. Since 2009, Andy has been leading large scale health system transformation in Wales, New Zealand and Australia, with a passion for integrating health and social care. Andy has practised co-creating health and relationship centred healthcare for over 20 years, with recent work leading kindness and compassion in healthcare. Andy took up his role as Regional Executive Officer in HSE South West in March 2024.

The Children's Health Ireland (CHI) Youth Advisory Council (YAC) will also participate as PPI on this panel. The CHI YAC is a group of Young people aged between 13 and 22 years old who share their experiences as users of Children's Health Ireland (CHI) hospital services in order to inform policy, practices, research and the development of services both within CHI and on a national basis. They will share their experience of having an input into the design of the new children's hospital.

Day 3 Plenary: Designing and Building Better Healthcare Outcomes for All

Speaker: Dr Deliya Wesley, Mathematica, USA

Panel: Prof. Clíona Ní Cheallaigh, Dr Aoibhinn Walsh, Consultant
Inclusion Health Services, St James's Hospital, Dublin, Ireland Paediatrician, Children's Health Ireland.

Ms. Maureen Nolan, Representative from Patents for Patient Safety Ireland Justyna Maslanka, CAIRDE, Ireland

HF Moderator: Prof. Susan Hallbeck, Mayo Clinic, Rochester, MN, USA.

Keywords: Human-Centred Design, Belonging, Healthcare Outcomes

Introduction

A key global challenge in healthcare is providing fair and just healthcare services to all individuals, regardless of their background or social status. HFE can have a significant role in helping to design and build healthcare systems that deliver to all.

Dr Deliya Wesley will deliver our keynote address. Deliya is a health services researcher who has spent her career applying a deep understanding of non-medical drivers of health outcomes for different groups to push the needle on systems transformation and policy change in health systems. She has led the design, development and evaluation of complex health interventions serving people from historically disinvested and marginalised communities. Following a career as an embedded health services researcher working closely with healthcare HFE engineers and patient safety researchers she now serves as the senior director of community impact at Mathematica. She leads strategic growth of a portfolio of research, technical assistance, and evaluation of programs and policies designed to impact the health and well-being of different communities.

Professor Susan Hallbeck will be our HFE moderator. Susan is the Scientific Director of Human Factors Engineering and Professor of Health Care Systems Engineering in the Robert D. and Patricia E. Kern Center for the Science of Healthcare Delivery and a Consultant in Health Care Delivery Research, as well as a Consultant in Surgery at

the Mayo Clinic in Rochester, MN. Professor Hallbeck is a Past-President of the Human Factors and Ergonomics Society and Past-President of the Society for Surgical Ergonomics. She is a Fellow of the Human Factors and Ergonomics Society and International Ergonomics Association. Professor Hallbeck is a licensed Professional Engineer and a Certified Professional Ergonomist.

We will have two healthcare professionals representing adult and paediatric services on the panel. Professor Cliona Ní Cheallaigh is an Associate Professor in the Department of Clinical Medicine, TCD and a Consultant in Infectious Diseases and General Medicine in St James's Hospital, Dublin. She is the Clinical Lead of the Inclusion Health Service in St James's Hospital. Her research examines the effect of social exclusion on health, including work on health systems design and evaluation, premature ageing in homeless adults and the effect of social exclusion on the immune system. Dr Aoibhinn Walsh is a Consultant Paediatrician with a special interest in Inclusion Health. Aoibhinn is the principal investigator and lead clinical researcher of the Lynn Clinic which looks at inclusive and equitable healthcare delivery to Paediatric populations experiencing social adversity e.g., children who are homeless, refugees and international protection applicants, and ethnic minorities who experience difficulty with engaging with healthcare services. Aoibhinn has always had an interest in healthcare delivery to marginalised children which was strengthened when she went overseas with Médecins Sans Frontières to work as an expatriate Paediatrician. Her current clinical focus is on the establishment and future planning of a Paediatric Inclusion Health service within Children's Health Ireland (CHI) and the HSE to formalise care pathways for children at risk of social exclusion with a strong focus on a robust system of care between hospital and community health and social care practitioners.

On this panel we will also have PPI representation from Ms Justyna Maslanka. Justyna is a Mental health advocate and community health advocate for ethnics and minority group. She is a member of the Mental Health Reform Organisation and Cairde, a community health development organisation working across Ireland dedicated to reducing health inequalities among minority ethnic communities in Ireland. Justyna participates on the National Implementation project for the Government, and other departments.

Day 3 Final Plenary: Bringing it All Together – the Future for Human Factors Ergonomics in Patient Safety

Speaker: Prof Ken Catchpole

Panel: Members of the HEPS 2025 National Organising Committee

Introduction

On the final afternoon of the conference we are pleased to introduce a session where Professor Ken Catchpole will try, with the help of the HEPS 2025 National Organising Committee members, to bring together the learning from the conference and in his role as Chairperson of the International Ergonomics Association (IEA) technical committee on healthcare, give an address on the future of HFE in healthcare.

Panel Discussion: Re-imagining patient-work and the future of care using digital technologies

Day & Time: Wednesday June 18th 09:50

Organiser: Dr Adeola Bamgboje-Ayodele, Research Fellow in Human Factors, University of Sydney, Sydney, Australia

Contributors: Prof. Rupa Valdez,
Systems and Information Engineering,
University of Virginia, Charlottesville,
Virginia, USA

Associate Prof. Shanjing “SQ” Yin, Duke
NUS Medical School, Durham USA, &
Human Factors Consultant for
Singapore Health Services, Singapore

Ms. Karen Thomson, South Warwickshire
NHS Trust, Greater Coventry, England

Workshop Keywords: digital, technology, patient ergonomics, self-care, minority populations

Introduction

Digital technologies increasingly provide patients with more opportunities to self-manage their health, more so since the COVID-19 pandemic. However, many patients struggle to use these technologies to practice self-management due to the work required¹. Patient-work is the combination of all health-related tasks and effortful activities that an individual must perform to achieve their health-related goals^{2,3}. Patient-work can benefit from Human Factors and Ergonomics (HFE) expertise, especially when HFE methods are adapted and applied during the stages of studying **the problem**, **designing** technological solutions, **and evaluating** those solutions⁴⁻⁶. However, a recent review has identified gaps in patient-work research for specific populations (e.g. minority populations, those not characterised by a disease, and children and their caregivers), thus limiting our understanding of **the problem** experienced by these populations⁴. In addition, how the use of emerging technologies for self-care and self-management (e.g. remote monitoring technologies or generative artificial intelligence (AI) tools) impacts patient-work remains unclear, limiting our understanding of how to optimise **the design** of these tools. Furthermore, there is sparse research on longitudinal **evaluation** of the

relationship between patient-work, technological acceptance and use over time, limiting our understanding of the temporal impact of technologies on patient-work. Operationally, while health services increasingly 'dispense' technology to patients, they rarely consider investing to reduce technological inconveniences on patients, instead relying on patients' intrinsic motivation for adherence. These gaps raise the need to further develop the science of patient ergonomics as patient-work and the use of emerging technologies become more ubiquitous, complex and consequential.

The concept of patient work is being studied across USA, Australia, the United Kingdom, and Singapore in various health and technology contexts. Our panel discussion will bring together experts in patient ergonomics, share some insights based on work done in each country, and raise discussions on how we might advance the science of patient ergonomics for future care.

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Panel Discussion: Safer, Better Care: A Human-Centered Approach to Clinical Incident Analysis

Day & Time: Friday June 18th 09:50

Organiser: Dr Tommaso Bellandi, Director of Patient Safety unit, Tuscany
Northwest Trust, Italy

Contributors: Emeritus Prof. Charles Vincent, Dept. Experimental Psychology, University of Oxford, England

Associate Prof. Helen Higham, Nuffield Department of Clinical Neurosciences, University of Oxford, England

Prof. Philippe Michel, Centre Hospitalier Universitaire de Lyon, Lyon, France

Dr Cora McCaughan, Assistant National Director, Healthcare Audit Unit, Internal Audit Division, Health Service Executive, Dublin, Ireland

Workshop Keywords: London Protocol, patient involvement, , second victims, human-centered design

Introduction

The pursuit of safer, better care necessitates a deep understanding of the human factors that underpin clinical practice. The London Protocol, a seminal framework for systems analysis of critical incidents, has significantly contributed to this endeavor. However, to truly optimize patient safety, we must broaden our focus to encompass the intricate interplay between human factors, organizational culture, and technological systems.

This special session will delve into the past, present, and future of systems analysis, with an introduction to the new version of the London Protocol 2024 and by examining real-world case studies and discussing emerging trends, we aim to:

- **Prioritise patient involvement:** Explore strategies to actively involve patients and their families in the incident investigation process, fostering transparency, trust, and shared learning.

- **Address the needs of second victims:** Discuss innovative approaches to support healthcare professionals who have been affected by adverse events, promoting resilience and well-being.
- **Enhance the human-centered design of healthcare systems:** Identify opportunities to optimize workflows, reduce cognitive load, and minimize the risk of error.
- **Foster international collaboration on learning from systems analysis:** Share experiences of systems changes through reporting, learning, and improvement, without blame or punishment.

By adopting a human-centered approach to systems analysis, we can create a safer, more resilient healthcare system that prioritizes both patient and provider well-being.

A panel of Experts from England, France, Switzerland, and Italy will share their insights, experiences, and innovative approaches.

References

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Systems Analysis of Clinical Incidents: The London Protocol 2024 currently under review on BMJ Q&S

Panel Discussion: Co-designing the patient journey: Methodological approaches, challenges, and strategies

Day & Time: Friday June 20th 14:20

Organiser: Assistant Prof. Megan Salwei, Center for Research and Innovation in Systems Safety, Vanderbilt University Medical Center, Nashville, Tennessee, USA
Associate Prof. Nicole Werner, Director Center for Research and Innovation in Systems Safety

Contributors: Associate Prof. Marijke Melles, Human-Centered Design for Quality of Care, Delft University of Technology, Delft, The Netherlands

Prof. Rupa Valdez, Systems and Information Engineering, University of Virginia, Charlottesville, Virginia, USA

Associate Prof. Enid Montague, Mechanical and Industrial Engineering, University of Toronto, Toronto, Canada

Workshop Keywords: patient journey, co-design, seips, system boundaries, processes of care,

Introduction

Patient safety, health, and well-being do not occur in a silo, rather, care unfolds across space and time and across multiple work systems over a patient's life course. Much of this care occurs outside of health systems and is performed by patients in collaboration with their informal care partners (e.g., family, friends). Therefore, to truly improve patient outcomes (e.g., patient safety), we need to expand our focus from tasks to processes of care (Walker & Carayon, 2009) and to work that occurs across work system boundaries (Werner et al., 2017), i.e., the Patient Journey. The SEIPS 3.0 model provides a conceptual grounding to study Patient Journeys, defined as "the spatio-temporal distribution of patients' interactions with multiple care settings over time" (Carayon et al., 2020; Carayon & Wooldridge, 2020). Yet, studying, designing, and improving patient journeys presents a challenge. Additional methods and approaches are needed to understand the complex

interactions that occur within and across work systems involving diverse stakeholders and multiple socio-organizational contexts (Carayon et al., 2020).

References

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Lunchtime Talks: To Celebrate the 20th Anniversary of HEPS

Day & Time: Wednesday, Thursday and Friday 13:20

Speakers: Prof. Riccardo Tartaglia¹, Prof. Peter Lachman², Dr Tommaso Bellandi³, Dr Francesco Venneri⁴, Dr Stavros Prineas⁵, Prof. Eva Doherty⁶, Prof. Angela O'Dea⁷, Prof. Siobhán Corrigan⁸, Prof. Marie Ward⁸

Affiliations: ¹Italian Network for Safety in Health Care, Università G. Marconi, ²Royal College of Physicians of Ireland, ³Tuscany Northwest Trust, ⁴University of Florence, ⁵Erromed Pty Ltd & Head of Anaesthetics, Blue Mountains and Springwood Hospitals, NSW, Australia, ⁶Royal College of Surgeons Ireland, ⁷Irish Centre for Applied Patient Safety and Simulation (ICAPSS) University of Galway, ⁸Centre for Innovative Human Systems, Trinity College Dublin

Keywords: patient safety, HFE, historical review, future trends

Introduction

Patient safety is still considered one of the most important issues in healthcare today, although the problems that emerged during the pandemic have shifted media attention to the increasing difficulties for citizens in accessing healthcare

The recent concern about medical errors developed 26 years ago with the publication of the "To Err is Human" (IOM, 1999). Patient safety was perceived, albeit mistakenly, as a new issue, and, in some way, this perception has fluctuated over time.

Patient safety is rooted in the practice and theory of medicine from its origins, the Hippocratic principle: "primum non nocere" (first, not harm). The ethics and practice of every doctor should be based on this principle (Bagnara and Tartaglia 2007). Although cases of alleged malpractice (and sometimes severe punishments for the guilty) have been frequently reported over the centuries, awareness that

medical professional activity could harm patients was practically unknown until the 19th century.

Public awareness of patient safety began in the second half of the 20th century, when Ivan Illich (1974) strongly discussed the negative effects of medical practice. In his work, he highlighted the clinical, social, and cultural iatrogenic effects of medical practice. His views were instrumental in the shift from evidence-based medicine to a view of medicine based on patient safety and proved fundamental in improving public awareness of the likelihood of negative outcomes from healthcare.

In light of these considerations, the idea of organizing an International Conference on Healthcare Systems, Ergonomics, and Patient Safety (HEPS) was born, from the decision of the Tuscany Regional Government to create a patient safety center in Florence, which years later became a WHO collaborating center on communication and human factors in healthcare, with the mission to implement a clinical risk management system in every healthcare organization and hospital in Tuscany. In this context, human factors and ergonomics, a highly multidisciplinary science, represented the right way to establish connections between different areas of knowledge, increase synergies, and provide added value to quality improvement (Bagnara and Tartaglia, 2007).

The HEPS conference represented an opportunity to demonstrate that ergonomics is not only about physical workload but also about cognitive and organizational issues that can lead to many improvements in the quality and safety of care. It has now become a meeting of researchers and clinicians to explore the latest in HFE theory and methodology.

After about 20 years since the first HEPS Conference in Florence, we will take stock of the developments over these past 20 years with some of the key figures from back then. Unfortunately, two renowned researchers, Robert Wear and Richard Cook, will not be present. However, these sessions will provide an opportunity to honor the significant contributions they made to the development of human factors in healthcare. We will address the developments in ergonomics within

surgery and anesthesia, with references to the past, present and future, aware that the future is no longer what it once was.

Workshop: Embedding, Extending and Influencing the Application of Human Factors in Health Systems

Day & Time: Wednesday June 18th 09:50

Facilitators: Mr Ben Peachey,
Chartered Institute of Ergonomics &
Human Factors, England.

Prof. Ken Catchpole, Medical University
of South Carolina, Charleston, USA &
International Ergonomics Association
Healthcare Technical Committee

Workshop Keywords: theory of change, knowledge, relationships/partnerships, influencing, health system levels

Introduction

Interest in adopting Human factors expertise and principles has been growing within healthcare systems across the world. However, this remains inconsistent, with considerable confusion over what the profession can offer, and how it can be leveraged to improve care for patients and working conditions for workers. This workshop aims to gather and discuss the successful and unsuccessful approaches, focusing on the following:

1. Obtain consensus on the challenges of adopting and sustaining human factors work within healthcare systems
 - a. Discuss the key challenges and successes that participants have in their daily work
 - b. Share knowledge on where work and the relationships/partnerships that facilitate this work have been successful
 - c. Consider a variety of influences at different levels with healthcare systems
2. Refine the Theory of Change Model

- a. Present the current Chartered Institute theory of change model o focus on the interventions/activities that could help us achieve our short term and longer-term goals
 - b. Brainstorm some ideas and engage attendees in helping us carry out some of the activities
3. Discuss networking and sharing of important information
- a. Explore the available Return-on-Investment (RoI) information and how we might generate and gather a greater weight of RoI data.
 - b. Consider clinical evidence, publications, and other methods for communicating the benefits to patients and staff of human factors
 - c. Identify key organizations, interest groups, regulators, professional societies, the types of knowledge and information they might benefit from, and how they might be approached.

Proposed Key Learning/Take-Away Points

The key learnings will be a shared understanding of how to approach different groups with appropriate and substantive messaging related to the adoption and leverage of human factors expertise, approaches and techniques within healthcare systems. Attendees will leave with a greatly enriched idea of how they can be successful in influencing human factors in healthcare in their own everyday work.

Workshop: Human-Centred AI in Healthcare

Day & Time: Wednesday June 18th 14:20

Facilitators: Prof. Mark Sujan, Chair in Safety Science, Centre for Assuring Autonomy, University of York, York, England

Dr Stavros Prineas, Erromed Pty Ltd & Head of Anaesthetics, Blue Mountains and Springwood Hospitals, NSW, Australia

Dr Raquel Santos, Hospital da Luz Learning Health & Center for Interdisciplinary Research in Health – Universidade Católica Portuguesa

Ms Rachel Pool, National Patient Safety Team, NHS, England

Ms Jessica L. Handley, MedStar Health

Prof. Marie E. Ward, Irish Human Factors and Ergonomics Society & St James's Hospital, Ireland

Dr Kate Preston, Research Associate, Centre for Assuring Autonomy, University of York, York, England

Ms Angela Carrington, HSC Northern Ireland

Prof. Gyuchan Thomas Jun, Loughborough University, UK & The Chartered Institute of Ergonomics and Human Factors

Dr Brittany Anderson-Montoya, Lead Human Factors Specialist, Teladoc Health Inc

Mr Haotian Yi, Loughborough University

Workshop Keywords: SEIPS, human-centred AI, socio-technical, tools, integration

Introduction

Artificial Intelligence (AI) refers to machines (including software) that perform functions, that normally require human cognition, without direct human aid (WHO, 2021). This workshop will present a model and tools that can be used by health and social care professionals to integrate AI into clinical practice taking a Human

Factors Ergonomics socio-technical systems perspective using the SEIPS3.0 framework and based on a CIEHF white paper (Sujan et al., 2021) and guide for health and social care professionals (Ward et al., 2024).

Workshop Objectives

Adopting a HFE systems approach to AI involves considering the interaction of people, tools, technology, environment, organisation with AI as part of the wider health and social care system throughout all stages of the AI development and implementation. This workshop will explore what that means in practice for healthcare professionals and present them with a tool that could help with this.

Proposed Key Learning/Take-Away Points

Human-centred AI is about taking a systems perspective to the design and use of AI technologies. This type of systems analysis can help clinicians and those wishing to integrate AI into their systems to look beyond just the technical characteristics of the technology. This supports better design, which will contribute to better use, better experience and acceptability, and improved patient safety. Human-centred AI aims to ensure that the use of AI is aligned to human values.

References

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Workshop: Networks for Patient Safety

Day & Time: Thursday June 19th 09:50

Facilitators: Dr Jill Poots, Centre for Innovative Human Systems, Trinity College Dublin, Ireland & Evidence-based Quality Improvement and Patient Safety Research Network, Ireland

Ms Juanita Guidera, HSE Quality & Patient Safety, Ireland

Prof. Riccardo Tartaglia, Italian Network for Safety in Health Care, Università G. Marconi, Italy

Ms. Maureen Nolan, Representative from Patents for Patient Safety Ireland

Prof. Sam Cromie, Trinity College Dublin, Dublin, Ireland & Evidence-based Quality Improvement and Patient Safety Research Network, Ireland

Prof. Siobhan Corrigan, Trinity College Dublin, Dublin, Ireland & Evidence-based Quality Improvement and Patient Safety Research Network, Ireland

Dr Maureen Flynn, Health Service Executive, Ireland

Dr Stavros Prineas, Nepean and Blue Mountains Local Health District, Sydney, Australia

Dr Francesco Venneri, Italian Network for Safety in Healthcare, Italy & Centro GRC Regione Toscana, Italy

Workshop Keywords: EQUIPS, networks, collaboration, quality & patient safety, Italian Patient Safety Network

Introduction

Networks are a useful tool to tackle research and improvement challenges by bringing people together to pool resources, share knowledge, and foster innovation (Castaneda & Cuellar, 2020). A systematic review suggested health professional networks are a vector to improve healthcare quality and patient safety (QPS; Cunningham et al., 2012). There are many examples of successful and emerging networks in healthcare, such as the IEA Technical Committee for Healthcare, Italian Patient Safety Network, Evidence-Based Quality Improvement and Patient Safety (EQUIPS) Research Network in Ireland, and WHO Patients for Patient Safety. It has

been suggested that establishing common goals and responding to challenges are important in the success of networks. Therefore, this workshop aims to equip attendees with knowledge of how to make the most of existing networks, and assemble new networks to tackle QPS challenges they may encounter in their professional and personal lives.

Workshop objectives

1. Bring patients, academics, and healthcare staff together to share experiences and insights into how to build and sustain networks to advance quality and patient safety
2. Learn experientially about a networking tool to facilitate collaboration and address complex challenges
3. Facilitate meaningful networking in the HEPS2025 community which can be sustained beyond the conference

Proposed Key Learning/Takeaway Points

Participants will:

- have an opportunity to grow their own network by interacting in a meaningful way with the HEPS2025 community
- collaborate with others in the workshop to develop goals and action points to solve QPS challenges unique to them
- Experience and learn how to implement a specific networking tool (Open Space Technology) and identify others which they can apply to their own organisations.

References

Castaneda, D. I., & Cuellar, S. (2020). Knowledge sharing and innovation: A systematic review. *Knowledge and Process Management*, 27(3), 159–173.

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Workshop: Healthcare Safety and the Role of Regulation

Day & Time: Thursday June 19th 09:50

Facilitators: Mr Maurice O'Donnell,
National Patient Safety Office,
Department of Health, Ireland

Mr Sean Egan, Director of Healthcare
Regulation, the Health Information and
Quality Authority (HIQA), Ireland

Dr Daren Scully, Health Products
Regulatory Authority (HPRA), Ireland

Ms Maureen Nolan, Patients for Patient
Safety Ireland

Prof Marie Ward, Centre for Innovative
Human Systems Trinity College Dublin

Mr Patrick Egan, Enterprise and
Employee Supports, Health & Safety
Authority (HSA), Ireland

Ms Carolyn Donohoe, Nursing and
Midwifery Board of Ireland (NMBI)

Prof. Una Geary, Director of Quality and
Safety Improvement, St James'
Hospital, Ireland

Dr John Fitzsimons, Children's Health
Ireland and National Quality and
Patient Safety (HSE), Ireland

Workshop Keywords: regulation, patient safety, staff health, accreditation

Introduction

Taking a systems approach to patient safety means considering the whole ecosystem of healthcare which includes the role of regulation. Patient safety regulation has been defined as the processes engaged in by institutional actors that seek to shape, monitor, control or modify activities within healthcare organisations in order to reduce the risk of patients being harmed during their care (Oikonomou et al., 2019). The Lucian Leape Institute report (2013) stresses that workplace safety is inextricably linked to patient safety. According to their report unless caregivers are given the protection, respect, and support they need, they are more likely to make errors, fail to follow safe practices, and not work well in teams. Thus, regulation for healthcare professionals is important for patient safety. Human Factors Ergonomics (HFE) is concerned with the wellbeing of both patients and healthcare

professionals in healthcare and is uniquely positioned to be a lens through which both the safety of patients and healthcare professionals can be explored from a systems perspective.

Workshop objectives

This workshop aims to explore the role of regulation in both staff and patient safety and will seek to address some of the challenges raised in the WHO Global Patient Safety Plan (2021) including for example:

- What is the role of regulation in the safety of patients and healthcare professionals?
- Who are the regulators and how do they regulate for safety of patients and healthcare professionals?
- What is the relationship between protecting and promoting staff health and safety, and the delivery of safe healthcare services?
- What is the relationship between regulation and accreditation?
- What is the relationship between health service regulation and the professional bodies like NIMBI, CORU and MCI?
- How can healthcare regulation and accreditation activities be better aligned for the goal of improving patient safety?
- How can patient safety core competencies be part of regulatory requirements for healthcare professionals?
- How can regulation and accreditation requirements for patient safety involve the principles of and training on HFE?
- How can HFE design principles be used when developing and designing new regulation in healthcare?
- How can HFE support services in the implementation of recommendations from Regulation?
- How can HFE support the design of new standards, feedback systems for existing standards and regulation, and learning and improvement systems to support the implementation of recommendations from regulatory inspections.

References

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<https://www.who.int/teams/integrated-health-services/patient-safety/policy/global-patient-safety-action-plan>

Workshop: Safety Culture

Day & Time: Thursday June 19th 11:50

Facilitators: Prof. Mark Sujan, UK Health Services Safety Investigations Body and University of York

Mr Tiberius Pereira, Patients for Patient Safety Ireland (PFPSI)

Ms Lorraine Schwanberg, Assistant National Director Incident Management, Open Disclosure and NIMS, HSE

Mr JP Swaine, National Directorate for Culture, Risk and Public Involvement, HSE

Ms Margaret McGarry, National Quality and Patient Safety Directorate, HSE

Ms Loretta Jenkins, National Quality and Patient Safety Directorate, HSE

Dr John Fitzsimons, Children's Health Ireland and National Quality and Patient Safety (HSE)

Ms Margaret Stone, National Directorate for Culture, Risk and Public Involvement, HSE

Ms Eleanor Southgate, National Quality & Patient Safety – Incident Management and Open Disclosure, HSE

Prof. Marie Ward, Centre for Innovative Human Systems, TCD and St James's Hospital

Workshop Keywords: leadership, organisational culture, systemic nature of culture, safety culture

Overview

Patient Safety is an important public health, ethical, and economic issue needing significant research and improvement (Bienassis and Klazinga, 2022). High-profile incidents and reports in healthcare have revealed multiple systemic failures attributable to Safety Culture, including poor leadership, failure to risk assess, and breakdown of teamwork (Hughes, 2023). Safety Culture has become a key priority for safety improvement in healthcare and the WHO Global Patient Safety Action Plan emphasises the need to instil a strong safety culture into the design and delivery of healthcare to ensure a reduction in both patient and staff harm (WHO, 2021).

Workshop Objectives

The objectives of the workshop are:

- to define and explore what is Organisational Culture and Safety Culture and the relationship between Organisational and Safety Culture
- to explore the relationship between Organisational Culture, Safety Culture and patient and staff safety
- to understand what is Just culture, Restorative culture, what would these cultures
- look like in practice, what are the challenges to Just and Restorative culture
- to understand the difference between system level definitions of culture and how
- system level culture relates to an individual's feeling of psychological safety to speak up for safety
- to understand the influence of systems on culture and vice versa

Methods/Procedure

Each facilitator will give a brief overview of their role in promoting a culture of patient and staff safety. Following this the participants will be broken into groups to work on key question like those above. Each facilitator will facilitate a group.

Learnings from each group will be taken back to the full group for further discussion and refinement.

Proposed Key Learning/Take-Away Points

Participants will understand the systemic nature of culture, what is the role of culture in patient and staff safety, and what can HFE offer in terms of the role of culture in the safety of both healthcare professionals and patients.

References

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Workshop: Falling in love with ‘Wicked Problems’ – Utilising human centered design to address complex healthcare challenges

Day & Time: Thursday June 19th 14:20

Facilitators: Ms Lorraine Schwanberg, Mr Jared Gormley, Head of the HSE
Assistant National Director, QPSIM, NQPS, Spark Innovation Programme
HSE

Ms Catherine Hogan, Patient Safety Together Lead, QPSIM, NQPS, HSE Dr Eve Stanley, HSE Spark Innovation Fellow, SPR in Geriatric Medicine

Ms Carolina Skemas, Service and Interaction Designer, Design Innovation Lab, St. James's Hospital Dublin and HSE Spark Innovation Programme

Workshop Keywords: systems thinking, human centred design, service design, innovation

Overview

This workshop will be delivered as a collaboration between Patient Safety Together (PST) of the Quality Patient Safety & Incident Management (QPSIM) Team, National Quality and Patient Safety (NQPS) and the HSE SPARK Innovation Programme. The workshop will showcase how we work with a human-centred, service design approach grounded in empathy and the power of prototyping to co-design and co-develop with our services and patient/service user partners. The session will also be an opportunity for participants to engage with developing potential solutions utilising a service design lens through digital and group thinking tools.

Patient Safety Together sits within the Office of the Chief Clinical Officer and working with others identifies, co-develops and disseminates crucial patient safety learning across the HSE and its funded services. Resources include HSE National Patient Safety Alerts, Patient Safety Supplements, Safety Stories and a Patient Safety

Community. Learning is identified through incident data, research, international and national publications and engagement with local services.

The HSE Spark Innovation Programme is a frontline, staff-led initiative that seeks to support, promote and recognise innovation amongst healthcare staff. HSE Spark Innovation Programme is committed to implementing design principles and innovation methodologies to deliver better healthcare for all. The programme leverages the intrinsic motivation of frontline healthcare workers to become active agents of change. With the support of the programme, they successfully design, develop and deploy novel solutions to complex challenges for their patients, their colleagues and the health service at large.

Using examples from Irish healthcare we will showcase lived experiences of how our work is positively impacting those who both use and work in our health services. We will also outline the active project on Patient Safety Learning: Reaching the right people for action and what we have learned so far.

Workshop Objectives

1. To encourage participants to develop a deeper appreciation of understanding the healthcare problems they encounter and leave motivated to tackle them using a human centered design approach.
2. To highlight how Patient Safety Together and HSE Spark collaborate and engage with stakeholders using system learning and exploring the redesign approach. To share learning to date on the project Patient Safety Learning: Reaching the right people for action
3. To engage with workshop participants to explore the potential solutions identified and to garner experiences from other settings and professionals

References

1. [HSE Incident Management Framework](#)
2. [Patient Safety Together](#)

Workshop: Human Factors/Ergonomics in medication safety: from shared knowledge to coordinated action

Day & Time: Friday June 20th 09:50

Facilitators: Dr Denham Phipps,
University of Manchester, UK

Dr Tamasine Grimes, School of
Pharmacy, Trinity College Dublin,
Dublin, Ireland

Dr Carlos Aceves-Gonzalez, School of
Psychology, University of Derby, United
Kingdom

Dr Angela Caro-Rojas, International
Society of Pharmacovigilance

Prof. Gyuchan Thomas Jun, School of
Design and Creative Arts, Loughborough
University, United
Kingdom

Dr Adam Sutherland, School of
Pharmacy and Medical Sciences,
University of Bradford, United
Kingdom

Workshop Keywords: pharmaceutical, medicines management, HF/E
education, international

Introduction

Given the role that medication plays in healthcare delivery, the supply and use of medicines is a key concern of patient safety work.[1] The previous twenty years have seen much work by human factors specialists and healthcare professionals to understand the systems surrounding healthcare delivery, which comprise the various groups involved (such as the pharmaceutical industry, healthcare professionals and patients), their tasks, equipment, workspaces and organisational structures. However, there remains a challenge in translating the insights gained from human factors analysis into medication safety, due in part to the limited embedment of HF/E methods and expertise. There is a need for greater integration of HF/E in medicines management [2,3].

This workshop will develop the agenda that was set out in special sessions at two previous international HF/E events (HEPS 2022 and the 2025 IEA Triennial Congress).

It represents the continuing partnership between the IEA and the International Society of Pharmacovigilance (ISoP), which aims to address medication safety challenges through coordinated action aligning research, practice and policy.

Workshop objectives

The aim of this workshop is to further develop collaboration between the various groups of participants with an interest in medication safety (for example: HF/E researchers and practitioners; healthcare professionals and managers; patients; the pharmaceutical industry; patient safety advisors and regulators). While the agenda will be set in part by the delegates, some of the questions that we anticipate being explored are:

- How do we develop a common language and understanding between the different stakeholders in this topic?
- What can human factors offer to sustainably address medication safety challenges?
- How do we coordinate the delivery of HF/E education internationally?

Proposed Key Learning/Take-Away Points

Through their participation in the workshop, delegates will contribute to the development of a

comprehensive strategy for incorporating HF/E in medicines management, which will be taken forward by IEA and ISoP. They will also improve their own understanding of:

- The application of HF/E knowledge and methods to medication safety
- The needs and perspectives of the different stakeholders in medication safety

References

1. Donaldson LJ, et al. Medication without harm: WHO's Third Global Patient Safety Challenge. Lancet 2017;389:1680-1.
2. Chui MA, Holden RJ, Russ AL, Abraham O, Srinivas P, Stone JA, et al. Human factors in pharmacy. Proc Hum Factors Ergon Soc 2017;2017:666-70.

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Workshop: Leading for Human Factors

Day & Time: Friday June 20th 11:20

Facilitators: Dr Carsten Engel,
International Society for Quality in
Health Care

Prof. Paul Bowie, University of
Staffordshire, UK

John McElhinney; Quality, Risk and Safety
Manager, West-North West Regional
Health Authority, Ireland

Workshop Keywords: systems focus, design, resilience, after action
review, HFE capacity

Overview

With its 'systems focus' and 'design intent', the science of Human Factors & Ergonomics (HFE) is well-placed to contribute as a multi-disciplinary partner in making health services more accessible, equitable and environmentally sustainable - especially in an era of increasing complexity of patient care delivery mixed with continuous resource challenges. The three main sub-domains of HFE (physical, cognitive and macro ergonomics) prompt us to ask serious questions about how organisations can purchase products, reduce waste and energy consumption, and design services that are more inclusive, human-centred, safer and sustainable. However, building HFE capacity and capability amongst key workforce members, including educating national and international policymakers, is necessary

From a Resilient Health Care perspective, there is evidence for the key role of leaders in supporting adaptive capacity and resilient performance. However, there is a lack of tools and training in how to operationalise resilience capacities and understanding in practice. This workshop will focus on how tools can support resilience and enable reflexive spaces to leverage resilience into practice.

From a national policy and service delivery perspective, how do we [in Ireland] best translate the emerging HFE research into practice that motivates and benefits the workforce, as well as the quality and safety of patient care?

The After Action Review can be used to identify the impact of Human Factors on clinical decision-making in safety-critical situations.

After Action Review (AAR) is a structured process which aims to identify opportunities for learning from events or incidents. The AAR process incorporates four questions to ascertain what staff expected would happen, what actually happened, why there was a difference between expected and actual and what can be learned from the event. The outcome of the AAR allows those involved in the event to understand what went well and why, what didn't go well and why.

The AAR process has been used to focus on the contribution of human factors in the context of serious patient safety incidents. Those involved in the incidents are invited to participate in an AAR within two weeks of the event with the focus on identifying learning opportunities in a psychologically safe setting. The facilitated discussion examines the context of the incident and how the events unfolded with a particular focus on situational awareness, environment, decision making and interdisciplinary communication. A summary report is provided to all participants with an invitation to complete a short online Introduction to Human Factors. Participants are also offered the opportunity to attend a more focused two-hour workshop where issues such as the role of bias, heuristics and cognitive load are explored.

Workshop Objectives/Questions

1. Building HFE workforce capacity and capability in healthcare quickly and at low cost: by whom and how?
2. Demonstrate learning tool/discuss how tools can be used to create reflexive spaces between leaders and the workforce.

Proposed Key Learning/Take-Away Points:

1. To support increased equity, access and sustainability in healthcare for all, a pre-requisite will be to build HFE competence amongst key workforce members, including national leaders.

References

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4. Haraldseid-Driftland C, Bø Lyng H, Guise V, Valen Wæhle H, Schibevaag L, Dombestein H, Ree E, Fagerdal B, Billett S, & Wiig S. (2024). Designing a learning tool for translating resilience in healthcare into practice: A qualitative mixed methods study, *Applied Ergonomics*, Volume 119, 2024, 104314. <https://doi.org/10.1016/j.apergo.2024.104314>

Workshop: Human Factors and Translation Simulation: Misunderstandings and Missed Opportunities

Day & Time: Friday June 20th 14:20

Facilitators: Prof. Dara Byrne HSE
National Simulation Office, Ireland

Prof. Paul O'Connor, ICAPSS, University
of Galway, Ireland

Workshop Keywords: human error, non-technical skills, patient safety, quality of care, translational simulation

Introduction

Within the healthcare simulation community, human factors is often equated with or used as a synonym for (i) human error or (ii) non-technical skills such as communication or teamwork. These misunderstandings limit the potential for human factors to impact patient safety and quality of care (1). Collaboration between human factors professionals and those engaged in translation simulation offers great potential for improving patient safety and quality of care and the working lives of healthcare professionals.

Workshop Objectives

On completion of this workshop the participants will:

- understand common misunderstandings about the meaning of human factors in healthcare and why this is detrimental;
- be able to define the meaning of translational simulation; and
- demonstrate how human factors approaches can support translational simulation.

Take-away Points

Simulation is an under-utilised approach to identifying and mitigating human factors issues in healthcare. There is a great opportunity for human factors

practitioners and simulationists to collaborate in developing and delivering impactful translational research and quality improvement projects.

References

O'Connor, P, O'Dea, A. When I say... nontechnical skills. Medical Education, 2024, 58(12), 1439-1441.

1 Competencies & Education for Human Factors Ergonomics (HFE)

Theme Keywords: safety culture, medication safety, competency frameworks, integrating HF/E

Rationale and Objective

Developing competencies in Human Factors Ergonomics (HFE) is critical for embedding safety, quality, and systems thinking into healthcare practice. The abstracts submitted demonstrate a growing commitment to integrating HFE into curricula, competency frameworks, and professional training, from undergraduate to specialist levels. They highlight innovative educational approaches such as immersive simulation, co-design processes, interprofessional learning, and national-level frameworks to build capability. Recognising that education is foundational to sustainable change, these contributions emphasise the need to develop not only technical skills but also cultural, teamwork, and resilience competencies among healthcare workers.

Content

- 1.1 Understanding Human Error: A Study on Workplace Accidents and Safety Culture
- 1.2 How can we make it better? – Embedding medication safety into a healthcare curricula through integration and interprofessional immersive experiences
- 1.3 Co-designing human factors competencies as part of a national quality and patient safety competency framework: An Irish case study
- 1.4 A National Competency Framework for Human Factors Skills in Surgery
- 1.5 Bridging the Gap – A retrospective analysis evaluating gender performance in Human Factors assessments in Irish Surgical Training.
- 1.6 Integrating Human Factors, Patient Safety and Quality Improvement Education
- 1.7 "Integrating Human Factors and Ergonomics (HFE) in Healthcare: A Primer for Academics, Educators and Learners"
- 1.8 Human Factors Multidisciplinary Workshop – A Participatory Research Study
- 1.9 Delivering a National Patient Safety Specialists Training Programme
- 1.10 Human Factors Education in Switzerland: A Landscape of Diversity and Growth

1.1 Understanding Human Error: A Study on Workplace Accidents and Safety Culture

Authors: Mr Hugo Jesus¹, Dr Rui Azevedo², Dr Celina Leão³, Dr Susana Costa³

Affiliations: ¹Faculdade De Engenharia Da Universidade Do Porto, ²NECE: Research Center for Business Sciences, UBI, Covilhã, Portugal, ³Centro ALGORITMI, University of Minho, School of Engineering, Braga, Portugal

Keywords: human error, safety culture, workplace accidents, risk perception, investigations

Introduction

Organizations have long sought to understand how to prevent workplace accidents to achieve expected levels of absenteeism reduction. A systemic perspective was adopted to comprehend the causes of accidents, considering the multiplicity of factors: human, workplace-related, organizational, and managerial. Workplace accidents arise from the combination of risks present and employees' behavior. Human reliability is defined as the probability of a person not failing to perform tasks within a certain period, under appropriate environmental conditions, and with available resources. This study aimed to understand the determinants of human error underlying accidents.

Methods

A data collection tool called “Contributions to the Transition to Industry 5.0” was developed to create a database for analyzing workplace accidents in 2022 related to human error, allowing the definition of strategies to enhance safety practices and reduce the incidence of accidents. Research questions were formulated to guide the development of an information collection tool among employees.

Results and Discussion

Results revealed a low-risk perception associated with dangerous practices. Organizations should provide comprehensive training on safety procedures and protocols to minimize the risk of human error, emphasizing the importance of consistent adherence. Employee participation and company orientation towards

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the study objective were highlighted, clarifying doubts and enhancing understanding of human failure dimensions in accident investigations.

1.2 How can we make it better? – Embedding medication safety into a healthcare curricula through integration and interprofessional immersive experiences

Author: Prof. Sharon Haughey¹, Mr Matthew Wilson², Ms Maria McConnell³, Dr Billiejoan Rice⁴, Dr Rick Plumb⁵, Dr Dan Corbett¹, Ms Angela Carrington⁶

Affiliations: ¹School of Pharmacy, Queen's University Belfast, ²South Eastern Trust, ³Southern Trust, ⁴School of Nursing and Midwifery QUB, ⁵School of Medicine, Dentistry and Biomedical Sciences QUB, ⁶Health and Social Care

Keywords: medication safety, interprofessional education, immersive learning, SEIPS, human factors

Introduction

Interprofessional medicines safety education has been delivered by multidisciplinary teams within Queen's University Belfast (QUB) for 15 years. The opening of the KN Cheung SK Chin InterSim Centre in QUB has facilitated the provision of authentic interprofessional (IP) simulation-based training, enabling effective medicines safety teaching. The Department of Health's 'Transforming Medication Safety in Northern Ireland'¹ acknowledges the need for human factors training within multidisciplinary programmes. As an IP team, we harnessed the opportunity to use InterSim's immersive technology coupled with the SEIPS² (Safety Engineering Initiative for Patient Safety) approach to medicines safety to facilitate learning. This also presented an opportunity to extend Human Factors training into years 1-3 of the new QUB MPharm.

Method

A patient representative, educators, practitioners, and the Trusts' Medication Safety Team co-authored and recorded an immersive scenario for a patient with sepsis with 360° video and audio capture. The scenario follows a patient through the complexities of clinical practice involving a medication safety incident. The immersive recordings and props from the scenarios were used in IP workshops such that students could analyse the events, using the SEIPS model. Through the workshop students would be able to:

- Engage with peers through an immersive medicines safety scenario

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- Take a systems analysis approach
- Recognise error producing conditions/error forming contexts
- Identify barriers/controls to reduce medication errors from occurring

A formal teaching evaluation was employed following the workshop to gather students' perceptions of the teaching approach.

Results

Feedback was obtained from 26 students (8 nursing and 18 pharmacy students). All students agreed (n=26) that the immersive videos and props were helpful and that the workshop was easy to follow. Over 95% (n=25) indicated that the learning outcomes had been met. In the free response comments, students recognised the importance of team communication and a systems-based approach to medicines safety, such as SEIPS.

Discussion

This innovative approach to IP medicines safety has received a positive response from students. It allows us to introduce full cohorts of students to key concepts in medicines safety. Following the introduction of a newly-structured MPharm degree at QUB for the 2023/24 academic year, we have taken the opportunity to scaffold MPharm students' understanding of Human Factors from Year 1, where interactive workshops led by members of the Trusts' Medication Safety Team on medicines safety have been delivered, which focus on understanding 'risk' and 'systems thinking'. In Year 2 we co-designed content around safety culture discussion and incident reporting. In Year 3 we introduced a uniprofessional workshop led by the Trusts' Medication Safety Team which used SEIPS to consider safety and systems issues from practice. Overall, our approach has received a positive response and provides a scaffolded, IP approach that could be replicated elsewhere.

References

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1.3 Co-designing human factors competencies as part of a national quality and patient safety competency framework: An Irish case study

Author: Dr Aoife De Brun¹, Dr Louise Hendrick⁸

Affiliations: ¹UCD IRIS Centre, UCD School of Nursing, Midwifery and Health Systems, University College Dublin, ²Health Service Executive, Dublin, Ireland, ³UCD IRIS Centre, UCD School of Nursing, Midwifery and Health Systems, University College Dublin, ⁴Health Service Executive, Dublin, Ireland, ⁵Health Service Executive, Dublin, Ireland, ⁶Health Service Executive, Dublin, Ireland, ⁷Health Service Executive, Dublin, Ireland and Children's Health Ireland, Dublin, ⁸National Quality and Patient Safety Directorate

Keywords: co-design, competency framework, human factors, patient safety, systems thinking

Introduction

As part of a project to develop a national quality and patient safety (QPS) competency framework for Ireland, a co-design approach was adopted to collaboratively develop a set of competencies for staff working across the healthcare system, patient partners and students to promote enhanced knowledge and skills in providing quality, safe care. While quality and patient safety is an implicit part of most healthcare programmes, there is no consensus or explicit agreement regarding the competencies that are relevant to all staff to support quality and patient safety. An evidence-based co-design approach was conducted and involved the identification, development and refinement of competencies related to many essential QPS topics, including human factors/ergonomics, communication, teaming and systems. This presentation will focus on the development process behind these competencies and how they were informed by the literature. It will also share insights into the discussions during co-design, and challenges related to introducing human factors/ergonomics and developing competencies aimed at various professional levels and groups in the health system.

Methods

Co-design decisions benefit from the perspectives of both service providers and users, making co-design a crucial approach in improving the relevance of outputs and system processes [1]. A co-design approach demands collaboration and promotes co-ownership of the task. A core value underpinning this work was ensuring broad representation across those who work in or use the health system. A co-design panel of 88 members was formed, comprising key national stakeholders in healthcare, quality and patient safety, human factors, health education, patients, carers, advocates, and policymakers. A literature review collated competencies developed in other jurisdictions and informed co-design workshop discussions. Three in-person workshops were held, and sub-groups were established with relevant experts/interested members to focus on key aspects of quality and patient safety. A series of online group co-design sessions were held among each sub-group to finalise the content for each topic area.

Results

A competency framework, the 'Quality and Patient Safety Competency Navigator', has been developed comprising 6 topic areas, one of which is 'Communication, Teaming and Systems'. This topic area introduces the concept of human factors/ergonomics and articulates relevant competencies aimed at various levels, based on how an individual defines their role in the healthcare system. The framework signposts resources, including practical examples, relevant to developing further learning and skills on the topic. Our presentation will share examples of the outputs from this work relevant to human factors/ergonomics.

Discussion

Co-design was an appropriate and highly valuable technique to engage subject matter experts and experts by experience in the process of determining the appropriate competencies relevant to quality and patient safety. Human factors/ergonomics emerged as a key component of the larger framework. We hope that by making competencies related to human factors/ergonomics explicit, this can introduce and embed human factors approaches and systems perspectives in quality and safety in healthcare. It is anticipated that this framework will inform undergraduate and post-graduate teaching, and direct staff, students and patients to resources to help them develop their knowledge, skills and behaviours on this topic.

1.4 A National Competency Framework for Human Factors Skills in Surgery

Author: Dr Dara O'Keeffe¹, Dr Angela O'Dea^{1,2}, Prof Gozie Offiah¹; Dr Emily O'Dowd¹, Dr Fardod O'Kelly¹, Prof Oscar Traynor¹, Prof. Eva Doherty¹

Affiliations: ¹RCSI, Dublin, ²Irish Centre for Applied Patient Safety and Simulation, University of Galway, Galway

Keywords: surgery training, human factors, non-technical skills, competency framework, safety management

Introduction

Competency-based training (CBT) in surgery is an educational approach that focuses on the achievement of specific competencies or skills rather than the traditional Halstedian duration-based model. Jurisdictions worldwide are moving towards CBT and are looking to define the competencies that will need to be assessed to ensure proficiency. Technical and clinical skills are the mainstay of defined competencies, with non-technical skills (NTS) playing a more minor role. A growing body of evidence outlines the importance of non-technical skills or Human Factors as the defining factor in moving from mere technical competence to surgical excellence.

Methods

Drawing on our experience of almost two decades delivering and assessing an interdisciplinary, postgraduate, longitudinal programme in professionalism and interpersonal skills, we have developed a comprehensive non-technical skills competency framework. We have analysed existing international competencies for healthcare professionals across a range of disciplines and, using a mixed methods iterative consensus building process, amalgamated these with our surgery specific NTS framework.

Results

Our framework outlines eight distinct domains with multiple competencies in each of the following; Attitudes, Behaviours and Performance; Cognition and Problem-

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solving; Professionalism; Safety Management Systems; Communication; Teamwork; Leadership and Error in Healthcare.

Discussion

Training and assessing non-technical skills and Human Factors helps equip surgical trainees with the knowledge, skills and attitudes necessary to respond to the increasingly challenging demands of providing safe and effective healthcare in the 21st century. This competency framework will allow surgical training programmes to define the required competencies in this area to help surgeons in training achieve surgical excellence.

1.5 Bridging the Gap – A retrospective analysis evaluating gender performance in Human Factors assessments in Irish Surgical Training.

Author: Dr Dara O'Keeffe, Dr Maria O'Sullivan, Prof. Kathleen Bennett, Prof. Eva Doherty

Affiliation: RCSI, Dublin

Keywords: gender equity, surgical training, human factors, non-technical skills, assessment

Introduction

Gender disparities in surgical skills and outcomes have gained increasing attention highlighting the need for promoting equity in surgical education. A recent study examining patient outcomes in over one million patients showed female surgeons had superior results (Wallis et al., 2023).

Recognising the gender differences within surgical practice can inform the development of more effective and inclusive surgical training programmes. Since 2005 The Royal College of Surgeons in Ireland (RCSI) has delivered a mandatory program of instruction in Human Factors to all surgical trainees. These skills, encompassing communication, situational awareness, decision-making, teamwork, and leadership, are crucial for minimizing clinical errors and increasing patient safety. Poor performance of these skills has been shown to contribute to more clinical errors than any other cause (Allard et al., 2020).

Technical skills and non-technical skills are examined through objective structured clinical examinations (OSCE) in RCSI and these provide a standardised method to evaluate operative surgical skills (OSS) and human factors (HF). This study aimed to delineate the gender differences in Human Factors examined by RCSI over a ten year period.

Methods

This study retrospectively analysed data collected from Surgical Training HF assessments administered by RCSI from 2013 to 2023. The dataset comprises assessment records from 383 CST trainees. Each observation corresponds to a single trainee's performance in an OSCE assessment.

All statistical analyses were performed using Stata/SE version 18.0 (StataCorp LLC, College Station, TX). Specifically, the Human Factors assessments were analysed using a Mixed-effects ML (Maximum Likelihood) regression model. All regression models report 95% confidence intervals (CIs) for the estimated coefficients.

Results

The total number of Human Factors assessments included in this study is 553.

- Gender: The coefficient of 0.0867 with a p-value of 0.844 suggests that the effect of gender is not statistically significant in this model.
- Intake year: Coefficients for the intake year are reported for each year from 2013 to 2023. Notably, the year 2022 has a statistically significant coefficient ($p = 0.008$), indicating a meaningful difference compared to the base year.
- Wald $\chi^2(11) = 57.16$: This tests the overall significance of the model. Log likelihood = -1657.7647.

Discussion

These findings contribute to the ongoing discourse surrounding gender equity in surgical education, suggesting that the existing training framework effectively assesses NTS regardless of gender. Moreover, given the critical role of Human Factors training in enhancing patient safety and reducing clinical errors, these results reinforce the importance of equitable training practices. As deficiencies in Human Factors are linked to increased medical errors and adverse outcomes, investing in comprehensive Human Factors training remains essential for improving both trainee performance and patient care outcomes.

References

Wallis, C. J. D., Marzouk, S., and et al. (2023). The impact of surgeon gender on patient outcomes: A population-based study of over one million patients. *Surgical Endoscopy*. Advance online publication.

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1.6 Integrating Human Factors, Patient Safety and Quality Improvement Education

Author: Dr John Brennan, Ms Rachel MacDonell, Ms Victoria Taylor, Dr Peter Lachman, Dr John Fitzsimons

Affiliation: Royal College of Physicians Of Ireland

Keywords: quality improvement, patient safety, systems thinking, interdisciplinary education, leadership development

Introduction

RCPI Quality Improvement (QI) develops and delivers a range of educational supports for interdisciplinary healthcare professionals to improve quality and safety for patients. Curricula, educational content and teaching are codesigned by clinicians, patients and others with expertise from a variety of professional backgrounds to enable improvement for individuals and teams across all care settings. Human factors principles and science are integrated within core content for postgraduate medical training, training programmes in QI and patient safety and through collaborative programmes that address key quality priorities. RCPI aims to build QI, patient safety and leadership capacity so that everyone working in healthcare can apply QI approaches effectively to improve care in their setting.

Human factors principles and systems thinking are embedded throughout RCPI QI and patient safety programmes. RCPI QI and patient safety education is delivered through a combination of online and in-person learning. Learning occurs through engagement with both synchronous and asynchronous content, for individuals and multidisciplinary teams. Education is designed using adult learning principles and aims to achieve culture and practice change. Learners are supported through Brightspace, RCPI's online interactive learning environment, hosting online learning tools, key resources, assignment submission and feedback and discussion networks. The RCPI Postgraduate Certificate in Quality Improvement Leadership in Healthcare is accredited by Quality and Qualifications Ireland (QQI).

For participants, patient safety science, practice and culture are framed through 3 paradigms:

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- 'Find and fix to prevent failure': understand active and latent failures, systems, processes and relationships
- Manage risk and reliability': understand and predict risks in the system while seeking high reliability
- Promote success': understand complex adaptive systems and the achievement of patient safety

Participants are equipped with core human factors (SEIPS), patient safety and quality improvement theories and tools. Leadership development is facilitated through Emotional Quotient Inventory (EQi) assessment and reflective learning. Participants are supported to develop skills in generating real world improvements in quality and patient safety in their unique contexts through the applications of human factors, quality improvement and leadership approaches.

From 2018 to 2023, QI and leadership courses were conducted with more than 1000 learners from across the Irish Healthcare system.

Learner numbers (enrolled 2018-2023):

- Postgraduate Certificate in Quality Improvement in Healthcare – 334
- QI in Action – >200
- Scholar in Residence – 31
- Situation Awareness for Everyone – >90 teams
- Certificate in Essential Leadership for New Consultants – 126
- Fundamentals of Quality Improvement (online) – 105
- Patient Safety (online) – 57
- Community Healthcare Organisation QI Collaborative – 22
- Embedding Quality Improvement Programme – 43
- National Stroke Collaborative – 66
- National Chronic Obstructive Pulmonary Disease Collaborative – 101

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Patient safety and other quality improvement project examples will be included.

RCPI QI designs and delivers a range of educational offerings to further the improvement of healthcare quality and patient safety. This education frames a broad view and contextualisation of 3 patient safety paradigms, with human factors principles embedded. Healthcare quality improvement is realised through learning and applying human factors thinking with leadership and QI methods.

1.7 "Integrating Human Factors and Ergonomics (HFE) in Healthcare: A Primer for Academics, Educators and Learners"

Author: Prof. Paul Bowie

Affiliation: NHS Education For Scotland, Glasgow, Scotland

Keywords: human factors, foundational principles, healthcare education, competency frameworks, interdisciplinary learning

Introduction

Despite strong interest in Human Factors and Ergonomics (HFE) amongst healthcare regulators, professional bodies, policymakers and the educational community, the purpose and approach of discipline is frequently misunderstood and mistranslated (1-4). This preliminary primer creates a unified resource for academics, educators, learners and multidisciplinary teams in healthcare services and the university sector on the role of HFE in educational provision and care delivery. We highlight 10 foundational HFE principles for educators and learners. These provide the broader context and aid a more informed understanding of the subject matter. To increase utility, this primer is also accompanied by guidance that signposts educators and learners to practical and freely accessible resources that have been aligned to various professional competency frameworks to help learners and supervisors meet related obligations by adopting a Human Factors lens e.g. GMC Generic Professional Capabilities Framework.

Methods

A pragmatic modified-Delphi method was used. 12 clinical educators and human factors specialists identified key foundational HFE concepts and related educational materials and aligned these with professional capability frameworks eg for medicine, dentistry and nursing and midwifery.

Results

10 key learning points were agreed that can enhance understanding of HFE principles and their applicability in healthcare:

1. Healthcare has been slow to adequately understand and embrace the benefits of HFE science and practice.
2. 'Human Factors' does not refer to the failures of people in health and social care.
3. Many different disciplines make important contributions to improving human work in healthcare e.g. clinical risk, health & safety, and quality improvement. So, what is different about Human Factors?
4. 'Human Factors' is also known as 'Ergonomics' in most of the world – they are viewed as the same discipline by the profession.
5. Human Factors is often promoted as a means of eliminating 'human error' – but this is impossible in most circumstances, particularly in highly complex and dynamic care systems, and is largely a futile endeavour.
6. Human Factors as a discipline is often conflated with approaches such as team working initiatives, non-technical skills training, crew resource management, simulation education, mindfulness and attempts to change human behaviour in general.
7. Human Factors is not just about improving patient or service user safety.
8. Human Factors is often misinterpreted in healthcare as being about 'factors of the human'.
9. Much of what is published about HFE in healthcare – e.g. training curricula, policy documents, educational guidance and research studies – often misunderstands, mistranslates and misapplies the purpose, approach and benefits of the science and should be treated with caution
10. Health and social care education cannot be separated from the context in which it is delivered.

Conclusion

This resource provides key insights into the science and practice of HFE for healthcare education and practice. It outlines examples of foundational principles and approaches for improving patient and service user safety, workforce wellbeing and overall system performance. Importantly it addresses the significant learning need and problematic issue in healthcare of what HFE is and what it is not.

1.8 Human Factors Multidisciplinary Workshop – A Participatory Research Study

Author: Ms Patricia Sheehan¹, Dr Aislinn Joy², Dr Helen Vosper³, Ms Angela Carrington⁴, Dr Aoife Fleming¹, Dr Suzanne McCarthy¹

Affiliations: ¹School of Pharmacy, University College Cork, ²School of Medicine, University College Cork, ³University of Aberdeen, ⁴HSC Northern Ireland

Keywords: participatory design, interprofessional education, SEIPS, patient safety, co-design

Introduction

Research has identified gaps as well as opportunities relating to Patient Safety(PS) and Human Factors(HF) education in undergraduate healthcare curricula^{1,2}.

There is a current lack of explicit PS education in undergraduate healthcare curricula with little identifiable HF content¹. There is a lack of shared understanding around what constitutes HF^{1,3}, and its applications in terms of PS. Where HF-related teaching occurs, the focus is typically on non-technical skills rather than the full systems scope of HF^{1,2}. There is a lack of robust tools and frameworks underpinning existing PS content¹. Much PS learning is considered to happen within the clinical environment with mentors within this setting representing key influencers of PS learning³. Interprofessional education (IPE) has been identified as a valuable platform with significant potential for PS teaching³.

This study aims to address gaps and build on identified opportunities towards developing a multidisciplinary HF PS curriculum. This study has received ethical approval from the UCC Social and Research Ethics Committee (Ref 2024-183).

Methods

This study uses workshop-based participatory research as part of a co-design approach towards developing a multidisciplinary HF PS curriculum. An interprofessional educational session will be used, which will comprise the following components:

❖ Competencies & Education for Human Factors Ergonomics (HFE)

1. Introductory presentation on the topic of HF
2. HF Workshop – participants work in groups to assess sample case study using a HF framework (SEIPS framework)
3. Outputs of the workshop will form part of the study data set.
3. World Café: Facilitated semi-structured post-workshop discussion using World Café methodology. Outputs to contribute to development of a multidisciplinary HF PS curriculum.

Multidisciplinary participation in the HF Workshop and World Café to be sought from the following groups:

- Faculty and undergraduate senior cycle students of healthcare disciplines at an Irish university
- Practicing healthcare professionals (e.g. pharmacists, nurses, doctors)
- Quality and safety professional (e.g. Quality and Safety Advisor)
- Patient representative

Results

Study design includes delivery of a PS/HF participatory interprofessional workshop which is underpinned by a sociotechnical systems framework (SEIPS). Outputs of the HF workshop will be included in the study dataset. Semi-structured post-workshop discussions are designed to obtain feedback on participant experiences of the workshop, both positive and negative. Participant views and ideas on incorporating HF training as part of PS education will be explored, recorded and will form part of the session outputs. These outputs will contribute as part of a co-design approach to developing a multidisciplinary HF PS curriculum.

Discussion

This study aims to address gaps and build on identified opportunities towards developing a multidisciplinary HF PS curriculum. Workshop design is underpinned by the SEIPS model, which provides a HF systems approach. Study design includes use of an IPE session. Interprofessional participation from a mix of healthcare disciplines as well as patient involvement will be sought. Data generated from this co-design approach will be used to inform future PS/HF educational initiatives.

1.9 Delivering a National Patient Safety Specialists Training Programme

Author: Prof. Mike Fray, Prof. Gyuchan Thomas Jun

Affiliation: Loughborough University

Keywords: blended learning, human factors education, systems thinking, safety culture, NHS training

Introduction

Aim: To review the delivery of a National Training Contract to NHS England to provide competencies for 800 Patient Safety Specialists.

Overview

NHS England have a strong focus on improving patient safety across its delivery (Patient Safety Strategy 2019). To support that strategy a 5 level education process was created (Patient Safety Syllabus, 2021). This project was to deliver a blended learning academic programme to 800 individuals across NHS England. Each of the participants was named, nominated and supported by their organisation as someone with a specific Patient Safety Specialist job title. The educational project was based on the Patient Safety Syllabus (2021) and was designed and delivered by the HF faculty from Loughborough University. The syllabus content covered a range of competencies that support knowledge and application across four pillars:

- Human Factors
- Systems Thinking
- Risk Management
- Safety Culture

The comprehensive syllabus (189 learning outcomes) was delivered in a blended style in 5 courses:

- A. Unpacking systems issues
- B. Managing patient safety risks

- C. Understanding cultural, legal and regulatory factors
- D. Involving those affected
- E. Designing solutions

Each student was required to complete the 5 online courses, attend 5 in-person study days and submit 5 case studies to show application of the tools and learning for each course.

Methods

This paper will report the effects reported through various data collection methods adopted to gain participant engagement, involvement and reviews of their learning and assessment experience. The training and assessment is completed on 31st January 2025. The information and analysis will include the following collected from participant feedback across the 18 month project (Sept 2023-March 2025):

- Completion rates with reasons.
- Assessment reporting and skills/tools included.
- Self-reported competencies pre- and post- learning comparisons
- Reflections on the human factors and safety science approaches to support patient safety.
- Self reported judgement's of confidence in PSS role
- Relevance and importance of learning materials.

A follow up survey was completed with all the completing after all assessments were completed which explored the ongoing requirements for support, further training and the possibility of higher qualifications, certification for HFE.

Discussion

This project is ongoing and a new cohort will be underway by the time of the conference. The success of the programme has created a significant step change in the awareness of HFE and safety science methods. This can only assist in the development of both the skills of patient safety specialists in NHSE and the recognition of HFE to support this role. Our understanding is that this kind of

❖ Competencies & Education for Human Factors Ergonomics (HFE)

comprehensive training programme has not been created previously. The reported success of this first cohort (n=800) indicates its success and might start an international roll out of HFE in patient safety learning.

1.10 Human Factors Education in Switzerland: A Landscape of Diversity and Growth

Author: Dr Thomas Stuedeli

Affiliations: F. Hoffmann–La Roche Ltd, Basel, Switzerland

Keywords: human factors education, Switzerland, professionalisation, certification, curriculum development

Introduction

This paper examines the landscape of Human Factors (HF) education in Switzerland, exploring its evolution, current state and future directions. The development of HF education is analysed in the context of professionalisation, certification and the changing demands of the Swiss working environment.

The role of the Swiss Association for Ergonomics (SwissErgo) has been central to the development of HF education and professionalisation over the past 35 years. The organisation's tiered membership structure, which includes Certified, Ordinary and Associate members, reflects a commitment to establishing clear pathways for professional development. The association with CREE for Eur.Erg. certification provides a recognised standard of competence, assuring employers and clients of the qualifications of HF professionals. The emphasis on a code of ethics further strengthens the professional standing of certified individuals, highlighting their commitment to ethical practice in research, design, evaluation and consultancy.

A key issue that emerges is the integration of HF expertise into the Swiss "ASA system" for occupational health and safety. Questions about the recognition of HF specialists within this system and the definition of the necessary competencies point to the growing demand for HF expertise in addressing OSH issues. This focus highlights the practical application of HF principles in real-world settings, particularly in areas such as manual handling and repetitive tasks, as reflected in the guidelines of the Federal Coordination Commission for Occupational Safety (FCOS).

A survey of Swiss teaching and research institutions reveals a diverse landscape of HF education and related disciplines. While all Swiss universities and universities of applied sciences offer basic training in HF and related fields, the survey aims to capture the breadth and depth of training in HF and related disciplines.

The interim results of the survey suggest a growing "HFE diversity index" in Switzerland, indicating the richness and variety of approaches to HF education and research.

The self-perception of education and research institutions emphasises key HF principles. A systems approach, the importance of design and a balanced focus between well-being and performance are consistently emphasised. These principles are in line with the IEA definition of Human Factors and Ergonomics, which emphasises the understanding of interactions between humans and other system elements to optimise human well-being and overall system performance. The influence of the CREE philosophy, with its emphasis on a broad education encompassing human cognition, psychology, physiology, anthropometrics and biomechanics, is also evident.

In conclusion, HF education in Switzerland is evolving rapidly, driven by professionalisation efforts, growing demand from industry and regulatory bodies, and a rich landscape of academic research and teaching. SwissErgo plays an important role in establishing professional standards, promoting ethical practice and fostering collaboration among HF professionals. The increasing integration of HF expertise into the Swiss ASA system demonstrates the practical value of HF principles in addressing real-world workplace challenges. The ongoing survey of teaching and research institutions promises to provide a comprehensive picture of the diversity and strengths of HF education in Switzerland, paving the way for future developments in this dynamic field.

2 Complementarity between HFE and other change and improvement methodologies in healthcare

Theme Keywords: SEIPS, participatory design, ethnography, system modeling, patient-centred innovation

Rationale and Objective

Healthcare improvement increasingly requires the blending of disciplines, and HFE offers complementary strengths to established change models. The abstracts in this theme illustrate how frameworks like SEIPS, participatory design, ethnography, and system modeling can enhance quality improvement, implementation science, and patient-centered innovation. By showcasing examples where HFE augments traditional improvement approaches, contributors reinforce the need for integrated methods to manage the complexity of healthcare systems and support more robust, sustainable outcomes.

Content

- 2.1 SEIPS, two ways: Applying the SEIPS framework in combination with other improvement methodologies in two contrasting Healthcare settings
- 2.2 Ergonomics and Inclusive Service Design to address the care needs of older patients with Multiple Long-Term Conditions
- 2.3 Recruiting participants to a focused ethnography study in the home of people living with type 2 diabetes: a critical reflection
- 2.4 Implementation and Improvement of the Major Haemorrhage Protocol for Bleeding Trauma Patients in a Major Trauma Centre
- 2.5 Delft Design Lab Health Journeys: Shaping the Future of Healthcare Through Co-Creation and Human-Centered Design
- 2.6 Enhancing healthcare-associated infection prevention through a multicomponent intervention based on human factors
- 2.7 Development and Evaluation of an Electronic Tool for the Key Indicator Method

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2.1 SEIPS, two ways: Applying the SEIPS framework in combination with other improvement methodologies in two contrasting Healthcare settings

Author: Ms Gill Smith¹, Dr Jill Poots²

Affiliations: ¹Kaizen Kata, ²Trinity College Dublin

Keywords: Patient Safety, Quality Improvement, Systems Engineering

Introduction

Sub-optimal work systems are a major contributor to inefficiencies, errors and patient safety incidents. A human-centred design approach can be deployed to improve the structures, processes and outcomes of healthcare systems. The Systems Engineering and Patient Safety (SEIPS)¹ model provides a practical framework for such an approach. SEIPS is a flexible tool which can be integrated with, and supports the use of other improvement methodologies. This presentation highlights two contrasting applications of SEIPS: an Intensive Care Unit (ICU) and Integrated Urgent Care Telephone Triage system (TT). Both projects aimed to deploy SEIPS in combination with existing improvement methodologies to inform system improvement.

Methods

Two separate field studies applying the SEIPS framework took place, to assess:

- 1.The safety of care processes and their impact on patient, family and healthcare worker safety at an ICU in Northern Ireland, during Covid-19 response, and;
- 2.Usability, workflow and their relationship to the wider work system in an Integrated Urgent Care telephone triage system in England

Data was collected using observations/work shadowing (TT, n = 13; ICU, n = 15), and interviews (ICU, n = 8). In ICU, these were subsequently tested using the Model for Improvement², and scaled and spread as appropriate. In TT, usability inspection methods informed observations of human-system interaction and SEIPS was used to analyse the systemic factors contributing to workarounds (process)³. Both projects aimed to identify work system quality improvements.

Results

Both projects identified factors across the 5 domains of the SEIPS work system which influenced day-to-day behaviours, affecting safe performance, both positively and negatively.

In the ICU, SEIPS enabled identification of factors which informed efficient and safe day-to-day operations during the Covid19 crisis. These were subsequently translated into change ideas, tested using the Model for Improvement, and scaled up and spread to the second ICU in the Hospital Trust . These adaptations led to strengthened team working, improved efficiency and productivity, and a reduction in cognitive load.

In the telephone triage system, several workarounds and technology factors were identified within the wider work system. Notably, a bi-directional relationship between technology and the wider work system was identified, highlighting SEIPS' ability to identify interactions between system components. The application of SEIPS informed macroergonomic improvements, for example, removing a technology-imposed time limit for notetaking, implementing a procedure for notetaking, and proposing technology-specific changes to improve the quality of information transfer using clinical notes in telephone triage.

Discussion

Ultimately, the presentation aims to encourage adoption of SEIPS, systems thinking, and 'work-as-done' principles, within the Healthcare Quality Improvement discipline, by making the tool more accessible, through demonstration of its application, combining with other methodologies, and highlighting simple, but effective interventions to improve outcomes as a result. Exhibiting two vastly different complex healthcare systems highlights SEIPS' ability to detect a breadth of work system factors and outcomes, from technology usability, to employee wellbeing, and organisational outcomes such as efficiency. This can spark debate on how best these can be 'optimised', according to human factors principles.

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2.2 Ergonomics and Inclusive Service Design to address the care needs of older patients with Multiple Long-Term Conditions

Author: Dr CARLOS Aceves Gonzalez^{1,2}, Dr Thalia Fierros-Elviro³, Dr Martha Gil-Barreiro³, Miss Karen alejandra Vazquez-Lopez², Miss Marisela Tachiquin⁴, Mr John A. Rey-Galindo²

Affiliations: ¹University of Derby, ²Universidad de Guadalajara, ³Hospital Geriatrico, Secretria de Salud Jalisco, ⁴University of Nottingham

Keywords: inclusive design, SEIPS 3.0, ageing population, care transitions, patient journey

Introduction

Multiple long-term health conditions (MLTCs) involve two or more chronic conditions—physical or mental—in an individual. MLTCs are rising globally, especially among those aged 65 and older, and this trend is expected to continue due to ageing populations. Multiple conditions can reduce quality of life, increase disability, and lead to functional impairments (Academy of Medical Sciences, 2018). Managing MLTCs poses challenges for patients, caregivers, and healthcare systems alike. Understanding the interaction between patients' needs and available resources is essential to provide adequate care for this population.

This paper utilises the Inclusive Service Design (ISD) approach (Aceves-Gonzalez, 2014) and the SEIPS 3.0 model (Carayon et al., 2020) to achieve two aims: 1) to identify staff perspectives on the barriers and facilitators faced by older patients with MLTCs and the challenges faced by themselves as service providers, and 2) to explore the potential outcomes of implementing the ISD and SEIPS 3.0.

Methods

Twelve staff members from a geriatric hospital in Mexico, including geriatricians, a nurse and administrative staff, participated in semi-structured interviews. The interviews aimed to gather insights into the patient's journey from appointment to discharge following the consultation. Participants talked about the facilitators and barriers experienced by patients with MLTCs and shared their experiences as healthcare workers interacting with various system elements. The interviews were

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audio-recorded, transcribed, and thematically analysed using the work system elements (SEIPS) at each stage of the patient journey (ISD). The study received approval from the hospital's ethics committee.

Results

Using the ISD allowed the participants to identify the various stages of the service and the barriers and facilitators that patients and their caregivers encounter throughout every touchpoint of their journey. The diversity of patient characteristics with MLTCs was a key factor highlighting the difficulties in providing appropriate service. Several staff members recognised that each patient may experience different problems using the service depending on their health condition. Similarly, through analysing the work systems elements (SEIPS), the participants acknowledged several vital challenges that hindered their ability to perform their roles and deliver better care to patients and their families. The main issues included inadequate consultation space, excessive service demand, insufficient staff, and complex bureaucratic processes involved in patient care.

Discussion

A key outcome of this study was mapping the diverse patient journeys and identifying the stakeholders involved in their care. This enhanced our understanding of care transitions for patients with multiple health conditions and provided insights for co-designing more integrated healthcare services.

Integrating the ISD approach with the SEIPS 3.0 model proved effective because it enabled a thorough analysis of every interaction point among users—patients, caregivers, and healthcare workers—and the various elements of the health system. The descriptive structure of SEIPS, combined with a framework like ISD, facilitated a detailed understanding of the experiences and needs of older patients with MLTCs and their caregivers when using the service. It also highlighted the challenges healthcare workers face in caring for this population.

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2.3 Recruiting participants to a focused ethnography study in the home of people living with type 2 diabetes: a critical reflection

Author: Dr Romaric Marcilly^{1,2}, Dr Sabine Bayen⁴, Dr Julie Prasivoravong³, Dr Paul Quindroit⁵, Prof. Jean-Baptiste Beuscart⁶, Mr Eric Avez⁷, Prof. Tamasine Grimes⁸

Affiliations : ¹Univ. Lille, METRICS: Évaluation des technologies de santé et des pratiques médicales, Lille, France , ²Inserm, Lille, France, ³Inserm, Lille, France, ⁴Department of General Practice, University of Lille, Lille, France, ⁵Univ. Lille, CHU Lille, METRICS: Évaluation des technologies de santé et des pratiques médicales, Lille, France, ⁶Univ. Lille, METRICS: Évaluation des technologies de santé et des pratiques médicales, Lille, France, ⁷Member of the Patient and Public Involvement panel, ⁸School of Pharmacy and Pharmaceutical Sciences, Trinity College Dublin, Dublin, Ireland

Keywords: participant recruitment, type 2 diabetes, ethnographic study, home-based research, systems engineering

Introduction

Recruiting participants for qualitative research is critical and challenging. The importance of sharing positive and negative participant recruitment experiences is necessary to optimize recruitment plans (Negrin et al., 2022).

We share here our experience of recruiting people living with type 2 diabetes (PT2D) to a focused ethnographic study performed in the participant's home. This study – HOMES-Diabetes – aimed to explore how insulin-treated PT2D in France actually use diabetes technologies and the inter-relationship with work system components using a systems engineering approach. The original recruitment plan included displaying posters and leaflets in healthcare organizations, announcements on social (media) networks, and advertising to patient associations and primary care professionals. Recruitment proved more difficult than expected.

Objective and method

We sought to explore the difficulties encountered, how we overcame them and generate recommendations to optimize participant recruitment in comparable

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studies. Data sources were the principal investigator's notes on recruitment and interviews with the consortium members who recruited the greatest number of participants. We used Gibbs' reflexive cycles of description, evaluation, analysis and conclusion (Gibbs, 1988) to describe the recruitment process, evaluate the cases of success and failure, and critically analyze the data to highlight the factors that facilitated or hindered participant recruitment.

Results

Of the 20 participants initially recruited, 14 were introduced to the study by a healthcare professional (by a GP (n=8 out of 13 proposed), hospital doctor (n=4/5) pharmacist (n=1), and nurse (n=1)). Five PT2D contacted us after seeing social media posts, and 1 heard about the study from a patient association. Two prospective participants changed their mind and did not take part. We identified three main factors influencing recruitment: (1) the participants, (2) the recruitment plan and (3) the research protocol. These factors were influential either independently or co-dependently. Participant factors included their cognitive capabilities (e.g., ability to understand the protocol), their interest in research about their condition, their perceived benefit of the research, their comfort in welcoming a stranger into their home, and their trust and comfort with the research team (e.g., influenced by introduction by a clinician, inclusion of the researcher's photo on the recruitment material). Recruitment plan factors included the recruitment action (i.e., passive through advertisements, active through proposals by clinicians). Recruitment by healthcare professionals was influenced by the trust between the clinician and the patient. Finally, research protocol factors included that the interviewer was not working directly with the clinicians, and that the participant commitment was a single interview. The place of the interview both encouraged (convenience) and deterred (privacy) participation. Together these factors impact both the communication with potential participants and their acceptance/refusal to participate.

Discussion

Our results are consistent with literature about participants' enrolment in qualitative studies. They extend knowledge to focused ethnography research based on interviews in the home setting and help generate strategies to optimize participant recruitment.

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2.4 Implementation and Improvement of the Major Haemorrhage Protocol for Bleeding Trauma Patients in a Major Trauma Centre

Author: Dr Adeel Akhtar¹, Dr Zarak Khan, Dr Emma Greenwood, Dr Louise McKee, Dr Nicola Weatherup

Affiliations: ¹Belfast Health And Social Care Trust, ²Queens University Belfast

Keywords: major haemorrhage, quality improvement, transfusion protocol, PDSA cycles, trauma care

Introduction

Haemorrhage as a result of traumatic injury is the leading cause of death in people under the age of 40. These patients may require a massive transfusion (MT), defined as a transfusion of more than 4 units in 1 hour or 10 units in 24 hours. Evidence suggests that these patients can benefit from transfusion of fresh frozen plasma (FFP), platelets and red blood cells (RBC) in a 1:1:1 ratio.

Aim

The aim of this quality improvement project (QIP) was to institute a protocol and additional measures that would result in patients receiving 1:1:1 transfusion ratio during major transfusion (MT). The secondary objective was to reduce blood components waste.

Methods

This QIP was started in 2017. The interventions were structured into two Plan-Do-Study-Act (PDSA) cycles. The first cycle aimed to improve transfusion ratios over a 2 year period, with interventions in the second cycle aiming to maintain any improvement through educational and training sessions. Another cycle was run in parallel to these two cycles, monitoring blood component waste over a 6 year period. The outcomes for each cycle were evaluated on a yearly basis and conclusions were drawn from any established trends over the cycle duration.

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Results

Following the institution of this QIP, the percentage difference from target ratio decreased by 30% and was maintained throughout the course of the project. 30 day survival rates were up trending throughout, and this was partly correlated with the improvement in ratio. FFP and Platelet waste were reduced by 13% and 10% respectively, with RBC waste being maintained at low levels.

Conclusion

In conclusion, this project has described procedures that can be implemented to improve blood transfusion ratios, targeted towards achieving a 1:1:1 FFP:Platelet:RBC ratio with improvement in 30 day survival. In addition, we were able to reduce the blood component waste during MT.

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2.5 Delft Design Lab Health Journeys: Shaping the Future of Healthcare Through Co-Creation and Human-Centered Design

Author: Dr Armagan Albayrak¹, Dr Petra Kok²

Affiliations: ¹Delft University of Technology, ²Reinier de Graaf Gasthuis

Keywords: Healthcare Transformation, Multidimensional Care Processes, Healthcare ecosystem

Introduction

Health Journeys is one of the labs within the Delft Design Labs at the Faculty of Industrial Design Engineering (IDE). The Delft Design Labs were established as platforms for design innovation and knowledge development, bringing together IDE staff, students, and external partners. One of the main goals of these labs is to involve more IDE students in the faculty's research, enabling their work to contribute significantly to the advancement of design research.

The Health Journeys Lab aims to shape the future of healthcare through co-creation and human-centered design, aligning technology with patient care workflows to develop sustainable innovations that support both routine practices and transformative health initiatives. The lab's research is guided by a unique co-directorship: Dr. Petra Kok, a Rheumatologist and CMIO at Reinier de Graaf Gasthuis, brings expertise in healthcare, while Dr. ir. Armagan Albayrak, an Assistant Professor at IDE, contributes expertise in technology and design. By fostering process-oriented thinking, the lab focuses on opportunities to integrate digitization and innovation directly into everyday patient care.

Healthcare consumption will rise exponentially in the coming years, there will be an increasing shortage of human resources and higher costs. To ensure patients receive continuous, comprehensive, and appropriate care, healthcare transformation and technical solutions are critical for maintaining accessibility, affordability, and quality. This transformation presents a multifaceted challenge due to the complex healthcare ecosystem, which involves various layers,

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organizations, stakeholders, and health technologies, all interacting with the patient and their social context.

At our lab, we collaborate with external partners across different levels of the healthcare ecosystem through a variety of projects (PhD, master's graduation, master's courses, and internships) to facilitate healthcare transformation. Our work focuses on Multidimensional Care Processes within the healthcare ecosystem, which emphasizes a comprehensive and integrated approach to health service delivery. This approach considers multiple dimensions of patient care, including healthcare policy, healthcare organization and stakeholders, and the personal patient-doctor relationship. Transmural care refers to healthcare delivery across different organizations and providers, acknowledging that the transformation of healthcare requires connecting these various dimensions and fostering a holistic understanding of the ecosystem.

All projects in our lab are rooted in Human-Centered Design, which serves as the scientific foundation for integrating technological and stakeholder perspectives across the healthcare ecosystem. Through co-design and journey mapping, this approach fosters empathy, shared vision, and collaboration, facilitating meaningful change. A selection of our projects will be presented at the HEPS 2025 conference, highlighting how we facilitate healthcare transformation by connecting different perspectives at various levels of the healthcare ecosystem, ultimately creating more sustainable solutions.

The healthcare challenges are so significant and impactful that they require a collective effort from all healthcare parties to take shared responsibility in transforming the healthcare system toward a sustainable future, where the focus shifts from curing diseases to prevention and appropriate care.

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2.6 Enhancing healthcare-associated infection prevention through a multicomponent intervention based on human factors

Author: Dr Tommaso Bellandi¹, Dr Alessia Cacciamani², Dr Giulia Lefosse³, Dr Cristiana Rigali¹

Affiliations: ¹Tuscany Northwest Trust, ²Tuscany Centre Trust, ³Meyer Academic Hospital

Keywords: infection prevention, multicomponent intervention, human factors, behavioural change, healthcare safety

Introduction

Healthcare-associated infections (HAIs) pose a significant threat to patient safety. This pilot study evaluated the impact of a multicomponent intervention aimed at preventing and controlling HAIs and antimicrobial resistance (AMR) within a large healthcare network.

The study aimed to collect qualitative and quantitative data to assess the impact of a multicomponent educational intervention on healthcare workers' practices and identify areas for improvement within a sample of long term care facilities.

Methods

Eight healthcare facilities were involved (2 rehabilitation centres, 3 intermediate care facilities, 3 nursing homes). Data Collection at baseline assessment involved non-participant observations, interviews, focus groups, and prevalence surveys that were conducted to identify current practices and areas for improvement. Intervention with a multicomponent educational that was delivered to healthcare staff to enhance knowledge and skills in areas such as hand hygiene, PPE use, environmental cleaning, and antimicrobial stewardship, by using scenarios co-created with participants on the basis of baseline data and exemplar stories of "good and bad care", where positive and negative contributory factors were explored in order to leverage systems improvement. Action planning:

- Participants were then encouraged to develop facility-specific action plans to address identified gaps and improve practices.

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- Post-intervention assessment: observations and prevalence surveys were used to evaluate the impact of the intervention.
- Data from observations, interviews, and focus groups were analyzed thematically to identify key themes and patterns.
- Prevalence data and other relevant indicators were analyzed using appropriate statistical methods.

This research design allowed for a comprehensive evaluation of the intervention's impact on healthcare worker knowledge, attitudes, and behaviors, as well as its influence on patient outcomes.

Results

Observations revealed critical areas such as hand hygiene, personal protective equipment (PPE) use, and medical device management. While overall infection prevalence increased, the proportion of HAIs caused by multidrug-resistant organisms (MDROs) decreased slightly. The educational intervention enhanced staff awareness and promoted the implementation of improvement actions.

Discussion

This study demonstrated the feasibility of a collaborative approach to HAI prevention. The multicomponent educational intervention was effective in increasing staff awareness and promoting improvements in practices. Findings suggest that a multidisciplinary approach, with a focus on human factors, can contribute to reducing MDRO-related HAIs. Further randomized controlled trials are needed to confirm these findings and assess the long-term impact of the intervention.

2.7 Development and Evaluation of an Electronic Tool for the Key Indicator Method

Author: Prof. HSIEH-CHING CHEN, Ms LI-HSIN CHEN

Affiliation: National Taipei University of Technology

Keywords: ergonomics tool, key indicator method, workplace risk assessment, digital health tool, participatory design

Introduction

The Key indicators method (KIM) is a tool developed by the German Federal Ministry of Labour and Social Affairs (BAuA) for assessing repetitive musculoskeletal risk. The KIM (2019) has become a crucial assessment tool for promoting musculoskeletal hazard prevention in Taiwan. The KIM extended tool (KIM-E), published by BAuA in 2020, is a significant advancement as it integrates the sub-task risks of a worker [1]. This integration expands KIM's coverage and reduces the possible human errors caused by the insufficient experience of the assessment personnel. Using KIM-E can provide a more comprehensive and accurate assessment of musculoskeletal risk, thereby enhancing workplace safety. However, using the KIM paper-pencil tool to integrate sub-task risks nonlinearly is relatively complicated.

This research aims to explore the demand for developing KIM2019 electronic tools and verify the tool's usability according to the demand survey. The first stage of the study uses the Zuvio online platform to collect relevant KIM operation and demand survey data on two participant groups of different ages after a 6-hour lecture. The first group was 33 junior students in a university's Department of Physical Therapy, and the second group was 31 working students studying for a master's degree. The survey results show that using the KIM-E, which employs a nonlinear formula to integrate the risks of three sub-tasks of a worker, the participants' accuracy ($p < 0.001$) and acceptance ($p < 0.005$) of electronic tools are significantly higher than paper-pencil tools. Both groups of participants will be more inclined to use electronic tools for risk assessment in the future. The percentage of participants who would use a combination of paper-pencil and other tools in the future was less than 5% and 25% for the junior and working groups, respectively.

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However, in the first stage of the demand survey, nearly one-fourth of the junior university students used Mac computers, which made them unable to operate the VBA-based electronic tool smoothly. Therefore, the second stage of the study re-developed a cross-platform web-based electronic tool and surveyed trainees' opinions after a 6-hour training course. Sixty-three (73%) of the 86 professional trainees had experience using the KIM paper-pencil tool, and the survey results showed that the web-based tool was highly accepted, regardless of age or working experience. 97% of the trainees believed they would continue using the KIM web-based tool for workplace assessment afterward. The research demonstrates the usability and acceptance of the web-based KIM electronic tool in promoting musculoskeletal hazard prevention and training.

3 Designing for Medication Safety

Theme Keywords: human-centred, systems thinking, documentation, storage, inventory management, family engagement

Rationale and Objective

Medication safety remains one of healthcare's most challenging areas, particularly in complex environments like paediatrics, pharmacy workflows, and hospital transitions. The submissions emphasise human-centred and systems approaches—designing better documentation, enhancing storage and inventory management, involving families in safety processes, and employing experienced-based co-design methods. By applying HFE principles, these projects highlight the shift in moving beyond blaming individuals toward reshaping systems for more reliable and error-resistant medication use.

Content

- 3.1 'Poka-Yoke' for medication safety in the digital era
- 3.2 Information display design for drug inventory management in a hospital pharmacy
- 3.3 A Human Centred Design Model for Medicines Optimisation - A Change Package to Support Medication without Harm
- 3.4 Multi-organisational Medicines Optimisation for older people living with frailty: Systematic review using SEIPS 3.0
- 3.5 A novel method of disposing of waste anaesthetic drugs
- 3.6 Finding Mud that Sticks: Using Experience-Based Co-Design (EBCD) to identify medicines safety interventions for hospitalised children.
- 3.7 Design for medication allergy documentation, display and alerts
- 3.8 Optimizing Objective Pain Measurement: A Study on the Efficacy of Multimodal Physiological Signals
- 3.9 What is needed for human-centred design in primary care medicines prescribing?
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3.1 'Poka-Yoke' for medication safety in the digital era

Authors: Ms Angela Carrington, Mr Daryl Connolly, Ms Anna Lappin, Mrs Maria McConnell, Ms Sharon O'Donnell, Mr Matthew Wilson

Affiliation: Belfast Health And Social Care Trust

Keywords: medication safety, error prevention, EPMA, digital health, system resilience

Introduction

'Poka-yoke' is a Japanese term meaning 'mistake-proofing' or 'error prevention'. It involves designing systems to prevent or detect errors before they occur.

Errors largely occur as a 'slip' or a 'lapse' i.e. an action or a decision that was not intended. They occur undertaking familiar tasks e.g. prescribing an incorrect insulin for the frequency intended; Novorapid® once daily at night, or a lapse, forgetting to check gentamicin levels prior to administration. These types of errors continue to occur in the absence of an engineered solution and reliance on prevention is education and training and reminding staff to remember to do 'the right thing'.

Northern Ireland's digitalisation of its healthcare record, the 'Encompass Programme', includes Electronic Prescribing and Administration (EPMA). This provides the opportunity to Poka-Yoke the medication use process in the digital era and increase system resilience. This supports implementation of the DoH's Strategy 'Transforming Medication Safety in Northern Ireland' (1) to 'Introduce systems to help reduce harm related to the prescribing and administration of medication'. The trusts' Medication Safety pharmacists in each trust work collaboratively to address medication safety issues across the region are well placed to Poka-Yoke high risk medication and processes within an EPMA system.

Aim

To identify and support development of medication error prevention strategies within EPMA in secondary care

Method

Trusts' Medication Safety team:

- Identified medication safety hazards which have the potential to be mitigated or reduced by EPMA.
- Reviewed these issues with Encompass Build team responsible for configuring the EPMA component to confirm existing inbuilt safeguards and to prioritise those which require additional development.
- Tested how the system responds to the hazards in either preventing them or reducing their likelihood of occurrence.
- Identified any residual risks to support ongoing system optimisation.

Achievements to date

- All national, regional and local medication safety alerts and safety messages issued over the last 20 years reviewed, to identify potential medication safety hazards; themed according to medication type using BNF Category and process type e.g. allergy management, medicine reconciliation.
- Development of a medication safety hazard list that includes hazard description, potential clinical harm and severity of hazard, using the NI Risk Matrix.
- Provision of error prevention options for consideration by the EPMA Encompass Build Team and agreement of those to be progressed during Build Phase.
- Test of Encompass 'Playground' system to determine existing controls.
- Identification of further error prevention strategies for Optimisation Phase.

Discussion

'Poka Yoke' is an important task to undertake to proactively error-proof the system. Undertaking practice risk analysis, evaluation and management is an essential requirement of Digital Clinical Safety Standards. (2) This work has shaped system configuration in the Build phase to enhance safer use of medicines in the digital era. The work is ongoing and will inform future system optimisation.

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3.2 Information display design for drug inventory management in a hospital pharmacy

Author: Dr Sheau-Farn Max Liang¹, Mr. Tai-Yuan Li¹, Mr. Ren-Ming Zhang², Mr. Tu-Sheng Lee², Ms. Su-Han Hsu²

Affiliations: ¹National Taipei University Of Technology, Taipei, Taiwan, ²Taipei City Hospital, Taipei, Taiwan

Keywords: drug inventory, display design, usability, situation awareness, SEEV model

Introduction

Drug inventory management is critical to healthcare quality and patient safety. Current practice heavily relies on healthcare information systems (HISs) for pharmacists to perceive and comprehend inventory status and predict future needs. However, the information displays of HISs have not been designed appropriately. Pharmacists need to seek information from different sources scattered around the systems, and often the information is not in a suitable format and the displays are cluttered with irrelevant information. Therefore, this study aims to improve information displays for drug inventory management.

Methods

An ergonomics design process was applied to analyze pharmacist needs in managing drug inventory, and design and evaluate display prototypes that reflect the needs of pharmacists in a hospital pharmacy. Data were collected through observations and interviews with senior pharmacists to identify the need for information displays. The prototypes were designed based on the SEEV model (visual salience, effort, expectancy, and value) (Wickens et al., 2001). That is, the salience of displays and the required efforts to perceive information should be consistent with what users expect and value. Eighteen pharmacists were recruited to participate in the prototype evaluation. Forty-eight SAGAT (situation awareness global assessment technique) (Endsley, 1988) questions were designed to assess the situation awareness of participants at level 1 (perception) and level 2 (comprehension). The usability of the prototypes was evaluated by SUS (system usability scale) (Brooke, 1996).

Results

Pharmacists' primary concerns for managing inventory were drug expiration dates, shortages, and irregular drug consumption. An overview display was designed to present the inventory status. Drugs were represented by their codes in rounded rectangles arranged as an array on screens. The default color was white for the rectangles but black for their borders and the codes to indicate a normal inventory status. Rectangles would turn red to denote that drug expiration dates were approaching. Rectangle borders would turn green when drug quantities were near their safety stock levels. The colour of the codes would turn yellow when there was irregular drug consumption. Pharmacists could check the details by clicking on rectangles. A bar chart was designed for the expiration date display to present the quantity of each inventory batch and highlight the batches about to expire. A line chart was designed for the drug shortage display to illustrate current and future trends in drug consumption, with a horizontal line representing its safety stock level. A control chart was designed for the irregular drug consumption display to reveal possible irregular consumption according to statistical control rules. The results showed that the average accuracy rate of SAGAT questions was 97%, and the SUS score was 78.2, indicating the display prototypes were easy to use and could help pharmacists be fully aware of drug inventory status.

Discussion

The findings of this study demonstrate the importance and effectiveness of applying ergonomic models and methods to information display designs for drug inventory management within the framework of analysis, design, and evaluation. Future research could employ this approach in other areas of HISs.

3.3 A Human Centred Design Model for Medicines Optimisation - A Change Package to Support Medication without Harm

Author: Ms Gill Smith¹, Mrs Anita Hogg², Dr Michael Scott³

Affiliations: ¹Kaizen Kata, Mallorca, Spain, ²Medicines Optimisation and Innovation Centre, ³Medicines Optimisation and Innovation Centre

Keywords: medicines optimisation, human-centred design, patient safety, quality improvement, health systems

Introduction

Introduction: Medicines optimisation and medicines safety practices can drive patient safety and quality of care. However, many healthcare systems do not have well-developed processes or measures to support these. Medicine safety practices are often disparate and varied and implementation is also a challenge.

The presenters will share a human/person-centred systems approach that can be implemented across healthcare settings.

The approach is underpinned by a human factors and ergonomics approach, supported by measurement and demonstrating the efficiency and effectiveness of the interventions. A package of tools and resources to support change will be shared. This work is relevant across systems and settings and is applicable globally. Components have been spread to Sweden, Norway, Poland, Austria and commencing in Africa.

Methods

A novel person centred system wide approach was developed coupling improvement methods with medicines optimisation. Our theory of change is that evidence-based, human/person-centred medicines optimisation interventions can be applied across the settings of acute care, intermediate care, primary care and nursing homes, to effect positive change to medicines safety and quality of care.

Quality Improvement Methodology using the Model for Improvement (1) is applied to our work and is presented as a Driver Diagram, Logic Model – an illustration linking the drivers to interventions and measures. An evidence summary demonstrates the impact of the interventions.

This work is supported by a package of tools to assist healthcare professionals and patients to drive medicines optimisation and safety at scale and includes shared learning. The work to develop an exciting medicines safety collaborative building across Europe will also be shared.

Results

Improving safety, efficiency, patient experience and sustainability

- Reduced length of stay by 2 days
- Reduced readmission within 30 days by 9.9% and within 90 days by 15.2%
- A return on investment of on average £51 for every £1 spent
- More appropriate medicines use, impacting positively on improved adherence, reduced waste (and reduced environment impact of same) and patients feeling more involved in their care (2,3).

Summary and Implications for Practice

The WHO 3rd Global Patient Safety Challenge Medication Without Harm aims to reduce severe, avoidable medication-related harm. Sub-optimal medicines use leads to poor outcomes, inefficiencies and waste and impacts on sustainability and climate change. Sub-optimal use of antimicrobials further impacts the environment and contributes to antimicrobial resistance, a serious problem worldwide and the focus of the 2017 European One Health Action Plan against Antimicrobial Resistance (4). The approach presented has demonstrated positive outcomes for patients and organisations and is adaptable and scalable globally.

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✦ Designing for Medication Safety

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3.4 Multi-organisational Medicines Optimisation for older people living with frailty: Systematic review using SEIPS 3.0

Author: Ms Eman Ali^{1,2}, Dr Justine Tomlinson¹, Mr Adam Jameson¹, Dr Adam Sutherland¹, Ms Sarah Alasmary³, Dr Patricia Achi¹, Dr Zoe Edwards¹, Mrs Hadeel Mohamed¹, Dr Kristina Medlinskiene¹, Dr Toby Capstick², Prof. Beth Fylan^{1,4}

Affiliations: ¹University Of Bradford, ²Leeds Teaching Hospitals NHS Trust, ³University of Leeds, ⁴NIHR Yorkshire and Humber Patient Safety Research Collaboration

Keywords: SEIPS 3.0, frailty, medicines optimisation, multimorbidity, cross-sector collaboration

Introduction

The UK health system faces increasing pressures to meet the care needs of the older population. Older people are encountering significant health challenges such as frailty, multimorbidity, and polypharmacy which put them at increased risk of adverse outcomes. Medicines play a key role in the management and treatment of diseases and several professionals working in different specialities and organisations are involved in medicine optimisation (MO). Cross-team collaboration is vital to provide joined-up care, however the health system has historically not been designed to support this, leading to care fragmentation. This is associated with risk of errors, increased costs, poor clinical outcomes, and reduced patient satisfaction. MO is a patient-centred approach to ensure a safe and effective use of medicines. This review aims to explore MO interventions, and the organisations involved in delivering the interventions using the Systems Engineering Initiative for Patient Safety 3.0 (SEIPS) framework.

Methods

Patient and Public Involvement (PPI) groups were consulted in the design stages of the review. A comprehensive search was conducted in electronic databases (Medline, Embase, CINAHL, SCOPUS, Psych-Info, CENTRAL, and PROSPERO). The eligibility criteria included adults aged 65 and older, living with frailty, taking medications, and receiving MO interventions such as medicines review and

deprescribing. The characteristics of the interventions and the organisations identified were tabulated and summarised narratively. The corresponding components of SEIPS 3.0 were extracted, tabulated, and summarised descriptively. (PROSPERO registration CRD42023475185).

Results

Sixteen studies met the eligibility criteria. MO processes predominantly comprised of medication reviews to identify problems associated with high-risk medicines (e.g., anticoagulants and antiepileptics) followed by deprescribing or dose reduction of potentially inappropriate medicines. Only three studies described MO interventions delivered across two or three health organisations, and the remaining studies were delivered in single health organisations. Documented SEIPS components for multi-organisational studies mainly consisted of:

- Persons who are patients (and or carers), and health professionals (geriatricians, pharmacists, nurses, and family physicians) and their characteristics such as knowledge, and experience.
- Tasks, which include MO activities, and involvement of patients in the decision-making process.
- Tools and technology, including MO tools, frailty assessment tools, and shared electronic health records to facilitate communication between the organisations, although the latter was not reflected in all the studies.
- Organisation, multiple organisations such as hospitals, primary care, and social care organisations were involved in delivering the interventions through collaborative working.

Discussion

The published evidence shows that MO interventions (primarily medicine reviews and deprescribing) are provided to older people living with frailty by a range of healthcare professionals. Evidence of collaborative working across health organisations to provide these interventions was limited, however, which may result in a disjointed and uncoordinated system, and to adverse outcomes such as preventable hospital admissions. The integration of care is essential to ensure older people living with frailty are managed holistically by collaborative teams. This integration can be facilitated by work systems redesign focusing on guidelines for

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the management of people with multimorbidity, and effective communication strategies to streamline the provision of care.

3.5 A novel method of disposing of waste anaesthetic drugs

Author: Dr Aine Cafferkey, Dr Sean Davis, Ms Sarah Jennings, Mr Conor Elsbend, Dr Aislinn Sherwin

Affiliation: St James's Hospital

Keywords: waste management, anaesthetic drugs, environmental impact, medication safety, healthcare sustainability

Introduction

Disposal of healthcare risk waste is a significant cost burden to the HSE. 17% of all healthcare risk waste is generated in theatre¹. Sharps, cytotoxic or anatomical waste account for almost half of healthcare risk waste¹. In 2023 disposal of healthcare risk waste cost St James's €1.1m. Applying the above breakdowns, €187,000 was waste from theatre, €93,500 was on sharps disposal.

Each day a significant amount of anaesthetic drugs are wasted despite active efforts to minimise waste. Guidelines specifically addressing the safe disposal of waste anaesthetic medications exist in the UK², USA³, Australia and New Zealand⁴: All unused drugs must be denatured. No HSE guidance exists. Local guidance stipulates that syringes containing unused medications must be placed in purple lidded bins, which are then exported for incineration.

Significant amounts of unused or partly used anaesthetic drugs are discarded on a daily basis. A recent survey of all elective cases in the main theatre complex in St James's over one day showed 922mls of drugs were discarded. Of this, 40% was propofol, 13% was opiates or benzodiazepines. Extrapolating this data we estimate that approx. 343,335mls drugs are disposed of on an annual basis.

Anaesthetic medications have significant potential for diversion. A recent survey revealed that 43% of our consultants and 36% of our NCHDs dispose of syringe contents into the sink due to concerns regarding diversion.

Methods

Drug denaturing kits are not readily available in Ireland. We sourced a sample of drug waste bins from Australia⁷ that meet our specifications – all drugs are denatured immediately in a safe, efficient, cost-effective, environmentally friendly way.

Results

The 2L kits were trialled in 13 theatres over a 7 day period. At the end of the trial period all 13 kits were placed in a purple-lidded 30L zulu bin. Therefore 52 purple lidded zulu bins would be filled on an annual basis (compared to our current estimated usage of 372 purple lidded sharps bins). All grades of anaesthesiologist stated that they would use the product if available.

Discussion

We are currently exploring procurement of the drug waste bins. They will remove substantial safety concerns regarding diversion and environmental concerns regarding contamination of water with unused drugs. In addition they should lead to cost savings as the volume of purple lidded bins being exported for incineration falls.

3.6 Finding Mud that Sticks: Using Experience-Based Co-Design (EBCD) to identify medicines safety interventions for hospitalised children.

Author: Dr Adam Sutherland^{1,2,4}, Dr Annie Keene³, Dr Denham Phipps^{2,4}, Prof. Darren Ashcroft^{1,2,4}

Affiliations: ¹University Of Bradford, ²NIHR Greater Manchester Patient Safety Research Collaboration, University of Manchester, ³Manchester University NHS Foundation Trust, ⁴Division of Pharmacy & Optometry, Faculty of Biology Medicine & Health, University of Manchester

Keywords: paediatric medication safety, Experience-Based Co-Design (EBCD), parent engagement, human factors and ergonomics (HFE)

Introduction

Avoidable medication related harm is estimated to affect between 1 and 2% of children during their hospital stay.⁽¹⁾ Existing interventions are relatively poor at intercepting potential harm. There is a lack of robust systems-oriented design for medicines safety and the voice of parents and carers is largely absent.

Co-production is an integral part of human factors/ergonomics (HF/E) informed design of processes and systems, with few reported applications in medicines safety. We used Experience-Based Co-Design (EBCD) to identify potential interventions to improve paediatric medication safety guided by data obtained from an ethnographic study of in-patient medication systems using a HF/E orientation.⁽²⁾

Methods

We used the EBCD method adapted by Raynor et al.⁽³⁾ Two workshops involving 19 participants were conducted in spring 2023. Attendance was purposefully determined to include parents, medical, nursing and pharmacy participants. A trigger video recorded by a parent from the ethnographic study and two case vignettes taken from observed events were used to stimulate discussion. Parent and professional participants were identified through their participation in the

research study. Participants worked in small groups and reflected on their experiences and were asked to 1) propose potential interventions and 2) prioritise these using a transparent transferrable voting system.

Results

Four areas for intervention were identified: Communication; Trust & Respect; Power & Control and Heuristics & Problem Solving. 13 potential interventions were proposed which were then reduced with multiple transferrable voting, and to final preferences using a single-vote approach to 1) A parent-held medicines history derived from routine NHS data; 2) participation of parents with experience in the training of caregivers; 3) appropriate skill mix in ward teams and 4) collaborative working with parents and clear delegation of responsibility (e.g. with regards to medicines administration.)

Discussion

To our knowledge this is the first reported use of EBCD to develop of paediatric medication safety interventions. Further it is also among the first where parents voices and lived experience have been drawn upon to support their development. The interventions proposed in this study would bring parents and families into the clinical space and offer them some assurance and agency over their child's care while offering support and assistance to overstretched healthcare services.

The use of a parent-held medication record would potentially void the need for repetitive, costly medicines reconciliation on admission, and enable parental validation of medication information for their children between care areas. Engaging parents in the training of nursing and medicines professionals allow practitioners and parents to see different perspectives and build trust and resilience between groups. Finally, medicines expertise is missing at the point of need. Pharmacy services are historically held at arm's length from clinical services, and embedding pharmacy services in clinical structures may improve access to medicines expertise. Further research is needed to develop and evaluate the implementation, adoption and effectiveness of these interventions on reducing avoidable medication harm affecting hospitalised children.

3.7 Design for medication allergy documentation, display and alerts

Author: Dr Yushi Yang¹, Ms Allison Drees¹, Dr. Nicole Mollenkopf², Dr. Allen Chen²

Affiliation: ¹Johns Hopkins Health System, Baltimore, USA, ²Johns Hopkins Health System, Baltimore, USA

Keywords: allergy documentation, EHR design, human factors, alert fatigue, sociotechnical systems

Introduction

The goal of this operational Human Factors study is to apply the sociotechnical systems approach [1] to address an important patient safety risk identified through medication error reports: patients receiving medications to which they are allergic [2; 3]. As embedded human factors practitioners that support system design work for the health system, we investigated the entire process related to a patient's allergy information processing, including obtaining and documenting the history of allergies and adverse reactions in the Electronic Health Record (EHR), display of allergy information in EHR, and allergy alerts during medication prescribing, dispensing, and administration. Our goal is to uncover system barriers that may contribute to a medication error related to allergy documentation and communication, and propose system design recommendations that may address those barriers.

Methods

We continuously work with interdisciplinary teams to provide our feedback in real time and collaborate to identify feasible solutions. The methods we utilized include SEIPS-based work system analysis, heuristic evaluation, cognitive walkthrough, observations, interviews, chart reviews, and human-centered design. We observed inpatient admissions during which allergy information may be collected, reviewed, and documented. We evaluated the EHR interfaces in a simulated environment. We interviewed additional providers, pharmacists and nurses to understand their cognitive process of managing an allergy alert. We identified the themes of system barriers, and facilitated an interdisciplinary team to review them and to brainstorm design solutions that may address those barriers.

Results

We found five major system barriers themes: (1) There is a lack of role clarity of who collects and documents the allergies; (2) Allergy documentation often lacks detail regarding severity and may not distinguish allergies from intolerances; (3) Allergy are displayed in the EHR with poorly designed color-coding, highlighting, and formatting; (4) The allergy list in the EHR mixes allergies and intolerances, and drugs, foods, and environmental agents; and (5) Allergy alerts are sometimes misleading, inaccurate, untrue and disruptive, creating alert fatigue and requiring repeated overrides.

Discussion

We proposed sociotechnical systems recommendations. For example, we suggested role and responsibility delineation for allergy inquiry, documentation, and the management of the allergy list to ensure documentation is accurate and includes necessary information. This process may include the documentation of new allergies, removal of inaccurate historical allergy information, and the communication of the rationale for allergy alert overrides. We also suggested EHR interface redesign, to ensure that the most important allergies (e.g., anaphylaxis reactions and severe contraindications) are displayed at the top of the allergy list with colored highlights. We also suggested refinement of the EHR allergy alerting logic: the system should fire interruptive alerts for anaphylaxis and high severity allergens to prompt a full clinical assessment, whereas for intolerances, no alerts should be fired for drugs of a different class that may be cross-reacting allergens.

Summary

We took a phased approach to identify and implement feasible system recommendations and are continuously engaged in the design and evaluation of implemented solutions.

3.8 Optimizing Objective Pain Measurement: A Study on the Efficacy of Multimodal Physiological Signals

Author: Prof. Yingzi Lin¹, Mr. Jianan Zheng

Affiliation: Northeastern University

Keywords: pain measurement, physiological signals, multimodal data, wearable devices, deep learning

Introduction

The current pain assessment methods are based on patients' self-reports in clinical settings. These “gold standard” pain assessment methods include numerical rating scales (NRS), visual analog scales (VAS), and verbal rating scales (VRS). However, these methods rely on patients' subjective reports and may be subject to bias, especially when patients are unable to accurately express the pain level. Objective pain measurement is of major significance to patient health management, and the multimodal physiological signals show unique advantages in this regard. The goal of this study is to investigate how multimodal physiological signals can enhance the accuracy and performance of pain measurement models, thereby reducing computational complexity. We aim to accelerate the model response time by optimizing the physiological signal combination. We also provide the possibility of developing low-cost, wearable pain monitoring devices.

Methods

We recruited 29 healthy subjects for the cold pressor test. Subjects put their right hand in ice water to induce pain. The data collected before they put their right hand in ice water are baseline data. The subjects reported their subjective pain intensity every 20 seconds during the experiment. We also collected multimodal physiological signals, including blood volume pulse (BVP), galvanic skin response (GSR), electromyography (EMG), skin temperature (ST), and respiratory rate (RR). We use an objective pain measurement model to evaluate the impact of different combinations of physiological signals.

Results (Work in Progress)

We will compare the performance of the model that receives different combinations of physiological signals. The parameters used to evaluate models are accuracy, precision, recall, F1 score, training time, and inference time. For combinations of physiological signals that show similar accuracy, we will further distinguish their advantages and disadvantages by comparing their training time and inference time. Through objective pain measurement models' performance comparison, we want to find the combination of physiological signals that have better performance in practical applications.

Discussion

This study shows the application of multimodal physiological signals for objective pain measurement. The results show an optimal combination of physiological signals for enhanced accuracy and efficiency. This finding lays the foundation for the development of an efficient and portable pain measurement system. It will help us develop more economical and accurate patient pain management methods. In the future, we plan to further test the effects of multimodal physiological signals through different deep learning hybrid models. We aim to develop a more accurately objective pain measurement system.

3.9 What is needed for human-centred design in primary care medicines prescribing?

Author: Dr Denham Phipps¹, Dr Andrea Short¹, Dr Brian Bell², Prof. Matthew Boyd², Ms Gill Gookey², Dr Nicholas Boddy², Mr Antony Chuter³, Prof. Anthony Avery²

Affiliations: ¹The University Of Manchester, ²University of Nottingham, ³Independent Patient Advisor

Keywords: primary care, prescribing safety, human-centred design, work systems, usability

Introduction

The ability of primary healthcare providers to meet their clinical and organisational challenges depends on a range of work system elements – people, tasks, tools, technologies and the working environment – coming together effectively. A human-centred approach aims to ensure that the various elements are designed or combined in a way that support effective performance.¹ Previous studies have made some progress in establishing human-centred design principles in primary care. For example, Phansalkar and colleagues have made recommendations for the design of medication alerts.¹ Despite such efforts, however, more recent studies suggest that a human-centred design approach has yet to be fully realised. Avery et al.'s² investigation of prescribing errors noted that deficiencies in the work system elements often occur in practice, and these deficiencies may compromise medication safety. Beasley et al.³ also cite evidence of work design problems in primary care, such as information technology that is difficult to use or integrates poorly into staff workflows. A particular concern identified in both studies is the interaction between users and technology during medicines prescribing; it is likely that better integration of human factors into the design of prescribing software will have a beneficial effect on medication safety.

Our project aims to identify human-centred design requirements for medicines prescribing in primary healthcare (healthcare delivered outside of hospitals, for example in general practice). We are focusing on prescribing, as this has previously been identified as a high-risk primary care activity, whose safety is threatened by deficiencies in the primary care work system.²

In order to understand the human factors present in prescribing, we have carried out three activities:

- A. qualitative interviews with prescribers (N = 25; 19 doctors and 6 pharmacists), using the Applied Cognitive Task Analysis format to examine how they carry out prescribing.
- B. observation of prescribers (N = 15; all doctors) prescribing for simulated patients in a prescribing software suite.
- C. focus groups with prescribers (N = 11; 9 doctors and 2 pharmacists), to discuss the work system factors encountered during prescribing.

We are carrying out thematic analysis on the interview and focus group transcripts, and content analysis on recordings of the observations. The latter is informed by a hierarchical task analysis of software usage combined with usability heuristics. We will present the initial findings from our data analyses, from which we will identify:

- the cognitive work that takes place during primary care prescribing.
- what support is needed for this work, either from healthcare technology or from redesign of work tasks and environments.
- what modifications are needed to existing prescribing software in order to better support prescribing tasks.

We expect two main outcomes from our study. Firstly, it will demonstrate the use of human factors methods to investigate primary healthcare work. Secondly, it will provide the basis for human-centred design recommendations in this setting, including both work environments and information technology.

3.10 To Understand the Effect of Frequency of Medicine Usage on Familiarity and Dominance of OTC Medicine Label: A Pilot Study

Author: Mr. Vrashal Verma¹, Dr. Manish Kumar Asthana²

Affiliations: ¹Department of Design, Indian Institute of Technology Roorkee,

²Department of Humanities and Social Sciences, Indian Institute of Technology Roorkee

Keywords: medicine label, usage frequency, over-the-counter

Introduction

In India, individuals use over-the-counter (OTC) medicines, which is quite typical. The information presented to the users on these OTC medicine labels is very vivid and ambiguous. Hence, a study is required to highlight the effect of frequent medicine usage on familiarity and dominance. This study used medicine labels to stimulate the user's frequent interaction with the OTC medicines. Furthermore, the effect of frequency of medicine usage, familiarity and dominance are studied here. Medicine was classified as pills, lotion, nutrition, and general health. A total of 70 participants were conveniently sampled among the general academic public between 18 and 55 years. The study aims to highlight the effect of frequent medicine usage on the familiarity and dominance of OTC medicine in the Indian context. These analyses help in the usage understanding of the categories of OTC medicine. The different label categories of medicine, i.e. pills, lotion, nutrition, and general health, were examined to understand the effect of frequency superiority over familiarity and dominance. The highly frequent users were less confused by label information, which highlights the understanding of users for medication comprehension. The participants' rating scores differed significantly in the high and low categories for dominance and familiarity with the OTC medicine labels. The results highlight the difference in the medicine's usage pattern. The correlation between the frequency, familiarity and dominance of the medicine labels defines the participant's perceptions of OTC medicine. The participants who are highly frequent users are less confused with medicine usage and more familiar with the medicine usage and information.

4 Designing for Patient & Public Partnership Involvement in Patient Safety & Wellbeing

Theme Keywords: co-design, system evaluation, active partners, lived experiences, patient voices

Rationale and Objective

Co-production and patient partnerships are becoming essential to safer, more human-centered care. The submitted works highlight innovative approaches to involving patients, parents, and community members in safety improvement, intervention co-design, and system evaluation. These contributions reflect the critical insight that patients are not merely passive recipients of care but active partners in its design and delivery. By incorporating lived experience and amplifying diverse patient voices, the submitted work aims to bridge gaps between care providers and care recipients, enhancing trust, empathy, and safety outcomes.

Content

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- 4.10 Synk – A Synchronization Device for Asthma Medication Management in Schools

4.1 Older adults and ED nurses' perception of work system barriers and facilitators to collaboration through perspective taking

Author: Prof. Kathryn Wust¹, Prof. Pascale Carayon², Prof. Nicole Werner³, Dr Peter Hoonakker⁴, Dr Hanna Barton⁵, Dr Paula Dail⁶, Prof. Barbara King⁷, Dr Brian Patterson⁵, Dr Manish Shah⁵, Denise Buckley⁸

Affiliations: ¹Department of Industrial and Systems Engineering, University Of Minnesota – Twin Cities, ²Department of Industrial and Systems Engineering, University of Wisconsin–Madison, ³School of Public Health, Indiana University, ⁴Wisconsin Institute for Healthcare Systems Engineering, ⁵BerbeeWalsh Department of Emergency Medicine, University of Wisconsin–Madison, ⁶University of Wisconsin–Madison Patient and Family Advisory Council, ⁷School of Nursing, University of Wisconsin–Madison, ⁸UW Health, University of Wisconsin Hospital and Clinics

Keywords: SEIPS, collaboration, discharge, perspective taking, older adults

Introduction

Multiple studies have used the work system model of the SEIPS model (Carayon et al., 2006) to analyze barriers and facilitators (B/F) in complex care processes. Recent research compares work system B/F from the perspective of multiple clinical and staff roles involved in the hospital to home-healthcare transition (Carman et al., 2021). Yet, little is known about barriers or facilitators identified through perspective taking, i.e., when one perspective identifies a barrier or facilitators from another role's perspective, during collaborative care processes.

Once such collaborative care process is the emergency department (ED) discharge process. During ED discharge, older adults and ED nurses collaborate, e.g., communicate about the discharge instructions, in preparation for the older adult to care for themselves at home. The discharge process is a critical component of an older adult's care in the ED because inadequate instructions and ineffective communication during the process may result in negative patient safety outcomes (e.g., ED recidivism).

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In our study on collaboration during the ED discharge process, we identified work system B/F from the perspectives of older adults and ED nurses (Wust, 2023). This follow-up study aims to identify work system B/F to collaboration between older adults and ED nurses from each other's perspectives.

Methods

We conducted semi-structured interviews with 15 older adults (≥ 65 years) about their ED discharge experience and 10 ED nurses about their perspectives of an ED discharge intervention. Wust (2023) details the methods used to identify work system barriers and facilitators. We conducted an inductive content analysis to identify instance when a B/F excerpt was perceived by the ED nurse from the perspective of the patient or vice versa.

Results

We identified 24 perspective-taking excerpts for work system B/F, representing four work system elements: person, technology & tools, organization, and task.

Older adults perceived barriers for ED nurses related to work overload and understaffing. For example, one patient said, "And I understand they were busy. And I know you're understaffed." (Pt 7). Older adults reported facilitators for ED nurses regarding their ability to serve as patient advocates.

ED nurses perceived barriers for older adults about physical and mental fatigue experienced and the amount of information conveyed during the discharge process. For example, discussing older adult's experience in the ED, one ED nurse said, "sometimes it's just hard because...we're discharging them from the ED, so you've probably got hard day" (ED RN 6). ED nurses perceived a well-designed, usable discharge instruction document as a facilitator from the older adult's perspective.

Discussion

Both older adults and ED nurses demonstrated awareness of barriers and facilitators experienced in each other's work systems, despite the data collection not being designed to explicitly assess perspective-taking. Our results provide

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evidence that patients and clinicians can put themselves in each other's shoes. Future research should assess what each role understands of the other roles B/F to establish common ground, which can serve as the basis to develop solutions for collaboration during complex care processes that benefit both roles.

4.2 Exploring parent-caregivers' experiences and perspectives on 'Fear of Hypoglycaemia' in Type 1 Diabetes: A mixed methods study

Author: Ms Vivienne Howard, Prof. Rebecca Maguire, Prof. Siobhán Corrigan

Affiliations: Trinity College Dublin

Keywords: Type 1 diabetes, fear of hypoglycaemia, lived experience, public and patient partnership, health psychology

Introduction

Hypoglycaemia is a common but dangerous side-effect of insulin treatment for Type 1 Diabetes (T1D), occurring when blood glucose (BG) drops below the healthy range. Hypoglycaemia can be extremely unpleasant to experience and can potentially result in significant neurological damage or death. Hypoglycaemia can occur multiple times weekly, with higher frequencies in children. Fear of hypoglycaemia (FoH) is a construct that purports to capture the psychological and behavioural impacts of hypoglycaemia threat. The Hypoglycaemia Fear Scale (parents) (HFS-P) is commonly used for quantifying this construct in parent-caregivers. High FoH is characterized in the literature as a maladaptive anxiety disorder that adversely affects T1D outcomes. To explore whether this understanding resonates with the lived experience, a public and patient partnership panel (PPP) (n=6) was consulted. Consensus indicated that the construct did not align well with lived experience and that the absence of critical cut-offs for the HFS-P could result in informed caregiving being captured by the tool and misinterpreted as maladaptive. The objective of this study was to investigate the perceived value of the construct FoH and utility of the HFS-P tool for quantifying FoH among parent-caregivers.

Methods

A two-phased, mixed-methods study. Phase 1: 123 parent-caregivers were recruited from an online peer-support group to complete an online survey. The survey included items to capture demographic and illness-related variables, engagement with T1D caregiving practice, T1D knowledge-seeking, HFS-P. A number of open-text qualitative questions asked participants to comment on the FoH construct and its

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perceived relevance, and to explore their assumptions about score interpretations. Phase 2: Eight parent-caregivers and one self-caring adult were purposively recruited for individual interviews where a protocol analysis methodology was utilised to closely examine the individual subjective experience of completing the HFS-P. An interpretive phenomenological analysis (IPA) was carried out.

Results

Phase 1: Higher levels of FoH were significantly associated with better illness management. Child's age, T1D duration and use of technology did not predict FoH. T1D Knowledge seeking and engagement did not predict higher FoH. Content analysis of open-text responses led to the emergence of 4 topic threads: Hypoglycaemia burden and FoH; HFS-P tool; predicting FoH; interpreting scores. Phase 2: IPA led to the identification of 5 themes: Universal concerns; driving hypoglycaemia distress; real-world hypoglycaemia management; HFS-P scepticism; FoH impressions.

Discussion

Findings challenged the common belief that higher FoH correlates with poorer illness management, instead showing that higher FoH may be linked to better health outcomes, supporting findings from the PPP consultation. Qualitative evidence indicated that BG management is highly context dependent, this was not felt to have been captured by the HFS-P. Participants raised concerns about the HFS-P, citing issues with language and relevance to real caregiving scenarios. Overall, the study suggests that the FoH construct and HFS-P scale may not be adequately attuned to the lived experience, resulting in limited utility and the potential to impact negatively on a highly burdened population. The research proposes more judicious use of the construct and highlights the value of PPP consultation in the development of research tools.

4.3 How to structure an HFE approach at regional level: example of a Testing and Experimental Facility

Author: Prof. Sylvia Pelayo¹, M Arnaud Louis², Mr Mathias Charlet², Prof. Alain Duhamel², Ms Marie-Julie Rock³, Dr Benoit Dervaux², the IN CITU stakeholders' committee^{2,4,5,6,7}

Affiliations: ¹Univ. Lille, CHU Lille, METRICS: Évaluation des Technologies de Santé et des Pratiques Médicales, ²CHU Lille, ³La Compagnie des Tiers Lieux, ⁴GRADeS INEA, Santé numérique, ⁵URPS Médecins, ⁶HOSPIMEDIA, ⁷Expert patient

Keywords: Participatory approach, maturity model

Introduction

Health technology has the tremendous potential to change our understanding of disease, transform the delivery of health-care services, and improve health outcomes. But using such technology safely and effectively comes at a price. Issues of appropriate design and implementation have emerged as special challenges. The integration of human factors and ergonomics (HFE) in the engineering recognizes that we are not creating for hypothetical situations but for real people with diverse capabilities and limitations and with specific needs and expectations in specific contexts.

A participative design approach has to be adopted to bring out solutions that are better matched to real needs, while integrating into their operation a diversity of stakeholders' representative of the complexity of the issues at stake in the healthcare environment. This participatory approach must incorporate the experiential knowledge of users and empower. However, notwithstanding the positive strides made towards stakeholder involvement in health technology design and implementation, there is still uncertainty about how best involve patients or carers and how the impact of their involvement should be evaluated. Innovative organizations are needed to work with users (patients, carers), healthcare professionals and the ecosystem actors to develop health technologies that address healthcare issues, users needs and expectations.

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The aim of the paper is to present a regional initiative in France to set up a systemic, integrated and participative approach to support the design, evaluation and implementation of health technologies, this based on an innovation maturity model. A Testing and Experimental Facility (TEF) structure was labelled to test technologies in real-world environments. The TEF was designed with a committee structure to involve patients, carers, healthcare professionals (paramedics, primary care and hospital clinicians) and socio-economic actors in the selection of supported technologies, and even in the TEF management. Secondly, a method of supporting innovation projects maturation was used, the Concept Maturity Levels. This method extends the widely-used TRL metric to include concept maturity in terms of needs (ensuring that HFE methods are mobilized and correctly) and programming (project management tasks).

Methods

A critical reflective analysis using Gibbs reflective cycle (1988) [1] was conducted.

Results

initial results show the value of the interest committee in terms of choice of supported projects, which are better targeted to the region needs, and the experimentation methodology put in place. The CML methods seems promising providing (i) a common language to all actors, including patients and carers, and (ii) more fluid processes in terms of support to evaluation and implementation at a regional level.

Discussion

The committee has now been given other tasks to consolidate its position in the TEF's management. The CML method is being enhanced as part of a continuous improvement process and needs to be disseminated to funders and state instances.

Acknowledgement

The authors would like to thank all the participants in the committee of interest: V. Brulin, L. Guedon-Moreau, A. Hennette, F. Loez, C. Nicoli, G. Veret, A Duhamel and MJ Rock.

4.4 Applying a co-design approach to co-developing patient safety resources

Author: Ms Catherine Hogan¹, Mr Tiberius Pereira², Ms Patricia O'Dwyer³, Ms Noemi Palacios¹, Ms Sophie Yang¹, Dr Orla Healy¹

Affiliations: ¹National Quality and Patient Safety Directorate, HSE, ²Patients for Patient Safety Ireland, ³Sage Advocacy

Keywords: co-design, patient safety, health literacy, public involvement, HSE

Introduction

Knowledge and understanding remain powerful tools in health promotion. The United Nations Ministerial Declaration of 2009 states that health literacy is an important factor in ensuring significant health outcomes. The HSE's National Quality and Patient Safety Directorate (NQPSD) is committed to elevating the patient voice and safety through improved health literacy, to support those who use our services to access and understand health-related information.

Patient Safety Together: learning, sharing and improving (Patient Safety Together) is a reliable and innovative programme within the NQPSD to identify, develop and disseminate patient safety information within the HSE and its funded services. An associated multidisciplinary HSE National Patient Safety Alerts (NPSAs) Committee is tasked with the identification, development, dissemination and evaluation of HSE NPSAs. HSE NPSAs are high priority communications relating to patient safety issues that can cause serious harm or death. NPSAs require HSE services to undertake specific actions within an identified timeframe.

Patient advocate partners within the HSE NPSA committee identified that people who use our health services may have difficulty in understanding any published HSE NPSA. There is a need to use technical and medical language within alerts to ensure staff fully understand the patient safety issue and know what to do as part of the associated required actions, though this may be confusing for those who use the service. However, changing the language used in an alert to make it more understandable for patients/service users may lead to unanticipated consequences. It is essential that the language used both articulates the problem

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and identifies the required action(s) clearly. A subgroup of the HSE NPSA Committee (healthcare staff and patient advocates) co-developed a new infographic ‘What does it mean for me as a patient or service user?’ to be published with every HSE NPSA. Each unique infographic will use non-technical language to explain what the alert is, why it is being issued and what it means for the patient and service user. The infographic will also outline what (if anything) the patient may need to do if the alert is relevant to their care. Prior to finalising the infographic template, patients and service users also tested the resource and feedback with suggested changes to the subgroup.

The benefits of this new resource are; to improve health literacy for those who use our services; to support people to play a more active role in their healthcare by making sure all the information given is clear and questions are answered; to reassure patients and service users that we are working together to continually try to improve care to improve patient safety culture. By truly working together as those who both use and work in health services we can have a lasting impact on patient safety culture. Please see www.hse.ie/pst for more information and for examples of the infographic provided with each alert.

4.5 A Partnership in Practice (Ireland) My Health, My Voice

Author: Ms Juanita Guidera¹, Ms Bernadette O'Reilly², Ms Kara Madden², Mr Kris Kavanagh¹, Ms Sheema Lughmani¹, Ms Sarah McEvoy³, Mr Joe Ryan¹, Dr Orla Healy¹, Dr Maureen Flynn¹

Affiliations: ¹Health Service Executive, ²Patients for Patient Safety Ireland, ³Department of Health

Keywords: patient advocacy, public partnership, community engagement, co-design, health services

Introduction

The aim of this intervention was to improve partnership in health and social care consultations and enhance health literacy to improve patient safety.¹

A national project team with staff and patient partners from Patients for Patient Safety Ireland (PfPSI), the National Patient Safety Office and across the Health Service Executive, co-designed and promoted a series of resources called “My Health, My Voice”. Resources included: a leaflet, audio leaflet, animated clip, poster, video clips, articles, website resources and podcasts. This co-design commenced for World Patient Safety Day (WPSD) 2023 focusing on improving patient partnership.

Learning and building on this, the resources were further developed in 2024, highlighting actions service users and staff can take to improve communications and advocate for themselves within healthcare consultations to improve diagnostic safety.

This is of strategic importance as it is estimated that almost one in three adults will have difficulty accessing and understanding health-related information.² Health literacy impacts patient safety in many ways. One identified solution to improve health literacy is to normalise sharing your health-related information and asking key questions and support a partnership between people using and delivering health and social care.

Methods

We applied an organisational development approach to design this intervention. The project team was co-chaired by a patient partner and HSE staff member and facilitated by National Quality and Patient Safety. Two members of a PfPSI subgroup also joined the project team. Members of the subgroup assessed the evidence underpinning health literacy and existing methods in use and then co-designed, tested and co-delivered materials. We then promoted the message and resources through a targeted communications plan.

Results

A consumer panel of patients, carers and family members evaluated the resources and provided insights which helped refine them. Members of the working group tested the leaflet during their healthcare appointments. And in 2024, we tested the leaflet within services which led to qualitative insights. The consumer panel results indicated that 64% of people were more confident asking questions after seeing the leaflet. This is likely to lead to improved knowledge sharing which will impact patient safety. We also identified invaluable insights about agency, power dynamics and behaviour. For example, in some instances, people may complete the leaflet but still wait for the healthcare professional to ask them about it which provides important human factors learning.

Discussion

Lessons were learned about the co-design process and insights which may impact how people use resources. Co-design work is thought-provoking and often hard when you have multiple people working to build a consensus. We identified key learnings to support future co-design of this nature including the necessity to continue to build psychological safety and trust.³

Collaborating with subject experts like the National Adult Literacy Agency (NALA) and HSE Communications expanded the reach and legitimacy of the final outputs. There are many factors which impact how service users will take up resources designed to support them beyond access or understanding, including perceptions of their own agency and power.

4.6 Maximising Early Breast Cancer Detection: The Importance of Mammographers' Proficiency in Performing the Eklund Technique

Author: Ms Kate Greene, Noelle Clerkin

Affiliation: Belfast Health And Social Care Trust

Keywords: breast cancer, diagnostic imaging, technical proficiency, patient outcomes, mammography

Introduction

In mammography the Eklund technique is used to visualise breast tissue when implants are in situ. This technique offers an additional projection in breast image interpretation which helps to overcome limitations encountered when imaging implants. The success of this technique relies heavily on the skill and expertise of the performing mammographer (1).

To appreciate the complexities of performing Eklund projections, mammographers must be trained to a high standard. Current training methods to perform Eklund projections often rely on conventional approaches and can vary across departments. This has the potential to hinder mammographer performance and therefore reduce overall image quality.

This study aims to assess mammographers' perspective on current training methods and identify areas for development in executing the Eklund technique.

Methods

A quantitative study consisting of a structured survey with 9 close ended questions. This was devised to gauge mammographers' perspectives on current training methods, current training satisfaction levels and areas for development. The survey was circulated across breast units in Northern Ireland. Digital and hard copy versions were made available. Data analysis employed statistical techniques to visualise trends and correlations among variables.

Results

1. 41 mammographers responded to the questionnaire.
2. 82% of participants did not feel adequately prepared for clinical practice with a further 76% experiencing challenges in applying the technique.
3. 93% of participants demonstrated that they would prefer increased hands-on practice during training and would consider the use of a simulation tool to support their learning.

Conclusion

This research highlights that training to undertake Eklund projections needs to be further developed. Simulation techniques and innovative devices could support this training and should be considered.

It is through the implementation of such training that would allow mammographers to optimise their performance and facilitate the early detection of breast cancer.

Impact of your Work

The findings of this research emphasise the limitations of current training methods for mammographers, highlighting the need for more comprehensive and up-to-date training programs and innovative training tools.

We can determine that these findings may have implications for future healthcare policies, funding for training programs and implementation of quality assurance measures in breast cancer screening initiatives.

4.7 Listening to Lived Experience: An Arts Collaboration

Author: Ms Vivienne Howard¹, Mr Matthew McKenna², Ms Aisling Forde³, Mr Grevet Smith Moyo², Dr Joan Alaboson²

Affiliations: ¹Trinity College Dublin, ²Maynooth University, ³Munster Technological University

Keywords: arts-based research, lived experience, patient engagement, storytelling, healthcare communication

Introduction

A group of Science Foundation Ireland (SFI) researchers, working on topics in health- and social-care domains, noted a prevalent strand of qualitative data in their research that spoke to the high-level theme ‘Unheard Voices’. Many of these voices were encountered in the process of applying patient and public involvement (PPI) methodologies. Findings highlighted the day-to-day experience of living with chronic illness or disability or managing technology as an older person. As a research group, we recognise that we cannot tell everybody’s story, but we can remind people to listen. Our objective is to nudge care providers to consider the ‘Human Factors’ at play in individual scenarios encountered. This is important, firstly, because decisions that impact on people’s lives are often made without their input and secondly, because the experience of being ‘heard’ or feeling ‘seen’ can be highly impactful for relieving distress and supporting positive physical and mental health outcomes.

Project aim

Create a researcher/artist collaboration to interpret our data through the lens of the theme ‘Unheard Voices’, producing an artistic output to be shared through multiple platforms to health and social care professionals and patient groups.

Methods

Independently, researchers identified and selected representative quotations from their qualitative datasets (interviews, focus-groups, policy documents). To provide context for these quotations, researchers composed explanatory paragraphs, culminating in the creation of a composite dataset. The research team determined

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that collaboration with a spoken-word artist would offer a creative and impactful means of interpreting the material for performance. A call for expressions-of-interest was disseminated through relevant networks, resulting in over 40 responses from working artists. The selection process was guided by the artists' engagement with the composite dataset, their alignment with the overarching theme of Unheard Voices, and their prior experience in similar projects. The selected artist engaged in individual meetings with each researcher to gain a deeper understanding of their respective contributions to the dataset and to explore personal responses to the material. Drawing on these discussions, the artist independently developed a spoken-word poem and devised a performance.

Results

A performance of the spoken-word poem was recorded by a video artist on a digital format, resulting in a novel tool for communicating a high-level message across multiple contexts (academic, healthcare). Notably, almost 30% of artists who made contact expressed some experience of personal resonance with the theme; “[as a patient with a serious illness] I am so grateful to know there are psychologists actively advocating for greater visibility and amplification of the voices too often failed by our social and healthcare systems”.

Discussion/Conclusion

We believe that the ‘artifact’ created is a powerful tool that will make an impact. It will be presented at conferences, distributed through the researchers’ networks and offered to relevant patient organisations to be included as part of advocacy campaigns.

The tool nudges researchers and clinicians toward a perspective shift and highlights the importance of individual human factors in the ‘lived-experience’ of recipients of health- and social-care, while acknowledging their distress and hopefully delivering some sense of being ‘heard’.

4.8 Designing an intervention to engage patient partners in the co-design of Health Regions

Author: Ms Juanita Guidera¹, Ms Anne Lawlor³, Ms Bernadette O'Reilly², Ms Christine Fenton³, Ms Kara Madden², Ms Lisa Fenwick³, Ms Angela Ryan¹, Ms Eileen O'Toole¹, Ms Marie O'Haire¹, Ms Nuala Scannell¹

Affiliations: ¹Health Service Executive, ²Patients for Patient Safety Ireland, ³Patient and Service User Partner Forum

Keywords: patient engagement, co-design, health systems, regional governance, participatory intervention

Introduction

The Health Service Executive (HSE) provides health and social care in Ireland. In 2024, six Health Regions were established. An Integrated Service Delivery model is being designed to bring community and hospital services together in the Health Regions to deliver integrated care closer to, or in the home, in partnership with people.

The expertise of people using services is vital to developing a quality and safe health care system. In this context, patient partners and service users were invited to join two co-design workshops facilitated by the Organisational Change Unit and National Quality and Patient Safety to explore the Integrated Service Delivery proposals.

Methods

The workshop was designed using an organisational development¹ approach and included 'liberating structures'² (microstructures drawn from complexity science to enhance relationships, conversation and opportunities for creative evaluation and action). The workshop also sought to map the experience of patients and service users using a case study.

In planning, the facilitators noted that there would be a requirement to adapt the approach dependent on the needs of the group.

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Workshop membership comprised nine patients/service users and five HSE personnel who explored key questions. They shared their outputs with senior management from the HSE and Department of Health.

The co-design partners agreed to evaluate the process using a post-event survey (including Likert Scale, open questions, closed questions and free text).

Results

64% (9/14) of partners completed the survey. 100% of respondents indicated that they would work together again.

Respondents acknowledged that there was effective hearing and partnership practice in a respectful and honest environment. Their suggestions to improve the workshops included:

- Time: management and allocation
- Additional consideration to attendees' specific needs (including accessibility)
- Population-representation
- Venue selection
- Workshop methodology

Discussion

Overall satisfaction ratings with the partnership experience were high. Areas for improvement include venue selection, prioritisation of real-life experiences over a case study and longer duration.

Patient partnership has often been restricted to those who are literate and have the means and good health to attend workshops. However, organisations need to identify how the voice of those outside of this traditional cohort may be captured.

It is necessary to build in planning and preparation time into the co-design process. This can be challenging as materials are often evolving up and until the workshop.

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Three-weeks-notice for events and two-weeks to read materials prior were recommended.

Choosing an environment appropriate to the needs of co-design partners is essential. It was recommended to build on conversations with group members to generate questions inviting people to share their needs beyond diet and physical access.

The design of an introductory workshop of this nature must have a clear objective while still maintaining a fluidity to co-design the method. It is recommended to discuss and agree expectations and roles of group members, methodology and ways of working. However, it is also acknowledged that in some instances these will also be influenced by organisational need and that people may have individual and conflicting preferences for ways of working.

4.9 Manual Patient Handling: Neuromuscular Demands During Horizontal Bed Transfers

Author: Dr Wayne Albert¹, Ms. Cynthia Dion¹, Ms Madison Holmes¹, Dr Michelle R. Cardoso²

Affiliations: ¹University of New Brunswick, ²Université de Moncton

Keywords: manual handling, biomechanics, patient safety, ergonomics, hospital staff workload

Introduction

Nurses are among the healthcare workers most affected by workplace musculoskeletal disorders (WMSDs). Patient handling (PH) has been identified as the primary sources of WMSDs in caregivers, predominantly affecting the shoulders and lower back. In New Brunswick, Canada, two competing PH programs have been developed to reduce the biomechanical and neuromuscular strain. Both programs are based on proper body mechanics and the concept of not lifting to reposition patients; however, they have never been scientifically tested.

The purpose of this study was to compare neuromuscular activity during manual patient repositioning using techniques from both the BIF and the ATRM programs when moving a patient horizontally to the edge of the bed.

Methodology

Twenty-six nursing students aged 17–35 years were recruited. The exclusion criteria for this study were that participants must not have experienced low back pain or a shoulder disorder within the 3 months prior to the study.

The BIF program included two techniques for moving a patient horizontally in bed and are referred to as Side-to-Side-1-Caregiver and Side-to-Side-2-Caregivers. The ATRM program included two techniques referred to as Side-1 and Side-2. Each program includes techniques performed with one and two caregivers, and each technique consists of two parts: moving the torso and moving the legs. Participants performed each technique twice, while neuromuscular activity was monitored

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bilaterally on eight muscles, for a total of 16 measurements, using a Bortec Octopus electromyography (EMG) AMT-system. The EMG data were represented as a percent change from maximum voluntary contractions (MVC) for each participant. Statistical differences in average and peak EMG activity were determined with a Wilcoxon signed rank test and Bonferroni corrections.

Results

Moving the torso of the patient, the BIF and ATRM techniques involving two caregivers required significantly lower mean and peak EMG activity than the one caregiver techniques. In two-caregiver techniques: the BIF techniques required significantly lower mean and peak EMG activity in the upper body. However, the ATRM techniques required significantly lower mean and peak EMG activity in the back and legs, with higher peak upper body and arm activity. Moving the patient's legs, the BIF techniques required significantly lower mean and peak EMG activity in the upper body and back compared to the ATRM techniques.

Discussion

The involvement of two caregivers in PH reduces EMG activity, as the physical load is distributed between caregivers and should be strongly recommended. The BIF techniques were more effective in reducing EMG activity in the upper body, as the lower bed height during the technique allowed the caregiver to better engage with their lower body for support. In contrast, the ATRM techniques were more effective for minimizing neuromuscular activity in the back and legs, as the caregiver positions themselves closer to the patient; however, this resulted in increased arm and upper body activity. When repositioning the patient's legs, the BIF technique was preferred, as the caregiver's hands were placed on top of the legs rather than underneath, thereby reducing the amount of lifting required.

4.10 Synk – A Synchronization Device for Asthma Medication Management in Schools

Author: Dr Carlos Manuel Escobar-Galindo, Mr. Joaquin Luis Crisoles, Domingo Seminario-De-Col

Affiliation: Universidad Peruana De Ciencias Aplicadas

Keywords: asthma management, medication adherence, pediatric health, school health, medical device design

Introduction

One of the most prevalent long-term respiratory conditions, asthma, mostly affects children (Ubilla et.al 2021). Timely medication administration is necessary for its proper treatment, and parents usually handle this. However, nurses take on this duty during school hours without speaking with parents directly, which may result in mistakes because of a lack of coordination or monitoring. SYnk, a prototype device that synchronizes parents and school nurses in administering asthma medication, was developed as part of this research to address this problem. The device's design, development, and conceptual validation are presented in this study.

Materials and Methods

Synk was developed using a user-centred methodology that integrated human factors concepts. A literature review was conducted to determine knowledge gaps regarding asthma management in school settings. Then, semi-structured interviews were carried out with school nurses to understand their challenges in medication administration and their communication with parents. Using this information, a 3D prototype was designed using modelling software, and its functionality was simulated based on observations and feedback from school nurses.

Results

Baseline interviews conducted before Synk's development revealed that school nurses face challenges such as the lack of systematic reminders, difficulties communicating with parents, and the risk of dosage errors. These findings guided the design of SYnk. A functional 3D prototype was created during the development

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process, integrating a programmable alarm, a clear display, and a confirmation button. The device includes a visual and audible alert that sounds at the appointed time, one of the device's features, a screen with the patient's name, prescription, and dosage shown, a button for confirmation to document medication administration, and a real-time notification system that updates parents.

According to nurses' feedback, the device was user-friendly and efficient at lowering errors. Nurses emphasized the value of parent notifications, the alarm's practicality, and the display's clarity. Additionally, the compact and portable design was well-received, as it does not interfere with school activities. Nurses also provided suggestions for improvement.

Discussion

SYnk proves to be a relevant alternative in improving patient safety by facilitating synchronization between parents and school nurses. The development of SYnk is based on a human-centred approach, focusing on the triad of parents, children, and healthcare professionals in schools, considering the school system as the environment where this interaction takes place. SYnk's interface includes systems that facilitate decision-making, error reduction, and effective communication, improving the flow of information with parents and enhancing transparency and patient safety. Its compact and colourful design allows for seamless integration into school nursing spaces without occupying much physical space. In contrast, its design reduces the number of decisions and tasks required. Patient safety is reinforced through on-screen verification and manual confirmation, reducing the risk of overdosing or missed doses.

Conclusion

Synk represents an innovative solution to improve asthma management in children during school hours. The device optimizes medication administration and promotes safety and trust by synchronising parents and nurses. Future research will include usability testing, the development of a physical prototype, and a pilot implementation in school

5 Designing for Risk Management

Theme Keywords: resilience, socio-technical risk, participatory ergonomics, predictive analytics, system vulnerabilities

Rationale and Objective

Risk management in healthcare must evolve from reactive incident reviews to proactive system design and redesign. The abstracts in this theme demonstrate methods like FRAM, socio-technical risk modelling, participatory ergonomics, and predictive analytics to identify hazards early and address systemic vulnerabilities. These studies recognize that true operational and care delivery resilience depends on understanding and managing the complex interactions between technology, work systems, and human behaviour, moving beyond traditional compliance models toward dynamic, adaptive risk control.

Content

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5.12 NSW's implementation of a prescription drug monitoring program: perceptions and experiences of implementors and clinicians

5.13 Human Factors Validation of Injection Devices: Ensuring Safe and Effective Use

5.1 Integrating Personality Traits into Risk Management: Insights from Nursing and Midwifery Safety Attitudes

Author: Ms Yeojin Kil, Dr Anna Chatzi

Affiliation: University Of Limerick, Limerick, Ireland

Keywords: personality traits, safety attitudes, nursing, midwifery, risk management

Introduction

Healthcare systems are inherently complex, involving intricate interactions between personnel, equipment, and procedures, contributing to the inevitability of errors (Sousa Santos, 2019). Human factors research in high-risk industries such as aviation and construction highlights the critical need for similar studies in healthcare to improve risk management. Personality traits, extensively studied as key determinants of safety attitudes/behaviours in these industries, warrant further investigation within the healthcare context. However, the application of these findings to healthcare remains underexplored (Kil et al., 2024). This study investigates the correlation between personality traits and safety attitudes among nursing and midwifery students and professionals, exploring their contribution to effective risk management.

Methods

A cross-sectional anonymous survey was conducted with 380 nurse/midwife practitioners and student nurses/midwives from higher education institutions in two European countries. The survey collected demographic information, personality traits measured using the Big Five Inventory), and safety attitudes (measured using an adapted version of the Flight Safety Attitudes Questionnaire-Flight Attendants). Data were analysed using SPSS to explore correlations between demographic factors, personality traits, and safety attitudes.

Results/Discussion

Nurse/midwife practitioners exhibited significantly higher safety attitudes compared to student nurses/midwives. Similar patterns in personality traits were observed in both groups. Extraversion, agreeableness, conscientiousness, and

openness positively correlated with safety attitudes, while neuroticism correlated negatively. Also, both groups demonstrated relatively high levels of agreeableness and conscientiousness and low levels of neuroticism. A hierarchical regression analysis was performed to assess the additional variance in safety attitudes explained by personality traits, beyond that accounted for by demographic factors. It was revealed that conscientiousness was a key predictor of safety attitudes for nurse/midwife practitioners, while agreeableness, openness, and neuroticism were significant for student nurses/midwives.

Conclusion

This study underscores the importance of integrating personality traits into risk management strategies in nursing and midwifery. These findings offer valuable insights for task allocation and the design of safety education programs. The results align with existing literature from other industrial fields, that conscientiousness and agreeableness are positively related to safety attitude, and neuroticism is negatively related. However, given that this study is one of the first to examine these relationships within nursing and midwifery, direct comparisons with other industries are limited. Further research across diverse geographic and cultural contexts is necessary to enhance the generalizability of these findings.

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5.2 Utilizing Functional Resonance Analysis Method (FRAM) to Validate Elements of Conceptual Integrated Risk Management Model

Author: Mr Kevin Hoy, Ms R Hanlon, Ms R Gleeson, Ms L Foley

Affiliation: Resilience Healthcare, Ennis, Ireland

Keywords: FRAM, integrated risk management, system modeling, Delphi method, sociotechnical systems

Introduction

This study uses FRAM (Hollnagel 2012) to validate elements of a conceptual model for integrated risk management in paediatric homecare. The conceptual model's philosophy of integration has the potential for failure and the FRAM enables for the analysis of complex sociotechnical systems, interactions of functions, and resonance of those functions. FRAM has been further expanded to "take the basic data and structures from the current component-focussed system engineering models and pull them all together into dynamic models" (Hill & Slater 2024).

Methods

The conceptual model has been developed using a Grounded Theory approach and extensive literature reviews as part of a separate research study by the author. The Delphi Method in conjunction with FRAM was used to analyse several key aspects of the conceptual model. A panel of experts was identified that have experience in healthcare and knowledge of using FRAM as a quality tool. The FRAM tool was then used to analyse the systems of incident reporting, complaints, and risk assessments. The experts were asked to agree each of the functions in the systems and the process concluded once consensus was mutually agreed upon by the experts. Emphasis was placed on the analysis of the resonance of the functions for risk mitigation within the model.

Results

The use of FRAM enabled early detection of potential risks within the systems, allowing them to be identified and either eliminated or adapted in the conceptual

model before real-world implementation. The use of experts reaching consensus across all systems led to the establishment of a defined structure for the key components of the conceptual model.

Discussion

Using FRAM in conjunction with the Delphi method was a novel adaptation of the established use of FRAM. The approach allowed for the identification of potential risks to a system prior to implementation of the conceptual model. Mapping of the functions, function components, and interactions of the functions enabled a comprehensive representation of the systems for incident reporting, complaints, and risk assessments. This representation further defines the risks and benefits of the functions in the conceptual model. Identification of functions, interactions of functions and resonance can also be seen as beneficial in defining data collection points in the systems for monitoring.

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5.3 COST2CARE: potential for safer care and reduced costs associated with older patients in acute hospitals using hospital discharge data

Author: Dr Marcia Kirwan¹, Ms Anna Connolly¹, Prof. Anne Matthews¹, Mr Fiachra Bane², Prof. Anthony Staines¹

Affiliations: ¹School of Nursing, Psychotherapy and Community Health, Dublin City University, ²Healthcare Pricing Office, Health Service Executive,

Keywords: adverse events, nursing-sensitive outcomes, hospital discharge data, older patients, cost analysis

Introduction

Older patients make up the largest proportion of acute hospital inpatient populations. They are often uniquely dependent on fundamental nursing care, in addition to care associated with their acute presenting condition. Where this care is incomplete, adverse events can occur as a result of hospitalisation, resulting in reduced function on discharge. Collectively known as 'Failure to Maintain' events (F2M) pneumonia, delirium, urinary tract infections and pressure injuries are four common adverse events that occur in older patients. These are nursing-sensitive outcomes, associated with the quality of nursing care provided, which contribute to higher healthcare costs overall. Incomplete or missed nursing care and its outcomes has been of interest to nurse researchers for over 20 years and is usually associated with reduced staffing levels. This study sought to determine the true rates of these outcomes for this cohort of patients and how they are currently represented in routinely available national hospital discharge (HIPE) data in Ireland. An important purpose of the study was to determine the cost to the health service of these frequently occurring events and to demonstrate how sustainable and accurate reporting of nursing sensitive adverse events in hospital discharge data can result in enhanced benchmarking, targeted interventions and ultimately lower rates and costs.

Methods

A structured two-step chart review was carried out in one hospital involving 1,000 patient care episodes (involving patients >65 years, admitted for 3 days or more) to

determine the rates of the F2M events. A validation exercise was conducted to determine how these events were recorded in the discharge data for the hospital. Statistical modelling was used to estimate the national rates using national discharge datasets (HIPE). An economic analysis was carried out using national rates, length of stay and key cost estimates determined during the chart review process including additional treatment and intervention costs.

Results

The local rates for the four F2M events were calculated through chart review in the study hospital. Three hundred and eighty-one events were found in 1,000 admissions. At least one of these events was found in 23% of admissions. The rates identified were as follows: Pneumonia 8.4%, Pressure Ulcers 14%, UTI 5.5%, Delirium 10.2%. Administrative discharge data for these admissions were examined and these events were ICD-10 coded as hospital acquired in only 25% of cases. Results on national rates modelled using local rates taking into account different hospital type, activity, and patient profile are presented along with early cost estimates.

Discussion

The rates identified through this chart review are in line with international studies. ICD coding of the events in hospital discharge datasets is still unreliable. Nonetheless it is clear that there is potential to enhance recording of hospital acquired adverse events in these datasets and that these could then be used as a reliable source of data for benchmarking and evaluation. By estimating costs of these nursing sensitive events, researchers have for the first time estimated the cost of the outcomes of inadequate nurse staffing.

5.4 Tracking the Impact of Patient Handling Interventions Using an Online Safety Reporting System

Author: Ms Anita Jogia, Ms Megan Snetselaar, Mr Zachary Burston, Mr. Peter Lim, Mr Carlos Brooks, Mr Greg Mould, Ms Jessie Bartelen, Mr Michael McQueen, Mrs Charis Johnson-Antaran

Affiliations: London Health Sciences Centre

Keywords: patient handling, incident reporting, staff safety, interventions, occupational health

Introduction

Workplace injuries are a serious issue for the health and social care industry, with the sector accounting for 20 % of all serious claims reported (Kugler, HL. et. al., 2024)¹. This study tracks changes in the total number and severity of reported patient handling incidents with implementation of various interventions. This type of tracking could guide leaders and practitioners in identifying interventions that might impact a reduction in incident reports. The study's purpose is to see what impact patient handling interventions have on staff incident reports.

Methods

Using a field study approach, the hospital's Occupational Health and Safety (OHSS) team used their online safety reporting system to track the total number and severity of patient handling incidents on one clinical unit for 3 fiscal years; April 1 to March 31, 2021/22, April 1 to March 31, 2022/23, and April 1 to March 31, 2023/24. The following interventions were randomly implemented during this time: patient handling training, onsite audits of patient handling practices, patient handling equipment, and bi-weekly rounding talking to unit staff on patient handling concerns. The OHSS team worked closely with unit staff to implement interventions.

Results

There were no significant changes in the total number of incidents reported during the 3-year period; with 13 reported in 2021/22, 18 reported in 2022/23 and 12 reported in 2023/24. However, a decrease in incidents was seen in the 3 months post

mandatory training. No major changes were seen in the severity of events, specifically level 3 (medical aid) or level 4 (lost time) events.

Discussion

Initial decreases in the total number and actual severity of incident reports was seen following practical training, additional equipment, audits and rounding. However, using staff safety reports to track interventions to reduce patient handling incidents is limited, and a field study approach does not control other factors such as staffing and organizational changes that may also influence reporting of incidents. Also, using total number of incidents reported on the unit may have been negligible to show any significant impact. While each intervention was well received by staff on the unit, their impact on reducing incident reports is unknown.

Summary

Incident reports are often used to track the safety of a system. However, there are limitations in using the same system to track the impact of patient handling interventions. A controlled study in an area with more incidents might help leaders and practitioners decide which intervention has the most impact.

5.5 Implementation of a participatory ergonomics intervention at a teaching hospital in Ghana: a piloted case study

Author: Dr Hephzibah Okyere-Mensah¹, Dr Isabella Amartey¹, Dr Ruth Owusu¹, Dr Aikins Minas², Mr Alfred Owusu³, Dr Emanuella Osei-Tutu^{1,4}, Dr Ernest Kissi⁵, Dr Emmanuel Kyeremateng-Amoah⁶

Affiliations: ¹Public Health Unit, Komfo Anokye Teaching Hospital, ²Internal Medicine Directorate, Komfo Anokye Teaching Hospital, ³Quality Assurance Unit, Komfo Anokye Teaching Hospital, ⁴Department of Global and International Health, Kwame Nkrumah University of Science and Technology, ⁵Department of Construction Technology Management, Kwame Nkrumah University of Science and Technology, ⁶Health and Nutrition Section, UNICEF

Keywords: Healthcare, Musculoskeletal disorders, participatory ergonomics

Introduction

Work-related Musculoskeletal disorders (WRMSDs) are increasingly emerging as a growing concern among health worker populations. This is largely attributable to the huge impact on their quality of life and well-being. Participatory Ergonomics (PE) is an efficient approach for reducing the risk of MSDs. However, this approach has not been well utilised in healthcare settings within the Ghanaian context. Thus, this study sought to implement a Participatory Ergonomics intervention by identifying ergonomic risk factors that increase the risk of developing WRMSDs and conducting follow-up training for health workers.

Methods

The study was bi-phasic and conducted from August to September 2024 in a clinical directorate of a Teaching Hospital in Ghana. The first phase (research phase) utilised a mixed-method approach, which involved a survey of seventy conveniently sampled health workers to identify ergonomic risk factors and propose solutions, followed by an observational analysis of work-related factors that increase the risk of MSDs. The second phase (Intervention phase) utilised the research findings to design ergonomic training for health workers in the directorate.

A descriptive and chi-square analysis of the research findings was performed and presented alpha numerically.

Results

Health workers exhibited a low level of knowledge concerning safe ergonomic practices (average test score of 28.5%). Though working in awkward postures (63%), manually handling heavy patients and equipment (83%), and burnout from voluminous workload (40%) were identified as potential risk factors for WRMSDs among the workers, it was observed that a significant relationship existed between; occupation and the occurrence of MSDs ($\chi^2 = 14.52$, $p = 0.02$) and awkward hip flexion and the occurrence of MSDs ($\chi^2 = 5.41$, $p = 0.02$). In addition, it was revealed that the wards were poorly spaced, workstations were poorly designed, and several work equipment were not adjustable to suit individual differences and needs.

One month after the research, an ergonomics training lasting over 3 hours was conducted for health workers in the directorate, with 100 staff and supervisors participating. The training hinged on risk factors identified from the study, ergonomics, risk management and working as a team. It was recommended that management create Participatory Ergonomics teams that will be supported by experts to identify problems, propose and implement solutions. In an evaluation conducted 6 months post-training, 92.9% of the 40 training participants interviewed indicated an improvement in their knowledge of risk factors for developing MSDs and on ergonomic principles.

While 74% of the respondents attested to practically applying the knowledge received from the training, 56 % had observed an improvement in their Musculoskeletal health post-intervention.

Discussion

This study underscores 'Occupation' and 'Awkward posture' as significant risk factors for MSDs within the directorate. It illustrates how ergonomics research facilitated the development of targeted training. It calls attention to repositioning resources to objectively assess risks related to specific tasks and sub-tasks performed by different professions. Additionally, it highlights the critical role of

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research and worker consultation in designing evidence based safe work policies and responsive ergonomic interventions.

5.6 Safety and quality of maternal and neonatal pathway in Kenya: the implementation of the WHO Safe Childbirth Checklist

Author: Mrs Giulia Dagliana¹, Dr Barbara Tomasini², Dr Stefano Zani², Dr Maria Vittoria De Vita³, Dr. Diego San Josè⁴, Dr Gianfranco Morino³, Mr Francesco Ranzani¹, Dr Washington Njogu³, Mrs Lucia Pincerato⁵, Dr Maria Josè Pinilla Caldes⁶

Affiliations: ¹Center For Clinical Risk Management And Patient Safety Of The Tuscany Region, ²Teaching Hospital Siena, ³Amici del Mondo–World Friends Onlus, Ruaraka Uhai Neema Hospital, ⁴Hospital Universitario Ramón y Cajal, ⁵Amici del Mondo–World Friends Onlus, ⁶Center for Global Health

Keywords: maternal safety, neonatal care, Safe Childbirth Checklist, implementation science, Kenya

Introduction

A 2014 WHO report highlights that most neonatal deaths, maternal deaths, and stillbirths occur during labour, delivery, and the first week after birth, with the majority in low- and middle-income countries. Poor-quality facility-based care remains a key factor in these high mortality rates. Research shows that maternal care quality is often influenced not only by clinical skills but also by access to training, adequate resources, teamwork, and effective communication among healthcare workers. In response to these challenges, WHO introduced the Safe Childbirth Checklist (SCC), a tool listing essential birth practices to reduce maternal and neonatal mortality by ensuring critical practices are followed in health facilities. This research aims to assess the impact of SCC implementation in a high-complexity hospital in Nairobi, Kenya, measuring adherence to essential birth practices and comparing pre- and post-intervention outcomes, while analyzing the checklist's sustained effects over time.

Methods

A retrospective experimental study with pre-post-intervention analysis was performed in Ruaraka Uhai Neema Hospital, in Nairobi. The study period was from 2016 to 2022, with 2016 being the pre-intervention period and from 2017 being the

post-intervention years. The intervention consisted of training of clinical staff and introducing the WHO Safe Childbirth Checklist into routine clinical practice.

Results

The study found a 32.4% increase in compliance with essential birth practices (EBP) in the post-intervention group compared to the pre-intervention group (91.4% vs. 59.0%; $p < 0.001$). The largest improvements were seen in prepartum body temperature measurement (an increase of 95.4%, from 0.5% to 95.9%; $p < 0.001$), newborn temperature measurement within 2 hours of birth (an increase of 82.4%, from 0.5% to 82.9%; $p < 0.001$), and the use of uterotonic drugs only if blood loss exceeded 500 ml (an increase of 57.2%, from 24.7% to 81.9%; $p < 0.001$).

Discussion

Improving quality and safety standards requires not only clinical interventions but also the implementation of organisational changes that foster non-technical skills, such as a strong culture and commitment to safety, structured communication among providers, effective teamwork, and "situational awareness." These improvement projects primarily aim to shift behaviours, establish best practices in care delivery, and cultivate a safety-oriented mindset among both patients and providers.

The introduction of the Safe Childbirth Checklist had a positive impact on healthcare workers' adherence to clinical protocols for supporting women and newborns throughout childbirth, from labour to discharge. Consistent with other studies in Africa and India, our findings showed significant improvements in adherence to key safety practices, targeting the primary causes of maternal and neonatal mortality.

5.7 Safety at the expense of quality? An ethnographic examination of aggression prevention and management practices in mental health wards.

Author: Dr Mary Lavelle¹, Ms Francesca Cibelli², Ms Olivia Lounsbury³, Dr. Natalie Sanford⁴, Prof. Janet Anderson⁵

Affiliations: ¹Queens University Belfast, ²City, University of London, ³Oxford University, ⁴King's College London, ⁵Monash University

Keywords: aggression management, restrictive practice, mental health, ethnography, organisational priorities

Introduction

Aggression is an unpredictable, safety critical, and emergent phenomenon on mental health inpatient wards. Evidence suggests that aggression can be prevented or de-escalated successfully when it is identified early in the patient trajectory. When unsuccessful, aggression is managed through the use of restrictive, and potentially unsafe practices including physical restraint, seclusion in a locked room, and forced tranquilisation. Because of the significant staff and patient safety risks associated with restrictive practice, early de-escalation is preferred whenever possible.

The aim of this study is to understand the mechanisms staff employ to prevent, respond to, and learn from, incidents of conflict and aggression on wards and the factors that influence their use.

Methods

Ethnographic observations (350 hours) of routine work across seven acute adult mental health inpatient wards were conducted. Semi-structured interviews with ward staff (n=16) further explored the routine work on the wards from the staff perspective. The key mechanisms staff employ and their use in practice was examined.

Results

Misalignments between resource capacity and demand were ubiquitous across wards. Under these conditions, patient-focused mechanisms designed to engage with patients and build therapeutic rapport (e.g. patient activities) were often cancelled. Similarly, mechanisms designed to learn from incidents of conflict (e.g. debriefs and reflective practices) were completed in a way that was deemed to be more tokenistic (e.g. attended by more junior members of staff). Staff prioritised tasks that were perceived to have high organisational priority, many of which required time in the nursing office on a computer or completing paperwork.

Discussion

Organisational priorities as perceived by ward staff do not align with mechanisms for de-escalation, aggression prevention, and shared learning. Moreover, these organisational priorities may contribute to increased aggression and restrictive practice due to a reduction in patient-focused activities. There appears to be a tension between the organisational priorities driven by markers of quality (e.g., audit) versus safety aims (e.g., minimising use of restrictive practice). The next step in this programme of work is to co-produce organizational strategies that support the prevention of conflict on inpatient mental health wards while maintaining safety and care quality.

5.8 Taking a socio-technical systems approach to supporting the care of patients with sepsis - SEIPS3.0 for SEPSIS

Author: Prof. Una Geary¹, Dr Nadim Akasheh², Mr Lionel P Pusing³, Ms Triona Yearsley⁴, Dr Arthur Hennessy⁵, Ms Louise McDonagh⁵, Prof. Marie E. Ward^{6,7}

Affiliations: ¹Quality and Safety Improvement Directorate, St James's Hospital, ²Internal Medicine, MED Directorate, St James's Hospital, ³Nursing Practice Development Unit (NPDU), St James's Hospital, ⁴Advanced Nurse Practitioner, SACC Directorate, St James's Hospital, ⁵Emergency Department, St James's Hospital, ⁶Health Systems Learning and Improvement, St James's Hospital, ⁷Centre for Innovative Human Systems, Trinity College Dublin

Keywords: sepsis care, SEIPS 3.0, socio-technical systems, hospital safety, co-design

Introduction

Sepsis is a common, time critical, life-threatening medical emergency. The early recognition and treatment of sepsis by healthcare professionals at the point of presentation or clinical deterioration is crucial to patient survival. A recent meta-analysis found that there were an estimated 48.9 million cases of sepsis and 11 million sepsis-related deaths in 2017 (Rudd et al., 2020). The 'sepsis six' care bundle was introduced in the UK in 2006 but compliance to the bundle remains poor (Yin, 2020). In this study the Systems Engineering Initiative for Patient Safety (SEIPS)3.0 (Carayon et al., 2020) was applied by a group of clinical and Human Factor Ergonomics (HFE) experts to identify factors that would support the care of patients with sepsis from a socio-technical systems (STS) perspective in a large acute teaching hospital.

Method

Qualitative methods including a clinical review of cases, documentation analysis including national reports into deaths from sepsis, and a multi-disciplinary focus group between healthcare clinicians and HFE experts were used to explore the issue of SEPSIS from an STS perspective and to co-design recommendations for improvements.

Results

The findings are presented using the SEIPS3.0 STS framework under the different STS components of patient, care team, clinical tasks, tools and technology, organisational conditions, physical environment, external environment, intersections of these STS components and outcomes. Recommendations for improvement were co-designed by all stakeholders and include recommendations for each of the components and across these systems components e.g. introducing real time automation from what is currently a manual task of updating routine patient monitoring measures (e.g. blood pressures, oxygen rate) into the electronic patient record (EPR); building the sepsis six process and pathway into the EPR; providing HFE training to support the recognition and management of deterioration, e.g., understanding the potential impact of cognitive bias in clinical decision-making, the importance of psychological safety and speaking up for safety, communication for handover; appropriate physical environments for the management of deteriorating patients. Recommendations for process, outcome and balancing measures were also co-designed.

Discussion

Sepsis is a life-threatening condition. This study has found that taking an STS approach to look at all factors in an acute hospital setting that could help support the identification and care of patients with sepsis would be beneficial in co-designing a holistic set of recommendations for improving sepsis care. System thinking and co-design can support a holistic understanding of system change, including ways to make the parts of a system work better together. This is important given the complexity of healthcare and the interaction of many components that are in a state of flux which is of particular current significance in relation to the development and implementation of digital healthcare tools and technologies including real time patient monitoring or 'digital twins' and EPRs. There is an urgent need that human wellbeing and social systems are improved and integrated at the same time as technological developments. It is through harnessing this STS approach that we can have more impact on change and ultimately improving the quality and safety of patient care.

5.9 Building an Ontology for Proactive Risk Control

Author: Dr Nick McDonald¹, Prof. Marie E. Ward^{1,2}, Prof. Una Geary², Dr. Rob Brennan³

Affiliations: ¹Centre for Innovative Human Systems, School of Psychology, Trinity College Dublin, ²Quality and Safety Improvement Directorate, St. James Hospital, ³ADAPT, School of Computer Science, University College Dublin

Keywords: risk ontology, enterprise risk management, socio-technical systems, controls, knowledge base

Introduction

Effective risk management in healthcare requires the flow of contextually valid operational evidence. However healthcare data and experience is often siloed. This is one factor that underlies the high level of failure of improvement initiatives. Leveraging healthcare digitalisation offers a potential solution – combining data and qualitative evidence in a Knowledge Base. This should represent current operational experience and could derive guidance for best practice for complex operational processes. Mindful Governance (MG) of operational risk is a practical approach to creating accountable governance that is grounded in operational experience. The MG methodology is supported by the Access Risk Knowledge (ARK) platform, which incorporates the Cube Socio-technical system analysis (STSA) methodology (McDonald et al., 2021). This has been shown to be effective in capturing implicit operational knowledge in healthcare settings. ARK can in turn support the adoption of Enterprise Risk Management (ERM) in healthcare (e.g. HSE, 2023).

Underlying the ARK platform is a set of formal ontologies providing a machine-readable framework for collecting and processing risk management evidence. Controls are a critical component of the risk management cycle. Previous work developed a unified controls ontology aligning ERM, Hierarchy of Controls (NIOSH) and STSA concepts. This paper describes the extension of this ontology by identifying relationships between control types to enable monitoring of controls in the MG approach.

Methods

The NeOn Methodology, a scenario-based methodology that supports collaborative ontology development (Suárez-Figueroa et al., 2011), was deployed as follows, by a multidisciplinary team of Computer Science, Human Factors and Healthcare professionals: goals, scope, and requirements were specified; ERM, NIOSH and Cube use cases focused on healthcare infection control were used to gather domain knowledge; the Data Privacy Vocabulary, which includes an extensive risk model, was identified for reuse. Ontology design specified the relationships and new concepts required. The ontology will be tested for logical correctness by integrating it into the ARK Platform. A validating case study will be performed.

Results

The enhanced ontology links controls (and NIOSH control mechanisms) to actions required (and their implementation). Twenty-nine new relationships were required to model these links. Using the administrative mechanism of attestation (affirming the validity of the programme of control), it links to the Obligation to Act framework of MG in which the importance, efficacy, viability, reliability and verified outcome of a control are attested in line with the sequence of implementation of that control. The 'Risk in Change' (projected or monitored) addresses the real risk of implementation failure despite the technical qualities of the control. This ends with a new 'Residual Risk' linked to the verified outcome of the control implementation.

Discussion

This framework supports transparent accountability of risk management across a complex operational system, linking activity to outcome across an implementation sequence. It enables sorting and aggregation of data to build a knowledge base from multiple related projects enabling coordinated organisational missions with clear objectives and explicit means of attaining them. This is an initial contribution to making healthcare work as a people-centred system, supported by data and information transformed into actionable knowledge.

5.10 Ergonomics and Management of Floseal kit in five surgical specialties and medico-legal implications.

Author: Prof. Riccardo Tartaglia¹, Chiara Parretti¹, Chiara Seghieri², Giuseppe Candido³, Micaela La Regina⁴, Dr Francesco Venneri⁵, Vittorio Fineschi⁶

Affiliations: ¹Department of Engineering Sciences (DSI), Guglielmo Marconi University, ²Management and Health Care Laboratory (MeS), Scuola Superiore Sant'Anna, ³Polytechnic University, ⁴Clinical Governance and Risk Management, Ligurian Health Authority n. 5, ⁵Clinical Risk Management and Patient Safety Center, Tuscany Region, ⁶Department of Anatomical, Histological, Forensic and Orthopaedical Sciences, Sapienza University of Rome

Keywords: surgical ergonomics, medical devices, Floseal, usability, medico-legal risk

Introduction

Controlling bleeding is certainly one of the most closely watched procedures and classified as a possible complication and harbinger of malpractice, a source of risk for the surgeon. Floseal (Baxter Healthcare Corporation) is a hemostatic matrix combining gelatin and thrombin, designed to control bleeding in surgical settings where standard techniques are ineffective or impractical. This study aimed to evaluate the number of kits used in various types of surgical procedures and to analyze the ergonomic characteristics, usability, and effectiveness of the medical device concerning procedural difficulty and hemorrhagic risk.

Methodology

The study included a quantitative analysis of 95 cases to assess the consumption of kits across different types of surgeries, as well as a qualitative ergonomic analysis through indirect observation of videos showing Floseal's application during surgical procedures. Thus, some possible medico-legal implications were evaluated.

Results

The quantitative study, conducted in several hospitals in Tuscany, showed that 93% of procedures required only one Floseal kit, with the highest usage in open surgeries (76%). The device was rated as highly effective (scores of 4–5 on a Likert scale) and

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demonstrated excellent ease of use (73% of cases). Regarding ergonomic aspects, the device showed outstanding ease of application without significant issues, even in complex settings such as robotic and laparoscopic surgeries. Attention to proper usage is essential to avoid errors (e.g., use in non-expandable areas or the risk of intravascular thrombosis), and preparation of the device is necessary to ensure rapid intervention times.

Conclusions

Floseal is a highly effective and user-friendly hemostatic device with broad applicability across various surgical specialties. Limited kit consumption per procedure (93% of the surgeries required only 1 kit) contributes to waste reduction and optimal hemorrhage management, moreover, the ergonomic design and usability of the surgical device highlights its effectiveness in hemorrhage control during surgery

5.11 Hazard identification and ergonomic risk management in a hospital complex: methodology based on Brazilian legislation guidelines

Author: Ms Angélica Juns¹, Mrs Adília Takasaki¹, Ms Ester Lopes¹, Mr Octávio de Oliveira¹, Mrs Gabriela Florez¹

Affiliations: ¹Sírio-Libanês

Keywords: ergonomic risk, hospital safety, hazard identification, legislation, occupational health

Introduction

National labor legislation, applicable to all Brazilian institutions with employment contracts based on the Consolidation of Labor Laws, provides the management of occupational risks in accordance with ISO 45001 standards. There is a specific regulation on Ergonomics, Regulatory Standard 17, which requires companies to conduct a Preliminary Ergonomic Assessment of all work situations to identify ergonomic risks in activities, categorize them by severity, and plan for their management. Compliance with this standard is still a significant challenge for large hospital complexes with an extremely wide range of functions and work activity. Therefore, the objective of this study was to define the method and conduct a Preliminary Ergonomic Assessment of all job functions in a private philanthropic hospital complex.

Methods

This is an analysis of work activities conducted in a private philanthropic hospital complex with an annual average of 600 inpatient beds and approximately 9,000 workers, with units located in São Paulo - SP, and Brasília - DF, Brazil. Nine ergonomists were responsible for carrying out the study. Initially, hazards were identified based on National Security data and country legislation. Fifty-three hazards were divided into the following domains: organizational, biomechanical, machinery and equipment, environmental, and cognitive. To measure ergonomic risks from the hazard analysis, an adaptation of the Failure Mode and Effect Analysis (FMEA) methodology for ergonomics was performed. Work activities were analyzed in work subprocesses and subsequently classified according to the FMEA index,

measured by multiplying the items of severity (1-3), probability (1-3), and control (1-3). Based on the numerical value, risks were classified as: insignificant (1), mild (2-3), moderate (4-9), severe (12-18), and intolerable (27).

Results

406 job functions were evaluated, and 4,693 hazards were identified. The hazards were classified into 616 severe ergonomic risks, 2,997 moderate risks, 1,032 minor risks, and 48 insignificant risks. Considering that intolerable risks required an immediate action plan and resolution due to the risk to the employee's health. The sectors with the highest volume of risks were the Surgical Center, Emergency Room, and Nutrition, and the positions were Nursing Technician, Nurse, and Cleaning Assistant. Most severe biomechanical ergonomic risks were classified from the hazards of lifting and manual handling of loads and standing for long periods, while severe organizational and cognitive risks were from the hazards of needing to maintain intense work rhythms and a workforce incompatible with production/operation demand.

Discussion

For the hospital institution to achieve sustainable expansion and ensure quality of life and workplace safety for employees, it is necessary to have the integrated action of several hospital sectors to execute action plans to mitigate ergonomic risks. The main areas in this process are Occupational Safety, Human Resources, Information Technology, Projects and Works, Clinical Engineering, and Maintenance. Support from the Executive Board and the People Management Board is also essential. Only the integrated management of work process improvements ensures the effectiveness of implementing improvements in Ergonomics and Human Factors.

5.12 NSW's implementation of a prescription drug monitoring program: perceptions and experiences of implementors and clinicians

Author: Dr Emma Tay¹, Prof. Meredith Makeham^{2,3}, A/Prof. Tracey-Lea Laba⁴, Prof. Melissa Baysari¹

Affiliations: ¹Digital Health Human Factors Research Group, Faculty of Medicine and Health, The University Of Sydney, ²Faculty of Medicine and Health, The University of Sydney, ³Faculty of Medicine, Health and Human Sciences, Macquarie University, ⁴Centre for Health Economics Research and Evaluation, The University of Technology Sydney

Keywords: drug monitoring, digital health, stakeholder perceptions, system usability, policy implementation

Introduction

Prescription drug monitoring programs (PDMPs) are employed globally as a strategy to address and manage harms related to high-risk medicines, such as overdoses and deaths. PDMPs typically track medicine use and provide alerts to healthcare practitioners to facilitate risk management. The PDMP in New South Wales (SafeScript NSW) was rolled out between October 2021 and May 2022. Medicines monitored include opioids, benzodiazepines, gabapentinoids, and other controlled medicines. (NSW Health) Existing research evidence on PDMPs was predominantly generated from US studies, with limited Australian studies.(Tay et al, 2023) Here, we describe and compare the findings from two sub-studies exploring the experiences of two key stakeholder groups, the implementation team and clinician end-users. We examined perceived 1) value and understanding of PDMP, 2) roll-out strategies that worked well, 3) barriers to roll-out and uptake, and 4) elements for long-term success of SafeScript NSW.

Methods

The studies formed part of a larger mixed methods evaluation of stakeholders' experiences of SafeScript NSW. Qualitative semi-structured interviews were held with implementors in March–April 2022, and an online survey was used to collect data from clinicians in May–August 2023. Implementors were stakeholders directly

responsible for the implementation of SafeScript NSW. NSW-registered prescribing and dispensing practitioners were eligible clinician participants. Descriptive statistics were used to analyse quantitative data and an inductive and deductive approach used to code and analyse qualitative data.

Results

Eight interviews were conducted with implementors and thematic saturation was reached. In the clinician study, 1235 responses were received. In both studies, respondents had a common understanding of the perceived value of PDMP for monitoring high-risk medicines. Most clinicians indicated it was useful for patient care-related activities, including making dispensing or prescribing decisions. The implementors viewed stakeholder engagement as critical for successful roll-out, alongside promoting uptake of training support, and targeting end-user experience. About half (49.7%; 525/1057) of the clinicians had not undertaken training although the majority (61.6%; 663/1077) rated SafeScript NSW as easy to use. Implementors identified some barriers to roll-out, particularly poor usability, end-user experience of the tool, lack of resources to manage increased workload introduced by SafeScript NSW, and broader systems integration. This was consistent with clinicians who said that difficult the log-in process (25.3%; 455/1795), time required to access (25.1%; 450/1795), and lack of systems integration (17.5%; 315/1795) were barriers to use. Other clinician-identified barriers included not knowing how to enrol or use SafeScript NSW and not having access at work. Nonetheless, 75.6% (767/1014) clinicians indicated they were extremely likely to use SafeScript NSW in the future.

Discussion

Many similarities (value, usability, integration) and minor differences (training, support) were found in these key stakeholder perceptions of SafeScript NSW. Both groups indicated that for long-term success, positive end-user experience and a perception that the system adds value and produces meaningful clinical impact were important. Understanding the perspectives of all key stakeholders proved useful for identifying areas for improvement, to ensure increased uptake, and the anticipated benefits from SafeScript NSW. We recommend examining all stakeholder experiences in future implementations and evaluations of digital systems.

5.13 Human Factors Validation of Injection Devices: Ensuring Safe and Effective Use

Author: Dr Thomas Stuedeli

Affiliation: F. Hoffmann–La Roche Ltd, Basel, Switzerland

Keywords: usability testing, injection devices, validation, risk management, patient safety

Introduction

This paper discusses the critical role and aspects of human factors (HF) validation in the development and regulatory approval of injection devices based on lessons learned from HF practice in pharma. It emphasizes core principles such as user-centered design, risk management and quality.

One core principle underpinning HF validation is user-centered design. This involves understanding the target user populations and their characteristics (e.g., age, dexterity, visual acuity, medical condition, education), and the intended use environment (e.g., home use, clinical setting). By incorporating these factors early in the design process, potential usability issues can be identified and addressed proactively, minimizing the likelihood of errors during actual use.

Another core principle of an HF validation is risk management. The process of identifying and evaluating use-related hazards plays a crucial role. Specifically, HF activities are helping to determine the probability and severity of potential use errors and their impact on patient safety. By systematically analyzing user interactions with the device, including tasks such as preparation, administration, and disposal, potential failure modes can be identified and mitigated e.g. through design modifications. This risk-based approach ensures that the device's design minimizes risks to an acceptable level, considering the benefit-risk balance.

And last but not least, the HF validation is an integral part and relies on a compliant quality management system (QMS). Only with a high level of , demonstrating a manufacturer's commitment to product safety and effectiveness. The importance of documenting the HF process, including user research, formative and summative

✦ Designing for Risk Management

usability evaluations, and risk management activities can not be overestimated. It's the documentation that provides evidence to regulatory authorities that the device has been rigorously tested and validated to meet user needs and safety requirements.

Next to the importance of the above mentioned core principles the paper also discusses different validation approaches and strategies and points out the importance of post-market activities and real-world data that can provide valuable insights into real-world device use, further informing the HF validation process and contributing to continuous improvement.

6 Designing for Healthcare Staff Wellbeing

Theme Keywords: injuries, fatigue, workload monitoring, staff emotions, organisational design

Rationale and Objective

The wellbeing of healthcare workers is intrinsically linked to patient safety and system performance, becoming the fourth pillar of the quadruple aim. Submissions in this theme explore ergonomic design, injury prevention, fatigue management, workload monitoring, and innovative supports like exoskeletons and back care programs. They also highlight the emotional dimensions of healthcare work, particularly post-pandemic. The abstracts advocate for a systems view that recognises wellbeing as a product of organisational design, not just personal resilience, and call for greater investment in the safety, satisfaction, and professional development of healthcare staff.

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6.1 Analyzing activity to understand and prevent violence in care. The case of care for elderly people with neurocognitive disorders (NCD).

Author: Dr Richard Renaudin¹, Mme Vanina Mollo^{1,2}, Mme Irène Gaillard¹

Affiliations: ¹Université de Toulouse, CERTOP (UMR 5044) – Maison de la Recherche, ²Cnam, CRTD (EA 4132)

Keywords: workplace violence, neurocognitive disorders, occupational health, activity analysis, geriatric care

Introduction

More than 55 million people worldwide suffer from neurocognitive disorders (NCD) linked to age-related neurodegenerative disease, including 1.2 million in France, and these figures are tending to increase in view of longer life expectancy (WHO, 2023; Rochoy & al., 2019). In the course of their work, caregivers may be exposed to aggressive behavior on the part of elderly patients with NCD (DRESS, 2016). These situations can be perceived and experienced as a form of violence, leading to difficulties in providing the expected care, with consequences for caregivers occupational health. The aim of this research is to understand what can lead to the emergence of “Potential Situations of Aggression” (PSA), and what caregivers do to prevent the emergence of PSA or deal with these situations when they do occur. We consider that PSA, like care, are the product of the coupling between the activity of caregivers and that of patients in a given context. Through the analysis of caregivers’ activity, we will seek to co-construct, on the one hand, a model of intrinsic understanding of violence, and on the other, organizational practices that support the health of caregivers and the achievement of expected care (Gaillard & Mollo, 2019). The methodology combined documentary analysis, observation and interviews in a medical gerontology department. Three days of observation were carried out, targeting inter-team transmissions and the performance of hygiene care with elderly patients suffering from TNC. In agreement with the professionals and patients concerned, three of the treatments were filmed for later use. Two were carried out by a single caregiver, the third by a team of two. Semi-directive individual interviews were conducted with three care assistants (CA), two medical-psychological assistants (MPA), one nurse and the department manager to understand their representations and experiences of aggression, any training they

had received, and their experiences in dealing with PSA. Five individual autoconfrontation interviews were conducted with the four caregivers observed, on the basis of the films made, so that they could become aware of and explain their actual activity (Mollo & Falzon, 2004; Cahour & al., 2016). Five explicitation interviews were conducted with a CA, the two MPAs, the nurse and the manager in order to analyze their lived experience of PSAs and enrich the understanding of activity and its determinants (Vermersch, 1994). Initial results show the omnipresence and physical nature of aggressive behavior in the form of blows, scratches and bites. They lead to incomprehension and vulnerability on the part of caregivers, due to their unpredictability and the danger they entail. Various individual and collective regulation strategies have been identified. They are aimed as much at being able to act as at staying safe. Some help to anticipate and prevent the onset of PSA, others to react to manifestations of aggression. These knowledge and skills remain invisible, even though they could contribute to caregivers' professional development, health and safety. The co-construction of dialogical spaces focused on analysis of caregiver activity by all could contribute to this.

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6.2 Exploring Hospital Staff Experience of an Occupational Health Biopsychosocial Back Care Programme

Author: Ms Aisling Purcell

Affiliation: St. Vincent's University Hospital, Dublin, Ireland

Keywords: occupational health, back care, biopsychosocial model, hospital staff, staff wellbeing

Introduction

St. Vincent's University Hospital introduced The Working Back's Programme (WBP) in 2003, providing staff reporting back pain access to Occupational Health (OH) and Physiotherapy services. The aim of the programme is to support employees with back problems and to reduce the length of time required off work due to these issues. This is achieved using a biopsychosocial approach to back pain management including medical assessment, provision of information and education, a designated physiotherapy and ergonomic staff referral service and a referral pathway for further investigations and/or consultation if required.

The programme is a joint initiative by the OH department and the Physiotherapy department. The original format of the programme involved an initial telephone triage call with an OH nurse and direct referral to the OH physician, who would then refer to a dedicated staff physiotherapist as required. One recurring challenge of the programme was the average wait times for appointments (10 weeks).

In response to this, the WBP was restructured in 2022 and a joint, first point of contact, Advanced Nurse Practitioner and Specialist Physiotherapist led Working Back's Clinic (WBC) for staff with back issues was designed. The aim of this initiative is for staff to receive best practice advice and treatment within one week of reporting symptoms. In 2023, a study was completed exploring the experience of staff who had completed the WBC, in relation to access, expectations of the programme, interactions with the multi-disciplinary team and factors that challenged and facilitated return to work.

Methods

A qualitative approach was chosen for this research study as the numbers who had completed the newly structured programme were low, therefore precluding a quantitative design. A sample size of 8 participants was achieved. Data collection was done through semi-structured interviews using a topic guide. Interview transcripts were analysed using a thematic analysis approach. Document analysis of participant's medical notes in relation to their back pain was also carried out.

Results

Participants reported that the programme, designed for healthcare worker wellbeing, was easily accessible and provided early intervention. Responses indicated the MDT's service was supportive, holistic & regarded positively for back pain management. When workplace occupational health recommendations were accommodated, they were regarded as beneficial in the return to work process. Challenges were identified by respondents, and these included busy work environments, poor staffing resources and on occasion lack of manager and colleague support which led to workplace accommodations not being made.

Conclusion

Overall the study found that the design and delivery of the WBC, as a healthcare worker wellbeing programme, was viewed positively by participants. Because of the biopsychosocial approach, participants reported benefits e.g. feeling supported and reported a change in their attitudes and beliefs in relation to their back issues. Recommendations from this study include consideration by the organisation of challenges identified particularly those related to staffing resources. In addition, to address the ever-increasing focus on resources and expenditure within the Irish health care system further evaluation of this programme would be beneficial and should incorporate a cost benefit analysis.

6.3 More Walking the Human Factors Tightrope: Striking the balance between freedom and control to optimise systems performance and foster employee wellbeing

Author: Mr Ed Montgomery¹, Ms Terri Morrissey², Dr Richard Plenty²

Affiliations: ¹Your Healthcare CIC, ²This Is...

Keywords: organisational design, employee wellbeing, human factors, autonomy, NHS

Introduction

The traditional hierarchical bureaucratic top-down design of NHS organisations can inhibit staff engagement, be a straitjacket for innovation and limit system performance.

Your Healthcare (YH) was set up as a member owned social enterprise in 2010, with UK Government backing, to trial an alternative approach. YH prioritises employee well-being as part of its strategic objectives. The organisation is designed to give its members more autonomy. Accountability is devolved to those working closest to the service users.

The organisation trusts and empowers its members, who in return are expected to demonstrate personal leadership, initiative and responsibility. A 'Manifesto' is in place which articulates five freedoms:

1. Freedom to change things for the better
1. Freedom to ask questions
2. Freedom to tell 'our great stories'
3. Freedom to innovate
4. Freedom to talk to partners about aligning services for better community value.

An approach to leadership, governance, process design and digital enablement based on human factors considerations has been developed which supports these freedoms and minimises systems risk, reinforcing rather than destroying the

empowering organisation culture and providing a framework for balancing autonomy and control.

The purpose of this paper is to summarise what has been learned from this experience and how lessons are being transferred into the organisation design of a broader multi-partner system for community healthcare, working closely with General Practitioners.

Method

The approach is multidisciplinary, combining theory and practice. It develops the relevant concepts on the optimal forms of organisation design and leadership practice that support employee wellbeing, motivation and retention (Plenty, R. and Morrissey, T., 2017) to include 'case study' and practical examples from Your Healthcare.

The research includes analysis of quantitative, qualitative and secondary data. Comparative data from NHS sources and YH on people metrics, employee experience, service outcomes, service improvements and financial results have been examined, along with stakeholder interviews, focus groups and behavioural reviews.

Developing a shared understanding of the human factors principles and practices that support this approach – and how to incorporate these into ways of working that add social value – is the final step, working in partnership with GPs and community stakeholders.

Results

YH has consistently higher 'employee engagement' scores than the NHS. It is stable, trusted by its partners, financially solvent and has a strong track record of innovation and research. The evidence suggests that the role that autonomy, wellbeing and a sense of agency plays in this is critical – and that organisation design is key to achieving this, balancing these personal freedoms with the necessary governance.

Discussion

We believe that this approach has the potential for replication and scaleup nationally and internationally in community health care.

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6.4 Using Readily Accessible Electronic Health Record (EHR) Data to develop Real-Time Models of Situational Workload in the NICU

Author: Dr Dan France¹, Dr Wael Alrifai², Dr Khyzer Aziz⁵, Mr. William Winstead³, Dr Mary Dye², Dr Eili Klein⁶, Dr Jason Slagle¹, Mr. Ryan Myles¹, Dr Lamia Alam⁷, Ms. Ruchi Patel¹, Mrs. Carrie Reale¹, Ms. Janelle Faiman¹, Ms. Oluseyi Daodu⁷, Dr Qingxia Chen⁴, Mr. Nicholas Garurevich⁴, Dr Ayse Gurses⁷

Affiliations: ¹Center for Research and Innovation in Systems Safety, ²Department of Pediatrics, ³Health Information Technology, ⁴Department of Biostatistics, ⁵Johns Hopkins Children's Center, ⁶Department of Emergency Medicine, ⁷Armstrong Center for Patient Safety and Quality

Keywords: situational workload, EHR data, NICU, nurse workload, performance shaping factors

Introduction

Introduction. Current workload measurement tools are largely ineffective in accurately measuring the workload experienced by clinicians nor do they identify mutable microsystem, organizational, and environmental factors that contribute most to workload, an essential prerequisite for developing workload-reduction and balancing strategies. It has only recently been appreciated that situational workload (SITWL)¹, the most reliable and actionable measure of workload, best explains changes in nurses' workload related to healthcare microsystem structure.² SITWL is most affected by performance shaping factors (PSFs)³ — performance obstacles and facilitators in the local work environment that can affect care at the unit, job, or patient-levels. Most importantly, SITWL is diagnostic of underlying contributory factors and therefore is actionable for systems improvement. For example, some SITWL contributors may be adjustable from shift-to-shift, while others would require a longer time frame to address through systems improvement. To date, SITWL has only been measured in bedside nurses using subjective surveys which are work-interrupting, and therefore potentially biased, and are difficult to integrate into clinical practice.⁴

We are developing and validating new real-time models nursing workload that are combining conventional measures of workload with robust estimates of SITWL

derived from readily accessible electronic health record (EHR) data, thereby laying the foundation for a future clinical decision support (CDS) tool to track real-time workload and guide the design and implementation of short-term (i.e., dynamic resource allocation) and long-term (i.e., system redesign) interventions to improve patient outcomes.

Methods

Guided by the Systems Engineering Initiative for Patient Safety (SEIPS) framework and an human factors engineering (HFE)-based model³⁷ of nursing workload, we have conducted (i) fifty 2–3-hour direct observations, (ii) fifty 30-minute post-observation semi-structured interviews, and (iii) four one-hour focus groups with representative samples of registered nurses (RNs) and neonatal nurse practitioners (NNPs) at two academic medical center neonatal intensive care units (NICU) to identify performance shaping factors (PSFs; i.e., barriers and facilitators) that contribute to STWL in the NICU microsystem. Participating nurses completed a card sorting exercises to rank the frequency and impact of identified PSFs. Our team used an iterative design and validation process to determine the feasibility of mapping the most influential PSFs to data elements in nursing flow sheets and other EHR sources as a first step in building real-time workload models for RNs and NPs, respectively.

Results

RNs and NNPs identified 79 distinct performance barriers and facilitators that influence SITWL in the NICU. Fifty-six (71%) of these PSFs were determined to be directly mappable to EHR data elements, 11 PSFs (14%) were indirectly mappable, and 12 PSFs (15%) were unmappable. The PSFs were categorized using the elements of the SEIPs work system model. Significant PSFs that cannot be currently mapped to EHR data include ‘patient rooms not stocked with needed supplies’, ‘spending time seeking supplies’, and ‘work interruptions’.

Discussion

The study demonstrates that sufficient PSFs in the NICU microsystem can be mapped to readily accessible EHR data for the development of real-time workload models. These methods are being used to build and validate real-time models of SITWL for NICU clinicians.

6.5 An Assessment of Work-related Musculoskeletal Disorders (WMSDs) Risk Factors among Midwives in Ireland while tending to Water Births

Author: Ms Natasha Joyce¹, Mr Enda F. Fallon¹, Dr Liam M Chadwick²

Affiliations: ¹Mechanical Engineering, University of Galway, Galway, Ireland, ²Irish Centre for Applied Patient Safety and Simulation, University of Galway, Galway, Ireland

Keywords: WMSDs, midwives, water births, ergonomics, postural risk

Introduction

Work-related Musculoskeletal Disorders (WMSDs) remain the predominant occupational injury reported to the Health & Safety Authority in Ireland. Midwives are a group of workers regularly exposed to a number of risk factors associated with WMSDs. In Ireland, an increasing number of prospective mothers are opting to avail of water birthing services. This poses a different set of WMSD risks to midwives when compared to more traditional midwifery activities due to the nature of birthing pools and their postural constraints. The work reported in this paper was completed to determine the scope of a study to assess the risk associated with midwives' postures while tending to prospective mothers when using a birthing pool.

Methods

A survey was administered to a convenience sample of practicing midwives. The survey had three sections. The first dealt with the demographic profile of the respondents, and the second with their experiences of WMSDs and their reaction to them. The final section asked midwives to rate their postural discomfort for a range of professional tasks while using birthing pools. The sampling method used was purposive. Ethical approval for the survey was obtained from a Hospital Research Ethics Committee.

Results

The mean length of service of the midwives sampled was 15 years. The majority worked full time hours per week. All respondents reported using birthing pools as part of their work. They had received manual handling training during their midwifery studies and as a biannual yearly follow-up in the workplace. Less than 5% reported that manual handling risk factors and safe postures specifically related to water births were included as part of training.

Eighty five percent of midwives agreed that there was a correlation between the task of facilitating water births and WMSDs. Over 90% of them reported experiencing unavoidable awkward postures and significant strain on their bodies while caring for water-birthing mothers. Similarly, 90% disclosed that they felt pain or strain when completing 10 specific tasks performed by midwives during water birth. Foetal heart rate auscultation in the 2nd stage of labour was rated as the task which caused the most difficulty in this regard. Less than one third of respondents reported visiting their General Practitioner with problems related to symptoms of WMSDs and only 18% approached their Occupational Health Department. Seventy one percent of respondents stated that they self-medicated with respect to WMSD symptoms.

Discussion

The results indicate that there is a need for the inclusion of specific water birth risk factors in midwifery manual handling training. Adopting awkward postures would seem to be presently unavoidable when tending to mothers during water births. These postures should be evaluated in order to quantify their risk and are the subject of further study by the authors. It may be possible to redesign the workplace to reduce these risks. Given the reduced levels of reporting and interaction with medical services, it would be reasonable to suggest that the level of WMSD symptoms are underreported by this cohort and that some ergonomic risks may be seen as a normal part of the job.

6.6 A survey of CPR related Work Related Musculoskeletal Disorders among Healthcare Workers and First Responders in the West of Ireland.

Author: Mr Enda Fallon¹, Mr Chinedu Okeke¹, Dr Liam M. Chadwick²

Affiliations: ¹Mechanical Engineering, University of Galway, ²Irish Centre for Applied Patient Safety and Simulation, University of Galway, Galway, Ireland

Keywords: CPR, WMSDs, emergency services, physical workload, ergonomic risk

Introduction

The increasing incidence of in-hospital and out-of-hospital cardiac arrest requires urgent intervention to avert irreversible brain cell damage that influences survivors' quality of life and prolonged financial burden. Cardiopulmonary Resuscitation (CPR) is the medical strategy for managing the early onset of pulseless cardiac arrest cases. There are clear and well defined documented protocols for the administration of CPR, which often assume optimised working conditions related to the physical and ambient environment. Real-life CPR however, can involve suboptimal working conditions which include, cramped workspaces, and unfavourable ambient environments. From an ergonomics perspective, CPR involves significant repetitive movements, extreme postures, and very high physical workload over short periods of time. Also, the CPR work of hospital employees and first responders can take place in highly charged and stressful situations. Moreover, there is no specific physical fitness standard for those who carry out CPR.

The work reported in this paper was completed to determine whether or how CPR is contributing to the rate of work-related musculoskeletal disorders (WRMSDs) among hospital employees and first responders in the West of Ireland. Specifically, the incidence of WRMSDs, the level and severity of associated symptoms, and the level of sickness absence reported by this cohort were examined. Ethical approval from a hospital group was obtained for the work.

Methods

A questionnaire, which included the Nordic Musculoskeletal Questionnaire (NMQ), was administered to a group of nurses, doctors, ambulance paramedics, fire service personnel, police, and volunteer first responders in the Health Services Executive (HSE) Area West. Only those who had received CPR training from the Irish Heart Foundation and/or participated in providing CPR within the last five years were included. They were also required to be between 20 and 60 years of age and without a current diagnosis of chronic respiratory illness, cardiovascular disease, or back injury. The sample of 260 was a purposive sample.

Results

Seventeen percent of respondents reported that they carried out CPR at least once every six weeks, while almost 40% reported performing it at least once a year. Respondents reported various musculoskeletal symptoms while performing CPR, presenting in the form of discomfort or pains. These symptoms were predominantly perceived around the hips (44%), shoulders (43%), wrist (37%), upper back (28%), ankle/feet (24%), and elbows (11%). The knee was least affected at 4.7%. The symptoms lasted for one week or more in 13% of the cases. Eighty one percent reported experiencing fatigue for up to 12 hours. Ninety two percent of respondents reported that they did not seek medical attention for WRMSD symptoms related to CPR.

Discussion

The survey results demonstrated that CPR is perceived as a contributing/influencing factor with respect to WRMSDs among first responders in the HSE West region. Surprisingly, given the relatively high incidences of symptoms reported, there was a relatively low absence rate due to sickness among the respondents. It would be reasonable to suggest that the level of symptoms are underreported by this cohort and that the ergonomics risks may be seen as a normal part of the job.

6.7 The Professional Wellbeing Work System Check: Development of a work systems-associated professional wellbeing tool

Author: Dr Eva-Maria Carman¹, Mrs Giulia Miles¹, Dr Ayah Ebeidalla², Dr Upasana Topiwala², Dr James Hunter², Dr Steve Cantellow²

Affiliations: ¹Trent Simulation And Clinical Skills Centre, Nottingham University Hospitals NHS Trust, ²Critical Care Department, Nottingham University Hospitals Trust

Keywords: staff wellbeing, work systems, tool development, healthcare workforce, system design

Introduction

There is an urgent need to develop more efficient and effective systems of care to cope with the increasing demands on healthcare systems as a result of increasingly ageing and complex patient populations. However, to achieve this, healthcare systems need to identify which areas to address, and therefore need monitoring tools. Staff wellbeing is vital not only for patient experience but also for patient safety and organizational performance [1]. Given the dynamic and ever-changing nature of healthcare systems, it is essential that wellbeing is regularly monitored, enabling proactive measures to enhance it.

Methods

Following an extensive work system review of the service that provides care out-of-hours at one large hospital NHS Trust in the UK, a professional wellbeing tool was developed for the service that would support work systems monitoring. In this context, professional wellbeing was defined as the job-related experience of perceptions and conditions that affect health and impact a worker's ability to achieve their potential [2]. The service decided to focus on this specific element of wellbeing as the goal of the tool was to identify work system components that could be redesigned so that professional wellbeing could be enhanced and the work system improved.

A three-step process was followed to develop the professional wellbeing tool, namely the development of a foundational model, survey construction and pre-testing of the proposed tool. The foundational model was developed using the results from the earlier work system review of the service, conducted in 2021/2022, which included analysis of 378 reported incidents, 4 observation sessions, 32 interviews with staff working in the service and a follow-up study conducted in 2023 that included additional interviews and focus groups with a total of 28 participants of staff working in the service. This foundational model consists of five domains including workload, communication, shift, team dynamics and professional development. Survey construction included generating a list of potential variables from a narrative literature review and the results of the previous two studies, reviewed iteratively by the management team of the service and revised to generate a preliminary draft of the tool, the professional wellbeing work system check (PWWS).

Results

The pre-testing phase applied a mixed methods approach, and currently the professional wellbeing tool is being evaluated for content and face validity with staff working within the service. To achieve this, staff have been asked to use the tool to assess their work experience over the last month in the service, and then in a follow-up interview discuss both their work experience in this same timeframe and evaluate the content of the tool. Following the interview, staff were asked to complete an online survey that further assessed the content validity of the PWWS check quantitatively using the method proposed by Lynn, 1986 [3].

This study is currently underway with the content and face validity evaluation to be completed at the end of November 2024. This paper and presentation will include the results from both phase 2 (survey construction) and phase 3 (pre-testing) of this project.

6.8 Evaluation of barriers and facilitators to clinician job satisfaction in a post-pandemic system: consistency with a conceptual-model of clinician well-being

Author: Dr Ignacio del Moral^{1,2}, Mr Jimmie Leppink³, Mr Matthew B Weinger⁴

Affiliations: ¹Hospital Universitario Marqués De Valdecilla, ²Hospital virtual Valdecilla, ³Leppink Analytics, ⁴Vanderbilt University Medical Center

Keywords: clinician wellbeing, job satisfaction, post-pandemic healthcare, systems approach, healthcare workers

Introduction

After COVID, a small Healthcare system in Cantabria, Spain wanted to initiate interventions to address clinician burnout. Before that, we wanted to assess clinician wellbeing (in Cantabria) in light of its importance to patient safety. In particular, we wanted to collect data to validate a conceptual model of clinician wellbeing developed by MBW in the process of writing the NASEM 'Burnout Report' [1]. The model, describes the context of clinical work as three layers with the care team and patient/family at the core surrounded by organizational and then societal layers; each layer has a myriad of mediating factors. Individual clinician's wellbeing is then influenced by personal- and work-related factors. The model suggests that clinician wellbeing is highly context dependent and can vary significantly not just between healthcare facilities and even between units or clinical roles within the same unit. We therefore started with a small qualitative study using a group interview methodology to delineate factors that either facilitate or impede clinician wellbeing within one regional Spanish healthcare system (Cantabrian Healthcare System or SCS).

Methods

Of the 163 interested clinicians, we randomly selected, consented and interviewed 36 working in three different 'units' (clinical domains) – Anesthesiology [2], Intensive Care Unit (ICU), and Primary Care [3]. These disciplines have been reported to exhibit high levels of burnout and, locally these specific units were believed to have issues with clinician well being during COVID. Participants spanned age groups as well as amount of experience. For each unit, we separately interviewed physicians and

nurses in small groups. Verbatim transcripts were coded by three independent researchers for themes using a previously developed consensus codebook.

Results

ICU nurses had significantly lower wellbeing scores than ICU physicians or than the other two nurse groups. Both ICU physicians and nurses expressed concerns regarding working conditions, difficult/demanding patients, and relationships with their colleagues. ICU physicians were concerned about a highly competitive environment and uncertain future prospects. In contrast, ICU nurses reported a lack of adequate supervision and support as well as insufficient time or financial support for additional training. In both Anesthesia and Primary Care, clinicians reported positive feelings about their work and their colleagues. Primary care clinicians described the need for more staffing. Primary care physicians wanted more autonomy in how they organize their work whereas nurses reported more recognition and better protocols. In Anesthesia, physicians were concerned about workload whereas the nurses felt a need for better organization and management.

Implications

A variety of factors, all aligned with our conceptual model, either positively or negatively affected wellbeing as well as professional needs, and some of these differed across professional domains as well as between physicians and nurses in the same domain and unit. Improving clinician wellbeing requires a solid understanding of unique local factors (at the unit, hospital and community level) and will accordingly require different types of interventions for different professional areas and roles. These findings begin to validate the model, and provide guidance for intervention design to mitigate barriers and enhance facilitators of clinician wellbeing.

6.9 Preventing Injuries in Nurses through Pre-shift Exercises

Author: Dr Joshua Wong

Affiliation: Sengkang General Hospital, Singapore

Keywords: nurse safety, injury prevention, musculoskeletal health, pre-shift routines, occupational health

Introduction

In our practice, it is not uncommon to see nurses in the wards getting injured as a result of patient handling activities. To address the problem, we aim to prevent work-related musculoskeletal injuries through pre (and post)-shift stretching exercises. Staff is encouraged to take on an active role in the protection and improvement of their musculoskeletal health and they are empowered to perform self-directed stretching exercises routinely before (and after) work with the support of their supervisors.

Methods

A pilot study to assess the efficacy and practicability of the programme will be conducted across two wards over 6 weeks (total about 40 pax, one ward as the intervention group and the other as the control). Exercise videos customised to the nurses' work demands will be played pre-shift and nurses going on shift will perform the stretching routine as a group. The control group will not receive the intervention.

Pre and post intervention outcomes will be tracked through a validated self-administered questionnaire on musculoskeletal symptoms (e.g. Nordic questionnaire) as well as data on work-related musculoskeletal injuries as reported on the Incident Reporting System (IRS). Outcomes will be compared between intervention and control groups. Qualitative feedback and other relevant data such as demographics will be collected to assess the effectiveness of the intervention.

Results

The exercise videos are made in-house by our physiotherapist colleagues and are in the final stages of editing. We plan to begin the pilot in Jan 2025 and tabulate the results in Mar 2025.

Discussion

Progressively, there are plans to extend the reach of the programme to other inpatient wards, other clinical and non-clinical areas in that order. Post-shift stretching will also be introduced and ultimately, the study group is hopeful that it will become a routine for SKH staff to perform stretching pre and post-shift/work.

6.10 Intraoperative pilot usability study of a novel passive neck exoskeleton for surgeons

Author: Dr M. Susan Hallbeck, Mr. Joseph Kim, Prof. Hamid Norasi

Affiliations: Mayo Clinic

Keywords: surgical ergonomics, exoskeleton, usability study, surgeon wellbeing, intraoperative support

Introduction

Neck and body pain is a prevalent problem among surgeons. A systematic review by Stucky et al., (2018) reported the prevalence of neck problems among surgeons to be about 50%. Surgeons at our institution reported different patterns of body part pain by surgical modality (Norasi et al., 2023). Additionally, surgeons have different needs and preferences to address these issues, as about 50% of surgeons fear that their work-acquired discomfort and pain will impact their career longevity (Hallbeck, et al., 2017).

One potential solution is to use passive exoskeletons to decrease the neck muscle load required to hold the weight of the head in extreme flexion.

Methods

Eight surgeons (six male, two female; breast, cardiovascular, plastic, thoracic, and vascular) trialed a passive neck exoskeleton (NekSpine™, CMI, San Clemente, CA, USA) during 14 open surgeries lasting at least two hours requiring flexed neck positions. This neck exoskeleton supports the head using a headgear connected to a flexible carbon fiber rod. The rod is encased in a soft vest to redistribute a portion of the head weight from the neck to the trunk. Surgeons' completed post-procedural surveys and gave comments; median (IQR) scores were calculated and reported.

Results

During 93% (13/14) of the procedures, surgeons reported wanting to use the NekSpine™ again; the 14th said "maybe", did try again and likes it. Surgeons reported median scores on physical comfort (0=decreased, 5=no change,

10=increased comfort) as 6.5 (5-7) , improvement in ability to perform surgery (0=none, 10=max) as 3 (1-5), restrictions to range of motion (0=none, 10=max) as 0.5 (0-2); and interference with their ability to perform surgery (0=none, 10=max) as 1 (0-2.75). Two surgeons reported minor headlight issues and one surgeon mistakenly put on loupes before the exoskeleton.

One surgeon noted the neck exoskeleton felt like someone was helping them hold their head up. Another surgeon who did not report a benefit during surgery reported noticeably improved neck-related sensation the next day.

Conclusion

Wearing intraoperative passive neck exoskeletons may improve support and reduce neck discomfort in surgeons, while not impeding their range of motion or interfering with surgical ability.

6.11 The Impact of Surgeon Hand Size on Instrument Use Difficulty: A Pilot Study

Author: Dr M. Susan Hallbeck, Mr. Joseph Kim¹, Prof. Hamid Norasi

Affiliations: Mayo Clinic

Keywords: surgical instruments, hand size, ergonomics, gender equity, inclusivity

Introduction

Average surgical glove size is an imperfect measure (proxy) of hand anthropometry, and grasp force exertion is often used to design surgical instrumentation hand/handle interfaces. Our study is ongoing and examines glove size in relation to sex, ethnic and racial background, country of origin, and surgical specialty. The primary aim is to assess whether glove size accurately predicts hand size and grip strength, and how this impacts surgeon ergonomic experiences in the operating room.

Methods

A 16-question survey was distributed through Qualtrics. Data collected included: surgical glove sizes, (including inner vs. outer for double glove), personal demographics, surgical specialty, an uploaded picture of the surgeon's dominant hand with a referent item, and questions directed towards instrument usage. The survey was distributed via social media, at surgical conferences, and by the Society of Surgical Ergonomics (SSE) membership communications.

Results

545 surgeons completed the survey. 62% were women, 60% double-gloved overall (51% males, 65% females double-glove), and the mode of inner or single glove size was 6.5, the same as the outer glove. The average glove size differed, by sex. The distribution of the glove size by sex shows that the median and mode size for females is 6.5 while for males is 7.5.

Overall, 58% of respondents reported difficulty using current surgical instrumentation due to hand size or strength; however, it was composed of 85% of

the females and only 15% of the males. Overall, 48% of the respondents felt that sizing of the instrumentation impacted their ability to perform surgery; comprised of 68% of the females and 19% of the males.

One participant summed it up as "Yes as a general surgery resident I struggled to use nearly all staplers one-handed and had difficulty reaching the small wheel on the endoscope/colonoscope - and was chastised when I tried to use two hands. I also had difficulty using all energy devices because some buttons and triggers were hard to reach. My economy of motion was compromised and I was told by larger handed (predominantly male) attendings that my skills were inferior to those of larger handed (predominantly male) residents; in contrast, attendings with similarly sized hands (predominantly but not exclusively female) told me I had excellent skills."

Conclusions

The data collection and analyses are ongoing. Currently, about 50% of the surgeons note a negative impact of instrumentation on surgical performance. Especially when considered by glove size, female surgeons had higher difficulty with instrumentation, and it had a higher impact on their performance. This is not due solely to hand size, but also sex-related differences in hand strength. Respondents have overwhelmingly demonstrated a preference for instrumentation that considers a more inclusive range of hand size. Surgical instrumentation needs to be changed to be inclusive.

6.12 Service Evaluation of Physiotherapy Component of Staff Working Backs Clinic (WBC) – Trends and outcomes

Author: Ms Theresa Flynn, Ms Darina Thomas, Ms Aisling Purcell, Ms Siobhan Bulfin

Affiliations: St Vincent's University Hospital

Keywords: physiotherapy, back pain, occupational health, return to work, service evaluation

Introduction

This project describes the outcomes of the Physiotherapy component of the WBC over a 2 year period, Jan 2023 – Nov 2024 and proposes the hypothesis:

“A combined Physiotherapy and Advanced Nurse Practitioner (ANP) led clinic for employees with mechanical LBP reduces pain, increases function and facilitates return to work without requiring referral to Occupational Health Physician (OHP)”

Background and Methods

The working backs programme started in 2002. It was a combined service between Physiotherapy and OHD for staff with back problems. A change management project was completed in 2020 to pivot the service from OHP led to a joint ANP and Physiotherapist led clinic – the aim being to “ensure staff had access to evidence based advice and treatment within one week of accessing the OHD”. Objectives are to minimise the personal impact of LBP and support the employee to stay at work or return to work.

The clinic is held every Tuesday. Patients are triaged for suitability by OH nurse via telephone. On the day of the clinic patients are assessed by the Physiotherapist, a treatment programme is agreed. Metrics collected are, Pain scale, Patient Specific Functional Scale (PSFS) and Keele score. The focus is on empowering employees to be co-producers of their own spinal health and to change attitudes and beliefs around back pain. The employee is then reviewed by ANP to review workplace modifications/restricted work/ psychosocial issues. Patients are discussed with the OHP at a monthly meeting or earlier if necessary.

Results

- 64 employees attended.
- Average number physio treatment session was 2.4. Maximum was 6.
- 21 % attended once, 25% of patients received 4 or more treatments.
- 37.5% reported a work related injury.
- 76.5% required sick leave
- 100% had returned to work.
- 4 were referred on to OHP, all returned to work.

Nursing was the largest group accessing WBC 37.5% (largest employment group in the hospital, approx. 1,000 employees). 50% were international nurses who had trained overseas.

Keele Scores

- 38.3% scored low risk
- 30.6% Scored medium risk
- 20.9% scored high risk. Treatment then focused on attitudes and beliefs.

Classification of LBP

Using the PSFS, Pain scale and Keele score employees were classified into the following groups.

1. Low pain- low disability 45%
2. Low pain – high disability 16%
3. High pain – low disability 14.5%
4. High pain – high disability 22.0%

Resources are focused on Level 2 and 4.

21% had one contact which included a detailed assessment, treatment, HEP, advice, back booklet and review of work duties which was sufficient to facilitate return to work.

Discussion

This paper gives general trends of the Physiotherapy component of WBC – the unique features of this service are the close cooperation with two disciplines. Data shows that all employees attending WBC returned to work. Further collaborative research between OHD and Physiotherapy is recommended to evaluate the effectiveness of the entire programme and to test the proposed hypothesis.

6.13 Barriers and facilitators in the work Systems of occupational therapists in Peru using the sensory integration approach

Author: Dr Carlos Manuel Escobar-Galindo¹, Mr Richard Raitt Rodríguez-Rojas², Mr José Enrique Villalobos-Tupia³, Mr. Siujon Kazuo Lee-Agarie⁴, Mr Kevin Gonzales-Rojas⁵

Affiliations: ¹Universidad Peruana De Ciencias Aplicadas. Faculty of design . Industrial design school, ²MERGO Human Factors Ergonomics Consulting, ³MERGO Human Factors Ergonomics Consulting, ⁴Universidad Peruana De Ciencias Aplicadas. Faculty of design . Industrial design school, ⁵Ideas y Sentidos. Center for Comprehensive Child and Adolescent Development

Keywords: occupational therapy, sensory integration, work system barriers, Peru, therapist wellbeing

Introduction

Occupational therapy, particularly under the Sensory Integration (SI) approach, is a therapeutic modality designed to help patients improve their ability to process and respond to sensory stimuli effectively. This approach involves activities stimulating the patient's sensory and motor systems, enhancing their interaction with the environment. However, occupational therapists (OTs) in this field face various challenges that impact their physical health and well-being and the safety and effectiveness of treatment for children. Therefore, this study aimed to identify the main barriers and facilitators in the work system of OTs using the SI approach to identify potential risks to the well-being of OTs and patients and to understand their interaction.

Methods

This study employed an exploratory qualitative design with thematic analysis. It used both inductive and deductive approaches based on the System Engineering for Patient Safety (SEIPS) 101 model (1). Five experienced OTs trained in SI from Lima, Peru, participated by responding to semi-structured interviews and facilitating access to their workplaces for the observational phase. The data were transcribed

and triangulated to generate codes, which were later grouped into themes and categorised according to the SEIPS 101 model.

Results

In the Person category, barriers included the physical composition, age, height, and lack of specific SI training of OTs. In the Tasks category, barriers involved the clinical profile of patients, the physical and behavioural characteristics of children, ambiguity in treatment approaches, and high physical and mental workload in working with children with disabilities, alongside varying work heights. Barriers to technology included the lack of suitable equipment and materials, excessive weight of SI therapeutic equipment, inadequate equipment maintenance, poor material quality, and limited diversity of therapeutic materials. In the environment, barriers were the lack of specialized spaces, insufficient control over external factors like noise and temperature, inadequate therapeutic culture among parents, and a high patient load. The primary impacts were high physical and mental overload for OTs and a risk of harm to children due to unsafe working conditions. Key facilitators included a few well-trained OTs, the involvement of educated parents, and continuous professional development for OTs.

Discussion

The results highlight various barriers and facilitators that affect the practice of OTs in the SI approach. Barriers related to the personal characteristics of OTs, such as physical composition, age, and lack of specialized training, underscore the need for continuous and job-specific education. The physical and mental burden faced by OTs, compounded by treatment ambiguities and inadequate equipment, emphasizes the urgent need to improve working conditions and infrastructure in treatment centers. This context suggests that patient health risks, particularly for children with disabilities, are closely linked to the working conditions of OTs. However, key facilitators, such as well-trained OTs and support from educated parents, were identified as essential for improving intervention processes. This study underscores the need for a comprehensive approach to address both barriers and facilitators, promoting a safer and more efficient work environment that benefits professionals and patients.

6.14 Designing a Fatigue Risk Management System for the NHS: Case Study from the UK Ambulance Sector

Author: Prof. Kristy Sanderson^{1,2}, Jonathan Rogers^{1,3}, Chiara Lombardo¹, Dr Colleen Butler^{4,5}, Nicola Healey⁵, Chrysanthi Lekki⁵, Julia Williams⁶, Elicia Austin⁶, Jen Dawe¹, Lucy Clark¹, Bryony Porter¹, Sandra James¹, Jeremy Dearling¹

Affiliations: ¹University of East Anglia, ²NIHR ARC East of England, UK, ³East of England NHS Ambulance Trust, UK, ⁴Health and Safety Authority, Ireland, ⁵Health & Safety Executive, UK, ⁶University of Hertfordshire, UK

Keywords: fatigue, risk management, ambulance services, staff wellbeing, safety culture

Introduction

Poor sleep and fatigue are common in acute and emergency health care staff. CATNAPS is a multi-site, multi method study which explores how fatigue can be managed in the NHS ambulance workforce.

The overall CATNAPS' aim is to develop a comprehensive fatigue risk management system (FRMS) for UK NHS ambulance services, which is acceptable, feasible, and likely to improve patient outcomes and staff wellbeing and experience. This is the first study to develop a comprehensive approach to fatigue management in an NHS workforce.

In this particular sub-study, we investigate how frontline staff and patients experience current fatigue actions and explore the potential to improve safety culture and reporting.

Methods

We recruited thirty frontline ambulance staff members and three ambulance service users from two Trusts for a one-to-one semi-structured interview. Staff participants were asked about their experience of fatigue, including their engagement with, and/or opinions about our co-produced list of components for fatigue management. Patients were also asked for their views about the same

recommended actions. All participants were also asked how, and whether, the recommended actions could be implemented, addressing any potential facilitators and barriers.

Thematic analysis was undertaken on the interview data. All members of the research team, including two members from a PPI perspective, were involved in the analysis.

Results

Seven themes explain staff and patient perspectives on fatigue management, including the proposed implementation of the recommended components of the FRMS : Fatigue is not spoken about, Lack of consistency from management; Trusts have implemented limited initiatives to manage fatigue; Fatigue management is a matter of personal preference; Impact of, and on, personal lives of staff; Staff and patients views about potential implementation of proposed fatigue management strategies; Concerns that fatigue can impact quality of care.

Discussion

Staff expressed reluctance to report fatigue because of fear of consequences, while both staff and patients supported formalised and evidence-based implementation of fatigue management actions by ambulance trusts. Current actions are predominantly staff-led so highly individualised, including caffeine use, role switching, and sleep banking. Successful implementation by Trusts of preferred fatigue management actions will require buy-in from frontline staff, managerial support, improved resourcing and increased public awareness on the importance of managing fatigue. These insights are informing development of implementation guidance so ambulance services can tailor the FRMS to their staff and their setting.

6.15 Effects of electronic health records implementation on health care provider outcomes: A prospective cohort study

Author: Prof. Matthias Weigl, Dr. Schmidt Katharina

Affiliation: Institute For Patient Safety, University Hospital Bonn, Germany

Keywords: electronic health records (EHR), provider outcomes, burnout, workflow interruptions, prospective study

Introduction

Adoption of electronic health records (EHR) has been proposed to reduce documentation burden, with potentially positive ramifications for provider satisfaction well-being. Nonetheless, available research is inconsistent, partly due to missing prospective designs that allow reliable inferences concerning trajectories over time (1, 2). Moreover, and despite various promising advantages of digitalized records in hospital care, there is a notable lack of studies focused on EHR implementation, particularly regarding its effects on provider outcomes in real-world clinical settings.

Methods

We therefore set out a prospective cohort study to survey the experiences of healthcare providers in the course of implementation of electronic health records in a hospital. Specifically, we sought to determine the trajectories of perceived workflow interruptions, multitasking, information overload, and burnout over time.

A before-after-design with a five-month-time lag was established to determine reported experiences before and after EHR implementation. Within an academic university hospital in Germany, three clinical departments (2 internal medicine, 1 surgical) were included. We surveyed nurses and physicians with standardized survey tools. Outcome measures were perceived levels of workflow interruptions, multitasking, information overload, and burnout. Analyses included descriptive statistics as well the testing for differences over time with univariate mean-difference tests.

Results

Altogether, 162 provider surveys were collected over time (T1-baseline: n=87, T2-follow-up: n=75). Reported workflow interruption tended to decrease over time but were not significant [T1: M=3.42, SD=.73; T2: M=3.28, SD=.97; $F(df=1)=1.31$, $p=.25$]. Experiences of Multitasking were stable over time [T1: M=3.33, SD=1.04; T2: M=3.24, SD=1.06; $F(df=1)=.27$, $p=.60$] as well as reported information overload [T1: M=2.83, SD=1.11; T2: M=2.64, SD=.96; $F(df=1)=1.29$, $p=.26$]. Concerning the burnout screening scores, experiences of emotional exhaustion [T1: M=3.10, SD=1.14; T2: M=3.02, SD=1.09; $F(df=1)=.23$, $p=.63$] as well as of depersonalization [T1: M=1.08, SD=.96; T2: M=1.23, SD=1.07; $F(df=1)=.89$, $p=.35$] did not change over time. Additional analyses included testing within professional subsamples, as well as for panel attrition.

Discussion

Given the increasing adoption of EHR in hospital care, concurrent evaluations into the effects on provider experiences and burnout over time are needed. Drawing upon provider reports, this prospective study did not show substantive changes over time. Although provider-rated levels of workflow interruptions, multitasking, and exhaustion were high, utilization of EHR did not alleviate workload and provider experiences. Despite its various limitations (e.g., single institution, provider self-reports, panel attrition, limited time lag), the findings may inform future research into documentation burden and provider experiences. Moreover, it may contribute to management of adoption processes and respective human-factors improvements to facilitate EHR workflow implementation in health care organizations (3).

6.16 Using simulations to evaluate the health information technology contributions to administrative burden

Author: Dr Enid Montague, LaShawn Murray

Affiliation: University Of Toronto

Keywords: simulation, health information technology (HIT), administrative burden, physician workload, time motion studies

Introduction

Research has alluded to the impact of poorly designed health information technology on physicians' administrative burden and subsequent wellbeing and job satisfaction. Most studies rely on physician self-report or EHR records to determine how much time physicians spend on specific tasks. However, self-report regarding time spent on work tasks can be unreliable and EHR records can miss the nuances of how or why work was done in a specific way. Finally, there is a great deal of variability in the way physicians work and in the needs of individual patients which can make it difficult to compare time of administrative tasks in different contexts.

Methods

To evaluate the effects of specific technology and features on physician work we developed clinical simulation which involved physicians completing regular clinical visits with simulated patients. In these simulations we were able to control for patient variability by having physicians provide treatment for the same physicians. To measure work we were able to use time motion studies techniques to measure the amount of time physicians spent communicating with patients, completing administrative tasks such as charting and referrals. In this paper we discuss the lessons learned from using simulations to study physician work, the impacts of health information technology and administrative burden.

Four patient case studies were developed in the EMR to reflect a routine patient visit and more complex patient visits. EMR records were populated with patient history. Cases were developed based on existing recorded patient visits, this allowed simulated patients to have a "script" to work from so that they could maintain

consistency across physicians. This allowed for study designs where physicians used a health information technology in two cases but did not in others to allow for comparison.

Clinical examination rooms were equipped with three mounted cameras, a laptop computer, and screening recording software. Physicians were invited to the research study and told to arrange the examination room as they would if they were going to see patients for the day. Then patient simulators were brought from the waiting room for each of the pre-developed cases. The physicians treated patients as they normally would and were asked follow-up questions or surveys after the sessions.

Analysis

Videos from the EMR screen, patient close up angle, physician angle and typing angle were synchronized to one video with 4 channels. Using behavioural coding software coders were able to analyze variables such as charting time, communication time and time spent of specific administrative tasks such as making referrals.

Using this approach researchers were able to compare performance on tasks using different tools (e.g. referral with fax vs electronic referral) or overall visit efficiency (e.g. charting with AI scribe vs typing). With additional behavioural coding the researchers were able to analyze behavioural patterns that contribute to the success or failure of tool adoption. For example, post visit usability measures could be used to better understand additional points of frustration or why physicians adopted the practices they used.

6.17 Reducing Physiological Strain in Patient Handling: A Comparison of Techniques with and without Technology

Author: Dr Michelle R. Cardoso¹, Ms. Cynthia Dion², Ms. Janie Cormier², Mr. Nicolas Bourque³, Dr Wayne Albert²

Affiliations: ¹Université De Moncton, ²University of New Brunswick, ³Université de Sherbrooke, Campus de Moncton

Keywords: patient handling, physiological strain, musculoskeletal injuries (MSI), assistive technology, Vendlet

Introduction

The healthcare sector is experiencing a global workforce shortage, particularly among nurses, leading to increased workloads and a higher risk of fatigue and musculoskeletal injuries (MSI)[1]. Lower back pain is the most common MSI among nurses, often caused by the physical demands of patient handling (PH) and rising workloads [2]. A PH technology called the Vendlet has been developed to help reduce physical strain among caregivers during PH tasks, while the patient is lying in bed.

The purpose of this study was to examine the physiological responses of caregivers during various PH techniques, both with and without the use of the Vendlet technology.

Methodology

The study included 28 participants aged between 17 and 40 years of age, all being students in a health sciences degree. Participants performed four repositioning techniques on a standardised patient (height: 166.5cm, weight: 62.2kg). The four techniques were: 1) Turning the patient onto their side (with-and-without the use of body pillows); 2) Moving the patient to the bed's edge; 3) Placing a sling under the patient; and 4) Moving the patient up in bed. Participants received training from a trained ergonomist for all PH tasks. Each technique was executed three times on two different beds: Bed 1 – no technology, using only the Span-America Medical Systems (SAMS) bed combined with a SwiftSlider draw sheet and a Fusion UnderPad

incontinence pad; and Bed 2 – SAMS bed with the Vendlet technology. Physiological stress responses were measured using the following: A Polar-H10 heart rate monitor to measure caregiver heart rate (HR), and the Empatica Embrace Plus to measure electrodermal activity (EDA). For statistical analysis, the change from resting baseline was determined using a Wilcoxon sign-ranked test, and post hoc Bonferroni correction, when results were significant. All significance was assessed at the $P < .001$ level.

Results

HR:

- Turning-the-patient-onto-their-side: Significant changes in HR were recorded for Bed 2 turn without pillow (7.24 ± 4.50 change from baseline, bpm) and Bed 2 turn with pillow (9.76 ± 5.53), compared to Bed 1 (8.88 ± 6.62).
- Moving-the-patient-to-the-bed's-edge: There was a more significant HR change for bed 1 (11.22 ± 5.76) than bed 2 (5.84 ± 3.34).
- Placing-a-sling-under-the-patient: Recorded HR was significantly higher between Bed 1 (17.10 ± 8.2) and Bed 2 (9.69 ± 5.34).
- Moving-the-patient-up-in-bed: No statistical differences were found between the two beds.

EDA:

- No statistical differences were found between the two beds for techniques 1,2,3 and 4.

Discussion

Overall, the use of technology was associated with a reduction in cardiovascular demands compared to manual handling during regular in-bed patient handling tasks. Additionally, technology did not result in an increase in electrodermal activity (a stress marker), among participants, which is a positive finding. Existing literature has shown correlations between the use of technology in healthcare settings and increased stress responses among caregivers, primarily due to frustration with technology use[3]. It is important to note that participants were provided with training; therefore, this may have influenced the outcome. When coupled with training, Vendlet technology can serve as a valuable tool for caregivers in handling

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patients, helping to reduce the physiological demands associated with in-bed patient care.

6.18 Adoption of Ergonomically Designed Surgical Loupes: Impact on Surgeon Intraoperative Workload and Perceived Facilitators and Barriers

Author: Dr Liyun Yang¹, Ms Melanie Hensel², Dr Xuelong Fan^{1,3}, Prof. Magnus Kjellman^{1,4}, Prof. Mikael Forsman^{1,2}

Affiliations: 1Institute of Environmental Medicine, Karolinska Institutet, 2Division of Ergonomics, KTH Royal Institute of Technology, 3Institute of Environmental Medicine, Uppsala University, 4Department of Molecular Medicine and Surgery, Karolinska Institutet

Keywords: surgical loupes, ergonomics, workload, musculoskeletal disorders (WMSDs), adoption barriers

Introduction

Work-related musculoskeletal disorders (WMSDs) are prevalent among surgeons, significantly affecting their well-being, career longevity, and surgical performance. Ergonomically designed surgical equipment, such as prismatic loupes, may improve surgeons' work posture and reduce workload. However, little has been studied regarding the effects of prismatic loupes during real surgeries. In addition, the factors influencing the adoption of such equipment remain underexplored. The aims of this project are twofold: firstly, we aimed to evaluate the effects of prismatic loupes on surgeon intraoperative physical workload and musculoskeletal discomfort. Secondly, we aimed to explore the perceived facilitators and barriers to surgeons' utilization of prismatic loupes in clinical practice.

Methods

Fifteen surgeons (five women and ten men) participated and performed two similar operations using prismatic and conventional loupes on the same day. All surgeons have received the prismatic loupes earlier in the project and felt confident in using the prismatic loupes. Physical workload was assessed objectively using electromyography and inertial measurement units (IMUs). Body part discomfort were assessed using questionnaires. Semi-structured interviews were performed to gather user experience, the perceived facilitators and barriers to using prismatic

loupes. The work system model was used as an analytical framework when analyzing the interview data.

Results

Prismatic loupes led to a significant decrease in muscle activity levels in the upper trapezius and left neck extensors, as well as a reduction in head flexion. The change in the self-rated neck discomfort, calculated as the postoperative rating reduced by the preoperative rating, was significantly smaller when surgeons used prismatic loupes. The interview results showed that surgeons' experienced improvements in physical load and outcome were strong facilitators. The knowledge of work postures and ergonomics also contributed to surgeons' adoption of new equipment. The common lack of organizational support was a barrier to surgeons' use of prismatic loupes. Also, surgeons need time to adapt to the new type of loupes, which can be a barrier if there is a lack of time to do so. The higher price tag of prismatic loupes could be another barrier. In addition, an understanding of that the prismatic loupes work differently among surgical team members was considered an important factor as performing surgery is teamwork. Surgeons also suggested to have longer supplier support, possibility to have a test period and an earlier introduction of the prismatic loupes in surgeons' careers.

Discussions & Conclusions

Our findings showed that surgical prismatic loupes can reduce surgeons' intraoperative physical workload and musculoskeletal discomfort compared to conventional non-prismatic loupes. The facilitators and barriers analyzed under the work system model showed that introducing new ergonomic medical equipment into the operating room needs to consider multiple factors besides the design of the equipment itself. Future studies are needed to show the long-term effects of prismatic loupes on surgeon performance and well-being, and cost-benefit analyses may be performed to convey this message to all stakeholders.

6.19 Manual Patient Handling: Neuromuscular Demands of Turning a Patient onto Their Side

Author: Ms. Cynthia Dion¹, Ms Madison Holmes¹, Dr Michelle R. Cardoso², Dr Wayne Albert¹

Affiliations: ¹Faculty of Kinesiology, University of New Brunswick, ²École de kinésiologie et de loisir, Université de Moncton

Keywords: patient handling, neuromuscular activity, EMG, safe patient handling programs

Introduction

Patient handling (PH) remains the leading cause of musculoskeletal injuries among healthcare providers (OSHA, 2024), with the back, shoulders, knees, wrists and neck being the most affected areas (Waehrer et al., 2005). To mitigate the physical strain associated with repositioning patients, safe patient handling (PH) programs based on biomechanical principles have been developed. In New Brunswick, two such programs have been introduced: Back in Form (BIF) and All the Right Moves (ATRM). However, limited research exists on the effectiveness of these PH programs in reducing caregivers' physical strain during PH tasks.

The purpose of this study was to compare neuromuscular activity during manual PH using techniques from both the BIF and the ATRM programs when turning a patient in bed.

Methods

Twenty-six nursing students aged 17–35 years were recruited. The exclusion criteria for this study were that participants must not have experienced low back pain or a shoulder disorder within the 3 months prior to the study.

Two techniques from the BIF program were included for turning a patient in bed, referred to as Turn-to-Side-1-Caregiver and Turn-to-Side-2-Caregivers. The ATRM program includes two techniques referred to as Turn-1 and Turn-2. Each program includes techniques performed with one and two caregivers. Participants

performed each technique twice, while neuromuscular activity was monitored bilaterally on eight muscles, for a total of 16 measurements, using a Bortec Octopus electromyography (EMG) AMT system. The EMG data were represented as a percent change from maximum voluntary contractions (MVC) for each participant. Statistical differences in average and peak EMG activity were determined with a Wilcoxon signed rank test and Bonferroni corrections.

Results

During both the BIF and ATRM program, the techniques involving two caregivers required significantly lower levels of average and peak EMG activity in the back and legs. The BIF technique Turn-to-Side-2-Caregivers resulted in significantly lower average EMG activity in the left lower back and external obliques compared to the ATRM technique Turn 2. Although Turn 2 had significantly lower levels of average EMG activity in the left upper back. The BIF technique Turn-to-Side-1-Caregiver resulted in significantly lower levels of average EMG activity in the right lower back, and legs, and lower peak left deltoid EMG activity, compared to the ATRM technique Turn 1.

Discussion

The use of two caregivers significantly reduced neuromuscular activity during PH, as the force/load required to move the patient is shared between caregivers. Therefore, using two caregivers during PH should be strongly encouraged, regardless of the PH program. The results of this study suggest that healthcare workers should prioritize the BIF technique for turning a patient onto their side with one caregiver, as this technique requires lower levels of overall neuromuscular activity. This may be due to the caregiver being positioned closer to the patient during the BIF techniques, keeping their arms close to the body, which allows the caregiver's body weight to passively assist in moving the patient. However, the results for both programs when using two caregivers were found to be very similar.

6.20 Pressure distribution of the patient during patient handling

Author: Ms. Cynthia Dion¹, Dr Michelle R. Cardoso², Dr Wayne Albert¹

Affiliations: ¹Faculty of kinesiology, University Of New Brunswick, ²École de kinésiologie et de loisir, Université de Moncton

Keywords: patient handling, pressure mapping, center of pressure (CoP), peak pressure (PP), Vendlet, training

Introduction

Patient handling (PH) remains a primary contributor to musculoskeletal injuries (MSIs) among healthcare providers [1]. To reduce MSIs related to PH, numerous safe PH procedures and technologies have been developed to mitigate the physical strain associated with repositioning patients in their beds. Among these is the Vendlet, an automatic repositioning system manufactured by Direct Healthcare Group (UK), designed to reduce the physical strain associated with PH.

Objectives

The objectives of this study were to examine the center of pressure (CoP) and the peak pressure (PP) applied to the patient by caregivers during PH, both with and without a mechanical aid, as well as with and without PH training.

Methods

The study included 28 participants aged between 17 and 40 years of age, all being students in a health sciences degree. Participants performed two repositioning techniques on a standardized patient. The two techniques included: 1) Turning the patient onto their side; and 2) Moving the patient to the bed's edge. Participants received training from a trained ergonomist for all PH tasks. Each technique was executed three times on two different beds: Bed 1 – no technology, using only the Span-America Medical Systems (SAMS) bed; and Bed 2 – SAMS bed with the Vendlet technology. A XSensor bed pressure mapping device was installed on both bed mattresses to record the patient's PP and COP. The percentage change from baseline pressure was used to standardize the peak pressure for statistical analysis.

A Wilcoxon signed ranks test and Bonferroni corrections were used for statistical comparison between Beds for each technique, pre and post training.

Results

Pre-Training:

Turning-the-patient-onto-their-side: Statistically significant vertical movement difference between Bed 1 and Bed 2, with no significant difference in lateral movement or peak pressure.

Moving-the-patient-to-the-bed's-edge: Statistically significant lateral movement difference between Bed 1 and Bed 2, with no significant difference in vertical movement or peak pressure.

Post-Training:

Turning-the-patient-onto-their-side: Statistically significant differences in both vertical and lateral movement between Bed 1 and Bed 2. No significant difference in peak pressure.

Moving-the-patient-to-the-bed's-edge: Statistically significant lateral movement difference between Bed 1 and Bed 2. No significant difference in vertical movement or peak pressure.

Pre-Training vs post-training:

Turning-the-patient-onto-their-side: Bed 1 showed greater lateral and vertical movement in pre-training. Bed 2 showed greater vertical movement post-training but more lateral movement pre-training.

Moving-the-patient-to-the-bed's-edge: No significant difference in CoP or peak pressure between pre- and post-training.

Discussion

No increase in peak pressure was found both pre-training and post-training, which is a positive outcome, because it indicates that caregivers did not apply more

pressure on the patient during handling. Post-training, there was a significant increase in patient movement patterns when using the technology, given the nature of using a sheet to reposition the patient. This also suggests that, with training, participants tend to use the technology more during the handling trials.

6.21 Manual Patient Handling: Neuromuscular Demands During Vertical Bed Transfers

Author: Dr Michelle R. Cardoso¹, Ms. Cynthia Dion², Ms Madison Holmes², Dr Wayne Albert²

Affiliations: ¹Université de Moncton, ²University of New Brunswick

Keywords: patient handling, neuromuscular activity, EMG, vertical transfer

Introduction

The physically demanding nature of patient handling [PH] places healthcare workers at a significantly higher risk of musculoskeletal injury [MSI] compared to other occupations globally (Coggon et al., 2012). Beyond impairing workers' quality of life, the high incidence of MSIs imposes a substantial financial burden on healthcare systems. In the United States, annual compensation costs for work-related MSIs among healthcare workers exceed \$2 billion, while the United Kingdom faces an annual expenditure of £400 million (Johnson et al., 2023). In response, healthcare providers in New Brunswick, Canada, have implemented two key safe PH programs: Back in Form (BIF) and All the Right Moves (ATRM) designed to mitigate MSI risk.

The purpose of this study was to compare neuromuscular activity during manual patient repositioning techniques from both the BIF and the ATRM program when moving a patient vertically towards the head of the bed.

Methods

Twenty-six nursing students aged 17–35 years were recruited. The exclusion criteria for this study were that participants must not have experienced low back pain or a shoulder disorder within the 3 months prior to the study.

The BIF program includes two techniques for moving a patient vertically in bed, referred to as Hammock-1 and Hammock-2. The ATRM program includes one technique, referred to as Up in Bed. Each technique requires the participation of two caregivers. Participants performed each technique twice, while neuromuscular

activity was monitored bilaterally on eight muscles, for a total of 16 measurements, using a Bortec Octopus electromyography (EMG) system. The EMG data were represented as a percent change from maximum voluntary contractions (MVC) for each participant. Statistical differences in average and peak neuromuscular activity were determined with a Wilcoxon signed rank test and Bonferroni corrections.

Results

The BIF technique Hammock-1 resulted in significantly lower average and peak EMG activity in the upper body (bilaterally), upper back (bilaterally), left lower back, external obliques (bilaterally), and legs compared to the BIF technique Hammock 2.

The BIF technique Hammock-1 resulted in significantly lower average and peak EMG activity bilaterally in the upper body, external obliques, and legs, as well as lower average left lower back compared to the ATRM technique Up in Bed.

The ATRM technique Up-in-Bed resulted in significantly lower average and peak EMG activity in the left trapezius, right biceps, left upper back, right lower back, and right leg, as well as lower peak activity in the left lower back and right external oblique compared to the BIF technique Hammock-2

The ATRM technique Up-in-Bed resulted in significantly lower average EMG activity in the right lower back compared to the BIF technique Hammock-1.

Discussion

The BIF technique Hammock-1 was found to be overall preferable to the BIF technique Hammock-2 and the ATRM technique Up-in-Bed. Hammock-1 involves distributing the patient's weight evenly into a squat position with a 45° counterbalance movement, relying heavily on gravity. A key limitation of this technique is the weight threshold between the caregiver and the patient. The least favorable outcome of this technique is that the patient may not move.

6.22 Comparison of two manual patient handling techniques and an assistive technology

Author: Ms Madison Holmes¹, Michelle Léger¹, Ms. Cynthia Dion¹, Dr Wayne Albert¹, Michelle Cardoso²

Affiliations: ¹University of New Brunswick, ²Université de Moncton

Keywords: patient handling, assistive technology, Vendlet, muscle activity, EMG, perceived exertion

Introduction

Healthcare workers experience one of the highest risks of musculoskeletal injury compared to other professions across the world (Coggon et al., 2012), with the largest risk factor being manual patient handling (Johnson et al., 2023, Poole Wilson et al., 2015). These injuries lower the quality of life, risk potential disability to healthcare workers, and impose extreme costs, lost work time to the healthcare industry and possible risk to patients. The Vendlet, an automatic repositioning system manufactured by Direct Healthcare Group in Denmark, UK is a potential technological solution to manual patient handling.

The purpose of this study was to compare muscle activity and rate of perceived exertion and discomfort while performing patient repositioning tasks manually and with the use of an assistive device.

Methods

Thirty-one male and female health science university students between the ages of 17 and 40, with no previous patient handling [PH] training participated in this study. Participants performed three repetitions of two different PH repositioning tasks: 1- turning a patient in bed, and 2- repositioning a patient laterally in bed. Each task was performed on a Span-America Medical Systems (SAMS) long-term care bed, as well as on a SAMS long-term care bed equipped with the Vendlet automatic repositioning system. Participants were only instructed on the outcome of the PH task; no direction was given on movement technique.

Neuromuscular activity was recorded throughout the trials with a 16-channel electromyography (EMG) system, recording eight bilateral muscles. The EMG data were represented as a percent change from MVC for each participant. Perceived effort (PE) and rate of perceived discomfort (RPD) were recorded after each PH task using questionnaires and the BORG -10 scale of PE. RPD was measured for 23 body parts on a scale of 0-100: representing no discomfort to extreme discomfort. RPD was represented as a change from baseline. To determine the hand forces applied for each PH task, participants were asked to replicate their applied force immediately following each repetition on a hand dynamometer attached to the bed frame.

Statistical differences for neuromuscular activity, RPD and PE were determined with one-way ANOVAs and Bonferroni corrections. Statistical difference of hand forces was determined using Paired T-tests and Bonferroni corrections.

Results

When turning a patient in bed, the use of the Vendlet system resulted in significantly lower average upper back and left lower back muscular activity and hand forces, bilaterally. The Vendlet system also resulted in significantly lower PE. No significant differences were found for RPD.

When repositioning the patient laterally in bed, the use of the Vendlet system resulted in significantly lower RPD in the back and PE. Average and peak muscular activity were also significantly lower bilaterally in the arms, shoulders, and back using the Vendlet system.

Discussion

Using the Vendlet System assistive technology during PH reduced the measured and perceived physical demands on participants even without proper training. The assistive technology transitioned the caregiver role from handling to supporting the patient.

6.23 Comparative analysis of postural and cumulative loading in patient handling with versus without assistive technology

Author: Ms Madison Holmes¹, Michelle Léger¹, Ms. Cynthia Dion¹, Ms. Janie Cormier¹, Dr Wayne Albert¹, Dr Michelle R. Cardoso²

Affiliations: ¹University of New Brunswick, ²Université de Moncton

Keywords: patient handling, postural analysis, cumulative loading, assistive technology, Vendlet, biomechanics

Introduction

Healthcare workers experience a high frequency of manual lifting (greater than 25kg) (Coggon et al. 2012), leading to one of the highest prevalences of low back pain and injury among the working population (Hoy et al. 2012). Manual patient handling is the leading risk factor for musculoskeletal injuries (MSIs) in this group (Johnson et al., 2023). MSIs not only diminish healthcare workers' quality of life but also result in disability, impose significant costs, cause lost work time, and present possible risk to patient safety. The Vendlet, an automatic repositioning system manufactured by Direct Healthcare Group (UK), presents a potential solution.

The purpose of this study was to compare joint angles and cumulative loading during patient repositioning tasks, performed both manually and with the use of an assistive device (the Vendlet).

Methods

Twenty-eight male and female health science university students between the ages of 17 and 40, with no previous patient handling [PH] training participated in this study.

Participants received an in-depth training session on the proper PH technique of turning a patient in bed from an expert in safe PH. The PH task was then performed three times, both manually and with the assistance of the Vendlet system. Each task was performed on a Span-America Medical Systems (SAMS) long-term care bed,

as well as on a SAMS long- term care bed equipped with the Vendlet automatic repositioning system.

The Qualisys Miquis motion capture system and Visual 3D software were used to record participants' movements during each technique and to calculate joint angles, respectively. Participants were outfitted with retro-reflective markers placed on anatomical landmarks to define the full body. Following each repetition of the PH technique, participants immediately replicated the hand force applied on a VALD DynaMo dynamometer. These hand forces, along with joint angles, were then used to calculate joint forces (a key marker for risk of injury) using an inverse dynamics biomechanical model. Statistical differences of joint angles were assessed using Paired T-tests and Bonferroni corrections. Joint forces will be available shortly.

Results

This preliminary analysis will include joint angles for the bilateral shoulders and the pelvis.

The use of the Vendlet system resulted in significantly lower peak and mean flexion/extension as well as mean abduction/adduction in the left shoulder. The manual technique however resulted in significantly lower rotation.

Similarly, the use of the Vendlet system resulted in significantly lower mean flexion/extension and abduction/adduction in the right shoulder. The manual technique resulted in significantly lower peak flexion/extension, and peak and mean rotation.

The use of the Vendlet system resulted in significantly lower peak and mean flexion/extension as well as mean abduction/adduction of the pelvis. The manual technique resulted in significantly lower peak and mean rotation.

Discussion

Although the PH task used for turning the patient in bed was designed with biomechanical principles, it still results in postures that require lower back flexion

and shoulder reaching. This preliminary analysis suggests that the Vendlet system allows for a more neutral posture compared to manual PH.

6.24 Evaluation of Burnout Syndrome and Work-Related Psychosocial Factors among Healthcare Workers

Author: Mr Marwan Babiker¹, Eda Merisalu², Zenija Roja³, Henrijs Kalkis³

Affiliations: ¹University of Latvia, ²Estonian University of Life Sciences, ³University of Latvia

Keywords: burnout syndrome, psychosocial factors, healthcare workers, Maslach Burnout Inventory, COPSOQ

Introduction

Introduction: Burnout is a significant worldwide problem in the healthcare field that has an adverse effect on patient care and health quality. Healthcare workers face significant psychosocial risks in their work environment, which can negatively affect their health. Evaluation of burnout and psychosocial risks is essential in healthcare settings since professionals have a greater vulnerability to these risk elements because of the nature of work. The study aims to investigate the prevalence of burnout syndrome and to determine the impact of work-related psychosocial risks on physicians working in family medicine centers (FMCs).

Methods

A cross-sectional study was conducted in FMCs in Jubail, Saudi Arabia, and included physicians working there. The data were collected through an online questionnaire sent through email from February to March 2024. All the participants took a three-part questionnaire that asked about sociodemographic data, the Maslach Burnout Inventory, which has 22 items pertaining to professional burnout and is a validated diagnostic instrument that consists of emotional exhaustion (EE), depersonalization (DP), and reduced personal accomplishment (PA). The final method used to determine psychosocial factors related to the work used selected parts from the short Copenhagen Psychosocial Questionnaire (COPSOQ) II. Informed consent was obtained from all physicians who agreed to participate in the study. The study was approved by the Institutional Research Board (IRB) of the Royal Commission health service program in Jubail.

Results

Among 52 participants who were enrolled in this study, with a response rate of 80.2 %, In each burnout dimension, the proportion of participants with high scores was as follows: 48.1% in EE, 28.5% in DP, and 14.7% in PA. In all three criteria, 30.4% of the individuals had high burnout scores. The outcome computed the participants' mean and standard deviation as well as psychological aspects. Meaning of work had the greatest mean score among all estimated psychosocial factors, followed by other scale elements like commitment to workplace, rewards, cognitive demand, and social support from coworkers and superiors.

Discussion and Conclusion

Burnout is a common problem among doctors and is associated with symptoms of both personal and professional strain. Workplace psychosocial disorders affect workers' well-being and may be important indicators of poor health and consequences linked to the job. Promoting healthcare professionals' well-being and increasing the effectiveness of the organization require building support systems and tackling burnout and psychosocial hazards. To properly comprehend the problem, establish causal and useful frameworks that describe the phenomenon, and create feasible action plans; future research must be conducted before intervention to assess influencing elements.

Acknowledgements

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7 Designing for System Performance

Theme Keywords: HF methods, team coordination, system performance, resilience, optimisation, patient transitions

Rationale and Objective

Healthcare systems must continuously adapt to complexity, variability, and competing demands. The abstracts under this theme investigate how human factors methods such as FRAM, simulation, resilience engineering, and cognitive load analysis can improve hospital throughput, team coordination, and patient transitions. They focus not only on optimising existing workflows but also on reimagining care delivery models. Through empirical studies and real-world interventions, contributors emphasise that better system performance requires rethinking processes, enhancing flexibility, and designing for real-world conditions, not idealized workflows.

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7.1 A systematic approach to sterile processing: Analyzing interactions across spacio-temporal bounds in a multi-work system process

Author: Ms Allison Drees

Affiliation: Johns Hopkins Medicine, Baltimore, USA

Keywords: sterile processing, system mapping, spatial analysis, work systems, patient safety

Introduction

Sterile Processing is a process where dirty surgical instruments are cleaned and sterilized in preparation for their next use. The sterilization process involves multiple sequential steps performed across various work systems of the hospital by distinct teams in the operating room and sterile processing department. The complexity of surgical instruments and intricacy of cleaning may result in compromised instruments from inadequate cleaning. If detected, this requires instrument re-sterilization, which may cause delays or cancellations of surgical procedures. If undetected, this issue may cause infection and harm to patients.

Methods

This qualitative study utilized a work system analysis approach to 1) analyze the sociotechnical system of sterile processing and 2) define system barriers from interactions within each work system and across work systems that contribute to inadequately cleaned or sterilized surgical instruments.

1. Observation: We conducted observations for 3 different surgeries at an academic and community hospital. We started observations during the end of the procedure and observed management of instruments during 1) operating room turnover, 2) decontamination, 3) assembly, and 4) sterilization. The surgeries included orthopedic and spine surgical procedures because they have high surgical pan use and instruments with difficult bioburden removal.
2. Work as imagined vs. Work as done: We developed two process maps – one illustrating the expected process as defined in policy and the other

illustrating the observed process. For each process mismatch, we defined the work system barriers that may contribute to the workaround.

3. SEIPS Analysis: We described the interactions of work system elements within and across work systems to determine how the work system design contributed to barriers noted from the process maps.

Results

Across the sterile processing work systems, 14 instances of workarounds were noted. We documented the work system element interactions that may contribute to those workarounds.

17 interactions within each independent work system and 4 interactions between work systems were identified to contribute to work system barriers. These were visually represented using a SEIPS interactions diagram . Examples include the following:

- OR Work System: OR turnaround is time-sensitive [Organization] and staff responsible for prepping surgical instruments for transfer to sterile processing have competing priorities [Task].
- OR – Decontamination Work Systems: Instruments may not be fully wiped and sprayed upon leaving the OR [Tools, Organization]. The decontamination space is small, and pans may sit for a long time before addressed [Environment] further worsening the difficulty of removing bioburden.
- Decontamination – Assembly Work Systems: There are ineffective tools to properly clean instruments in decontamination [Tools] and there is high cognitive strain during pan assembly [Tasks]. This may lead to missed identification of remaining bioburden.

Discussion

Through this work, we demonstrate how work system analysis can be applied to a multi-work system process to support the identification of barriers within each work system and how those impact upstream and downstream work systems. This method of evaluating a process from start to finish ensures design improvements that holistically improve the system, rather than improving one work system and causing unintended barriers to another.

7.2 The Importance of Technology and Social Systems for Safe, High Quality Intraoperative Anesthesia Handoffs

Author: Ms Mojgan Zoaktofi¹, Dr. Michael Russell², Dr. Ankit Basal³, Dr. Osman Ozaltin⁴, Prof. Abigail Wooldridge¹

Affiliations: ¹Department of Industrial and Enterprise Systems Engineering, ²Department of Anesthesiology, ³Systems Science and Industrial Engineering, ⁴Edward P. Fitts Department of Industrial and Systems Engineering

Keywords: anesthesia handoffs, sociotechnical systems, communication, patient safety, OR teamwork

Introduction

Perioperative care inherently contains care transitions before, during and after surgery, including transitions between hospital units and between providers for break relief and shift changes (Abraham et al., 2021). Anesthesia providers (i.e., physicians, certified registered nurse anesthetists, anesthesia assistants) are involved in pre-, intra- and post-operative care and play a critical role in ensuring continuity of care (Abraham et al., 2021). Transitions are opportunities for resilience and recovery as well as information loss and harm; in fact, some studies have found that intraoperative anesthesia handoffs increase risk of adverse events (Abraham et al., 2021). In this study, we conduct a Systems Engineering Initiative for Patient Safety-based (SEIPS; Carayon et al., 2020) analysis of intraoperative transitions between anesthesia providers to inform the development and implementation of improvement interventions.

Methods

We conducted an online survey of anesthesia providers at an academic health care system in the Eastern United States. We invited all anesthesia providers at the system to participate voluntarily, a total of 183. Sixty anesthesia providers began the survey, with 46 completing it. We collected perceptions of effectiveness, efficiency, quality, satisfaction and familiarity with handoff participants of the last handoff the respondent participated in and a composite measure from the Agency for Healthcare Research and Quality (AHRQ) Survey on Patient Safety (SOPS) Hospital Survey 2.0 (Sorra et al., 2021) on handoff and information exchange. We elicited

qualitative descriptions of the current process for permanent (i.e., shift change) and temporary (i.e., break relief) intraoperative transitions between anesthesia providers; we also elicited suggestions to improve these transitions. We computed the composite score following the survey user guide (Sorra et al., 2021). We developed process maps to describe the care transition processes and conducted thematic analyses of the improvement suggestions.

Results

Fifty-six percent of respondents were positive on the handoff and information exchange composite measure (average score: 3.47). The effectiveness, efficiency and satisfaction of individuals with the last handoff they participated in was associated with the handoff and information exchange score. The process described by respondents shared overarching commonalities – preparation before handoff, a handoff where information about the patient and case is exchanged, and then assumption of care by the incoming provider. However, there was variation between permanent and temporary handoffs, particularly the level of information detail and preparation, between roles and, perhaps most importantly, within the same role and type of handoff. Improvement strategies centered around building awareness and agreement on a consistent process and what and how information should be communicated, dedicating time and staff for handoffs, and using a tool/technology to support the process.

Discussion

The recommendations identified by respondents align with the literature. One important finding is ensuring anesthesia providers can participate in handoffs. Even with well-designed, appropriate notes or checklists (electronic or otherwise), tools will not improve handoffs if hospitals do not have sufficient staff scheduled in such a way as to allow time for handoffs. In short, this work provides further evidence that technology-based interventions are unlikely to succeed with positive, intended consequences without also attending to the social subsystem.

7.3 Patient Handover in ED – Are we addicted to words, and why do we (almost) never use our strongest sense?

Author: Mr Ariel Braverman¹, Dr Eli Jaffe², Dr Dan Schwarzfuchs³, Dr Amit Frenkel³, Prof. Yuval Bitan¹

Affiliations: ¹Ben Gurion University Of The Negev, ²Magen David Adom, Israel National EMS, ³Soroka Medical Center

Keywords: emergency handover, communication, non-verbal cues, patient transfer, ED safety

Introduction

Patient handover, particularly between Emergency Medical Services (EMS) and the Emergency Department (ED), is a critical transition point in patient care. (Javidan et al Clinical handover from emergency medical services to the trauma team) Communication failure during handover can lead to incomplete or incorrect information transfer, which may impact patient outcomes and even endanger patients. (Eggins S, Slade D. Communication in Clinical Handover) Even though vision is our most substantial and complex (information transfer wise) sense, it is not used as the primary sense to deliver and receive information in most patient handovers. (Moriarty D. Information processing. Practical Human Factors for Pilots), and the primary medium of the information exchange during the patient transfer remains verbal.

Methods

This study investigates verbal versus visual information use and balance during the EMS-to-ED handover process. Through a combination of observational analysis and survey methodologies, we aimed to evaluate current practices, the reliance on verbal handovers, and the perceived effectiveness of visual/written information. The observational checklist follows the SBAR (Situation, Background, Assessment, and Recommendations) information transfer methodology. The observation checklist includes check boxes of “Observed/Non Observed” about different aspects of information transfer – verbal and visual. In addition, the study consists of a Likert questionnaire that is distributed to ED and EMS personnel and examines their attitude toward the transfer of information during the patient handover.

Results

In 83 patient transfers, we observed verbal communication as the dominant mode of information exchange, occurring in 97.6% of cases, with minimal to no use of visual aids (documents) beyond electrocardiograms (ECG). The EMS charts were particularly “not a factor” in the handover. EMS records were handed to the ED personnel during the handover in 5% of observed handovers and were actively reviewed during the handover only in 1% of the observations. However, the average handover time was relatively long: 41 seconds for Advanced Life Support (ALS) teams and 29 seconds for Basic Life Support (BLS). In only 40.96% of handovers (primarily by ALS teams), EMS teams provided complete medical background information, mostly verbally. On the other hand, results from Likert-scale surveys of EMS and ED personnel revealed that despite relying heavily on verbal communication and giving them a high ranking in the questionnaire (average of 5.4 across both groups), staff expressed across-the-board confidence in the need for visual “aids” (documentation) as well and gave the presence of medical documentation during the handover an average rank of 4.3 out of 6.

Conclusion

The lack of integration of visual aids suggests a potential for miscommunication or omission of critical information, highlighting the risks associated with the current practices. The visual modality in information transfer has been proven essential for effective information processes and preventing information loss. This study underscores the need to enhance patient handover’s visual and written aspects to complement verbal exchanges. The findings highlight this need and provide a pathway for further research and development of more visual-based handover concepts. These protocols can significantly improve information accuracy and continuity of care during the EMS-to-ED transition.

7.4 Thematic analysis of the ergonomic and systems factors influencing the production of digital hospital discharge summaries

Author: Mrs Catherine O'Reilly¹, Mrs Julie Crawford¹, Mrs Laura Pickup¹

Affiliations: ¹University Hospitals Bristol and Weston NHS Foundation Trust

Keywords: discharge summary, digital health, ergonomics, workflow, hospital communication

Introduction

The transfer of care from tertiary to primary care services is an essential part of the patient journey but not without risk. The risks recognised include lack of adequate and timely communication, delays in patient care, increased readmission rates, and reduced satisfaction for patients and General Practitioners (GP).

This study examined the system factors which influence the production of quality digital discharge summaries (DS) and identified areas of organisational learning.

Methods

A mixed method approach was used. Data were obtained from interviews, survey, site visits, incidents, complaints, patient experience reports, and organisational data. Thematic framework analysis was used for a deductive approach to coding data from incidents, complaints and patient experience reports. The framework was expanded with inductive codes generated from site visits, interviews and survey comments. Descriptive statistics of quantitative data were generated from survey, complaints responses and organisational data. The Systems Engineering Initiative for Patient Safety (SEIPS) framework informed mind maps to interpret the themes coded in the data and understand key system interactions influencing the DS process.

Preliminary results identified 11 key themes, which reflected issues impacting quality and reliability of the DS process.

Examples of key findings are provided below:

- Junior doctors usually write the DS, with nurses rarely providing input

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- The DS is not seen as a multi-disciplinary team responsibility
- Junior doctors frequently do not know the patient well when they write the DS
- There is no recognised quality standard for DS
- Training is rarely provided on how to write high quality DS
- Clinical specialty needs are not reflected in the DS template
- The DS is written to impart information primarily to the GP
- Hospital doctors and GPs value different information on the DS
- The DS is not designed and written for patients
- Not all hospital digital systems support DS writing
- The inpatient environment negatively impacts focused attention to writing the DS

Discussion

This study identified factors within and outside the control of the organisation which affect the DS. The organisation now acknowledges the risk imposed by external factors such as the national template or staffing constraints, and this study will inform the organisation's risk management of the DS process. Further work is required to define 'quality' and the development of an accepted standard. Mutual understanding of the needs of hospital clinicians and GPs would improve the quality of the DS. This study highlighted the need for closer working between hospital Doctors, pharmacists and GPs to understand each group's roles and requirements from the DS. Greater understanding of nursing and allied health professional roles in production of the DS is also required. The next step for this study is to better understand how patients interact with the DS and requirements to meet their needs.

The use of mixed methods allowed deeper understanding of factors affecting the writing of the DS. This enhanced organisational learning and allowed targeted risk management and a focused approach to improvement work to improve the standard of the DS process.

7.5 Enhancing Healthcare Safety through Functional Resonance Analysis method (FRAM): An Empirical Study on Work-as-Done

Author: Mr Kevin Hoy, Ms R Hanlon, Ms R Gleeson, Ms L Foley

Affiliation: Resilience Healthcare, Ennis, Ireland

Keywords: FRAM, work-as-done, healthcare safety, systems thinking, complexity science

Introduction

This empirical study applies the Functional Resonance Analysis Method (FRAM) within the framework of Safety II principles (Hollnagel, 2014) to examine work-as-done in a residential care setting for children with intellectual disabilities. The impetus for this research arose from a positive external inspection outcome, which led to a deeper reflection on daily operations and practices.

Method

The study utilized FRAM to compare work-as-done with work-as-imagined in a residential care environment (Hollnagel, 2012). Given the requirement to adhere to regulatory standards, the research focused on 32 processes aligned with the Health Information and Quality Authority (HIQA) National Standards for Residential Services for Children and Adults with Disabilities. Group sessions were conducted with a facilitator, the person in charge, a team lead, and a service manager. Together, they mapped each process as a set of functions, identifying interdependencies and interactions between these functions using documented evidence and staff expertise. The mapped processes were then modeled using FRAM software for verification. Additionally, the study assessed the resonance of functions to identify potential upstream and downstream risks. Based on the findings, action plans were developed to replicate several efficient systems across other services.

Results

A thorough review of all 32 processes resulted in 23 recommendations, with three key recommendations explored further in this study:

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1. The service developed an internal audit process aligned with regulatory standards.
2. A comprehensive suite of template documents was created.
3. An internal system for assessing compliance readiness against regulations was introduced.

These three recommendations were integrated into quality improvement projects, enabling successful replication of the systems across 32 residential services. This also facilitated corporate oversight of regulatory readiness.

Discussion

This study illustrates the advantages of integrating a Safety II framework alongside traditional quality improvement approaches. Healthcare organizations can leverage tools like FRAM to enhance service quality by comparing work-as-done to work-as-imagined. Process reviews allow for the identification of workarounds, labour-intensive systems, efficient procedures, and potential risks. While traditional approaches focus on learning from what goes wrong, Safety II adds value by emphasizing learning from what goes right.

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7.6 Elucidating physicians' clinical performance and decision making using full-scale simulation of acute crisis management scenarios: The IMPACTS Study.

Author: Dr Matthew Weinger^{1,2,3}, Dr Laurence Torsher^{1,4}, Dr Huaping Sun^{1,5}, Dr Randolph Steadman¹, Dr. Jason Slagle^{1,2,3}, Dr Elizabeth Sinz^{1,8}, Dr Matthew Shotwell^{1,2}, Dr. Megan Salwei^{1,2,3}, Carrie Reale^{1,2,3}, Dr John Rask^{1,9}, Laura Militello¹, Dr. William McIvor^{1,6}, Dr. Adam Levine¹, Dr. Meredith Kingeter^{1,2,3}, Dr. Jeffrey Huang^{1,4}, Dr. Ann Harman^{1,5}, Dr. Steve Howard^{1,6}, Dr. David Gaba^{1,6}, Dr Huang-Tram Duran^{1,5}, Dr. Caoihme Duffy¹, Joshua Declercq^{1,2}, Dr. Jeffrey Cooper¹, Dr. Amanda Burden^{1,10}, Dr. Jack Boulet¹, Dr. Arna Banerjee^{1,2,3}, Dr Michael Andreae¹, Dr. Shilo Anders^{1,2,3}

Affiliations: ¹Simulation Assessment Research Group (SARG), ²Center for Research and Innovation in Systems Safety (CRISS), ³Vanderbilt University Medical Center, ⁴The Mayo Clinic, ⁵American Board of Anesthesiologists, ⁶University of Pittsburgh Medical Center, ⁷Stanford University School of Medicine, ⁸West Virginia University, ⁹University of New Mexico, ¹⁰Cooper Medical School of Rowan University

Keywords: clinical simulation, crisis management, decision making, performance assessment, physician training

Introduction

A keystone of healthcare quality and safety is clinician competence. The gold standard for physician competence is board certification. While board certification is associated with other measures of physician performance [PMID28383325], there is no solid evidence that it reliably evaluates clinicians' ability to manage acute care events, a critical anesthesiology competence. We sought to validate a model and measures of physician performance using high-fidelity simulated crisis management. Our goal was to develop an infrastructure, tools, and materials to conduct clinical performance assessments and to describe the decision-making strategies of experienced vs. inexperienced clinicians.

Methods

Using a prior large-scale study as a foundation [PMID28671903], we developed four 15-minute standardized acute care scenarios and conducted 8-hour study days with 102 anesthesiologists of varying experience (62 board-certified

anesthesiologists (BCAs), 26 senior and 16 junior residents) at four diverse sites. Before the 8-hour study day, each participant completed a comprehensive eSurvey about their personal characteristics, clinical training, current practice attributes, and prior exposure to simulation and to crisis event management. All encounters were video recorded and scored subsequently by blinded trained raters using several different performance measures – the presence of clinical performance elements [CPEs, i.e., checklist items], 9-point behaviorally anchored rating scales, and 9-point holistic measures of medical/technical, behavioral/non-technical, and overall performance. After every scenario, we conducted 40-minute cognitive interviews (CIs) to delineate participants' thought processes and decision-making strategies (to be reported separately) [PMID37941803]. Each participant's national board exam scores were also obtained. We used a principal components analysis to statistically summarize multiple survey variables related to participants' clinical, simulation, and crisis management experience, respectively. Multivariable regression models were developed to examine the association between the distribution of performance measures and physician characteristics including time since the start of residency training).

Results

Intra- and inter-rater reliability coefficients were >0.8 for CPEs and >0.5 for BARS and holistic measures. Overall, senior residents received the highest performance scores followed closely by BCAs, with junior residents' scores being much lower. Senior residents and BCAs were more likely than junior residents to perform management-critical CPEs. For example, the use of point-of-care ultrasound for diagnosis in the complex cardiorespiratory distress scenario or the escalation of therapy with additional volume and pressors in the hypotension scenario. There were no differences in performance between academic and community practice-based BCAs. Initial multivariate models suggest that the most significant predictors of performance are time in either direction from completion of training and prior exposure to actual clinical crisis events. Analysis of Board Scores is ongoing these results will be available.

Discussion

These findings appear to validate our model, tools, and infrastructure to conduct high-fidelity simulation-based clinical performance assessment. Senior trainees

showed the highest overall performance. Practitioners who were further away from initial training and board certification had average lower performance scores than those close to end of training, supporting the value of continuous certification programs. We expect this study's findings to inform guidelines on critical event management and to support policymaking about the content, execution, and timing of simulation-based training and assessment.

7.7 Quantifying Nurse Workload and its Effect on Quality of Care in the Emergency Department - A Process Simulation Study

Author: Dr. Sadeem Munawar Qureshi¹, Dr. Sue Bookey-Bassett², Prof. W. Patrick Neumann¹

Affiliations: ¹Human Factors Engineering Lab, Toronto Metropolitan University, ²Daphne Cockwell School of Nursing, Toronto Metropolitan University, Toronto, Canada

Keywords: nurse workload, ED operations, process simulation, quality of care, staffing

Introduction

The emergency department (ED) is a high-pressure environment, especially for nurses who face rising patient volumes, chronic staff shortages, and increasingly complex, unpredictable cases. This crisis has reached critical levels in Canada, with some EDs being forced to close due to severe staffing shortages. Despite the situation's urgency, there is a significant gap in effective, proactive workload measurement tools to manage and alleviate the burden on healthcare professionals in these high-demand settings.

Methods

This study developed an approach to nurse-centered modelling by simulating the nursing care delivery process on a task-by-task basis in the ED setting, using the approach of Qureshi et al.[1]. This nurse-focused process simulation model was created using Rockwell Arena (a discrete event simulation software). The model input data were collected using time and motion studies (TMS) and multiple focus groups on care delivery patterns. TMS was conducted across 18 shifts with 18 nurses. 72% identified as female and 28% as male. TMS was used to create task distributions for care task frequency and durations. The physical layout of the unit was measured using Bosch Laser Measure (GLM30 100 Ft.), and was virtually recreated using Visio. The model quantified the impact of operational design and technical policies, such as staffing ratios, in terms of Nurse workload (distance walked; nurse movement; mental workload) and quality of care (e.g., missed care, waiting time).

Results

TMS reported “Documentation”, “communication”, “other direct nursing care”, “monitoring and vital signs”, “vascular access” and “medication” to be the most frequently observed tasks with a task count of 143, 128, 57, 55, 54 and 46. “Teaching students or new hires” (11.6 min) was the least performed task followed by “elimination” (8.8 min). Nurses were observed spending more than 25% of their time doing documentation-related tasks (average duration of 6.4 min per instance). Preliminary modelling results show an average 9.2 km distance walked by a nurse in a 12-hour shift, with a mental workload of 42 tasks in queue and a task waiting time of 1.1 hr. The model also reported a missed care of 31 tasks, equivalent to 1.8 hrs of work. Detailed results will be shared at the conference.

Discussion

“You cannot improve what you cannot measure” – given the complex nature of work, ED lacks the utilization of objective workload management tools. The model presented here can help address the staffing crisis in ED and other healthcare settings by providing precise information on staff workloads and their implication on quality of care, under a variety of operating scenarios. Currently, the model is being validated against step-counter data gathered from 10 ED nurses across full shifts. Further, model usability and utility tests are underway with healthcare system stakeholders such as directors of infection prevention and control, unit managers, charge nurses, architects, ergonomists etc.

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7.8 Should we escalate? barriers and enablers to deteriorating patient escalation by staff in Ireland: early findings

Author: Ms Sue Markey¹, Dr Liam M Chadwick²,

Affiliations: ¹RCSI Hospital Group, Dublin, Ireland, ²Irish Centre for Applied Patient Safety and Simulation, Galway, Ireland

Keywords: patient escalation, clinical deterioration, barriers, enablers, Irish hospitals

Introduction

The Irish National Early Warning System (INEWS) V.2 was launched in 2020. Anecdotal evidence suggests staff 'Fail To Escalate' (FTE) care despite the patient's Early Warning Score indicating they should. This FTE increases the likelihood of Failure To Rescue (FTR): failure to deliver the interventions needed to mitigate patient deterioration (Jones et al., 2011). Contributors to FTE and FTR are often influenced by and related to human factors (Chadwick, 2014). Evidence of inconsistencies exist in how nurses and junior physicians recognise and escalate patient deterioration. In order to address ways of improving patient care, it was considered essential to identify barriers and enablers to deteriorating patient escalation.

Methods

Following a literature review, a focus group protocol was developed to identify factors contributing to FTE and elicit local experiences, while also identifying enablers that improve escalation of care. Three focus groups were replicated in two different hospitals (Site 1 & Site 2) – one each with nurses, junior doctors and registrars – totalling six. Thematic analysis of the focus group discussions was based on the findings from the literature review (Burke and Conway, 2023, O'Neill et al, 2021, Petersen et al, 2017).

Results

Focus group discussions differed significantly by site, predominantly driven by organisational factors, i.e. whether the physician teams were geographically

oriented to ‘home wards’ or not and some process factors. Six main themes emerged as both barriers and enablers to escalating care for deteriorating patients: governance, communication, teamwork, professional boundaries, escalation and clinical experience. Summary early findings are presented in Table 1.

Table 1. Summary early findings

Governance	Home based wards (Site 1) On home based surgical wards, staff come directly to speak, but on the medical wards you don’t have a home.(Site 2) Reduced concerns about escalating care as staff are more familial in home wards.
Communication	(Site 1) Dependence on indirect and inefficient communication processes. (Site 2) Efficient in-person ward based communication
Using ISBAR communication	(Site 1) Reliance on the INEWS score with little additional context about patient(Site 1 & Site 2) Informative and efficient ISBAR updates, with patient familiarity and context.
Communication using bleeps	(Site 1) Frustration from ward staff that registrars do not carry their pagers/bleeps.(Site 2)Less reliance on pagers/bleeps and staff more consistently carry them
Teamwork	(Site 1) A need for frequent introductions to ‘team’ members. (Site 2) Familiarity and consistency with colleagues

Discussion and Conclusion

Evidence suggests that geographic colocation of physician teams with their patients could significantly reduce factors contributing to FTE and FTR. The emergence of home wards as an enabler to escalation in this research is considered to be tightly coupled to other enablers such as communication and teamwork. It is planned to present the findings to the management team on each site to discuss the benefits of home wards to staff and patients. Further research is required to establish the prevalence of the barriers and enablers to escalation within the broader health system.

7.9 Is it safe to substitute nurses for doctors in hospitals? A review examining the effect of task-shifting on patient outcomes

Author: Dr Marcia Kirwan¹, Prof. Michelle Butler², Dr Vera McCarthy³, Dr Timothy Schultz⁴, Dr Ashagre Molla⁵, Dr Judith Cole⁶, Prof. Jonathan Drennan⁷

Affiliations: ¹School of Nursing, Psychotherapy and Community Health, Dublin City University, ²School of Nursing, Psychotherapy and Community Health, Dublin City University, ³School of Nursing and Midwifery, University College Cork, ⁴Adelaide Nursing School, University of Adelaide, ⁵Bahir Dar University, ⁶Nuffield Department of Population Health, University of Oxford, ⁷School of Nursing, Midwifery and Health Systems, University College Dublin

Keywords: task-shifting, nurse practitioners, patient outcomes, workforce optimization, healthcare delivery

Introduction

A shortage of healthcare workers and spiralling healthcare costs prompt those who plan care to look for alternative approaches to care delivery while maintaining quality standards.

It is estimated that by 2030, there will be a shortfall of 18 million healthcare workers globally and that the impact will be greatest in lower-middle-income countries. Across all countries, hospital services are under increasing pressure due to the heightened demands of changing demographics, ever-growing levels of complexity of disease, staff shortages and rising costs.

There is growing interest in 'task shifting' some of the tasks undertaken by physicians to non-physicians, and as a result in many countries nursing roles have been expanded to include tasks previously undertaken by a physician under supervision (delegation) or independently (substitution) [1, 2, 3]. The development of new and more autonomous roles for nurses is also possible due to advances in nurse education, expansion of nursing scope of practice, and advances in treatments and technology. Additionally, nurses are taking on patient care roles for

a growing number of chronic conditions that require regular consultations with a healthcare provider.

It is timely to evaluate the impact of this move on patient outcomes, process of care outcomes and economic outcomes in order to plan for future healthcare delivery. We have conducted a Cochrane systematic review of the substitution of nurses for doctors in hospital settings (inpatient and outpatient).

Methods

This is a Cochrane systematic review. Included are randomised trials of both individual and cluster design that examine the impact of substituting nurses for doctors in hospital settings on patient outcomes, process of care outcomes and economic outcomes.

Results

In the review to date we have identified circa 88 relevant randomised controlled trials. Interventions include nurses substituting directly for physicians (role substitution), nurses taking on tasks previously undertaken by a physician using a protocol or working under medical supervision (task substitution), and nurse-led outpatient clinics substituting for physician-led clinics or nurse-led care substituting for doctor-led in-patient care. Common settings include emergency departments and clinics for rheumatology, dermatology, diabetes care, respiratory conditions (asthma or chronic obstructive pulmonary disease), cancer (screening or follow-up of patients), and atrial fibrillation. Trials of nurses conducting endoscopies, medical termination of pregnancy, and pre-operative assessment were also included. Preliminary analysis of outcomes demonstrates important findings on patient mortality, patient safety, clinical outcomes, quality of life, self-efficacy, costs, and relative performance of practitioners. We will present these results in detail focusing on patient safety outcomes.

Discussion .

Early results indicate that nurse-physician substitution in certain healthcare settings is an effective means of maintaining safety and quality of care for patients, with likely overall cost reductions. The results are important for healthcare planners,

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clinicians and patients in light of increasing demands and projected shortages of healthcare staff across countries, in particular in low-income countries where the number of physicians is critically low.

7.10 Evaluating the learnability of virtual care technologies used in residential aged care homes: A Cognitive Walkthrough

Author: Dr Adeola Bamgboje–Ayodele¹, Professor Melissa Baysari¹, Anita Higgins¹, Sarah Harkin², Pan Teng³, Margaret Watkiss⁴, Prof. Susan Kurrle⁵, Associate Prof. Fiona Robinson⁶, Prof. Meredith Makeham⁶

Affiliations: ¹University of Sydney, Faculty of Medicine and Health, Sydney Nursing School, Digital Health Human Factors Research Group, ²University of Sydney, Faculty of Medicine and Health, Clinical Skills and Simulation Education, ³Sydney North Health Network, ⁴Twilight Aged Care, ⁵University of Sydney, Faculty of Medicine and Health, Northern Clinical School, ⁶University of Sydney, Faculty of Medicine and Health, General Practice Clinical School

Keywords: virtual care, usability, aged care, cognitive walkthrough, digital health

Introduction

Virtual care (VC) can improve timely access to general practitioners (GPs) for residents in residential aged care homes (RACHs)[1]. However, there are many reports of challenges associated VC technology adoption. Effective and regular training on VC technologies is recommended to overcome adoption barriers [2], however, in RACH settings, where workload and staff turnover are high, ongoing staff training is challenging. Instead, VC technologies should be easy to learn. The extent to which VC technologies used in RACH settings are learnable, a key determinant of usability, is not known.

Aim

To evaluate the learnability of VC technologies used to connect residents with GPs in RACHs.

Methods

Cognitive walkthrough (CW) was used to evaluate a dashboard, video conferencing system and a 6-in-1 remote monitoring device for measuring vital signs e.g. temperature and oxygenation. This innovative new platform was trialed

in the Northern Sydney region of New South Wales, Australia. Two human factors experts walked through 10 tasks (GP=4, nurse=6) and 44 subtasks (GP=13, nurse=31) using the VC technologies, and identified problems, directed by the CW prompts.

Will the user:

1. understand that the current step is needed to reach their larger goal?
2. notice that the correct action is available?
3. associate the correct action with the effect that the user is trying to achieve?
4. see that progress is being made toward the solution of the task?

The evaluators also identified any additional usability issues and determined the severity of the problems and issues with subject matter experts (GP and nurse).

Results

A total of 27 problems were identified based on the CW prompts and tasks (24 for the nursing workflow and 3 for the GP). For the nursing workflow, 42% (n=10) of the problems concerned CW prompt 1, and 33% (n=8) were focused on CW prompt 2 (see above). Based on nursing tasks, 67% (n=16) of the problems were related to “capturing resident’s vitals signs” and 25% (n=6) were related to “joining a resident to a VC call”. For the GP workflow, the majority (2/3) of the problems focused on “viewing current and previous vital signs for the resident”.

In addition, the experts identified 12 usability problems during CW (5 for the nursing workflow, 7 for the GP workflow). These primarily related to the display and functionality of the dashboard such as placements of icons, missing information and the absence of cues. The majority of issues were rated as being minor or moderate severity.

Discussion

The study revealed that the learnability of VC technologies used in RACHs, such as the platform evaluated here, is an area requiring further development. Many of the problems identified involved users not knowing what to do at each stage of using the system, particularly when capturing resident vital signs and adding a resident

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to a virtual call. Making some small changes to technology design, such as consistency in placement of icons and clarity of information is likely to improve the learnability of VC technologies and minimize the reliance on training in this setting.

7.11 Measuring team performance in multidisciplinary tumour boards: Implications for quality development to enhance patient safety

Author: Prof. Guido Offermanns^{1,2}, Ms Alexandra Kratki²

Affiliations: ¹Karl Landsteiner Institute For Hospital Management, ²University of Klagenfurt

Keywords: tumour boards, team performance, quality improvement, multidisciplinary care, oncology

Introduction

In Austria, tumour boards (MDTs) are considered the gold standard in cancer care. They provide multidisciplinary recommendations that can influence the patient's journey and treatment plan. Multidisciplinary teamwork has been shown to promote patient safety through improved communication or decision-making, but the evidence for its effectiveness in cancer care is still controversial. Evidence suggests that MDTs do not always work optimally and not all decisions are implemented into care. These inefficiencies can be detrimental to patients, resulting in suboptimal decisions, delayed treatment or misdiagnosis. Therefore, it is necessary to review the various understandings of the effective work of MDTs and factors that influence multidisciplinary teamwork. This study aims to identify strategies to improve team performance by analysing team culture and communication using a self-assessment instrument developed for tumour boards.

Methods

A mixed-methods approach, including a systematic review and 57 qualitative interviews with expert MDT members, was used to develop the Austrian Tumour Board Survey (ATS). The online survey was pre-tested in nine MDTs in an academic hospital with 117 participants between March and May 2022 (response rate of 58.0%). Ten items were changed and added for clarity. The second online survey, which included 52 items in nine scales on a 5-point Likert scale and open questions for improvement strategies after each item, was conducted in nine other MDTs with 81 participants between January and August 2023 (response rate of 55.5%). Descriptive statistics were used and the answer options on the Likert scale were

summarised in categories from poor (mean scores up to 3.00) to excellent (mean scores between 4.51 and 5.00).

Results

Descriptive statistics suggest a positive mean score on the team culture and communication scale across the sample ($M=4.19$, $SD=0.46$). Results in the summarised categories show that team culture and communication (67.9%) achieved the highest levels of agreement in the average and good categories (all mean scores between 3.51 and 4.50). Other scales related to team performance, such as attendance (60.5%) and documentation (37.0%), achieved the highest level of agreement in the poor and sufficient categories (all mean scores up to 3.50). The scales decision-making process (60.0%) and organisation (54.3%) were also rated in the sufficient or average category (all mean scores between 3.01 and 4.00).

Discussion

The levels of agreement in the poor, sufficient, and average categories, indicate potential for quality improvement, particularly scales in relation to team culture and communication (i.e., organisation, attendance, documentation, or decision-making process). Ineffective tumour board performance might affect patient safety and could be improved by considering the human factor, i.e. by implementing team training programmes (i.e. active team development, board observation, debriefing and feedback), but also by changing organisational structures to allow time for preparation, to ensure the quality of patient results, or to facilitate regular attendance to improve the decision-making process and communication. It is important to emphasise that the team performance of the MDT has a direct impact on mortality and morbidity and therefore on patient treatment and safety.

7.12 How to Provide Safer Emergency Care for People with Mental Health Conditions? Learning from AcciMap Analysis of Multiple Safety Incidents

Author: Mr John A. Rey-galindo¹, Dr Cecilia Landa-Ávila², Dr Gyuchan Thomas Jun², Dr Carlos Aceves-González^{1,3}

Affiliations: ¹Universidad De Guadalajara, ²Loughborough University, ³University of Derby

Keywords: mental health, emergency care, system design, vulnerable populations, patient safety

Introduction

According to WHO, one in eight people has a mental health condition (MHC) affecting cognition, emotional regulation, or behaviour. People with MHC are often more vulnerable when seeking emergency care, especially when their condition coexists with physical health issues, which can complicate diagnosis and treatment.

Factors like stigma, lack of information, and fragmented service delivery (Wainberg et al., 2017), combined with overcrowded and under-resourced emergency departments, increase the risk of negative health outcomes for people with mental health conditions.

While some information exists on emergency care for people with MHC, there is limited evidence on how safety incidents and the factors involved are related, from a systems perspective and whether these relationships are unique to this population. This lack of clarity hinders the ability to identify potential improvements in care.

Therefore, this study aims to contribute to understanding the relationships between factors contributing to safety incidents affecting the diagnosis (delay, loss and misdiagnosis) during emergency care of people with MHC.

Method

The AcciMap method (Rasmussen, 1997) was used to map factors contributing to safety incidents. Three studies (one from Sweden and two from the UK) were selected based on criteria: peer-reviewed articles focused on people with MHC, safety incidents during diagnosis, emergency settings, and qualitative data. All studies reflect health professionals' perspectives.

Using the version of Branford et al. (2009), the AcciMap was constructed as follows:

- Incidents were assigned to the Outcomes category.
- Factors were classified into Actors/Processes/Conditions, Organisational, and External/Social.
- Relationships between incidents and factors were mapped for each study.
- This process was repeated for all reported incidents.
- Three joint meetings between authors ensured accurate reporting, classification, and consistency in relationships.

The final AcciMap summarise multiple incidents and individual descriptions per study.

Results

All three studies highlight misdiagnosis and delayed treatment. Key factors reported include erratic behaviour and lack of trust in patients for Actors/Process/Conditions. In the Organisational category, the main issues were lack of knowledge and time, while labelling and stigma dominated the External/Social category.

Patients' erratic behaviour often leads to mistrust and misattribution of symptoms to mental disorders. This is worsened by organisational issues, such as insufficient knowledge about interacting with these patients. Additionally, chaotic emergency settings exacerbate patient behaviour, further complicating care. The analysis reveals that these contributing factors can lead to outcomes of varying severity, hindering accurate diagnosis and treatment.

Discussion

This analysis highlights the significant challenges in preparing the emergency system to care for individuals with MHC, particularly in managing the behavioural responses common in this population. The absence of appropriate conditions, such as informed and trained staff or a calm environment, increases the likelihood of high-risk safety incidents. Using the AcciMap to analyse multiple incidents offers a comprehensive view of how these incidents relate to contributing factors, while still preserving the detailed insights gained from single-case analyses. It also helps identify which system adjustments are both most critical and most feasible, providing a clearer path to improving emergency care conditions for people with MHC.

7.13 FRAM analysis of management of paediatric leukaemia patients across multiple geographic sites

Author: Mr Nicholas Seaton, Dr Laura Pickup, Dr John Moppett, Mrs Julie Crawford,

Affiliation: University Hospitals Bristol & Weston Foundation Trust, Bristol, England

Keywords: FRAM, paediatric oncology, distributed care, chemotherapy safety, system resilience

Introduction

Children with leukaemia who live outside regions offering specialist cancer services benefit from a shared care system involving multiple healthcare providers, allowing for more accessible care closer to home while drawing on the expertise of regional tertiary care. However, this model of distributed care increases the complexity of the system. This may introduce risks in managing chemotherapy, including potential medication incidents such as missed or excessive doses, and complicates communication of care adjustments between multiple providers and families.

This paper describes work to analyse potential variability through various patient safety scenarios at an acute children's hospital, identifying opportunities to enhance resilience of these functions through team-based and organisational learning.

Methods

The Functional Resonance Analysis Method (FRAM) (Hollnagel, 2012) was used to examine chemotherapy provision in a paediatric haematology and oncology service. Data were gathered from organisational data, observations, and semi-structured interviews with 11 multidisciplinary team members to understand how everyday work is performed. Interview data were analysed to define key functions and their variability. A FRAM model was developed to explore couplings, dependencies, and variability across functions. A workshop with clinical representation reviewed and refined the model.

Results

Preliminary findings revealed the complexity in paediatric care, involving multiple stakeholders across different locations, with technology playing a key role in communication and support for distributed cognition to ensure safety of the delivery of care. The electronic system for prescribing and administering chemotherapy was inadequate to reliably alert staff to incorrect or incomplete actions during safety-critical tasks. Parents and guardians provide resilience in the system to share critical information between geographically distributed units. They were required to understand their child's chemotherapy regimen in considerable detail to collect and reconcile medications, but the lack of a user-friendly schedule hindered their understanding and the coordination between families, staff, and care sites. Local GPs had access to electronic discharge summaries, while shared care centres in different regions did not. Allocation of staff rosters has the potential to disrupt care continuity, highlighting the need for fatigue management and improved shift design.

Discussion

FRAM effectively visualised the complexity in obtaining distributed cognition across the chemotherapy care system, highlighting key functions and constraints shaped by geographical and technical factors. It raised important questions about safety oversight, particularly in managing dose adjustments across locations and improving visibility in a distributed care network. Healthcare continues to face challenges with integrating electronic patient records, with risks from poor interoperability and coexistence of paper and electronic systems. Unlike traditional tools focused on cause and effect, FRAM offered a 'blank model' for clinicians to simulate incidents, facilitating model validation and identifying functions requiring greater resilience. FRAM functioned as a boundary object, providing a shared framework that aided meaning-making between investigators and clinical staff (Nathues et al, 2024). The process benefitted from a highly engaged clinical team who identified new functions and couplings during a workshop, informing safety recommendations to enhance resilience locally and regionally. The model will continue to be used proactively to simulate future scenarios and adapt to system changes, supporting development of further interventions.

7.14 Enhancing Patient Safety in Interhospital Transfers Through Identification of Non-Routine Events

Author: Dr Michael Cauley¹, Dr. Dan France¹, Dr. Jason Slagle¹, Dr. Kelly Sopko², Dr. Jesse Wrenn¹, Dr. Michael Ward¹

Affiliations: ¹Vanderbilt University Medical Center, ²VA Tennessee Valley Health Care

Keywords: interhospital transfers, patient safety, non-routine events, handover communication, VA healthcare

Introduction

Interhospital transfers from emergency departments (ED) are high-risk transitions of care linked to increased inpatient mortality rates, higher costs, longer hospital stays, and lower rates of discharge to home. A systems-based approach is essential to understand the factors that contribute to adverse events during these transfers. Human factors engineering offers such an approach, utilizing the Non-Routine Events (NRE) framework to examine multifactorial contributions to adverse events. NREs represent deviations from optimal care, with higher levels of NREs correlated with patient injury and harm. We sought to apply the NRE framework to interhospital transfers within the Veterans Administration (VA) in the United States to identify contextual and systemic factors contributing to NREs in the interhospital transfer process, ultimately aiming to enhance transfer safety.

Methods

This qualitative study utilized previously validated surveys to gather data from clinicians and patients post-transfer, employing content analysis (i.e., interviews, verbatim transcription, coding, and theme development) using the NRE framework. Transfers from non-VA EDs intended as direct-to-hospital-floor admissions between January 2024 and April 2024 were included. The Comprehensive Open-ended NRE Survey (CONES) was administered to clinicians, while the Patient CONES (PCONES) survey gathered insights from Veterans and/or family members to identify contextual and systemic factors contributing to NREs occurring during the transfer process. Interviews were recorded and transcribed using VA Microsoft Teams, with accompanying medical record reviews. Following transcript analysis,

NRE-related excerpts of each transcript were organized in Excel, categorized, and reviewed for interrater reliability by NRE subject matter experts.

Results/Findings

44 eligible transfers were identified, with 52 CONES and 19 PCONES surveys collected. Three contributory factors were determined to influence NRE occurrence during transfers: prolonged presentation following acceptance (e.g., bed availability, resource allocation, and distance between facilities), absent clinical documentation, and limited internal communication. First, transfer times from acceptance to arrival at the receiving VA facility varied between 2 and 48 hours, leading to unexpected arrivals and a lack of warm handoffs, defined as unambiguous communication, for receiving teams. This delay impacted team readiness and patient safety. Second, although clinical documentation from the transferring ED is crucial for continuity, only 36% of transfers (16) included these records. The absence of documentation impeded the receiving team's ability to establish a shared mental model, creating safety risks due to information gaps. Finally, communication primarily relied on phone calls between the transferring ED clinician and the triage hospitalist, who documented information in a Transfer Coordination Note (TCN). However, inconsistencies in the TCN quality limited the effectiveness of anticipatory guidance for receiving teams. These findings suggest opportunities for quality improvement by standardizing the TCN to promote consistent communication for receiving teams.

Discussion

Applying the NRE framework to interhospital transfers identified key gaps in interhospital transfer safety. Enhancing communication consistency, increasing transfer documentation availability, and real-time data usability can reduce NREs and improve patient safety. Standardizing documentation practices, including the TCN, with a focus on the content and quality of clinical documentation and interhospital communications present opportunities to reduce NREs and strengthen patient safety.

7.15 Why We Fail to Learn? - Barriers to Learning - Understanding the Persistent Recurrence of Patient Safety Incidents in Healthcare

Author: Mrs Abiola Ajayi-obe, Prof. Patrick Waterson, Prof. Gyuchan Thomas Jun

Affiliation: School of Design and Creative Arts, Loughborough University

Keywords: patient safety, learning from failure, STAMP, inquiry analysis, system improvement

Introduction

Patients being harmed due to patient safety incidents continues to result in avoidable mortality and morbidity outcomes in ever increasing numbers since data began being collected. Notably, figures relating to death does not consider sub optimal patient outcomes arising from safety incidents, which does not result in death.

Aim

The aim of this study is to determine whether a direct link can be made from National Healthcare Inquiry Findings to Recommendations made and Action Implementation to determine whether the actions have a correlated effect on resolving or preventing identified themes from recurring, sustainably, over time.

B: Methods and Study Design

Methods

The review was conducted using a deductive thematic approach to frame the analysis of findings from 10 National Healthcare related Inquiries [Government Commissioned Patient Safety Investigations] dating from 1966 to 2023 across various specialties.

The contributory factors, leading to the main findings, were then analysed using The System-Theoretic Accident Model and Processes (STAMP) Framework to understand the safety system where incidents took place and the associated interactions and control mechanisms which did not work as planned.

Results

The review identified several common repeating themes appearing across all the ten inquiries reviewed including: Delinquent Leadership (90%), Physical Isolation of the Provider Unit (90%), Staff Competencies (80%), Poor Organisational Culture (80%), Inadequate Regulatory Oversight (70%), Patients and Families Not Heard (70%), Whistle blowers Concerns not Acted Upon (70%).

Discussion

The recurrence of repeating themes and contributory factors show that recommendations made to resolve issues were either inappropriate or not properly implemented as intended.

Further work will be undertaken to theme the actions taken against correlated findings to understand the strength of the effect of the action in reducing recurrence.

Initial findings indicate that greater emphasis needs to be placed on Action Plan management and in the monitoring and evaluation of implementation. Presently, the stated commitment of health care providers, to learn and measurably improve following the findings of safety inquiries seems to focus solely on the initiation and completion of safety investigations. And not on evaluations of the efficacy of action plan implementation to reduce future recurrence.

Understanding ‘Why We Fail to Learn?’ is vital in understanding what healthcare professionals and institutions need to do or not do to ensure measurable improvements take place in the wake of safety reviews to protect the safety of all persons in receipt of healthcare. This study aims to clarify why learning gaps persist, urging healthcare providers to adopt effective, measurable improvements to enhance patient safety and public trust.

Preliminary results highlight the need for stronger management, monitoring, and evaluation of action plans.

7.16 Measuring nurses' and older patients' perspectives on and experiences of missed nursing care in an acute hospital setting

Author: Ms Anna Connolly, Ms Anne Matthews, Dr Marcia Kirwan

Affiliation: Dublin City University

Keywords: missed nursing care, older patients, nurse surveys, patient perspectives, hospital quality

Introduction

Patient safety is among the many health priorities which nurses contribute to by providing direct patient care. Nurse shortages, a lack of resources and increased care demands contribute to missed nursing care. The regular omission or delay of care poses a threat to patient safety and is associated with nurse, patient and organisation-related consequences. Older patients are particularly vulnerable to missed nursing care due to complex care needs resulting from co-morbidities and emergency admissions. If the demand for nursing care exceeds supply, adequate care may not be delivered to patients with complex care needs. Although missed nursing care impacts on the overall quality and safety within healthcare settings, it is experienced by patients, therefore both the nurse and patient voice must be heard. Hospitals must consider the prevalence of and reasons for missed care in order to improve patient safety and healthcare quality

Methods

Permission was sought to use and adapt the MISSCARE Survey and MISSCARE Survey-Patient for an Irish context to collect data on patient and nurse perspectives of missed nursing care. Healthcare professionals from the participating hospital co-developed the adapted survey instruments in collaboration with the researchers and the roll out of the surveys was supported by the nursing executive and facilitated by the Assistant Director of Nursing for Research and Innovation. Both paper-based and online surveys were distributed to registered nurses and patients aged over 65 years old on in-patient adult wards. Nurses were asked to indicate how frequently nursing care is missed and identify the potential reasons for that care being missed. Using likert scales, core areas such as communication,

timeliness, and the provision of basic nursing care were measured from the patients' perspective. The data collected through the nurse and patient reported surveys on missed nursing care will be analysed using SPSS.

Results

This study sought to explore both nurses' and patients' perspectives on and experiences of missed nursing care. Through the analysis of the surveys which is currently underway, the prevalence, contributing factors, and impact of missed nursing care in an Irish healthcare setting, and how it is experienced by both nurses and patients, will be explored. Approximately 150 nurses and 150 patients completed the surveys. The extent to which nursing care was provided according to patients will be determined. Furthermore, the frequency of and reasons for missed nursing care in addition to the type of care left undone most often, according to nurses, will be made explicit.

Discussion

According to previous studies, the types of care that are often left undone are ambulation, turning, feedings, patient education, discharge planning, the provision of emotional support, hygiene care, documentation of intake and outputs and patient monitoring. Inadequate staffing, followed by lack of material resources and communication/teamwork issues have also previously been identified as the most common reasons for missed care. It is anticipated that the results of this study will outline and highlight similar areas which require immediate attention in order to reduce missed nursing care and improve patient safety in acute hospital settings.

7.17 Co-creating a Sociotechnical Systems-informed Co-creation Process for Clinical Design: An Action Research Project

Author: Prof. Sam Cromie¹, Natalie Duda¹, Ms Riona Madden¹, Prof. Siobhán Corrigan¹, Dr Mary Galvin³, Ms Anne Horgan², Ms Sonya Allen², Prof. Marie E. Ward^{1,4}, Dr Siobhán Ni Bhriain², Mr Tim Carey², Ms Patricia Gilsenan²

Affiliations: ¹Trinity College, ²Heath Service Executive, ³Munster Technological University, ⁴St James's Hospital

Keywords: co-creation, sociotechnical systems, clinical design, action research, healthcare innovation

Introduction

Designing models of care is a highly complex form of “knowledge mobilisation” (Grindell et. al., 2022) requiring the integration of clinical expertise and international evidence-based best practice with healthcare data and real-world knowledge of how the system works in practice. Clinical design teams comprise geographically distributed multiple actors working over a prolonged time period, with a changing and evolving delivery system and population health profile. The system they are re-designing is imagined in as many different ways as there are stakeholders.

Attempts to improve the healthcare design process have included incorporating Sociotechnical Systems (STS) approaches (Carayon & Salwei, 2021; Ward et. al., 2023). Carayon & Salwei (2021) recommend taking the whole work system into account, generating a deep understanding of the work of healthcare teams and engaging in continuous design cycles. Ward et. al. (2023) emphasised systematically building a rich transdisciplinary picture of the current situation.

Collaborative approaches have been variously characterised as co-creation, co-design and co-production. The key principles of co-creation are the co-creation of value, focus on all stakeholders’ experiences, direct interaction between the stakeholders and creation of platforms for continual dialogue (Vargas et. al. 2022).

Method

This paper describes an action-research collaboration between HFE researchers and clinical design teams from the Irish Health Service Executive's Clinical Design & Innovation. The objective is to re-design the clinical design process from an STS perspective. Phase I reviewed the current design process through document review, interviews, a survey and a workshop. Phase II defines, applies and refines a co-creation process for clinical design with a supporting "toolbox" and training activities.

Results

Phase I found that design teams are highly motivated to improve the system but face frustration due to outdated design models, tight timelines, limited resources, and competing priorities. The teams also lacked knowledge of STS and design methodologies. Phase II is developing a new process with an accompanying "toolbox" and training supports. These are being iteratively refined through application to three clinical design teams working on diverse models of care. This approach seeks to integrate sociotechnical systems analysis within a co-creation process.

This paper will report activities and experiences from the initial months of the project focussing on what worked and what did not work so well in engaging stakeholders, building a strong design team and integrating HFE and STS into the clinical design process.

Discussion

Design processes often look well on paper but get messier when they meet real-life constraints and barriers. The paper will examine how the co-creation and STS design ambitions of the project are faring in the face of real-life constraints and barriers. Key elements of the co-creation process include stakeholder analysis to identify who needs a seat at the design table; workshops to clarify values, objectives and scope; as-is system analysis; to-be system definition; planning, communication, implementation and monitoring. A key consideration is how to design resilience into the design process so that it can adapt effectively to the variety of design challenges and contexts it meets.

7.18 Organizational factors shaping the success of antimicrobial stewardship programs in hospitals

Author: Dr Bethany Van Dort^{1,2}, Dr Angus Ritchie^{1,3}, Dr Jonathan Penm^{1,4}, Dr. Jane Carland^{5,6}, Dr Timothy Gray⁷, Dr Amrita Ronnachit⁸, Ms Kate Morton⁹, Mr Nathan Chahoud¹⁰, Prof. Melissa Baysari², Linda Peute¹

Affiliations: ¹eHealth Living & Learning Lab Amsterdam, Department of Medical Informatics, Amsterdam UMC, location University of Amsterdam, ²Faculty of Medicine and Health, The University of Sydney, ³Health Informatics Unit, Sydney Local Health District, ⁴Department of Pharmacy, Prince of Wales Hospital, ⁵Department of Clinical Pharmacology and Toxicology, St Vincent's Hospital Sydney, ⁶School of Clinical Medicine, UNSW Medicine & Health, St Vincent's Healthcare Clinical Campus, Faculty of Medicine and Health, UNSW, ⁷Department of Infectious Diseases and Microbiology, Concord Repatriation General Hospital, ⁸Department of Infectious Diseases and Microbiology, Royal Prince Alfred Hospital, ⁹Department of Pharmacy, Lismore Base Hospital, ¹⁰Department of Pharmacy, Orange Health Service

Keywords: antimicrobial stewardship, organisational culture, implementation, prescribing safety, healthcare quality

Introduction

In hospitals, effective antimicrobial use is challenged by inappropriate prescribing and the growing threat of antimicrobial resistance. Antimicrobial stewardship (AMS) programs aim to improve prescribing through a multidisciplinary approach involving audits, prescriber feedback, education, and surveillance. Using a Human Factors Ergonomics approach, this study aimed to understand how organizational factors facilitate or hinder AMS programs to develop recommendations for improving AMS.

Methods

A contextual inquiry methodological approach was used which included observations and semi-structured interviews, informed by the Systems Engineering Initiative for Patient Safety (SEIPS) model (Carayon et al., 2006). Data were collected from two regional and two metropolitan hospitals in New South Wales, Australia,

with AMS team members observed and interviewed between May 2021 and May 2023. Observation notes and interviews were analyzed using inductive content analysis and mapped to the SEIPS model. To enrich the findings and enable cross-national comparison, interviews will be conducted with AMS teams in the Netherlands to identify and contrast organizational factors influencing AMS practices. These results will be reported during the presentation.

Results

Findings mapped to the organization element of the SEIPS framework are reported here. Key organizational themes are executive support, resources, interdepartmental relationships, and organizational culture. The AMS teams at metropolitan hospitals were supported by multiple infectious diseases consultants, whereas regional hospitals had only one infectious diseases consultant overseeing the AMS program. Additionally, regional AMS teams were responsible for programs at peripheral hospitals, which posed additional challenges.

Executive support was perceived to enhance the awareness of AMS across the organization. Hospital executives allocated necessary resources for AMS which was reportedly driven by infectious diseases consultants advocating for AMS initiatives and presenting data to demonstrate their value. The requirement for AMS programs in hospital accreditation further reinforced executive support. Ward pharmacists were reported and observed to be fundamental in supporting AMS efforts and identifying inappropriate prescriptions. In regional hospitals, AMS pharmacists had less time to dedicate to AMS work as they were also required to cover the wards.

Across all hospitals, participants emphasized the importance of relationships for successful AMS, with in-person meetings and feedback highlighted as strategies for building rapport. Participants from one hospital (metropolitan) reported challenges with their interdepartmental relationships and attributed it to a lack of support from senior staff and a culture of high prescriber autonomy.

Discussion and conclusion

This study highlights the importance of organizational factors including, executive support, resources, and interdepartmental relationships, in determining the success of AMS programs. As a hospital-wide initiative, AMS requires strong

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executive support to increase program awareness and allocate sufficient resources, particularly in regional hospitals where specialized staff are limited, and responsibilities extend to multiple hospitals. Promoting positive relationships between AMS teams and prescribers through collaborative decision-making and in-person interactions may enhance the acceptance of AMS recommendations and improve patient safety. Understanding how organizational factors affect AMS internationally can offer valuable insights into best practices and facilitate the adaptation of successful strategies across different healthcare systems.

7.19 When process discontinuities are the manifestation of cross-functional collective activities serving patient care in external radiotherapy

Author: Dr Alexandra Wartel¹, Dr Céline Poret¹, MCF HDR Johann Petit², Dr Magali Edouard¹

Affiliations: ¹Institut de Radioprotection et Sûreté Nucléaire (IRSN), ²CNRS, IMS, Equipe d'ergonomie des systèmes complexes

Keywords: process discontinuities, cross-functional teams, radiotherapy, workarounds, collaborative care

Introduction

External radiotherapy is a cancer treatment that involves several professionals from a variety of fields, working within the framework of a care production process. The Institute for Radiation Protection and Nuclear Safety (IRSN) and the Nuclear Safety Authority (ASN) have observed a "lack of fluidity" in this process, particularly in the treatment preparation phases. This "lack of fluidity" could have an impact on work (carried out in a hurry) and on the safety of care. In literature outside the human and social sciences, fluidity is synonymous with performance: a fluid production process is a high-performance process. The initial request suggest that a fluid process guarantees patient safety. But literature in the humanities and social sciences talks more about continuities and discontinuities. In the educational sciences, discontinuities can be moments of stagnation necessary for learning. In ergonomics, studies show that cross-functional collective activities are performance-enhancing through the question of continuity. We aim to characterize discontinuities in the care production process, to identify their possible effects on the work of professionals and on patient safety.

Methods

To do this, we characterize discontinuities in the preparation process by understanding the articulation of individual and collective activities, using two intrinsic approaches of the human activity developed in French-speaking ergonomics: the course of action (Theureau, 1992) and the instrumental approach (Rabardel & Beguin, 2005). The method we designed is a longitudinal approach that

articulates two perspectives: the individual day of a specific profession, and the collective history of a patient's treatment which can be likened to the concept of patient's journey (Carayon et al., 2019). We compare two fields to examine the respective effects of these two organizational modes on the development dynamics of collective activities, on possible discontinuities and on care safety.

Results

Our study shows that the main cause of discontinuities is to allow the necessary cross-functional collective activities for the proper management of the patient. However, these cross-functional collective activities, and above all the articulations required for their development, are rarely considered in the sequential breakdown of the prescribed process, leading to disruptions and putting pressure on the teams. For example, in some cases (re-irradiation, atypical tumor localization), the dosimetrist and radiotherapist need to adjust to each other to draw up a treatment plan that considers the disease, its localization, the patient's specific characteristics and the technical possibilities. As the process does not allow for these adjustments, the file is passed back and forth between dosimetrist and radiotherapist, resulting in discontinuities in the prescribed technical process.

Discussion

Based on this empirical knowledge, we open the discussion to design perspectives by highlighting what organizations should consider enabling and support the development of real cross-functional collective activities, involved in preparation. For example, for cases considered atypical or involving re-irradiation, a specific process could be devised whereby dosimetrists and radiotherapists could discuss the technical possibilities in relation to medical objectives before dosimetry is carried out.

7.20 Developing an evidence-driven concept of operations for hospital PCHCAI

Author: Prof Nick McDonald¹, Prof. Marie E. Ward^{1,2}, Prof. Una Geary², Dr. Brian O'Connell³, Prof. Colm Bergin^{4,5}, Dr. Rob Brennan⁶, Declan Byrne

Affiliations: ¹Centre for Innovative Human Systems, School of Psychology, Trinity College Dublin, ²Quality and Safety Improvement Directorate, St. James Hospital, ³Department of Microbiology, St James's Hospital, ⁴Department of Infectious Diseases, St James's Hospital, ⁵School of Medicine, Trinity College Dublin, ⁶ADAPT, School of Computer Science, University College Dublin

Keywords: concept of operations, hospital workflow, systems design, AI integration, patient care

Introduction

Building resilient healthcare requires a whole organisation response to systemic risks.

This paper builds on a 3-year programme of co-ordinated research activities concerning different aspects of the prevention and control of healthcare acquired infection (PCHCAI) in a hospital (Ward et al., 2024) developing a 'concept of operations' (Conops) for a resilient PCHCAI programme. Resilient healthcare systems (RHS) have been described as those that have the capacity to consistently deliver safe, high-quality care through adaptations at multiple system levels (micro, meso, macro) in the face of challenges and disruptions (Wiig et al., 2020). This Conops moves beyond being largely reactive and compliance driven, to support the development of RHS that have proactive, predictive, evidence and outcome driven risk management approaches. The Conops framework links micro-, meso- and macro- levels of the organisation (and beyond the hospital) and addresses current risks, the identification of critical systemic mechanisms and the actions that need to be taken that can lead to the mitigation of risk and the realisation of value.

Methods

The underlying methodology is supported and integrated by the ARK platform; this embeds the Cube Socio-Technical Systems Analysis (STSA) and links to diverse types and sources of data, generating risk assessments and mitigating actions, managed across an implementation pathway (McDonald et al., 2021).

Results

Focus groups and workshops, along with data mapping and analysis, have taken place between experts with Human Factors Ergonomics (HFE), Quality and Safety and Data Science backgrounds and healthcare professionals from Infectious Diseases and Microbiology backgrounds. Some areas for improvement identified in an initial analysis include: data and knowledge sharing across the micro, meso and macro system; building data analytics and capability in relation to predictive risk management extending the scope of surveillance data for certain infections to outside of the hospital setting.

Defining the PCHCAI Conops in full is ongoing and will address: different strands of operational activity (e.g., PCHCAI in relation to Surgical Site Infections and the surgical pathway); the organisational structure of PCHCAI; data governance, managing data, and analysis; resources and capability; the development of a meso-level knowledge system; and the critical role of quality and safety. Specific issues include: cross-disciplinary integration in delivering adequate data and knowledge covering the overall PCHCAI process; delivering Findable, Accessible, Interoperable, and Reusable (FAIR) actionable knowledge to populate a sharable Knowledge Base; and the role of meso-organisational processes across the data lifecycle and in delivering usable tools, platforms, policies, programmes, education and training.

Expected benefits

The Conops should enable an STS that can better support resilient PCHCAI which in turn may lead to more general societal benefits in terms of implementing the European Antimicrobial Resistance (AMR) programme and the WHO climate resilience framework.

7.21 An Ergonomic observation of care on a new hospital ward design of 20 single occupancy rooms and two four-bedded bays

Author: Prof. Al Ross, Dr Yetunde Ataiyero, Ms Emma Stimpson, Ms Helen Hall, Ms Helen Ashby, Dr Alisen Dube, Ms Vanda Carter, Dr Hazel Ann Smith, Ms Jacky Copping, Mr Paul Morris, Prof. Sarahjane Jones

Affiliation: University of Staffordshire

Keywords: hospital design, ward layout, ergonomics, nursing workflow, patient care

Introduction

James Paget University Hospitals NHS Foundation Trust (JPUH) provides acute and specialised care for around 250,000 patients in England, UK. As part of the UK's National Health Service (NHS) commitment to a new hospital build programme, the Department of Health and Social Care supported JPUH to build and test the design of a fully operational 'concept ward' with a bed occupancy of 20 single rooms and two four-bedded bays. Different hospital wards used the building on rotation, whilst allowing their existing clinical areas to undergo essential building repairs. This study aimed to gain a nuanced understanding of everyday care work on the ward to inform future designs.

Methods

This study took place within the context of a wider multi-method evaluation of the ward. Ethical approval was obtained from the UK Health Research Authority (IRAS ID: 334395). Observations followed a generic Ergonomic 'walk through' underpinned by two broad inter-related frameworks. The SEIPS (Systems Engineering Initiative for Patient Safety) model was used as a general guide for note-taking and the CARE (Concepts for Applying Resilience Engineering) model was used to capture Ergonomic interactions and associated care adaptations and adjustments. [1]

Procedures

A single trained Ergonomist (AR) visited general surgery, respiratory and paediatric wards over 54 hours total to observe: care functions (nurse handover, moving patients); staff (e.g. by shadowing healthcare assistants, registered nurses over time); areas of the ward over time (staff rooms, single rooms and bays). Note-taking was iterative and aimed to describe use of the ward rather than make direct comparisons across services. Photographs were taken for notes, avoiding images of staff or patients.

Analysis was by Framework analysis [2] broadly guided by standard Ergonomic domain distinctions setting out cognitive, physical and organisational factors and interactions. Themes were cross-checked in discussion with staff conducting other parts of the study (YA, ES) and at various engagement events with senior members of the project from JPUH and commercial build partners.

Results

The ward is roomy and facilitates good moving and transfer. Space can be used flexibly for different clinical and operational needs with multiple repurposing. Care is less centralised and more distributed than with a traditional 'hub' nurses' station and physical ward board.

There are important trade-offs with single rooms between enhanced privacy, noise reduction and infection control and staff vigilance in observing patients, including those at risk due to mental health conditions. In addition, glare prevents observing patients when there is a light differential between corridor and rooms/bays.

There are challenges in everyday hybrid digital/paper working such as a lack of writing surfaces and non-operational and confusing call bell systems. Security and workflow also interact, with multiple issues in staff accessing swipe-card protected areas of the ward. There is much use of ad hoc signage to 'finish the design' where usability is not intuitive (such as with lighting systems).

Discussion

This innovative study has described care at an early stage of a new hospital build project and made principled Ergonomic recommendations for future design.

7.22 Misalignments and Adaptations in the Management of Aggression on Mental Health Wards

Author: Ms Olivia Lounsbury, Dr. Natalie Sanford, Ms Francesca Cibelli, Prof. Janet Anderson, Dr Mary Lavelle

Affiliation: University Of Oxford

Keywords: mental health, aggression management, adaptation, team dynamics, hospital safety

Introduction

Mental health care faces significant challenges due to its complexity and inadequate resourcing. Traditional safety management approaches, heavily reliant on protocols and policies, often assume a stable system where capacity can consistently meet anticipated demand. This assumption overlooks the inherent variability and emergent nature of mental health care, which requires flexible and adaptive responses. Resilient Health Care (RHC) offers a lens to understand variability and resulting adaptations.

Mental health staff frequently encounter situations where demand exceeds capacity (misalignments), necessitating ad-hoc adaptations. The Concepts for Applying Resilience Engineering (CARE) 2.0 Model offers a conceptual framework for understanding the interplay between demand-capacity misalignments (e.g., staff shortages, equipment constraints), adaptations made by staff to address these misalignments, and subsequent impacts (1).

The purpose of this study was to use the CARE 2.0 model to identify misalignments and adaptations in mental health wards and discuss the immediate and overarching impacts of both on care delivery during aggression management with mental health patients.

Methods

Semi structured interviews with mental health staff (n=16) and ethnographic observations (n=350 hours) were conducted across seven mental health wards in

England. Findings were analysed inductively and deductively by a team of researchers.

Results

Staffing was the most pervasive misalignment and surfaced repeatedly in both interviews and observations. However, misalignments were not confined to staffing alone: misalignments were prevalent across all areas of the system, including communication, equipment, process, space, and workflow misalignments. A new misalignment type (service misalignment) was identified which adds to the misalignment types already represented in the CARE 2.0 model. Despite these challenges, staff leveraged their adaptive capacity to devise workarounds that enabled work to continue. When demand was high and capacity was low, staff used process adaptations so work would continue. For example, staff modified how the activity was completed, who completed the activity, and when the activity was completed, with “how” being the most common.

Notably, the adaptations observed in the ethnography differed from those reported in the interviews: Interview results revealed adaptations staff would have preferred to take while results from the ethnography showed adaptations staff actually made based on the resources available to them. Additionally, staff often expressed frustration at being forced into what they felt were suboptimal responses, due to systemic constraints. These constraints shaped the trajectory of their adaptations. This illustrates the interconnectedness of misalignments, frontline adaptations, and the short term impacts on work processes. Potential long term impacts on care delivery are also discussed.

Discussion

The synthesis of data from both interviews and observations revealed differences not only between work-as-imagined and work-as-done, but also between work-as-done and work-as-described. It is important to note that frontline behaviour does not occur in a vacuum and that other overarching organisational pressures influence ward activity.

This study adds to the existing definition of team adaptive capacity (2) by highlighting additional factors that influence adaptation in response to

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misalignments in mental health, such as complex socioeconomic challenges. Future research should examine the impact of various team features and structures on the misalignment-adaptation-impact trajectory (3).

7.23 Resilience and Adaptive Capacity in Hospital Teams: An Ethnographic Study of Five Hospital Team Types in Two Hospitals in England

Author: Dr. Natalie Sanford, Prof. Gabriel Reedy, Prof. Dame Anne Marie Rafferty, Prof. Janet Anderson

Affiliation: King's College London

Keywords: resilience, adaptive capacity, team types, ethnography, hospital systems

Introduction

Resilient Healthcare emphasises the importance of flexibility and adaptation to maintain safety in complex healthcare systems. Research has focused on understanding how teams contribute to system adaptive capacity, particularly within specific settings like surgery and anaesthesia. However, a significant gap exists in our understanding of how diverse healthcare teams adapt to variable conditions outside of these specialised areas.

Current research often fails to account for the unique characteristics and challenges faced by teams in different settings. To effectively enhance teamwork and safety, it is crucial to understand how different types of teams navigate demands and adapt to problems within their specific contexts. This necessitates a broader understanding and categorisation of healthcare teams, based on the characteristics of the team not solely the clinical area. A recent study by Sanford et al. (2024) identified five types of hospital teams based on their structure, membership, location, and function: structural, hybrid, satellite, responsive, and coordinating.

The aim of this study was to expand on this work to investigate how adaptive capacity is hindered or supported by organisational and contextual factors in these five different types of hospital teams.

Methods

This ethnographic study consisted of data collection in two hospitals situated within one NHS England Trust (one large and one community hospital) with ten total teams (one of each type per hospital). In total, 144 hours and 54 minutes of ethnography were completed across the two hospitals and 24 semi-structured interviews were conducted.

Interview and observational data were analysed using an inductive-deductive approach to data analysis, using a typology of hospital teams (Sanford et al., 2024) and the Concepts for Applying Resilience Engineering (CARE) Model 2.0 (Anderson et al., 2016; Sanford et al., 2022).

Results

The main finding was that both organisational and team context impacted teamworking, demand-capacity misalignments, and team adaptation. While misalignments were pervasive and found in all teams, teams' responses to these challenges varied significantly based on their unique features, suggesting that team type impacts adaptive capacity. While adaptations supported teams' abilities to overcome challenges, they also required resources and were possible depending on team type.

Discussion

Adaptive strategies differ based on team type. This challenges existing teamwork improvement practices, which assume that one size fits all when conceptualising and training teams. Existing cross-disciplinary work around team adaptation identifies factors such as team stability, experience working together, and other team characteristics as contributing to team adaptive capacity. This is the first study to examine teams that differ in these characteristics to understand how teamwork and adaptation differ based on these characteristics in practice.

The results provide foundational knowledge to guide future intervention design, which may potentially bring about wider changes in training and sustaining successful teams and supporting their adaptive capacity. These findings also have implications for workforce planning and resourcing and can inform future work that

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aims to strengthen adaptive capacity and teamworking in healthcare and in other industries.

7.24 Why We Fail to Learn? Barriers to Learning - Probing deeper into the Recurrence of Patient Safety Incidents in Healthcare

Author: Mrs Abiola Ajayi-obe¹, Prof. Patrick Waterson², Prof. Gyuchan Thomas Jun³

Affiliations: ¹School of Design and Creative Arts, Loughborough University, ²School of Design and Creative Arts, Loughborough University, ³School of Design and Creative Arts, Loughborough University

Keywords: patient safety, systemic failures, action plan evaluation, healthcare inquiries, STAMP

Introduction

Despite years of data collection, patient safety incidents continue to cause avoidable harm, resulting in unnecessary deaths and long-term health issues. Even more concerning are the sub-optimal outcomes that don't lead to death but still significantly affect patients. This study seeks to investigate whether the recommendations from national healthcare inquiries have been successfully acted upon and whether these actions have a real, lasting impact on preventing recurring safety incidents.

Methods and Study Design

The review was conducted using a deductive thematic approach to frame the analysis of findings from 10 National Healthcare related Inquiries [Government Commissioned Patient Safety Investigations] dating from 1966 to 2023 across various specialties.

A deductive, thematic approach was applied to identify key factors contributing to recurring incidents. Using the System-Theoretic Accident Model and Processes (STAMP) framework, we analysed the safety system breakdowns and control failures that allowed these incidents to occur.

Results

The review revealed several recurring themes across all 10 inquiries, which include:

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- Delinquent Leadership (90%)
- Physical Isolation of the Provider Unit (90%)
- Staff Competencies (80%)
- Poor Organisational Culture (80%)
- Inadequate Regulatory Oversight (70%)
- Patients and Families Not Heard (70%)
- Whistle-blower Concerns Ignored (70%)

These themes point to consistent gaps in healthcare safety systems that, despite numerous recommendations, continue to go unaddressed.

Discussion

The recurring nature of these issues suggests that the recommendations made in response to patient safety inquiries are often either irrelevant or poorly implemented. Our findings highlight the need for a much stronger focus on the management, monitoring, and evaluation of action plans aimed at addressing these safety concerns.

Many healthcare providers seem to focus on the initiation and completion of safety investigations, but not on evaluating whether the actions taken are reducing the recurrence of incidents. This failure to follow through on action plans is a possible reason why we fail to learn from past mistakes.

To truly improve patient safety and public trust, healthcare systems must go beyond merely acknowledging problems. They must commit to real, measurable changes and ensure that these changes are effectively implemented, monitored, and evaluated. This study aims to uncover why learning gaps persist in healthcare, urging providers to take meaningful action that leads to measurable improvements and sustainable change.

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Preliminary conclusions emphasise that action plan management along with robust monitoring and evaluation must be prioritised to break the cycle of recurring safety incidents.

7.25 Enhancing Airway Management Safety: Leveraging Cognitive Forcing Strategies and Prosocial Sharing through One Safe Act – Airway (OSA-A)

Author: Dr Caoimhe Duffy, Dr Justin Ziemba, Dr Lewis Kaplan, Dr Meghan Lane-Fall, Dr Justin Clapp, Dr Ellen O'Sullivan, Dr Mark Neuman, Christa-Maria Ngam1

Affiliation: University Of Pennsylvania

Keywords: airway safety, cognitive forcing strategies, proactive behaviours, anesthesia safety, One Safe Act

Introduction

Adverse events in airway management are often attributed to technical and cognitive errors. While structured pathways exist to support the acquisition and maintenance of technical skills, addressing cognitive errors—such as lapses in judgment and flawed decision-making—remains challenging. These cognitive errors contribute to up to 80% of anesthetic critical incidents, yet they are an under-explored target for improving patient safety. Cognitive forcing strategies, successfully implemented in other fields, have been shown to reduce errors by encouraging pre-procedural planning and metacognitive self-monitoring. A prior pilot study at the Hospital of the University of Pennsylvania demonstrated that the One Safe Act (OSA) intervention promotes proactive safety behaviors. In this study, perioperative staff (n=147) identified and documented their “One Safe Act” during natural workday pauses. Building upon these findings, this study investigates the application of OSA in airway management (OSA-A), exploring the potential to enhance proactive and prosocial safety behaviors and decision-making among anesthesia providers during intubation.

Methods

This controlled before-and-after study evaluates the impact of OSA-A on cognitive behaviors and patient safety during intubation across three hospitals—two intervention sites and one control site. Pre-intervention focus groups (4–6 anesthesia faculty, residents, and CRNAs) were conducted to explore cognitive strategies, decision-making patterns, and barriers in airway management. Participants completed pre-intervention self-efficacy and proactive behavior

assessments and identified a routinely performed safe act, their OSA-A. These discussions were audio-recorded and are currently under analysis. The intervention stage is currently ongoing, comprising of OSA-A training integration into grand rounds, faculty meetings, and breakout sessions at intervention sites. Clinicians reflect and document their OSA-A during small group discussions, reinforcing proactive safety behaviors, while the control site received standard educational materials. Ongoing dissemination through emails and meetings sustains engagement across sites. Post-implementation, outcome data will be collected across all sites, with a primary focus on preventable hypoxic episodes ($\text{SpO}_2 < 95\%$ or $>5\%$ drop from baseline within 10 minutes of intubation). Post-intervention assessment will comprise of repeat provider self-efficacy and proactive behavior scores. Additionally, semi-structured interviews ($n=30$) using chart-stimulated recall will explore proactive behaviors and intervention feasibility. Data analysis will assess correlations between proactive behaviors, self-efficacy scores, self-documented OSA-As and adverse outcomes, including hypoxia.

Results

Focus group discussions to date have highlighted common cognitive strategies around intubation, including pattern recognition, mnemonic use, and the reinforcement of learned experiences from past adverse events. Preliminary findings indicate that participants find OSA-A engaging, with increased dialogue and intradisciplinary sharing of proactive safety behaviors

Discussion

By engaging anesthesia providers in metacognitive reflection—through identifying and articulating their 'One Safe Act' (OSA-A)—this process strengthens resilience behaviors, enhances decision-making under pressure, and fosters prosocial behavior through the sharing of safety practices among providers. This study, grounded in a Safety-II framework, evaluates whether cognitive forcing strategies like OSA-A can provide a structured approach to mitigate cognitive errors, improve clinical decision-making, and promote collaboration among anesthesia providers, ultimately improving patient safety. The findings hold significant potential to advance anesthesia practices and safety in high-risk procedures.

7.26 Data-Driven Rounds: Unlocking Throughput and Efficiency With ACUs and SIBR Rounds

Author: Dr Thomas Grogean¹, Dr William DeMarco¹, Ms Molly Burleson², Mr Andrew Stein², Dr Liam Chadwick²

Affiliations: ¹Berkshire Health Systems, USA, ²Unit Inc., Atlanta, USA

Keywords: accountable care units, SIBR, hospital throughput, interdisciplinary rounds, system performance

Introduction

Inefficient discharge processes prolong length of stay (LOS), straining hospital capacity and reducing margins. Accountable Care Units (ACUs) using Structured Interdisciplinary Bedside Rounds (SIBR®) improve throughput by hardwiring patient-centered, interdisciplinary discharge collaboration (Stein et al., 2015). At our hospital, SIBR was implemented across seven acute hospitalist-led medical units (ten clinical teams) to standardize interdisciplinary communication. Optimal SIBR impact hinges on consistent high-performance. We assessed whether combining financial incentives for throughput metrics with data-driven coaching/feedback could enhance physician engagement, performance, and outcomes.

Methods

Financial Incentives for Throughput

We introduced physician incentives tied to three throughput metrics:

1. Discharge order by 9am in >30% of cases (targeting morning coordination)
2. Readmit rate <15% (balancing efficiency with safety)
3. LOS variance from geometric mean LOS (GMLOS) <1 day (rewarding timely discharges)

Process Monitoring of SIBR

We also introduced two methods of SIBR rounds process monitoring:

✦ Designing for System Performance

1. SIBR Team Observations (STO): Charge nurses orchestrating daily SIBR rounds recorded quantity/quality data (5 KPIs: e.g., clear discharge plan) and free-text notes for each team, digitized into an online platform by unit staff.
2. SIBR Leadership Observations (SLO): Leaders and quality improvement specialists evaluated physician, nurse, and case manager performance (e.g., physician discharge planning, case manager preparedness) during weekly leadership observations of team rounds, entering data directly online.

Together, STOs and SLOs combined frontline perspectives on daily SIBR performance with leader-level assessment of individual physician and staff capabilities.

Data-Driven Coaching and Feedback

STO/SLO data integration enabled granular performance tracking. Monthly meetings of all unit leadership dyads reviewed performance dashboards to identify improvement opportunities and prioritize interventions (e.g., 3pm discharge huddles), while individual physicians received peer-benchmarked coaching around strengths and blind spots.

Results

1,902 STOs (22,080 patient interactions) and 101 SLOs were recorded. Teams engaged 83% of eligible patients (excluding admissions within 12 hours) at the bedside (80%). Average quality KPI scores were 95%, with variability observed, though physicians newer-to-SIBR scored lower, suggesting an adaptation period.

Discharge orders by 9am increased from 14% to 27% and discharges by 11am rose from 10% to 16%. LOS decreased from 4.37 to 4.13 days, with 36% of the decrease attributed to lower-acuity patients (GMLOS reduction) and 64% to improved discharge coordination, corresponding to 0.15 excess days reduced per stay across all 7 medical units.

Discussion

Financial incentives paired with coaching and feedback (supported by robust process monitoring (STO/SLO)) reduced LOS by 271 patient days over a 12-month

✦ Designing for System Performance

period, effectively freeing capacity for 13 additional patients per month. This model – combining incentives, real-time data, and structured feedback – provides a scalable framework for hospitals aiming to achieve high-performance SIBR and efficient, safe discharge coordination.

7.27 Application of a Human Factors Approach to Investigate the Hospital to Home transition for Patients with Multiple Long-term Conditions

Author: Mr Mikas Glatkauskas¹, Ms Malin Olsen Syversen¹, Dr. Marianne Lea^{1,2}, Dr. Michael Scott³, Dr. Karin Svensberg⁴, Mrs. Berit Denstad⁵, Dr. Torunn Wibe⁶, Dr. Liv Mathiesen¹

Affiliations: ¹Research group for Clinical pharmacy, Department of Pharmacy, Section for Pharmacology and Pharmaceutical Biosciences, University of Oslo, Oslo, Norway, ²Department of Pharmaceutical Services, Oslo Hospital Pharmacy, Hospital Pharmacies Enterprise, South-Eastern Norway, Oslo, Norway, ³Medicines Optimization Innovation Centre, Antrim Area Hospital Site, Antrim, Northern Ireland, UK, ⁴Department of Pharmacy, Uppsala University, Uppsala, Sweden, ⁵User Representative, ⁶Centre for Development of Institutional and Home Care Services in Oslo, Oslo, Norway

Keywords: care transitions, hospital to home, human factors, multimorbidity, patient journey

Introduction

Patients with multiple long-term conditions (MLTCs) can encounter difficulties in medication management after hospital discharge. This challenge is exacerbated by the inadequate communication between healthcare sectors. Our study aimed to investigate hospital discharge and the processes involved focusing on medication management for patients with MLTCs transitioning from hospital to home. A human factors and systems engineering approach was employed and integrated the perspectives of patients, general practitioners (GPs) and homecare nurses (HCNs) to identify barriers and facilitators for the outcomes of these stakeholders.

Methods

Semi-structured interviews with 21 patients and focus group interviews involving 14 GPs and 10 HCNs were conducted. Home-dwelling patients with MLTCs ≥ 18 years using a minimum of 4 medications for a minimum of 2 separate conditions were included from two geriatric wards and one internal medicine ward at a university

hospital in Oslo, Norway. GPs and HCNs were included from various primary care units in Oslo, Norway. Utilizing the Systems Engineering Initiative for Patient Safety (SEIPS) framework we examined how individuals, tasks, tools, environment, and organizational context interact within work processes.

Results

We identified 5 individual key work processes which were shaped by the interaction of the 5 work system elements. Person and technological factors were the most prominent in shaping performance. Patient empowerment was described as a facilitator for several work processes. However, some GPs described the patients' medical knowledge as an important barrier affecting the patients' ability of understanding medication regimens. Organizational factors such as time limitation often affect the HCPs priorities when addressing patient needs. Additionally, the complexity of medication lists for one patient was a key task barrier that hindered optimal information flow between the patient, hospital, and primary care units resulting in outcomes such as increased workload for the HCP and potential medication errors for patients.

Discussion

This study investigated the intricate hospital to home transition from the patient and HCP perspectives respectively. Facilitators and barriers were discovered that could guide the implementation of strategies for a secure hospital to home transition and patient centered medication management for individuals with MLTCs.

7.28 The Application of Human Factors to Systems Analysis Review of Incidents

Author: Dr Samantha Hughes, Ms Lorraine Schwanberg, Ms Loretta Jenkins, Ms. Margaret McGarry, Ms Catherine Hogan, Ms Florina Rizoica

Affiliation: National Quality and Patient Safety, Incident Management Team

Keywords: incident analysis, human factors, systems review, patient safety, root cause analysis

Introduction

Healthcare systems are recognising the value of applying HFE to improving patient and staff safety and staff wellbeing. In addition, the HSE has committed in the HSE Patient Safety Strategy (2019–2024) and the HSE Incident Management Framework (IMF) (2020) to the implementation of a Just Culture, a values based supportive model of shared accountability which recognises that individual staff should not be held accountable for system failings. HFE is central to this culture change.

Incident reviews and near-miss analysis look at why incidents occurred so that systemic issues that contributed to the incident can be identified and addressed to improve the safety of systems and to reduce the risk of the incident occurring again.

The HSE IMF (2020) supports the analysis of Human Factors and the application of systems analysis methodology to identify the contributory factors to incidents so that the appropriate safety improvements can be made to systems. Since April 2022, the 2.5 day training on Systems Analysis Review of an Incident includes a 1.5 hour session on Human Factors and its importance in the review of incidents.

Methods with the design of the study

An analysis of incident review reports completed in 2023 and available in NIMs was undertaken by members of the Incident Management Team. The key objective of the analysis was to identify key learning from reviews to share with the wider HSE to

enhance patient safety. This approach was insightful and offered the opportunity to understand how the IMF is applied in practice.

Results

The review reports indicated a varied application of systems thinking and HFE to incident reviews. While many review reports were of a high standard with excellent learning, there were instances where there appeared to be insufficient consideration of the systemic issues that contributed to the incident, including consideration of the human factors associated with the incident. Consequently, in some instances recommendations focused on the individual or described weak control measures such as retraining, education, procedure development/amendment. In addition, there was little evidence of consideration of cognitive biases that may have contributed to the incident.

Discussion

In any healthcare setting there can still uncertainty about what constitutes an effective incident review and how effective they are in improving patient or staff safety. We know that the quality of reviews can be variable and that systemic issues are not always addressed.

This reading of incident reviews underlines the importance of applying a systems lens to reviews and incorporating human factors thinking in the approach. Well-structured research to measure the current application of HFE to incident reviews in the HSE and to enhance understanding of how HFE can be practically applied to incident reviews is warranted. It will inform both healthcare providers and academic partners in the development of specific and directed training, education, supports and resources to enhance healthcare staff knowledge of how the application of HFE could be applied in incident reviews to develop well defined, evidence-based actions for safety and quality improvement.

8 Innovating for Advances in Artificial Intelligence, eHealth and Digital Health Technologies

Theme Keywords: safety, usability, workflow integration, human factors-informed design, cognitive load

Rationale and Objective

Digital technologies have transformed healthcare, but they bring both opportunities and challenges for safety, usability, and workflow integration. The submitted abstracts explore how EHRs, prescription monitoring programs, virtual care tools, and digital discharge summaries impact work systems and patient outcomes. Many highlight the importance of human factors-informed design and evaluation to ensure technologies support rather than hinder clinical work. By prioritising usability, reducing cognitive load, and engaging users early, digital health interventions can become true enablers of safer, more efficient care.

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8.1 Implementing an Ethics by Design Approach in Personalised Preventive Pharmacogenetics: A Pilot Study in Development

Author: Dr Paul Liston¹, Emma Lohan¹, Burakcan Izmirli², Pieter-Jan Volders^{3,4,5}, Gökhan Ertaylan²

Affiliations: ¹Centre For Innovative Human Systems, Trinity College Dublin, ²Environmental Intelligence, VITO, ³Laboratory of Molecular Diagnostics, Jessa Hospital, Hasselt, Belgium, ⁴Faculty of Medicine and Life Sciences, Hasselt University, ⁵Department of Biomolecular Medicine, Ghent University

Keywords: Ethics by Design, AI, pharmacogenetics, bias detection, stakeholder engagement

Introduction

This study presents a pilot from the RAIDO (Horizon Europe) project which focuses on leveraging reliable AI and data optimisation across a range of sectors, including healthcare. The RAIDO healthcare pilot is focused on pharmacogenetics (PGx) and the development of a personalised preventive healthcare solution using an "Ethics by Design" approach. The project is still in development, but the ethical framework has played a critical role in ensuring the PGx solution will be acceptable to stakeholders when implemented. The pilot's objective is to address key challenges in PGx, such as variability in the availability and comprehension of actionable genetic information, socio-economic disparities, and healthcare professionals' diverse understanding of PGx data. By integrating ethical considerations from the outset, the project seeks to enhance the safety, fairness, and transparency of AI-driven PGx applications.

Methods

The PGx pilot follows a human-in-the-loop design methodology, where healthcare professionals and patients contribute to the co-creation of PGx application archetypes. AI models are being developed and optimised for bias detection, explainability, and performance. The ethical framework, guided by Nurock's (2021) principles of "Ethics by Design," incorporates mechanisms such as fairness by

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design, privacy by design, and accountability. Participatory processes, including stakeholder workshops and consultations, ensure that diverse perspectives are considered. Special attention is given to creating a system that respects privacy and minimises bias by training AI models on data that are representative of the population.

Results (Work in Progress)

As the pilot is still under development, no concrete results are available at this stage (initial results will be available in Summer 2025). However, the Ethics by Design approach has helped outline a clear roadmap for developing an AI system that will likely be more acceptable to stakeholders when fully implemented. The emphasis on transparency, fairness, and inclusivity has fostered trust and engagement among stakeholders, including healthcare professionals, patients, and innovation providers. Early feedback from participants in the design phase suggests that the approach is effectively addressing ethical concerns, such as bias in AI models and data privacy.

Discussion

The integration of an Ethics by Design approach has proven invaluable in shaping this healthcare solution. By embedding ethical considerations into every stage of development, the pilot is poised to produce a PGx application that not only enhances drug safety and efficacy but also aligns with the expectations and needs of its diverse users. The participatory and transparent design process ensures that the final product will be more likely to receive stakeholder approval and be more sustainable in the long term. As the project progresses, continued ethical oversight will be crucial to maintaining the system's fairness and usability. The next steps will involve completing the system development, deploying the solution in real healthcare settings, and gathering quantitative data to assess its impact.

8.2 Designing for the Future: A Post-Implementation Monitoring System for Artificial Intelligence in Health Care

Author: Dr Megan Salwei^{1,2}, Dr. Sharon Davis², Dr. Laurie Novak^{1,2}, Dr. Colin Walsh², Ms. Carrie Reale¹, Mr. Russ Beebe¹, Dr. Scott Nelson², Dr. Peter Embi²

Affiliations: ¹Center for Research and Innovation in Systems Safety, Vanderbilt University Medical Center, ²Department of Biomedical Informatics, Vanderbilt University Medical Center

Keywords: AI monitoring, algorithmovigilance, human-centered design, sociotechnical systems, workflow integration

Introduction

Artificial intelligence (AI) holds promise for transforming healthcare but also presents safety risks. One risk is AI performance degradation (i.e., drift) over time due to changes in clinical settings (e.g., data infrastructure, patient populations) and sociotechnical factors. Unrecognized shifts in AI performance or associated outcomes (e.g., rates of sepsis) could result in harm to patients and clinicians. Addressing these risks necessitates continuous post-implementation monitoring of AI models, known as algorithmovigilance (1). Yet, there remain few systems to support systematic and comprehensive algorithmovigilance in healthcare organizations. In this study, we describe the design of the Vanderbilt Algorithmovigilance Monitoring and Operations System (VAMOS).

Methods

Typically, a human-centered design process starts with studying the environment of use and intended users to understand their workflow and needs. However, this process is limited when designing a system for a work domain that does not yet exist, referred to as the “envisioned world problem” (2), which is the case for AI monitoring systems. Entirely new departments and roles will likely be developed in the coming years to support the ongoing maintenance and monitoring of AI models within healthcare systems. But how do we achieve user-centered design when the user roles do not yet exist? Miller and Feigh (3) describe two specific pathways for designing for the envisioned world: (1) the technology-driven path,

and (2) the work-driven path. The technology-driven path focuses first on the technology's capabilities and then introducing it into the work domain. This approach largely ignores the broader sociotechnical system and its impact on the technology's use. In contrast, the work-driven path starts by focusing on the context of future work and users' work goals. This (superior) approach is more likely to result in technologies and systems that support end-user needs. In line with the work-driven approach, we used human-centered design to develop the VAMOS system.

Results

We conducted 9 participatory design sessions, which initially focused on mapping out the envisioned governance process for AI at the health system, the roles that will be involved, and the technological functionality needed to support this work. We then developed initial mock-ups of the VAMOS system.

We conducted 8 formative design interviews with diverse stakeholders working in the roles identified in the initial design sessions. The interviews focused on the participants' current role in AI design, implementation, and monitoring, their information needs for monitoring AI systems, and their feedback on the early mock-ups. Through this process, we elicited design guidelines for comprehensive algorithmovigilance systems. VAMOS has three main components: the performance dashboard, accordion snapshot, and model-specific pages.

Discussion

Given the diversity of roles and goals for using the VAMOS system, one important functionality was flexibility, especially the ability to filter displays, terminology, and reports. On the high-level dashboard, participants emphasized the importance of seeing process information (e.g., model run rate, user acceptance), the clinical impact of models (e.g., outcomes), and the model's criticality (i.e., safety risks if incorrect). We faced several challenges in designing for the 'envisioned world', which we will discuss along with recommendations.

8.3 The Influence of Electronic Health Record Design on Usability and Medication Safety: Systematic Review

Author: Ms Marie Cahill¹, Prof. Brian Cleary^{1,2}, Dr Shane Cullinan¹

Affiliations: ¹Royal College Of Surgeons In Ireland, ²Rotunda Hospital

Keywords: EHR design, usability, medication safety, systematic review, ISO standards

Introduction

Electronic health records (EHRs) are real-time patient-centred records, maintained by a patient's healthcare providers (HCPs).(1) EHRs encompass both clinical and administrative data, and their advantages are well-documented, including improved care quality and cost savings.(2) However, the design of EHRs can contribute to professional dissatisfaction, with the inadequate design of EHRs repeatedly being cited as a challenge by users.(3) While the design of EHRs can hinder their usability, poorly designed EHRs can also result in adverse drug events and medication errors.(4) Our study seeks to evaluate how EHR design influences both usability and medication safety, so as to provide practical insights regarding how usability and medication safety can be promoted in the design process of an EHR and to enable health systems to prioritise optimisation efforts.

Methods

A systematic review was conducted of PubMed, EMBASE, CINAHL and the ACM library from 1 January 2009 to 8 October 2024. Eligible studies reported on the impact of specific EHR design elements on usability and/or medication safety, involved HCPs and took place in a secondary, tertiary or quaternary care setting. The design features identified within these studies were validated, by cross-referencing these elements with International Organization for Standardization (ISO) standards pertaining to design recommendations for interactive systems, software user interface, menu dialogues, forms and the visual presentation of information.(5) A narrative synthesis was conducted, with studies being tabulated based on whether they assessed usability and/or medication safety. Patterns were then identified and common design elements between studies were translated into themes. The Mixed

Methods Appraisal Tool (MMAT) was used to evaluate study quality and PRISMA guidelines were followed throughout the review.

Results

Thirty-two studies were identified. While a variety of study methods were employed, surveys were the most common, followed by interviews. The design features described in these studies fit within seven broad design themes: searchability, automation, customisation, data entry, workflow, user guidance and interoperability. When these design themes were prioritised and implemented consistently within EHR systems, higher usability and enhanced medication safety were reported. The opposite was found for systems that neglected these aspects of EHR design. Our review also highlighted the numerous ways these themes can be implemented, while identifying the contributing factors that permit their successful implementation.

Discussion

The design of EHRs can enhance or undermine usability and medication safety. This depends on the searchability and customisability of these systems, how data entry processes and provider workflow are facilitated and how automation, user guidance and interoperability are implemented. Additionally, a number of the themes explored in our review have appeared in other studies, such as the positive role of customisation and the need for systems that facilitate provider workflows.(6, 7) However, our review also highlights important design themes, including automation, that were not included in these aforementioned papers. Future research should examine how consistency amongst usability evaluations can be fostered and centre on the development of guidance regarding what exactly constitutes a design element, within an EHR context.

8.4 The benefits of online health record for patient safety: Findings from the National Engagement on Digital Health and Social Care.

Author: Dr Daráine Murphy, Inna Novak, Deirdre Hyland, Emma Burke, Marie Higgins, Dr Kevin O'Carroll, Dr Nerilee Ceatha, Deirdre Connolly, Linda Weir, Rachel Flynn

Affiliation: HIQA, Dublin, Ireland

Keywords: online health records, patient safety, digital health, public engagement, interoperability

Introduction

The World Health Organization promotes digital developments that are person centred and are appropriate to a local context[1]. The European Commission has set targets for all EU citizens to have access to electronic medical records by 2030[2]. The Digital Health Framework for Ireland 2024-2030[3] and the HSE's corresponding implementation roadmap[4] set out a vision to digitally transform health services with a focus on empowering patients. In this context, HIQA, in partnership with the HSE and the Department of Health conducted the National Engagement on Digital Health and Social Care. The aim of this engagement was to understand the views of the public and professionals around the digitisation of health and social care services. The focus of this paper is to demonstrate the public and professionals' views on the benefits and practical uses of online health records for patient safety.

Methods

A mixed-methods approach to data collection was used. There were two surveys, a national telephone survey with a representative sample of the public (n=2009) and an online survey with professionals working in health and social care (n=1020). There were separate focus groups with professionals and with the public, including representatives of minority groups.

Results

The public think that online health records will enable greater communication between different professionals and services and could improve patient safety. The public (80%) identified contacting professionals about missing information or mistakes in their record as an important benefit of an online health record. Other practical benefits rated highly by the public included renewing prescriptions for regular medications (78%), tracking progress of blood tests or other tests (76%) and updating contact details (77%). The public identified that it is important to have information on current diagnosis (91%), current medications (91%), referrals (90%) and discharges (84%) in their online health record. The public want education and training to ensure equitable access to online health records by all. Professionals feel that greater sharing of information is important for ensuring high quality, safe, integrated care. Professionals (over 80%) think that people having access to their own online health record will help them be better informed about their own health, be able to prepare questions to ask during appointments and have greater ownership of their health.

Conclusions

The research provides valuable insights and gives the public and professionals a platform to voice their opinions and have a meaningful impact on how digital health and social care is developed and implemented in Ireland. HIQA is an independent statutory body with a legislative remit to drive improvements in health information and promote safety and quality in the provision of health and social care services Ireland. HIQA will use the findings to inform their health information programme of work, including the development of national standards for health information.

8.5 A Human Factors Evaluation of the use of Patient Alerts within an Electronic Medical Records Program

Author: Mrs Camilla Rowland, Dr Laura Pickup, Mrs Fiona Spence, Dr Kyle Harrington

Affiliation: University Hospitals Bristol and Weston NHS Foundation Trust

Keywords: EPMR, alerts, clinical decision support system, heuristics

Introduction and Problem Statement

The Accessible Information Standards (AIS) were created in 2016 by NHS England and require health and adult social care organizations within the NHS to apply five requirements to meet information and communication needs of patients with a disability, impairment or sensory loss (NHS England, 2017). At University Hospitals Bristol & Weston NHS Foundation Trust (UHBW) patient alerts within the electronic patient medical records (EPMR) system are used to record and flag these patient needs. It was recognized by the Experience of Care and Inclusion Team that the digital system created challenges for staff and was impacting on patient safety. The aim of the research study was to use human factors methods to evaluate the current design of the patient alerts system and the objective was to produce a set of principles to inform future design of patient alerts.

Methods

Two human factor methods were chosen. Focus groups were held, one with clinical and one with non-clinical staff to gain their perception of the current design of the patient alert system. A thematic analysis was completed of the focus group data. A heuristic evaluation was completed of the EPMR system by human factor experts from the Human Factors Professional in Healthcare network group. As recommended by Quiones et al (2018) a domain specific set of heuristics were created to reflect three core requirements of the EPMR, usability, safety critical and efficiency.

Results

A total of twelve staff attended the focus groups. Five core themes were determined from the focus group data, with the theme of Design eliciting the most

participant exerts. Participants perceived the current design of patients' alert lacked clarity or information to enable a successful interaction with a patient who has information or communication needs. Three human factor experts participated in the heuristic evaluation. Recognition and recall was the heuristic which participants scored as most severe for usability, Helpfulness was the second most severe. Participants felt that new users would struggle to locate information and doubt their choices when moving through steps for each task

Discussion

We believe that this research study is the first of its kind to evaluate information and communication patient alerts. Previous human factors research was sourced relating to medication patient alerts within a clinical decision support system. Some similar results were found to be applicable to the use of patient alerts within an EPMR. A set of six principles for the creation of a patient alerts system are proposed to inform NHS health and adult social care organizations. Application of these principles within an EPMR system will enable successful implementation of the Accessible Information Standards. Successful implementation of these Standards will increase patient safety, staff reliability and provide efficient use of clinical services reducing missed appointments.

8.6 Tracking the Spread; Implementing Robotic Process Automation for Efficient Disease Surveillance and Enhanced Patient Safety

Author: Ms Brid-ann O'Shea, Ms Louise Cullen, Ms Joanne Moran, Ms Jennifer Doyle, Mr David Grogan, Ms Aine Creagh, Ms Aoibhe Flynn

Affiliation: HSE – Health Protection Surveillance Centre

Keywords: Robotic Process Automation, disease surveillance, patient safety, automation, public health

Introduction

Timely notification of infectious diseases is critical for prompt public health action. In Ireland, 89 diseases are notifiable under the Infectious Diseases Regulations 1981, with the Computerised Infectious Disease Reporting System (CIDR) serving as the national system for managing infectious disease surveillance. 80 notifiable diseases are recorded on CIDR; this information is used to investigate cases, prevent infection spread, and enable early outbreak detection. The rapid surge in COVID-19 notifications in 2020 placed enormous pressure on CIDR and public health, highlighting the urgent need for more efficient data processing.

Robotic Process Automation (RPA) brings transformative efficiencies to healthcare by automating repetitive tasks approximately eight times faster than humans. During 2020 an RPA solution was introduced to support the processing of COVID 19-notifications on CIDR, creating a virtual workforce that produced timely data for the National Public Health Emergency Team (NPHET).

This report examines the role of RPA within CIDR, which has proven essential to patient safety and informed public health action.

Methods

The RPA solution queries the CIDR database to manage laboratory notifications, operating six sub processes 22 hours per day, 7 days per week. Virtual workers

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processes and output case data to an Excel file that summarises each transaction, flagging exceptions and logging errors.

The output data populates a Power BI dashboard facilitating real-time monitoring of metrics, including processing speed, failure rates, time and cost savings and overall throughput. The robots process 90% of COVID-19, Influenza and RSV records, with remaining cases flagged as exceptions for public health teams to review as per agreed business rules.

The HPSC, working closely with the HSE Centre of Excellence (CoE), developed essential documents; the Process Design Documents (PDD), Solution Design Documents (SDD) and Solution Test Documents (STD) for each of the sub-processes, ensuring a robust RPA solution. Keeping these documents up to date is critical as they provide a clear framework and essential references for future adjustments and troubleshooting.

Results

RPA has substantially increased data processing capacity and accuracy, particularly during peak periods. In December 2021, the system processed 20K positive lab results daily using 115 robots.

After the 2021 HSE cyber-attack caused a large build-up of records, robots handled up to 35K enhanced surveillance COVID-19 records daily, clearing a four-month backlog within two weeks.

In a typical year, approximately 48k notifications would be processed across 80 diseases. In 2023, the RPA solution processed 93K notifications, saving 9.2K manual hours, generating cost savings of €334.8K.

Discussion

This report highlights the potential of RPA in transforming public health surveillance by reducing manual workload and improving data reliability, allowing healthcare professionals to focus on higher-value tasks. It also highlights RPA's adaptability and scalability in responding to surges in case numbers and in clearing backlogs.

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In March 2022, as the demand for efficient data handling increased across other infectious diseases, RPA was expanded to include Influenza and Respiratory Syncytial Virus. RPA is an operational imperative; without these virtual workers, timely data processing would be unachievable.

8.7 The role of Human Factors and Ergonomics in the development of a machine learning model for predicting surgical times

Author: Dr Raquel Santos^{1,2}, Valdemar Costa¹, Luisa Ferreira¹, Augusto Marques³, Itamara Oliveira³, José Maria Moreira¹, Jorge Cerejo¹, Dr Nuno Silva¹, Dr Francisca Leite^{1,2}

Affiliations: ¹Hospital da Luz Learning Health, ²Center for Interdisciplinary Research in Health – Universidade Católica Portuguesa, ³Luz Saude

Keywords: machine learning, surgical time prediction, human factors, data validation, workflow variability

Introduction

Despite advancements in artificial intelligence (AI) to develop prediction and classification models, little research has been devoted to real-world translations with a user-centered design approach [1].

Operating theatres (OT) are critical components of healthcare facilities. Accurately predicting surgical times is a vital aspect of OT management, as it directly influences scheduling, resource allocation, and patient flow.

The goal of the AI team at Hospital da Luz Learning Health was to develop a machine learning (ML) model to more accurately predict surgery durations, aiming to optimise scheduling and maximise OT allocation. To this end, they requested the Human Factors and Ergonomics (HFE) team to validate the accuracy of recorded surgical times, entered by various staff members in the digital system supporting surgical activity.

Methods

The task of recording OT times was characterised through observation and unstructured interviews to those involved: records made; timing of the records; who makes the records; where the records are made; need for editing the recorded times and associated reasons.

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The decision-making processes of the various participants regarding the time recording, i.e the triggers to make the records were also characterized.

The OT times collected included: room entry, sign-in; start of anaesthesia; time-out; start of procedure; end of procedure; sign-out; end of anaesthesia; and exit from the room.

Thus, over 30 hours distributed between May and June of this year, two ergonomists observed 12 surgeries (6 cholecystectomies and 6 arthroscopies) involving 19 clinicians: two surgeons per specialty and three different circulating nurses for each surgeon.

Results

Of the 108 times analysed, 74 (69%) showed no discrepancy with real timing, while 34 (31%) presented discrepancies ranging from 1 to 12 minutes, with 91% of these discrepancies being between 1 and 5 minutes. More delays than early recordings were noted among the discrepancies. These findings suggest the validity of existing data for developing the ML model.

Different strategies were adopted for recording surgical times, depending on factors such as: the person recording; the trigger considered for the timing; and any edits made to the record. The start of anaesthesia had the highest number of different triggers (5), while room entry and exit had the fewest (2). These data suggest a need to standardise the triggers used.

There is variability in the decision-making process leading to the time recording, depending on: the surgeon; the professional recording the time; the procedure performed; and the location and type of anaesthesia administered. This finding suggests that such variability should be considered in the development of the ML model.

Discussion

This project reports on the involvement of HFE in one of the crucial stages of ML model development: understanding whether the available data is reliable and reflects reality.

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The complexity of the healthcare context often leads to a gap between work-as-imagined and work-as-done, meaning that the available data may not fully correspond to the designed processes and actual activities. Validating data provided by information systems is essential for creating a robust algorithm, and HFE is the discipline best equipped to perform this task.

8.8 Impact of Semantic Interoperability and Usability-based Optimisations on Decision Support Alerts to Reduce Bleeding Risk in Patients with Bleeding Disorders.

Author: Ms Eimear Roche, Sinead Kelly, Feargal McGroarty, Prof. Niamh O'Connell, Dr Michelle Lavin

Affiliation: St James's Hospital

Keywords: clinical decision support, semantic interoperability, usability, alert burden, bleeding disorders

Introduction

Patients with bleeding disorders have their ambulatory care managed using a national electronic patient record (EPR). Inpatient care however, is documented in a local hospital EPR. An interruptive Clinical Decision Support (CDS) alert, triggered by manual documentation of the SNOMED “Bleeding Disorder” term in the hospital EPR, was available to warn hospital prescribers if they select medications for these patients which increases bleeding risk. An interface was introduced between the national and hospital EPRs which facilitated the automated transfer of SNOMED coagulation diagnoses between the systems.

Aim

Re-design the alert to:

- Increase usability and leverage information transferred across the new interface
- Investigate impact on the alert burden and acceptance rate

Methods

The usability of the CDS alert was assessed and optimised using a validated assessment tool and the logic was updated to include the SNOMED bleeding diagnoses terms transferred across the interface.

The study was a retrospective service evaluation of the effectiveness of the CDS alert. A report was generated from the EPR listing all of the occasions when the CDS alert was triggered over a four-month period pre- and post-optimisation in response to an attempt to prescribe a medication with a high bleeding risk to a patient with a documented SNOMED bleeding disorder diagnosis.

Results

Alert Burden:

1. A total of 30 alerts on 16 patient's pre-optimisation and 91 alerts on 30 patient's post-optimisation were generated.
2. Acceptance Rate (number of medications not prescribed)
3. Pre-optimisation 13% (2 medications) of the alerts were accepted compared to post-optimisation where 26% of alerts were accepted (11 medications).

Conclusion

In optimising the alert, the alert burden increased 50% however it was hypothesised this was due to the automatic transfer of the SNOMED bleeding diagnoses and requirement for manual data entry in only one system. Despite the increase in burden, the alerts presented were of greater clinical relevance due to the removal of alerts generated by task reminders, COX-2 inhibitors and visibility of the documented bleeding disorder within the alert window. Overall, directed optimisations can increase effectiveness of CDS and using information transferred automatically across an interface (i.e. semantic interoperability) to drive CDS is a novel concept that can support optimisation of other CDS.

8.9 Integrating Human Factors Socio-Technical Systems Analysis in a Data Investigation in an Acute Hospital: Methodological Insights

Author: Mr Sajjad Karimian^{1,4}, Prof. Siobhán Corrigan², Prof. Marie E. Ward^{2,3}, Prof. Una Geary³, Dr. Rob Brennan⁴

Affiliations: ¹D-Real, University College Dublin, School of Computer Science, ²Centre for Innovative Human Systems, School of Psychology, Trinity College Dublin, ³Quality and Safety Improvement Directorate, St. James Hospital, ⁴ADAPT, School of Computer Science, University College Dublin

Keywords: sociotechnical systems, data management, CPE infections, interdisciplinary framework, SEIPS

Introduction

Data management in healthcare, encompassing secure, efficient, and cost-effective data handling, faces challenges due to system interoperability issues and data fragmentation, leading to inconsistencies that hinder accurate patient outcome reporting. This study introduces a mixed-methods framework, integrating Computer Science (CS), Human Factors Ergonomics (HFE), and Socio-Technical System Analysis (STSA) methodologies to address data inconsistencies in reporting Carbapenemase-Producing Enterobacteriaceae (CPE) infections within a hospital setting. CPE, a resistant "superbug," poses significant treatment challenges by resisting carbapenem antibiotics. This study aims to answer: To what extent does integrating CS, HFE, and STSA methodologies improve CPE-related data management, and what challenges emerge in balancing social and technical challenges?

Methods

CS methods are employed to create a foundational understanding of data flow and technical interactions. Specifically, we use the Data Value Map (Sammon & Nagle, 2017), Data Flow Diagrams (DFD) (Yourdon & Constantine, 1975), and Unified Modelling Language (UML) use case analysis to systematically map the generation, management, and sharing of CPE-related data.

Subsequently, we integrated STSA approaches, specifically the Cube (McDonald et al., 2021) and the SEIPS 3.0 framework, to contextualise data handling within human-centred processes. This layer of analysis provides insights into workflow challenges that could impact data quality. Together, these methods form a structured, multi-layered framework that comprehensively evaluates the social and technical dimensions in managing CPE data.

Results

The detailed modelling of the data handling processes enabled identification of key stakeholders in data workflows, including the Information Management Systems, Microbiology, Infection Prevention and Control, Quality and Safety Improvement Directorate teams. Semi-structured interviews captured insights on CPE data practices, informing a use case analysis to clarify stakeholder roles and interactions.

DFDs visualised data pathways, while the Data Value Map evaluated dataset ownership and value, offering an integrated view of data flows, ownership, and touchpoints across systems and provides a structure to an investigation as it provides understanding about data analytics projects by underlying what type of question to ask of stakeholders. Iterative stakeholder validation, informed by STSA frameworks, supported comprehensive data mapping and alignment of suggestions for improvement within the socio-technical context.

Discussion

This study proposes an effective, interdisciplinary framework by combining Computer Science, Human Factors Ergonomics, Socio-Technical System Analysis methodologies for analysing CPE-related data in acute hospital settings. By merging Socio-Technical System analysis and CS approaches, the framework offers a structured view of data flow, ownership, and stakeholder interactions. The HFE perspective, notably through the SEIPS and Cube, adds crucial insights into the impacts of data processes on hospital workflows and patient safety.

The combined strengths of these disciplines enable a holistic examination of the STS, where CS methods yield insights into how data flows through the technical system, and HFE approaches contextualise these insights within operational

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realities. Although applied to a single site and infection type, this framework holds promise for generating actionable insights into healthcare data management challenges. Successful application of this interdisciplinary approach requires careful planning and collaboration to balance the needs of both technical and human-centred elements within complex hospital systems.

8.10 Leveraging Machine Learning for Predictive Analytics in Intensive Care Units: A Data-Driven Approach to Enhance Patient Outcomes

Author: Dr Alison N. O'Connor

Affiliation: University Of Limerick, Limerick, Ireland

Keywords: machine learning, ICU, predictive analytics, explainable AI, patient outcomes

Introduction

In acute critical care settings, the ability to rapidly assess and respond to patient needs is paramount to improving clinical outcomes. Intensive Care Unit (ICU) data, such as that collected by Ireland's National office of clinical audit (NOCA), offers a rich source of information for ICU departments in Irish hospitals. Leveraging this data with machine learning presents a promising solution to identifying patterns indicative of patient outcome that can aid decision-making processes. In this work explainable machine learning techniques are applied to ICU data to predict patient length of stay. This model can assist clinicians in improving patient outcomes through optimisation of ICU resources, enabling more personalised care pathways in hospital settings.

This study addresses the relationships between patient outcome, patient length of stay and readmission rates to identify potential early-warning indicators for adverse events. Further we compare the performance of an explainable machine learning model (decision tree) to that of more complex machine learning models (e.g., neural network). One of the challenges in ICU data is its inherent complexity and high dimensionality, often exacerbated by missing values. We address these challenges by exploring advanced preprocessing techniques, such as imputation methods, normalization, and data reduction, discussing their impact on machine learning model outcomes. Feature selection and dimensionality reduction methods, including Principal Component Analysis (PCA), is employed to enhance model performance. A key aspect of this project is the interpretability of machine learning models, which is critical in a clinical setting and has been identified as a key challenge for European healthcare digital transformation [1]. Additional models,

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SHAP (SHapley Additive exPlanations) and LIME (Local Interpretable Model-agnostic Explanations), have been applied to more comprehensively understand feature importance, this can provide transparency to clinicians in relating model predictions to input data. These interpretability tools can help clinicians understand how specific factors contribute to patient outcomes, which can aid in validating model predictions and informing clinical decisions.

In addition to model development, this project incorporates rigorous validation techniques to ensure robustness and generalisability of the predictions. Cross-validation and holdout testing are used to assess, compare and validate model performance. Another focal point of this study is the potential integration of the developed model(s) within existing hospital systems. These tools could contribute towards real-time clinical support and can potentially be used as inputs for a digital twin [2]. For instance, a predictive model indicating a high risk of adverse events could trigger timely alerts for clinicians, leading to early interventions and potentially mitigating patient deterioration. Similarly, resource allocation models could optimize ICU bed management by predicting discharge times, which can be especially valuable during high-demand periods.

The expected outcome of this research is a predictive tool that will provide ICU teams with actionable insights, enabling proactive and personalized patient care. This study will also contribute to identifying specific machine learning methodologies most effective for ICU data and addresses some of the ethical considerations of deploying such models in real-time clinical environments.

8.11 Sociotechnical Solutions for Intraoperative Breast Cancer Tumor Margin Assessment

Author: Prof. Abigail Wooldridge¹, Prof. Hamid Norasi², Dr M. Susan Hallbeck²

Affiliations: ¹University Of Illinois Urbana-Champaign, ²Mayo Clinic

Keywords: breast cancer, tumor margins, sociotechnical systems, surgical technology, SEIPS

Introduction

An important method of cancer treatment includes surgical removal of tumors, and one associated quality of care issue is incomplete tumor removal, i.e., positive tumor margins, which often results in the patient undergoing additional surgical procedures. For example, in the United States breast cancer affects 1 in 8 women and approximately 20–40% of surgically-treated patients undergo additional surgeries due to close or positive margins.^{1, 2} Various surgical techniques and technologies to localize tumors and assess margins have emerged. An opportunity for more success exists with intraoperative margin assessment in vivo with new technology. However, an introduction of a new technology interacts with and changes the entire sociotechnical system.³ This study seeks to answer the questions: What do breast cancer surgeons currently do to define and assess tumor margins? What do breast cancer surgeons need in a technology for accurate intraoperative margin assessment?

Methods

To answer these questions, we used purposeful sampling to recruit breast cancer surgeons in the United States to participate in semi-structured interviews. The interview guide was grounded in the Systems Engineering Initiative for Patient Safety (SEIPS) model³ and organized to understand process and challenges related to tumor margin definition and assessment. Interviews last on average 53.8 minutes (range: 40.1–59.8 minutes) and were recorded and transcribed. We cleaned the transcripts and then conducted a thematic analysis⁴ to describe the process and identify design requirements.

Results

We interviewed 11 surgeons with an average of 13.3 years of experience post residency (range: 4–36 years). Of the 11, eight were women. The process related to tumor margin definition and assessment shared similarities across interviewees. In general, interviewees first estimated the size and location of the lesion to be removed using preoperative imaging and palpation. They made the incision and dissected to the lesion, removing it and marking orientation. Five interviewees reported removing additional tissue along all margins routinely.⁵ They then performed some assessment, perhaps only palpation and radiography, which led to re-excision of additional tissue on selective margins or the procedure concluding. All received pathology reports postoperatively.

Discussion

All interviewees were enthusiastic about a label-free technology looking at the cavity in vivo rather than the specimen ex vivo, although the majority believed it was more applicable to lumpectomy than mastectomy. The size of the technology entering the cavity was also a concern for lumpectomies as well as fit with tunneling surgical techniques. The technology must accommodate variation in breast tissue. Accuracy, sensitivity, specificity, and safety were of paramount concern. Interviewees differed on what information should be provided to them after the scanning procedure.

These data help to inform design of a technology to intraoperatively assess breast cancer tumor margins. Our work is ongoing, triangulating findings with observational data. We will collect additional information about decision making needs to inform the design of both the physical and cognitive interfaces, as well as the overall workflow.

8.12 Laying the Theoretical Groundwork for AI User Experience Surveys in Health Care

Author: Dr Barbara Barry, Dr Xuan Zhu

Affiliation: Mayo Clinic

Keywords: AI, user experience, clinician trust, behavior change models, human-computer interaction

Introduction

The rapid evolution of artificial intelligence (AI) in healthcare is placing increasing demands on clinicians and patients, underscoring the need to understand their nuanced interactions with these technologies and their effects. This includes interactions within the growing influx of predictive analytics and needs for AI oversight in clinical practice. These developments necessitate revisiting and expanding existing theoretical models to better align with human experiences and the current uses of AI in clinical settings (1). This study aims to address this need by developing a novel theoretical model, based on qualitative research, to guide the assessment of clinician experiences and use of AI.

Methods

We conducted qualitative research involving focus groups and interviews with clinicians who use AI tools in their practice. All sessions were audio recorded, transcribed, and deidentified. We used applied thematic analysis to identify key themes and patterns in clinicians' user experience and perceptions of AI applications (2).

Results

The findings revealed several critical factors influencing clinicians' user experience and perceptions of AI in healthcare, including trust, perceived value, confidence in oversight, and impact on clinician-patient relationships. These insights guided the development of a theoretical model outlining key dimensions of user experience specific to AI applications in healthcare, encompassing decision-making processes before, during, and after use of AI-enabled applications. Specifically, clinicians' intention to use a specific AI application is influenced by perceptions

such as its outcome expectancies, ease of use, and self-efficacy in using the application, along with clinicians' general attitude toward and familiarity with medical AI. This intention directly influences clinicians' actual use of the application and their self-efficacy in the clinical practice the AI application supports. In turn, this clinical practice self-efficacy, combined with perceptions such as the practice's alignment with clinician identity and peer norms about the practice, shapes clinicians' intention to adhere to the practice, which ultimately, impacts patient outcomes.

Discussion

The proposed model builds on existing human-computer interaction frameworks and behavior change models (3,4). By integrating theories from two complementary disciplines, this model offers a comprehensive and theory-informed approach to assessing user experience of AI tools in healthcare. This study advances our understanding of the human experience with AI in healthcare and lays the groundwork for more effective assessments of AI use by clinicians and effective integration of AI into healthcare.

8.13 End-User Requirements for A Mobile Health Record App for Trauma-Informed and Integrated Care: A Systematic Literature Review with Realist Lens

Author: Mr Felicien Izaturwanaho¹, Prof Marie E. Ward^{1,2}, Prof. Clíona Ní Cheallaigh^{3,4}, Prof. Siobhán Corrigan¹

Affiliations: ¹Centre for Innovative Human Systems, School of Psychology, Trinity College Dublin, ²Quality and Safety Improvement Directorate, St James's Hospital, ³Inclusion Health Service, St James's Hospital, ⁴Department of Clinical Medicine, School of Medicine, Trinity College Dublin

Keywords: Inclusion health, User requirements, Mobile health record app

Introduction

Research on mobile health record apps has focused on assessing whether they can achieve their intended objectives, for instance, enhancing medication adherence for persons experiencing chronic conditions. There is a limited understanding of which mobile health record apps, for persons experiencing social exclusion, were effective for whom, under what conditions, and to what extent, and why. Social exclusion refers to those in poor health due to various severe disadvantages stemming from issues such as poverty, intergenerational trauma, marginalisation, mental health disorders, and the presence of multiple chronic conditions (Aldridge et al., 2018).

Methods

A systematic literature review, applying a realist lens, was conducted to understand for persons experiencing social exclusion (context) which mobile health record apps (mechanisms) support integrated care continuity (outcome). This was expected to deepen an understanding of the needs of patients, staff, and a hospital-based Inclusion Health Service, with community-based services, to develop a set of end-user requirements for a mobile health record app for supporting trauma-informed and integrated care continuity for patients across time and space. A systematic search of ten databases: Web of Science Core Collections, Medline, PsycINFO, CINAHL, Cochrane, Embase, Scopus, ProQuest, Lenus and OpenGrey International, was undertaken in April 2024 in English with no date

limit. Additional publications were identified through manual search and consulting two senior international academics in the field. The review used the PRISMA 2020 guidelines (Moher et al., 2009).

Results

The quality of evidence was assessed with the 16-item quality assessment tool (Sirriyeh et al., 2012). One thousand three hundred and thirty-two papers were found eligible for the review, of which eleven qualified for inclusion following quality assessment. Data were synthesised using the realist method to illuminate recurrent patterns, which resulted in four plausible hypotheses. These hypotheses are: (i) contribute to the enhancement of the integration of healthcare systems and services; (ii) improve the quality and availability of health information; (iii) diminish adverse medical events and care duplication; and (iv) improve care coordination across time and space. Improving care coordination across time and space was the most commonly cited plausible hypothesis. This is important as mobile health record apps are implemented to enable integrated care continuity across different healthcare settings that are involved in caring for these persons.

Discussion

Taking a realist lens allowed the research team to focus on the context and mechanisms that influence the implementation of mobile health record apps for the persons. This work will inform the interviews and focus groups with these persons and healthcare professionals, and a survey with healthcare professionals to develop the user requirements for a mobile health record app in the Inclusion Health Service in a large teaching hospital. Information gaps—such as the lack of data on multi-platform accessibility—limited a comprehensive understanding of how and why these mobile health record apps functioned in their specific implementation contexts. Overall, applying a realist lens offered a unique perspective to understand the complexity of implementing mobile health record apps with those experiencing social exclusion.

8.14 It works, but is it usable? How usability analysis can change the trajectory of artificial intelligence tool development

Author: Ms Allison Drees¹, Dr Yushi Yang¹, Samantha Pitts²

Affiliations: ¹Johns Hopkins Medicine, ²Johns Hopkins University School of Medicines

Keywords: AI usability, heuristic evaluation, human factors, workflow integration, patient triage

Introduction

In this presentation we will describe a human factors usability analysis done to evaluate an artificial intelligence (AI) tool during a pilot in outpatient clinics, and the impact the evaluation had on the future implementation of the tool.

The developed AI tool aimed to address the burden of triaging electronic messages sent from patients to an outpatient clinic care team. Providers, nurses, and office assistants are adept at handling different types of messages, but there is no easy way to triage the messages without fully reading the contents. As a result, messages get read by many people and are passed between team members before the right person can address it. To rectify this situation, an innovative AI tool was developed to categorize incoming patient messages into “clinical” or “administrative” categories. Using these categories, the most appropriate staff member can take responsibility and address messages quicker. This study evaluated the usability and usefulness of the patient message categorization AI tool aimed to improve efficiencies and relieve workload burden for healthcare clinicians.

We performed a pilot implementation evaluation of the AI tool using the conventional heuristic evaluation method.

- A task-based evaluation of a nurse and office coordinator was conducted using interviews to develop realistic scenarios of their daily life and interaction with the AI tool.

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- Five human factors experts followed the scenario tasks in a test environment based on the daily work of nurses and office coordinators. We identified design issues using Nielsen's design heuristics.
- We performed an affinity diagram exercise to group findings into common themes and evaluated the severity of the identified design flaws.

23 total design flaws were captured, 10 of which were specific to the design of the AI message categorization tool. Two major usability catastrophes were identified: 1) There is no capability to change the category of a message leading to workarounds to ensure the correct user receives the message to address, and 2) As the conversation and messages evolve, the category from the original message will persist and may no longer be correct and/or useful overtime.

Results

The findings from the heuristic evaluation were shared with the AI implementation team to guide improved design that fits user needs. Through this remediation process, it became evident that the functionality of the tool could not be modified in a way that would mitigate the risks noted from the evaluation. Ultimately, the findings from this evaluation persuaded redirection and executive decisions regarding expanded implementation.

Discussion

Human factors evaluation of AI tool usability and usefulness is critical to ensure these new innovations fit user needs. Within this presentation, we describe the application of a heuristic evaluation to an AI tool assessment and demonstrate how it is used through a case study of the patient message categorization AI tool. The outcomes demonstrate how impactful human factors methods are in guiding the direction and decisions for AI development and implementation. Additionally, the disruption from the usability findings that halted further implementation reflects the importance of engaging human factors early and often.

8.15 Development of a human-centred AI review tool

Author: Prof. Mark Sujan¹, Prof. Marie E. Ward², Dr Kate Preston¹, Ms Rachel Pool³, Dr Huayi Huang⁴, Ms Angela Carrington⁵, Prof. Paul Bowie⁶

Affiliations: ¹University Of York, ²St James's Hospital, ³NHS England, ⁴University of Edinburgh, ⁵HSC Northern Ireland, ⁶NHS Education for Scotland

Keywords: human-centred AI, SEIPS, sociotechnical systems, AI governance, healthcare innovation

Introduction

Policy makers worldwide advocate the widespread adoption of artificial intelligence (AI) in healthcare as a key strategy to address critical health system challenges, including workforce challenges and an increased demand for services. While the use of AI holds great transformation promise, its implementation risks being overly focused on the technical capabilities of the AI technologies, potentially neglecting the broader socio-technical complex within which these technologies will operate.

In response to this, the Chartered Institute of Ergonomics and Human Factors published a White Paper on “Human Factors and Ergonomics in Healthcare AI” [1], which was followed up by a guidance document for healthcare professionals [2]. The intention of these publications was to raise awareness of a human-centred and systems approach to healthcare AI, which can complement the current technology-centric approach to healthcare AI.

To further support practitioners, a practical human-centred AI review tool has been developed. This tool is based on an extended version of the Systems Engineering Initiative for Patient Safety (SEIPS) [3]. The tool conceptualises AI as an element of the work system, alongside people, tasks, other tools and technologies, physical spaces, and the organisational and external environments. It provides structured prompts for practitioners to explore key interactions in the integration of AI technologies into clinical systems. Prompts were developed and refined through discussions within a multi-disciplinary stakeholder group convened via the Digital

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Health and AI special interest group at the Chartered Institute of Ergonomics and Human Factors.

The tool is designed to make systems thinking and a human-centred approach to healthcare AI more accessible to practitioners. It can help stakeholders consider important systems interactions before and during the integration of AI technologies to enhance patient and staff outcomes.

Future work will focus on refining the tool based on stakeholder feedback across different disciplines and settings.

8.16 Using Quality Improvement approach to strengthen Health system for Quality health care

Author: Mr Hussein Mulebo

Affiliation: Jhpiego University of Nairobi, Nairobi, Kenya

Keywords: quality improvement, healthcare systems, QA/QI, Kenya, KQMH

Introduction

Kenya is committed to enhancing healthcare quality. The Ministry of Health developed the Kenya Quality Model for Health (KQMH) a conceptual framework that provides an integrated approach to improving healthcare quality by addressing quality issues. Implementation of KQMH has faced challenges with diverse quality management system (QMS) maturity. The objective of the intervention was to measure the counties' QMS maturity and address the needs of the counties with specific interventions.

Methods

A cross-sectional descriptive study design with a mixed-methods strategy, integrating both quantitative and qualitative data-gathering techniques, was employed. The study was conducted between the 8th of April and the 30th of May 2024, focusing on health systems in ten Kenyan counties: Turkana, West Pokot, Kakamega, Trans-Nzoia, Nakuru, Nairobi, Kajiado, Taita Taveta, Kilifi, and Kwale. A purposive sampling method was utilized. Data collection tools administered to identified respondents across program counties. Data collection process involved a collaborative effort between consultant enumerators, program staff, and Ministry of Health (MOH) personnel. The gaps addressed in response to specific county needs and priorities. Counties with near maturity QMS supporting other counties through onsite-mentorship and virtual month learning sessions.

Results

The assessment highlighted varying degrees of adherence to KQMH. On a scale of 1-3 (1-none of standards are met, 2-partially meets the standards and 3-all standards are met). Nairobi (2.82) and Kakamega (2.88) demonstrated strong adherence to Quality Assurance/Quality Improvement (QA/QI) practices, while

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counties such as Kajiado (1.59), Taita Taveta (1.65), and Trans Nzoia (1.65) showed substantial gaps in their QA/QI structures. Nairobi and Kakamega exceptional performance demonstrate robust adherence across most sectors, signaling the presence of well-developed and functional QA/QI systems. Kilifi, Kwale and Turkana, with scores just over 2.00, have foundational systems but require additional development in specific areas. West Pokot (1.71) and Nakuru (1.88), present varying degrees of adherence suggesting they are not fully functional or effective.

Conclusion

The diverse levels reflect the individual journeys and development stages in QA/QI practices within their healthcare facilities. The approach facilitates a valuable knowledge transfer, allowing for the sharing of effective strategies and experiences from counties that already have established QA/QI systems.

8.17 The Pros and Cons of WhatsApp Usage in a Transplant Surgery Team

Author: Dr Iftikhar Khan¹, Dr Mahmoud Obeid¹, Dr Mohammed Al Qahtani¹

Affiliations: ¹King Fahad Specialist Hospital In Dammam, Dammam

Keywords: WhatsApp, communication, transplant surgery, teamwork, ethics

Introduction

Effective communication between members of a healthcare team is essential for positive outcomes. Poor communication is a leading contributory factor to adverse events in patient management. The advent of WhatsApp and other mobile messaging applications have added a new dimension to healthcare communication, making some other communication channels, such as landline phones, obsolete or redundant, and it has made communication easier. Many reviews of using WhatsApp as a communication tool in a surgical setup have reported its positive and favourable impact [1]. Transplant surgery is a complex endeavour with large clinical and non-clinical teams needed to interact for its success. This study looks at the perception of WhatsApp messaging in our transplant surgery team based in Dammam, Saudi Arabia involved in liver and kidney transplantation from living and deceased donors.

Methods

Semi-structured interviews were conducted to assess the perception of senior and junior doctors, nurses, and coordinators about WhatsApp messaging regarding its ease and challenges. Interviewees were asked on the pros and cons of WhatsApp usage in a transplant setting and asked if there were any limitations to its usage. Responses were noted anonymously then summarized into topics with recurrent responses highlighted.

Results

Three members from each category of transplant team members were interviewed. The topics discussed were grouped under ease of use, ethical/legal issues, training needs, and special requirements. Overall perception was positive. The interviewees looked favorably at WhatsApp communication because it is rapid,

free, efficient and removes hierarchy barrier. Also, images and videos can be shared. Negative comments/concerns were few and focused mostly on the ethical/legal standpoint of its usage as to its value in record keeping in documentation, whether a consent is needed if patient clinical finding is shared, who should be the administrator and what to do if a member leaves the team – should the member exit voluntarily or be removed by the administrator. Also, a stable internet connection and smartphone are special requirements.

Discussion

WhatsApp messaging appears to be a promising communication channel for surgeons and other healthcare professionals. Among its many perceived benefits, it was noted to flatten the hierarchy, allowing all members of a team communicate directly, and is available free of cost to anyone with a smartphone. However, its widespread adoption brings with it a host of new problems, such as the legal issue of patient consent and the difficulty of determining which members of the team may remain in a WhatsApp group. These issues will need to be considered in WhatsApp policymaking and its etiquette guidelines formulation to solidify its role as a communication medium.

8.18 AI-Based Clinical Decision Support for Predicting In-Hospital Clinical Deterioration: Preliminary Results from a Systematic Review of Barriers and Facilitators

Author: Ms Melody Saikali^{1,2}, Professor Melissa Baysari³, Dr. Valentina Lichtner⁴, Prof Sylvia Pelayo^{1,5}, Dr. Jane Carland^{6,7}, Dr Romaric Marcilly^{1,5}

Affiliations: ¹University of Lille, University Medical Center- Lille, METRICS: Evaluation of healthcare technology and medical practice, ²Quality and Patient Safety Department, Lebanese Hospital Geitaoui-UMC, ³Digital Health Human Factors Group, Sydney Nursing School, Faculty of Medicine and Health, The University of Sydney, ⁴Division of Nursing, Midwifery and Social Work, School of Health Sciences, The University of Manchester, ⁵Inserm, CIC-IT 1403, ⁶Department of Clinical Pharmacology & Toxicology, St Vincent's Hospital, ⁷School of Clinical Medicine, Faculty of Medicine and Health

Keywords: AI, clinical decision support, clinical deterioration, barriers, facilitators

Introduction

Health technologies have become an integral part of healthcare systems. Clinical decision support systems (CDSSs) are among the fastest growing tools being developed to aid in clinical decision making. One important use case for CDSSs is the detection and management of clinical risks of deterioration (e.g sepsis, thromboembolism) [1]. Despite rapid advancements in the technology, research shows that adoption rates are low [2] and CDSSs can have negative unintended consequences on clinicians (e.g burnout) and patient safety (e.g errors and adverse events) [3]. One reason for these negative consequences is the lack of, or poor design and integration of these tools within the healthcare professionals' clinical workflow [3]. Therefore, there is an increased need to obtain a more comprehensive understanding of what factors influence implementation and use of CDSSs in hospitals, a key aspect for effective tool design and successful adoption. The objective of this systematic review is to identify and describe the barriers and facilitators for the implementation and/or use of AI-based CDSSs for the prediction of clinical deterioration risks in hospitalized patients.

Methods

A systematic review of studies that have used/implemented AI-based CDSSs predicting risks of in-hospital clinical deterioration was undertaken according to PRISMA guidelines. PubMed, EMBASE, Web of Science and PsychInfo were searched for primary articles published between January 1, 2010 and August 31, 2024. Studies were included if they were published in peer-reviewed journals/conference proceedings, in English and identified barriers and/or facilitators to the implementation or use of an automated AI-based CDSS being used by doctors or nurses for predicting or managing in-hospital clinical deterioration. Title and abstract screening, full text screening and data extraction were reviewed independently by two researchers at each step. Extracted data included study characteristics (year, setting, objective, time since implementation), deterioration type, AI model used and barriers and facilitators impacting implementation and use. Author recommendations to enhance implementation and use were also extracted. Analysis comprised of descriptive assessments of study characteristics and qualitative analyses of identified factors influencing implementation and use and authors' recommendations.

Results

Of 5,146 articles, 17 were included in the review. Papers were published between 2016 and 2024, comprising qualitative or mixed methods studies. Evaluations of CDSSs were conducted from 2 months to 2 years following CDSS implementation. Most CDSSs targeted both doctors and nurses and aimed to predict sepsis or general clinical deterioration. The type of AI model used was not clearly reported in several studies. Diverse factors influenced implementation and use, and a range of suggestions were made by authors to enhance uptake. These are currently being identified and analysed.

Discussion

Our findings show that the timing of post-implementation assessments span a broad timeframe. Most CDSSs in the literature detect a narrow spectrum of clinical deterioration risks. A better understanding and application of what factors impact the successful implementation and use of such tools by CDSS developers and healthcare institutions is needed, to better aid clinicians in managing patient

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clinical deterioration risks. Complete results will be presented during the conference.

8.19 The use of smartphone apps to harness public engagement and save lives in out-of-hospital cardiac arrests

Author: Ms Aurélie Hay-David, Dr CARLOS Aceves Gonzalez, Dr Victoria Filingeri

Affiliation: University of Derby

Keywords: OHCA, smartphone apps, CPR, AED, volunteer responders

Introduction

In the UK, around 60,000 out-of-hospital cardiac arrests (OHCA) occur annually, with about half receiving ambulance resuscitation and fewer than 1 in 10 surviving (HQIP, 2021). Early cardiopulmonary resuscitation (CPR) and automated external defibrillators (AEDs) significantly improve survival rates, emphasizing the "Chain of Survival" (Smith, 2021). Volunteer responders, including individuals trained in basic CPR and AED use—from the public to off-duty medical professionals—are crucial for enhancing early response and survival rates. Smartphone apps, text messaging, and GPS technology have been used to alert volunteer responders to the location of a collapsed person and the nearest defibrillator. However, there is no comprehensive review of the specific smartphone applications used by volunteer responders, their features influencing effectiveness in emergencies, or potential ergonomic improvements for better usability.

Aims

To identify applications currently used by volunteer responders, explore their impact on patient survival, the features that enhance their effectiveness in emergencies, and potential opportunities for improvement through ergonomics.

Methods

Multiple PubMed Central® (PMC) and Google Scholar searches were performed to access English-language publications related to software applications for OHCA volunteer responders. The following terms were used: "applications", "life-saving", "OHCA", and "volunteer responders". The full search and analysis of the results are ongoing and will be reported during the conference presentation.

Results

Four applications were identified, including GoodSAM, myResponder, FirstAED, and PulsePoint. Preliminary findings revealed research published regarding first responders and their use of applications. For instance, a systematic review and meta-analysis involving 23,351 patients (Scquizzato et al., 2022) indicated that alerting first responders led to a higher rate of volunteer-initiated CPR/AED use prior to ambulance arrival and improved patient survival at discharge. Data from the GoodSAM app suggest that volunteers enhance patient outcomes, although response rates can be low, as evidenced by 1.3% in London compared to 5.4% in the East Midlands. In Singapore, the myResponder app had 46,689 volunteers, with 24.1% accepting alerts and arriving at the scene, thereby improving patient outcomes (Ming Ng et al., 2020). Possible reasons for the lower response rate include responders being unavailable due to work or personal commitments and limited access in urban areas compared to rural ones. The figures may not be directly comparable because of the response radius and the quantity and distribution of AEDs. Only one study was identified regarding apps for cardiopulmonary resuscitation, which suggests that very few apps are designed to align with current basic life support guidelines and provide an acceptable level of usability and hedonic quality for laypeople (Kalz et al., 2014).

Discussion

The results highlight available technology for alerting responders and providing guidance, including AI, but also indicate low response rates to real emergencies. Further research is needed to understand the reasons behind these lower rates and usability issues in the app design. We can foresee that cognitive factors play a role in this interaction to persuade volunteer responders to engage and train, empowering them to step forward. However, we assume that patient survival rates might increase by understanding this complex interaction from a systems perspective.

8.20 A Systematic Review of Qualitative Evidence on the Barriers and Facilitators to the Use of Virtual Wards

Authors: Dr Sara Cucurachi¹, Dr. Sinéad Lydon¹, Ms. Laura Louise Moens^{2,3}, Prof Tanja Manser^{2,3}, Prof. Paul O'Connor¹

Affiliations: ¹Department of General Practice, University Of Galway, ²FHNW School of Applied Psychology, University of Applied Sciences and Arts Northwestern Switzerland, ³Faculty of Medicine, University of Bern

Keywords: gamification, AI, QMS, blended learning, LMICs

Introduction

Virtual wards replicate traditional hospital care without a physical facility, offering short-term transitional care to reduce hospital admissions and allow recovery at home. They have shown positive impacts on health outcomes, such as mortality and readmissions. However, existing reviews mainly focus on quantitative data, neglecting qualitative research on user experiences. Qualitative studies are important to understand factors influencing the acceptance of virtual wards. This review aims to synthesize qualitative research using a behavioural model to identify barriers and facilitators at various levels, with recommendations to improve the sustainability and acceptance of virtual wards.

Methods

The review protocol was registered on PROSPERO (CRD42024519627). Searches were conducted in Medline, EMBASE, CINAHL, PsycINFO, and Academic Search Complete in March 2024. Studies were included if they focused on virtual wards, defined by criteria such as care provided outside healthcare facilities, a multidisciplinary team, remote monitoring of vital signs, and a goal of early discharge or preventing hospital admission. Qualitative studies (and mixed-methods studies from which qualitative data could be extracted) examining barriers and facilitators were selected, with studies published in English. A deductive content analysis approach, within a thematic analysis approach, was carried out to collate and organise the extracted data related to barriers and enablers to virtual wards using the Theoretical Domains Framework (TDF).

Results

Searches initially identified 7,489 articles. 70 articles were screened full-text and 16 met the inclusion criteria. All articles referenced the TDF domains "Knowledge" and "Environmental Context and Resources". Key factors for successful virtual ward implementation include having tech-savvy healthcare professionals and educated patients, as well as clear, standardized criteria and protocols for admission, care, and discharge. Adequate resources and addressing technical issues such as connectivity or outdated devices were also considered essential. "Skills" and "Social support" were acknowledged as important respectively in 15 and 14 articles. Mandatory training to address skill gaps and a robust support system were identified as essential facilitators. Finally, having the endorsement of key stakeholders ("Social/professional role and Identity", 13 articles), facilitating a sense of security ("Emotions", 11 articles) and having disciplined healthcare professionals, as well as patients, were all recognized as important facilitators ("Intentions", 11 articles).

Discussion

Co-designing virtual wards with end users can help bridge knowledge and skill gaps, ensuring technology and processes align with patient and healthcare professional needs for safe, effective care. Involving healthcare managers in this process can help identify essential resources and access points, while also encouraging their investment in and advocacy for the technology. To combat potential patient isolation and encourage mutual accountability, peer support programs should be developed and assessed. Additionally, simulation-based education can enhance confidence and preparedness for both healthcare professionals and patients, reducing disengagement and improving safety and care quality. As virtual consultations may have lower diagnostic accuracy and guideline adherence, future research should focus on optimizing technology use while equipping healthcare professionals with the necessary skills and resources.

8.21 How can we ensure AI technology is human-centred?

Author: Dr Kate Preston¹, Prof. Mark Sujan¹, Dr Ernest Lim², Prof. Ibrahim Habli¹, Dr Jo Iacovides¹

Affiliations: ¹Department of Computer Science, University of York, ²Ufonia Limited

Keywords: human-centred AI, assurance frameworks, industrial demonstrators, healthcare AI, cross-sector

Introduction

Introduction: The use of artificial intelligence (AI), including autonomous systems and robotics, is expanding across sectors, including healthcare [1]. Initially, the development and safety assurance of AI was technology centric, focusing narrowly on the algorithm, and how it for example compared with expert clinicians. However, it has become increasingly apparent that a human-centred approach is necessary, which focuses on how the AI technology will interact with the wider sociotechnical work system to enhance overall system performance, safety and human wellbeing [1]. To highlight how a human-centred approach for AI technologies development and assurance may be completed, this project aims to develop a contextualised human-centred AI framework, based on previously completed industrial demonstrators and the wider literature. While this will be a cross-sector framework, to showcase its benefit to healthcare, the framework will be mapped against an AI technology developed for the healthcare sector.

Methods

Firstly, 22 industrial demonstrates completed as part of the Assuring Autonomy International Programme (AAIP) were examined to provide context and highlight the types of work system interactions studied, alongside the approaches and methods used and the key results [2,3]. Secondly, a scoping review of existing human-centred frameworks will be completed to highlight key principles that should be of focus. The results from the reviews will then be used to develop the contextualised human-centred AI framework, which will be mapped against an AI technology, Dora, a voice-based clinical AI assistant and medical device used in the NHS by thousands of patients weekly, to highlight its usefulness in healthcare [4].

Results

The review of industrial demonstrators highlighted that the most common interaction studied was between the AI technology and its user, both on its own and within a broader environmental context. One demonstrator looked at all work system elements, and several focused on the interaction between the AI technology and the external environment, including regulation [3]. The scoping review is currently in progress, but this alongside the finished contextualised human-centred AI framework will be presented at the conference.

Conclusions

This project aims to exemplify how a human-centred approach can be taken for the development and assurance of AI technology, across sectors, including healthcare. By applying the two review methods, the framework will showcase the high-level principles suggested in the literature alongside the interactions considered within the industrial context.

8.22 Barriers and enablers to home haemodialysis: A qualitative systematic review

Author: Ms Aine Earley¹, Dr. Sinéad Lydon¹, Dr. Rachael Walker², Ms. Lisa Gannon¹, Prof. Donal Reddan^{3,4}, Ms. Lorna Durack^{3,5}, Prof. Paul O'Connor^{1,6}

Affiliations: ¹Department of General Practice, School of Medicine, University Of Galway, ²School of Nursing, Faculty of Medical and Health Science, University of Auckland, ³Home Dialysis Unit, Merlin Park Hospital, ⁴School of Medicine, University of Galway, ⁵Galway University Hospital, Health Service Executive, ⁶Irish Centre for Applied Patient Safety and Simulation, University of Galway

Keywords: home haemodialysis, barriers, enablers, COM-B, TDF

Introduction

The growing prevalence of chronic kidney disease has led to an increased need for renal replacement therapies. Although renal transplant is the preferred treatment for patients with end-stage renal disease, many patients require dialysis before receiving a transplant, and others may not be suitable transplant candidates requiring long-term dialysis. Home haemodialysis (HHD) is a cost-effective alternative that allows for more effective use of overburdened resources. Furthermore, HHD is associated with improved patient outcomes and has implications for patient safety, such as the reduced risk of hospital-acquired infections compared to hospital-based dialysis; however, its adoption remains low. There is a need to understand the factors that may support or hinder the use of HHD. Accordingly, a systematic review of the qualitative literature was conducted to identify barriers and facilitators to HHD for patients, their carers/family, and healthcare professionals.

Methods

This systematic review was carried out following PRISMA guidelines. Electronic searches were conducted on Medline (OVID), EMBASE, CINAHL (EBSCO) and PsycINFO. The COM-B and Theoretical Domains Framework (TDF) were used to collate the barriers and enablers identified within the papers through deductive content analysis.

Results

Thirteen studies met the inclusion criteria. Of these, 8 studies used interviews, 3 used mixed methods, 1 used focused groups, and 1 combined interviews and qualitative surveys. Participants were patients in seven studies, family members in two studies, and healthcare professionals in four studies. Within the capability component of the COM-B model, a lack of knowledge of HHD was identified as a barrier by healthcare workers and patients. Within the opportunity component of the model the suitability of patients' homes (e.g. home modifications), and the healthcare system was identified as a barrier to HHD. Fostering an environment of support and community was seen as a facilitator of HHD. Within the motivation component of the model, a lack of confidence and reluctance of patients to burden their family members with the responsibility of treatment were perceived as barriers. Improvements in the quality of life for the person receiving HHD were regarded as a motivator.

Discussion

HHD is an existing cost-effective treatment, that's associated with improved patient outcomes. In addition to being consistent with the aims of Sláintecare, an expansion of HHD supports the immediate priorities for the Irish National Renal Office of: expanding dialysis capacity to accommodate growth in demand; providing services closer to patients' homes; and improving patient-centred care. To encourage widespread HHD use, understanding its barriers, and facilitators, for patients, and the healthcare system is key to developing and implementing effective interventions to increase uptake.

8.23 Implementation Factors for Digital Early Warning Systems: A Systematic Review and Best-Fit Framework Synthesis

Author: Ms Maeve Moran¹, Prof. Siobhán Corrigan¹, Prof Marie E. Ward^{1,2}, Mr Felicien Izaturwanaho¹, Mr. David Mockler¹

Affiliations: ¹Trinity College Dublin, School of Psychology, Centre for Innovative Human Systems, ²St. James's Hospital

Keywords: early warning systems, digital health, SEIPS, implementation, patient safety

Introduction

The past decades have seen increasing clinical implementation of Early Warning Score (EWS) systems, aggregate tools used to identify early signs of patient deterioration. While the integration of EWS systems into the Electronic Patient Record (EPR) represents a significant opportunity to augment score sensitivity and specificity for the reduction of unnecessary in-hospital mortality, little evidence exists exploring the implications of EPR-embedded EWS system implementation on clinical team workflows. A systematic review was therefore conducted exploring the factors which influence effective implementation (or not) of digital Early Warning Systems within acute care settings.

Methods

A search of CINAHL, Embase, MEDLINE, PsycInfo, and Web of Science databases was performed, seeking to identify both peer-reviewed articles and grey literature published after 1997 which included any qualitative or quantitative evaluations of EWS integration within the EPR in adult, acute care settings.

Results

After screening, 22 relevant articles met the inclusion criteria, from which 11 discrete clinical barriers and facilitators to effective digital EWS implementation were synthesised, as mapped to the SEIPS model of work system and patient safety (Holden et al., 2013). Findings support the potential for digital EWS systems to

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facilitate care escalation in the event of patient deterioration; however, effective implementation of such systems is limited by individual, clinical team, and organisational factors.

Discussion

Further sociotechnical research is needed investigating digital EWS systems, incorporating clinician perspectives in both design and implementation for the ultimate maximisation of user satisfaction, care quality, and patient safety.

9 Designing and Building Better Healthcare Outcomes for All

Chair: Dr First Last, Centre/Department,
University/Company Name, City,
Country

Theme Keywords: health literacy, inclusive design, workforce diversity, virtual health

Rationale and Objective

Ensuring equitable access to safe, high-quality care remains a major goal for healthcare systems worldwide. The submissions under this theme address disparities across age, gender, geography, and health literacy. Projects range from inclusive service design for older adults to analysis of workforce diversity and access challenges in virtual health. Contributors emphasize that human factors approaches must account for social as well as technical determinants of health, designing systems that are accessible, inclusive, and fair for all populations.

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9.1 Are all surgeons the same? Assessing emotional Intelligence and gender differences amongst surgical residency applicants in Ireland

Author: Professor Fardod O'Kelly^{1,3}, Mr Brendan O'Connor^{1,2}, Dr Emily O'Dowd¹, Dr Karen Neylon¹, Dr Hannah Shakleton¹, Dr Katherine Sheehan¹, Dr Eva Cotter¹, Dr Dara O'Keeffe¹, Prof. Barry McGuire¹, Prof. Oscar Traynor¹, Prof. Eva Doherty¹

Affiliations: ¹RCSI, Dublin, ²Department of Paediatric Surgery, Children's health Ireland at Crumlin, Dublin, ³Department of Paediatric and Adolescent Urology, Beacon for Kids, Beacon Hospital, Dublin

Keywords: emotional intelligence, gender differences, surgical training, residency, stress tolerance

Introduction

The importance of emotional intelligence (EI) is being increasingly recognised and possessing high levels of EI may be at least as important as a surgeon's clinical knowledge and technical skill for achieving the best outcomes for patients. Our aim was to assess the use of two measures of EI; the Bar-On EQ-i and the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT) in predicting success of entry to higher surgical training programmes. We also wanted to study whether there were differences in self-reported and performance EI scores, differences in EI scores over time, or gender differences in EI.

Methods

Two hundred and seventy surgical trainees who were applying for higher surgical training programmes (HST) completed EI assessments. As not all candidates were successful in gaining entry to a HST upon first attempt, 56 candidates repeated the measures a second time and nine on a third occasion. Data were analysed using SPSS version 20.0.

Results

Overall, female residents scored statistically significantly higher than male residents in the self-reported EI domains of independence, stress management,

stress tolerance, adaptability, reality testing, and problem solving. Mean scores on the MSCEIT were broadly similar across genders with the only significant difference that male surgical residents scored higher in managing emotion than female residents. However, there was no overall significant gender difference in total MSCEIT or EQ-i scores. In comparing those that were overall successful in initial or subsequent interviews and those who were ultimately not successful in their application to surgical residency, the former group scored higher in the EQ-i domains of independence, stress management, stress tolerance, reality testing and optimism. Successful male candidates also demonstrated higher levels of stress tolerance. There were no differences in MSCEIT scores between successful and unsuccessful candidates.

Discussion

Overall success in gaining entry to surgical residency was associated with higher levels of stress tolerance but was not predicted by total scores on performance measures of EI. We believe that our findings argue for the support and development of EI and human factors skills from the earliest stages of a surgical career.

9.2 Roma Women's Experiences of the Quality and Safety of Maternity Services: Learnings from Co-Designing an Engagement Strategy

Author: Ms Jaspreet Kaur Dullat,

Affiliation: UCD, Dublin, Ireland

Keywords: Roma women, maternity services, co-design, health equity, cultural sensitivity

Introduction

Measuring quality in healthcare can be challenging due to its multifaceted and complex construction [1]. This study is part of a larger proof-of-concept project (QS Signals) that aims to develop and report measures of quality and safety of maternity services in Ireland. In capturing the experience and perceptions of service users, Public and Patient Involvement should reflect the diversity of women who use maternity services.

Engagement with communities with poorer health outcomes and known inequities in healthcare provision will provide insights into the relevant measures of quality. Pregnant women who are recent immigrants, have lower socioeconomic status and poor nutrition are at increased risk for poor maternal outcomes [2,3].

Objective: Recognising the lack of diversity in traditional co-design processes, this study focused on engaging with Roma community women, a marginalised group at higher risk of obstetric complications to assess if a suite of proposed measures of the quality and safety of maternity services captures their experience and perspectives of maternity care in Ireland.

Methods

A co-design engagement process was conducted with a panel of women from the Roma Community. Workshops were co-designed with a representative organization to maximise panel members' contribution by addressing cultural, literacy, language and trust barriers. Workshops were conducted online and

focused on collecting their experiences about their pregnancy, delivery, postnatal period, and newborn. An additional educational component delivered by an HSE Public Health Consultant using non-technical language. A survey was also carried out to gather more information through one-to-one approach & translation support.

Results

Accessible and culturally sensitive workshops lead to meaningful participation. Each participant had between 2 and 6 children, and their first child was born when they were aged 15–18 years. All women faced significant challenges due to low levels of education, language barriers and precarious housing.

Most participants stated they had been treated well by healthcare professionals. However, some participants had low levels of engagement with maternity services, particularly during the antenatal period. Reluctance to engage with services was explained by the difficulty in communicating with healthcare professionals, lack of an interpreter when needed, and hesitancy by some in disclosing their Roma identity due to concerns about how they may be treated, with these concerns influencing both their engagement with maternity services and the capture of information that reflects their experiences. Limited knowledge of available services, including the complaints procedure, and hesitancy in discussing mental health, also impacted service engagement.

Discussion & Recommendations

Insights gained from these workshops will be incorporated into the design of quality measures that reflect their experiences. This engagement highlighted the importance of capturing accurate ethnic identifiers and ensuring women are comfortable. Such identifiers are important in measuring the equity of service provision. Participants also made some recommendations to improve the quality of service through the provision of a culturally appropriate female interpreter during antenatal visits and hospital stays. Participants also recommended outreach activities to encourage engagement with maternity services e.g. provision of online maternal and child health education and delivery of antenatal classes tailored to their needs.

9.3 IRESTORE National Residential Older Persons Early Warning System - Standardising Early Recognition, Response and Escalation to Acute Deterioration

Author: Ms Mary Bedding

Affiliation: National Deteriorating Patient Improvement Programme, Dublin, Ireland

Keywords: Early Warning System, older persons, residential care, early recognition, PDSA

Introduction

Currently there is no standardised Early Warning System (EWS) specifically for use in older people (OP) in Irish residential care facilities (RCFs). It is widely acknowledged that early identification of acute deterioration in older people is crucial, but is challenging for RCF staff due physiological changes, multiple comorbidities and atypical presentations, (Betancourt et al. 2015).

Purpose

Post Covid-19 a need was identified to scope out and test an OP EWS for RCFs, to aid early recognition of deterioration and to standardise the response and escalation. A proof-of-concept project was established to address this issue.

Methods

Using PDSA QI methodology, a UK deterioration detection tool was adapted for testing in Irish OP RCFs, (re-branded IRESTORE). 15 pilot sites were chosen for a 3-month pilot. Train-the-Trainer methodology was used to train local IRESTORE facilitators responsible for providing local education and data collection. Pilot took place between May-August 2024. Data was collected on resident deterioration episodes requiring: GP review or unplanned transfer, and staff evaluations were completed to assess acceptability of the tool and the implementation process.

Results: There was a 25% reduction in unplanned transfers during the pilot period compared to the same three-month period in 2023. There was very positive feedback from both Healthcare Assistant (HCA)/support staff and nursing staff on

using the tool. They felt that the tool not only formalised what they had done previously but gave them greater understanding of acute deterioration in OP and greater confidence to report their concerns in a more concise manner. The nurses felt that it empowered them to make better clinical decisions regarding escalation, improved communication with other healthcare professionals and gave them more confidence to care for unwell residents within their RCFs.

Discussion

Despite fears that the introduction of a residential OP EWS would increase unplanned transfers this does not seem to be the case. Staff reported feeling much more confident to monitor and care for unwell residents insitu, and a willingness to wait for a GP review rather than call an ambulance, (unless indicated). There was huge acceptance of the tool by nurses and HCAs who felt that they had received adequate training to use the tool. However, the nurses did highlight that the 'Escalation Protocol' could pose challenges for staff especially if the resident has an above zero INEWs score. Nurses expressed that as it was called a 'protocol' they felt this implied that the actions had to be adhered to and that it had the potential to stifle clinical judgement. This issue along with a couple of minor amendments to the proforma will serve as a second PDSA cycle for the project.

Conclusion

Overall, the project has been hugely successful. Without doubt the standardisation of the tool and the process has given staff more confidence not only to identify early deterioration, but also to respond more appropriately to the acutely deteriorating resident, with increased confidence in communicating concerns and has empowered nurses to make better clinical decisions regarding escalation. The plan is to scale-up nationally.

9.4 Cancer Care, a Hospital Without Walls-Pioneering more accessible healthcare.

Author: Ms Aine Boyle¹, Ms Ciara Parthiban^{1,2}, Ms Fiona Power²

Affiliations: ¹Tallaght University Hospital, ²South Dublin Community Intervention Team

Keywords: cancer care, community clinics, accessibility, resource optimization, patient-centered care

Introduction

Cancer remains a formidable global health challenge, with its incidence escalating year by year accounting for around 9.6 million deaths in 2018*. The International Agency for Research on Cancer (IARC) estimates that new cancer cases will rise to 27.5 million per year by 2040, triple the number from 2018. In the context of Ireland, data shows that cancer stands as the leading cause of mortality in the country, with projections indicating a potential doubling of cancer cases by 2045**

While the oncology day ward is vital for Systemic Anticancer Treatment (SACT), establishing community-based clinics for pre-chemotherapy care provides accessible, equitable, and efficient care. This shift to community settings helps address the challenges of increasing cancer rates and promotes collaboration between the oncology day ward and the South Dublin Community Intervention Team (CIT), transforming our approach to cancer care.

Methods

South Dublin CIT opened a clinic in the Kilnamanagh Primary Care Centre (PCC) initially for one day per week, and with a limited capacity of 5 patients. Due to its success and demand, it is now operational two days a week, seeing up to 15 patients per week. In order to provide even more accessible care, another community clinic has opened in Clondalkin PCC. The number of services provided has also expanded. Originating as a phlebotomy service preceding chemotherapy, it expanded its scope to include additional clinical nursing responsibilities like PICC care, port flushes, 5FU pump disconnection and administering treatment-related injections i.e. GCSF, Bisphosphonates.

Results

In 2023, there was a steady increase in clinical attendance and data shows increased activity in 2024. This collaboration between acute and community services established a seamless care pathway for patients.

Other patient outcomes:

- Enhanced clinic access, reduction in travel time, reduced patient wait times.
- Reduced costs associated with parking at the hospital and paying for meals while waiting for blood results
- Reduced time spent in the hospital environment which in turn helps to reduce the risk of nosocomial infections.

Organisational outcomes

Our innovation goals consist of integrating the acute and community services, providing equitable and accessible care.

This shift reduces the burden on hospitals and minimizes the challenges patients face when accessing care.

Other hospital outcomes are:

Resource optimisation, time management, reduction of potential waiting lists, facilitating protected time for staff education.

Discussion

Community-Centred Clinics transcend conventional limits, setting the standard for equitable and accessible care. By relocating certain cancer care services to community settings, the project has significantly improved the accessibility of care for patients. The establishment of clinics within primary care centres and the local community has reduced the need for long hospital visits, making it easier for patients to attend appointments. This change has resulted in a steady increase in clinical attendance, with more patients engaging with the services due to the convenience and reduced travel requirements. The expansion of clinic operations from one to five days per week, and the subsequent increase in patient capacity,

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further underscores the project's success in making cancer care more accessible and increasing patient attendance.

9.5 Measuring Microaggression in Patient Healthcare Systems

Author: Dr Enid Montague, Degnan Lawrence

Affiliation: University Of Toronto

Keywords: microaggressions, racial disparities, healthcare equity, systematic review, observational methods

Introduction

We conducted a systematic review of the literature regarding microaggression definitions and approaches to measurement. Racial or ethnic microaggressions as experienced by racial or ethnic minority individuals or groups is the focus concept for this review. Through that concept, this review covers assessment tool measures, health outcomes and effects, and interventions relevant to professional healthcare encounters. As such, the setting of included studies depends on how it interacts with the three research questions guiding this review. For measures and health outcomes, the search uses no restrictions on setting. For interventions, the setting focuses on professional mental or health care encounters.

Methods

The search was limited by inclusion criteria related to date range, language, and study design. Only on literature written in English were included in the review. For the publishing types, only conference proceedings, academic peer-reviewed journal articles, and appropriate grey literature were included. Lastly, only empirical studies were included, whether quantitative or qualitative. Studies addressed the experience of racial or ethnic microaggressions in relation to health outcomes, methods of identification and measurement, or plans for interventions within a professional healthcare setting.

Results

The resulting sources ($n = 16$) include quantitative ($n = 9$), qualitative ($n = 6$), and mixed method ($n = 1$) studies which inform three categories of interest for this review: measures, health outcomes, and interventions. As some sources overlap multiple categories, the number of sources which represent them exceed the

number of total included sources with measures ($n = 15$), health outcomes ($n = 5$), and interventions ($n = 5$). The sample sizes vary with each study from 12 to 3453 participants with [state distribution among study methods].

The experience of microaggressions in this review centers around racial or ethnic minorities within the health care setting. The nature, effects, and potential areas of improvement of these racial or ethnic microaggressions develop through the lens of the three guiding research questions involving measures, health outcomes, and interventions. For measures, some studies focus on survey measures designed to examine quantitatively physicians and counsellors about their assumptions based on cultural group membership, realities of race and racism, cultural issues, and stereotypes. Qualitatively, some studies focus on using interviews, focus groups, diaries, or open question responses to examine the types of microaggressions experienced by patients or clients as well as how health care providers “construct ‘truths’ or discourses about clients that historically have been marginalised by health services and system,” (Shaburidin et al., 2020). However, no studies described assessing microaggressions through observation, communication or behavioral analysis. These approaches would be most useful in the evaluation of patient experiences and disparities in patient experience experienced by marginalized groups.

Conclusions

Criteria for a human factors and ergonomics tools to evaluate microaggressions would include ability to measure the presence of these critical events using observational and communication analysis methods. Objective approaches to identifying microaggressions may prove more credible ways of inciting change in sociotechnical health systems where microaggressions affect patient care.

9.6 Incorporating Equity Considerations Into Serious Safety Event Review Processes

Author: Ms Deenar Virani, Ms Deenar Virani, Prof. Myrte de Alfred

Affiliation: University Of Toronto, Toronto, Canada

Keywords: equity, SSE, patient safety, fishbone diagram, social determinants of health

Introduction

Patient safety events describe instances of avoidable harm within healthcare settings, and among these are serious safety events (SSEs) which represent cases resulting in significant patient harm or death [1,2]. These events are voluntarily reported by hospital staff using event reporting systems [3]. SSEs often undergo analytic review processes, with the objective of investigating systems factors contributing to the events and developing interventions to prevent recurrence and improve safety [4]. Examining SSEs from an equity lens presents a significant opportunity to reduce avoidable harm towards marginalized patient populations, as well as inform the implementation of potentially effective future interventions [5].

Methods

In this study, semi-structured interviews will be conducted with hospital staff to collect information about the current SSE review process, how equity is currently being considered during the process if at all, and trends they have observed related to equity issues. We will interview hospital staff to identify prevalent themes and issues regarding equity, as well as current pain points. The themes and pain points identified will be used to inform the design of a standardized approach to incorporate equity considerations into the SSE review process. Simulations of potential approaches will be conducted with mock SSEs to gather feedback and inform an updated iteration. The developed tool will then be utilized by the event review committee during the SSE review process for the duration of a three month trial period. Additional feedback from the use of the tool during the evaluation period will be used to inform an improved iteration of the selected approach, as well as provide additional recommendations to incorporate equity considerations.

We have thus far completed an initial investigation of the current SSE review process.

Results

The current investigation process is robust and standardized across all SSEs, with a major emphasis on analyzing root causes through the use of the “5 Whys” method and fishbone diagrams. There is currently no systematic process for incorporating equity into the SSE review process at the hospital. Team members may express equity concerns, including asking if equity issues could have been tied to the outcome or event. There is not a defined process for integrating these concerns into the review process and a lack of awareness of how equity issues manifest in healthcare. The team is trialing an adapted version of a fishbone diagram, with added branches that consider relevant social determinants of health factors. If a concern is identified, the equity team is invited to the review meeting

Discussion

SSE reviews are essential to increase patient safety. Considering equity issues during reviews can help mitigate avoidable harm experienced by marginalized populations. Utilizing a standardized method for equity review will enable hospitals to identify the prevalence of these issues, as well as develop interventions to systematically address them. Our research will help identify tools that are effective in uncovering equity issues during these investigations. Other considerations for supporting equity include developing equity dashboards, implementing robust equity taxonomies, and providing relevant health equity training and resources for staff.

9.7 The Forgotten Aim: Investigating Inequities in Clinical Systems

Author: Prof. Myrte de Alfred

Affiliation: University Of Toronto, Toronto, Canada

Keywords: health equity, sociotechnical systems, disparities, SEIPS, systemic bias

Introduction

Racial and ethnic disparities in health outcomes are associated with billions of dollars in excess medical costs, premature death and disability, and lost productivity [1]. Decades of research have documented racial/ethnic disparities in the leading causes of death, in the diagnosis and treatment of a range of illnesses, and use of health services [2,3]. Emerging evidence suggests that health systems are plagued by systemic design biases that contribute to variation in care disparities in outcomes [4, 5, 6]. While alleviating health disparities requires a multidisciplinary approach and multilevel analysis, there is a need for hospital level assessment to uncover factors within the clinical system influencing variations in the quality of care provided to individuals of varying racial/ethnic backgrounds [7, 8].

Methods

The proposed research seeks to incorporate equity as a cross-cutting feature across the dimension of sociotechnical factors ensure that previously identified system equity issues are resolved and context specific challenges that result in adverse outcomes are promptly identified. Building on our initial efforts compiling equity issues in healthcare identified from the literature, we will host a half day equity analysis workshop with 18 – 20 invited participants including clinicians and health equity to elucidate a broad range of equity related challenges impacting access and quality of care. These issues will then be refined and categorized according to sociotechnical and socioecological factors. We are currently in the process of conducting scoping reviews on equity issues in the delivery of care and completing an ethics application for the equity analysis workshop.

Results

Our initial review identified 16 equity issues contributing to disparities in health outcomes and variations in care. These distribution of the factors among the SEIPS 2.0 factors were as follows: person (n=3), tools and technology (n=2), task (n=4), organization (n=3), and external environment (n=4). Issues included inaccurate medical beliefs about biological differences among races[9], race corrections and unfair algorithms impacting treatment[10], [11], lower reliability of medical devices, such as a pulse oximeter, due to skin tone [12]. Additionally, healthcare workers experience racism from patients and colleagues[13] and healthcare financing models effectively assigns a lower dollar value for patients based on race [14].

Discussion

Equity is described as the “forgotten” aim of healthcare quality. Current health equity efforts focus on population level approaches to address the health disparities; however, hospitals must also play a critical role in reducing disparities in health outcomes. Focusing on hospital level contributors to disparities is a novel underlying thread of this work. The examples from our preliminary synthesis illustrate how inequities are designed into the care system through the sociotechnical elements. Our planned research will expand on these findings providing a comprehensive assessment of equity issues that will need to be investigated and addressed to reduce disparities in health outcomes.

9.8 Closing the Design Gap: Conducting Usability Studies in Low-Middle Income Countries for Inclusive Medical Device Design.

Author: Dr Lengwe Sinkala

Affiliation: Clarimed, Chadds Ford, USA

Keywords: medical devices, usability studies, LMICs, human factors, co-design

Introduction

Human factors studies are essential in identifying potential risks and improving the functionality of devices to prevent harm. They play a crucial role in the design and development of medical devices, ensuring that they are safe, intuitive and effective for the end users. One of the key factors in ensuring these studies provide unbiased data is in considering the intended use environment and understanding the unique systems in which these devices will operate.

The growing demand for equity in healthcare requires us to account for the diverse environments in which medical devices are used. However, in many low- and middle-income countries (LMICs), human factors studies are not conducted within their intended use environments, creating barriers to the appropriate design of medical products in these geographies.

Medical devices are frequently designed for high-resource environments with well-trained staff and robust infrastructure. However, LMICs face challenges like limited infrastructure, unreliable power, personnel shortages, and cultural nuances that affect usability. Devices that perform well in well-resourced hospitals can fail when used in environments facing these challenges, yet they are often tested in settings that don't reflect this reality and are intended for use across a wide range of settings, including the one mentioned above.

Methods

To address this gap, ClariMed has taken a practical approach by supporting the African Foundation for Premature Babies and Neonatal Care (AFPNC) in improving

preemie and maternal care in Ghana. This initiative integrates human factors studies early in device development, focusing on understanding local context, identifying key challenges and opportunities, and forming actionable recommendations. The research will inform the design of a cost-effective and sustainable medical device tailored to the needs of premature infant care in Ghana, demonstrating the importance of equity-driven design.

Key points about the work in progress are as follows:-

1. Significant gaps in the healthcare system do affect device usability in Ghana, such as limited access to resources, workforce constraints, and cultural nuances impacting patient care.
2. Interviews that were conducted highlighted that devices designed for high-resource settings often fail under these conditions.
3. Stakeholders emphasised the importance of co-designing solutions with end users to ensure functionality and adaptability.

Discussion

The findings emphasise the critical role of usability studies in LMICs to ensure medical devices meet the unique needs of diverse healthcare systems. By incorporating local context into the design process, the study addressed barriers that could otherwise hinder the adoption and effectiveness of medical technologies. This approach not only supports equity in healthcare but also aligns with Sustainable Development Goals 3, 9, and 10 by promoting good health, innovation, and reduced inequalities. The Ghana project highlights that designing for LMICs is not about short-term fixes but about creating scalable, sustainable solutions. Usability studies are essential in fostering global health progress by ensuring medical devices are practical, cost-effective, and beneficial for all regions. This approach can reshape healthcare innovation and reduce inefficiencies caused by overlooking local needs

10 Governance for Human Factors Ergonomics and Patient Safety in Healthcare

Theme Keywords: competency frameworks, training, organisational maturity, leadership, accountability

Rationale and Objective

Strong governance structures are essential to embed HFE into healthcare systems sustainably. Abstracts in this area show how national competency frameworks, specialist training programs, and organisational maturity models can drive systemic improvements in patient safety. Contributors highlight the need for leadership, accountability, and integrated reporting mechanisms to move human factors beyond isolated projects toward a core part of how healthcare organisations function and improve.

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10.2 Development of a Learning Response Review Tool for healthcare safety investigation and learning reports: a modified-Delphi study

Author: Prof. Paul Bowie

Affiliation: NHS Education For Scotland, Glasgow, Scotland

Keywords: safety investigations, learning response, Delphi study, root cause analysis, blame-free culture

Introduction

The standard of healthcare safety investigations and learning reviews is known to be variable in healthcare settings worldwide (1-3). A mechanism to review written reports of organisational investigation responses to provide developmental feedback for improvement for report writers and safety investigators does not appear to exist. The aim of the study was to design a formative educational tool that is informed by examples of 'good practice' and 'traps to avoid' in relation to safety-related learning response outputs (e.g. root cause analysis reports and similar) for all areas of healthcare.

Methods

The study was conducted over a 6-month period (October 2023 to March 2024) with 20 informed and experienced participants representing a mix of regional and national healthcare organisations and academic institutions in the UK (e.g. safety learning and human factors specialists, leaders, clinicians, educators and academic researchers). The content of the tool was agreed upon using an online modified-Delphi process and informed by key findings from published evidence where safety investigation practices and written reports were shown to be sub-optimal.

Results

An 8-item preliminary Learning Response Review Tool with descriptors (reduced from an original 11 items) and a basic 3-point ordinal rating scale ("good evidence;

“some evidence”, “little evidence”) for formative self-assessment was co-designed through the expert development group processes.

The development and consensus building process went through three iterations of the modified-Delphi process until final agreement was reached. During this process, the tool content was reduced from 13 items to 8 items. For example, “the need to consider the importance of both ‘context’ and ‘situation’” in the learning response review was removed due to lack of sufficient agreement by the group. Similarly, “the need to acknowledge the difference between intentional and unintentional human failure”, and “do not confuse recommendations with solutions” were considered but eventually omitted.

A ‘written comments’ section was also added for each item for users to clarify and rationalise their ratings and highlight: a) areas that might be improved or b) content that was thought to have worked well and should be shared with others for standard-setting future reports and inform local training. Users are also encouraged to use direct quotes taken from written reports to explicitly highlight good practice or learning opportunities.

The final 8-item tool aids formative assessment of written safety investigation reports against the following identified ‘good practices’:

1. People affected by incidents are meaningfully engaged and involved
2. The “Systems Approach” is applied
3. ‘Human Error’ is considered as a symptom of a system problem
4. Blame language is avoided
5. Local Rationality is considered
6. Counterfactual reasoning is avoided
7. Safety actions/recommendations are systems-based, developed collaboratively and evidence-based
8. The written report is clear, easy to read and anonymised

Conclusion

A formative preliminary learning response review tool was developed, based on published evidence, sound educational principles and informed 'expert' contributions, to address well-established issues with both standard of safety investigations and learning responses and related reports in healthcare organisations worldwide. More development and testing of the tool's utility is necessary

10.3 Exploring the Hazards of Medical Devices: A Qualitative Study in Hospital Care and Hospital-Care-at-Home

Author: Ms Karlijn van Beekum¹, Dr. Mees C. Baartmans¹, Prof. Dr. Cordula Wagner^{1,2}

Affiliations: ¹Nivel, ²Amsterdam UMC

Keywords: medical devices, hazards, qualitative study, SEIPS, interoperability

Introduction

Medical devices play a crucial role in treatments and patient care in hospitals and hospital-care-at-home. The application of these devices poses risks to patient safety and may contribute to (potentially preventable) adverse events. These events include perforations, (internal) bleedings and infections during endovascular procedures and implant placement (Schoten et al., 2019). This qualitative study aims to explore the hazards of medical devices experienced in hospital care from the perspective of experts on medical devices.

Methods

11 semi-structured interviews were conducted with 14 hospital-based experts on medical devices, including medical physicists and managers of the department medical technology. Interviewees were asked about medical device policies and their experience with device hazards in hospitals and hospital-care-at-home. The transcripts were member-checked, and thematically and inductive analysed to highlight experienced hazards. The Systems Engineering Initiative for Patient Safety (SEIPS) model was used as a framework to present these hazards from a work system- and human factors perspective. As approved by the ethics committee of Amsterdam UMC (registration number: 2023.0459), the participating professionals provided both verbal and written consent for the interview and recordings.

Results

Six hazards of medical devices were identified. Shortages of medical devices and staff development induce an increasing use of unfamiliar devices, imposing safety risks. The growing necessity of interoperability and integration of devices

complicates manageability and compatibility. Alarm and monitoring systems produce numerous alarms, hindering effective responses. Additionally, the rise of artificial intelligence in healthcare presents risks due to limited knowledge and mismatches with patient data. Lastly, inconsistent and underdeveloped policies, data quality issues, and varying environment and users introduce risks in hospital-care-at-home.

Discussion

This study contributes to the understanding of the hazards associated with medical devices. The identified hazards provide insights for developing policies for hospital-care-at-home, user competency and training, enhancing data sharing and guiding research into risks and potential preventive interventions.

10.4 Assessing the role of medical devices and non-technical skills in the operating room: A focus on orthopaedic and endoscopic procedures

Author: Ms Karlijn van Beekum¹, Prof. Dr. Cordula Wagner^{1,2}

Affiliations: ¹Nivel, ²Amsterdam UMC

Keywords: medical devices, non-technical skills, OR, teamwork, surgical safety

Introduction

A combination of multiple factors may cause medical devices to contribute to adverse events, such as bleeding, perforations and infections during endovascular procedures and implant placement (Schoten et al., 2019). This study aims to gain insights into contextual factors that promote the safe application of medical devices and identifies opportunities for further improving patient safety.

Methods

This study observed surgical orthopaedic and endoscopic procedures, to better understand the role of medical devices in patient safety. We focussed on the use of medical devices, contextual factors and non-technical skills. An observation scheme based on OTAS (Hull et al., 2011) and OSATS (Cook et al., 2013) was used. Over a hundred procedures in the operating room (OR) were observed across six orthopaedic and two endoscopic departments in seven Dutch healthcare organisations. Technical aspects were further explored by asking the physicians a post-procedure reflective question. In a semi-structured group session, the findings were discussed together with the healthcare professionals. This study is approved by the ethics committee of Amsterdam UMC (registration number: 2024.0028), the participating healthcare professionals provided both verbal and written consent for the researcher's attendance during the procedure.

Results

The application of medical devices, ranging from scalpels, surgical lights and endoscopic cameras, is crucial for surgical procedures. Preliminary results suggest that non-technical factors as the surgeon's chosen approach and behaviour, for

example in selecting device type, order and settings and the cultural dynamics within the OR, influenced the application of medical devices. These choices also affected the level of participation of the professionals in the safety checks, which were (almost) always conducted. Surgeons frequently engaged surgical assistants by seeking their judgement, fostering collaboration. The team level of experience in knowledge and collaboration, impacted by ongoing staff shortages, affected the application, such as exchanging instruments. Patients' characteristics, including obesity and muscle flexibility, significantly influenced the procedure and required adjustments of the team. Additionally, technical factors, including packed ORs filled with devices and materials, and challenges in cable management, influenced the application of medical devices. A frequent occurring complication was the constipation of the suction drains, resulting into unclogging the drain with another instrument. Challenges in equipment management, such as medical device shortages and backorders, are often addressed by adjusting the application approach, substituting with a device of the same intended use or an alternative device, or by seeking assistance from professionals outside the OR. In general, the procedures were proceeded as expected, mentioned by the physician afterwards, and the outcomes of the procedure, right after the surgery, were generally successful according to the healthcare professionals. Unexpected events were internally taken care of by the healthcare professionals.

Discussion

Medical devices are extensively utilized in the OR during orthopaedic and endoscopic procedures, wherein the device selection was influenced by the level experience of the team and the approach and behaviour of the surgeons. Despite challenges such as staff shortages and equipment management, procedures typically proceeded as expected, and immediate outcomes were successful, due to effectively addressing any unexpected events.

10.5 Research on innovative design of wheeled rollator based on UB-FBS-TRIZ theory

Author: Ms Mengna Zhu, Dr Mengya Zhu, Dr Yong Gong

Affiliation: Ningbo University

Keywords: wheeled rollator, elderly mobility, TRIZ, user-centered design, FBS model

Introduction

The rollator walker is a mobility aid designed to assist elderly individuals in walking. It features a wheeled structure that helps users with limited lower limb function or poor balance. It significantly enhances the autonomy and safety of elderly users when venturing outside. However, prevalent rollator walkers often grapple with challenges including operational complexity and a disconnect between functional capabilities and user requirements.

Methods

This study employs a User Behavior (UB) approach, utilising in-depth interviews and behavioral analysis to systematically explore the actual needs of experienced users while using walkers. By extracting the usage demands of the elderly, in conjunction with the Function-Behaviour-Structure (FBS) model, a functional model of the rollator walkers was constructed, thereby transforming the aforementioned user needs. A systematic description of the core issues was produced using TRIZ theory. The conflicts between intended functions and structures were identified and an analysis of these conflicts was conducted. The contradictions were resolved through the use of a conflict matrix, which employed inventive principles and separation principles, thereby forming a product innovation design method integrating UB-FBS-TRIZ. Finally, the feasibility and effectiveness of this method were validated through a design case study of rollator walkers.

Results

Our research identified four aspects of user needs: interactivity, portability, ease of use, and functionality by applying hierarchical and scenario-based tasks. The design key points of the rollator walkers were clarified, and the corresponding

innovative design completed. A user satisfaction survey conducted on the designed rollator walkers confirmed that the proposed UB-FBS-TRIZ theory effectively meets the mobility aid needs of elderly users.

10.6 Effects of Microfluctuations on Visual Fatigue and Accommodation Control under Different Visual Loads

Author: Mr Yi-Chuan Chang, Prof. Dr. Rudy Ying-Yin Huang

Affiliation: National Taiwan University

Keywords: visual fatigue, microfluctuations, digital devices, ergonomics, accommodation control

Introduction

With the widespread use of digital devices, visual fatigue from prolonged screen time has become increasingly prevalent, especially during the COVID-19 pandemic. This surge in digital exposure has heightened concerns over visual health as a public issue. Previous studies suggest a correlation between ocular microfluctuations—considered input signals for visual accommodation control—and visual fatigue. However, inconsistent findings have left the predictive potential of microfluctuations uncertain, and their role in accommodation control remains unclear, possibly due to their complex temporal structure over extended periods.

Aim

This study aims to analyze microfluctuation behavior, blink frequency, and pupillary responses in two age groups during prolonged exposure to varying visual loads. By comparing objective measurements with participants' subjective assessments of visual fatigue, we seek to explore the correlation between microfluctuations and fatigue induced by visual load and to investigate whether microfluctuations serve as input signals for the visual accommodation mechanism.

Methods

We plan to recruit 20 participants each from the 20–25 and 40–45 age groups. To minimize order effects, participants will be randomly assigned to different sequences of device usage. Each will perform a 30-minute visual task on both a desktop monitor and a tablet, while eye-tracking records blink frequency and pupil size changes. Microfluctuation measurements before and after the experiment will observe low- and high-frequency components, and results will be compared with

fatigue scale ratings. Ambient lighting, device brightness, and resolution will be controlled to ensure data reliability.

For data analysis, blink frequency (blinks per minute) will assess visual fatigue. Pupil size changes will be measured across time intervals, calculating average diameter, and linear regression will evaluate the impact of visual load on pupil dilation or constriction. Microfluctuation data will undergo Fourier transformation to quantify energy changes in low-frequency (<0.6 Hz) and high-frequency (1–2 Hz) components, enabling assessment of visual fatigue under different visual load conditions.

Results

Preliminary results from the 20–25 age group indicate that different devices affect visual fatigue differently. Tablet users exhibited lower blink frequency and slower pupil dilation speed than desktop users, suggesting higher visual load and more readily induced visual fatigue with tablets. Microfluctuation analysis showed increased high-frequency components after tablet use, aligning with subjective fatigue ratings. Testing will continue with the 40–45 age group to explore whether age-related factors—such as lens hardening and weakened ciliary muscles—lead to slower focus adjustment and increased visual fatigue. This could confirm the correlation between microfluctuation behavior and visual fatigue induced by visual load and clarify whether microfluctuations serve as input signals for the visual accommodation mechanism.

Discussion

The anticipated outcomes of this study include defining an objective and quantifiable indicator of visual fatigue and clarifying the role of microfluctuations in accommodation control. These results are expected to enable accurate and objective assessments of visual fatigue and cognitive workload, providing more precise assessment indicators for conditions associated with visual fatigue in clinical medicine, and further promoting research in cognitive workload and visual ergonomics.

10.7 Measuring Progress through Progression in Measurement: A Systematic Review of the Measurement of falls in Secondary Care

Author: Ms Jan Christian¹, Associate Prof. Alexandra Lang¹, Dr Michael. P. Craven^{1,2}, Dr Katie Robinson³

Affiliations: ¹University Of Nottingham, , ²NIHR MindTech HealthTech Research Centre, Institute of Mental Health, University of Nottingham, Nottingham UK, ³Centre for Rehabilitation and Ageing Research, School of Medicine, University of Nottingham

Keywords: falls prevention, benchmarking, patient safety, systematic review, SEIPS

Introduction

In-patient falls are a major cause of morbidity and mortality, with around 247,000 falls occurring annually in the UK, costing the NHS £2.3 billion. Although falls prevention guidelines exist, there is little evidence supporting the efficacy of interventions in hospital settings. Previously the Royal College of Physicians (RCP) recommended tracking falls per 1,000 bed days to benchmark performance. This does not acknowledge varying ward layouts, differences in patient visibility, and staffing levels, which affect the ability to monitor at-risk patients. In 2022, (RCP) recognised these issues moving to end benchmarking, but the practice persists due to the lack of alternatives. This variation means that there is suboptimal governance in this space and opportunity for system improvements once the full extent of diversity in measurement is understood.

Method and Design

This study supports a PhD project on technology enabled fall prevention in secondary care. A systematic review was conducted to assess the effectiveness of fall prevention interventions in hospitals, reviewing studies using falls per 1,000 bed days as a metric. PRISMA guidelines were followed with independent review.

Results

From 2,385 articles searching 9 databases, 85 studies were included. Key themes identified through thematic analysis within NVivo14® included clinical environment, nurses' behaviour, cost, fall definition inconsistencies, and variability in reporting practices. Patient visibility was only considered in relation to moving patients to observable beds with control of this limited by the hospital environment. Nurse education was the main intervention in 30% of the studies. There was no consistent definition of what constitutes a fall, with 22 different definitions across the included papers. Eleven methods of calculating fall rates were found, only three studies clearly explained their calculations. Studies from the US highlighted concerns about underreporting.

Discussion

The lack of standardised reporting, continues to hinder progress in understanding and preventing falls in hospitals. Additionally, diverse methods of measuring outcomes in inpatient care suggest that no single quantitative metric will adequately capture the complexity of fall prevention efforts. A significant proportion (19%) of included studies were Randomized Controlled Trials (RCTs), but these often yielded inconclusive or negative results. Timmons et al. (2019) suggests that RCTs fail to account for social context and the complexity of real-world environments, making a more pragmatic approach necessary.

The findings from this study emphasise the importance of understanding how hospital falls are shaped by interactions between technology, people, and the environment. Thereby reinforcing the need for a systems perspective and Human Factors methodologies to tackle this pervasive patient safety challenge. The Systems Engineering Initiative for Patient Safety (SEIPS), model offers a comprehensive framework for studying and presenting these concepts.

The PhD will build on this analysis, testing clinical systems and falls prevention technology and how they align with the human capabilities and contextual limitations of patient care. Future work will also address overuse of education and how failure to capitalise on the possibilities of technology currently results in "heavy reliance on high levels of human performance with a resultant small and unstable foundation for safety" (Kelly et al., 2023).

10.8 Model of health work system for the maternal-perinatal route from ergonomics with a territorial approach in dispersed rural areas.

Author: Señora Sandra Joaqui

Affiliation: Universidad Del Valle

Keywords: maternal-perinatal care, ergonomics, rural health, sociotechnical systems, territorial approach

Introduction

This paper presents the conceptual progress of the first year of doctoral candidacy and structures a first approximation of the findings. Therefore, it is not structured with the established requirements.

Maternal and neonatal morbidity and mortality continues to be a public health problem in several countries around the world, especially in low-income countries. Although the World Health Organization has developed different strategies for their reduction, environmental, institutional and community factors influence the occurrence of events, most of which are preventable. Temporary or permanent disability affects the quality of life of the mother and child in their emotional, economic and family spheres and the high costs it generates for the healthcare system in terms of assistance and economic benefits affect its financial sustainability.

The situation is exacerbated in the low complexity (BC) or first level of care, health institutions located in municipalities with high rurality, dispersed rurality, ethnic and/or peasant population, victims of the armed conflict and with low state resources, which are responsible for providing access, quality and timeliness in the provision of health services to women during pregnancy, childbirth and puerperium, being highly responsive.

However, the ESE-BC, being a socio-technical health system, influenced by environmental factors (Political-Legal (P-L), Economic-Financial (E-F), Sociocultural (S-C), Technological-Scientific (T-C) and Ecological-Geographic (E-G)), do not

provide access, quality and timeliness in the provision of health services, violating the right to health and causing obstetric violence to the mother-child binomial.

Now, articulating the P-L, E-G and S-C factors, the expanded concept of Territory emerges from its components of: a) Territory Objective Governance Space -TEOG-, conformed by the P-L factors related to laws and norms (external and internal) and the E-G that contemplate environmental conditions (climate, soil, vegetation etc.). b) Territory Lived and Lived Subjective Space -TESVV- where the S-C factors mediate the social and community dynamics of a particular place. For this case, the expanded concept of Territory mediates the contextual and structural factors of the health institution as a socio-technical system that materializes the right to health of the mother-child binomial.

Therefore, since ergonomics is a scientific discipline focused on the understanding of systems and their interactions at different levels, which seeks the welfare of the Human Being and the performance of the systems involved, this work aims to propose a health care model from the systemic vision of ergonomics, for the comprehensive route of maternal and perinatal care (RIAMP) with Territory approach, in a first level public hospital located in rural areas, which facilitates the principles of access, quality and timeliness, in the provision of health services.

10.9 Slaying Sacred Cows: Lazy, Magical and Simplistic Thinking in Patient Safety

Author: Prof. Ken Catchpole

Affiliations: Medical University of South Carolina, Charleston, USA & International Ergonomics Association Healthcare Technical Committee

Keywords: patient safety, critical thinking, cognitive bias, training, improvement science

Introduction

In a complex, confusing, obfuscating post-truth world critical thinking is vital. However, a look through the patient safety and clinical human factors literature reveals a range of misleading studies, accepted wisdom, and lazy, magical and simplistic thinking. This talk will consider how to apply deeper critical thinking to patient safety and clinical HF science.

Lazy thinking

The often-stated “communication” as the cause of patient safety incidents has been incredibly misleading as (i) it is what people know to report (ii) is a huge part of any care so has a denominator problem (iii) is so broad it can mean teamwork, workspace design, task design, staffing composition, communication mediums, or their design. In short, it can mean virtually anything. “Situational Awareness” can also be attributed to all of these things, ironically as that has also been hugely misused and misinterpreted. Indeed, any attribution of harmful outcomes to “cognitive bias” fails to acknowledge the reliance on these biases for fast and successful care – which in fact reflects expertise. Overcoming this lazy thinking and digging deeper into both “work as done”, a wider variety of data sources, and adopting non-linear, simple attributions leads to a much richer way to understand clinical incidents.

Magical Thinking

Training in healthcare is particularly subject to magical thinking, treating people as if they can be simply reprogrammed by the infusion of information. This leads to the magical idea that behaviors can be changed through didactic presentations (e.g.

“in service” training) of huge bodies of knowledge (e.g. TeamSTEPPS). There are also problems of training people who don’t want to be trained (the “Take a horse to water” problem) and the problem of maintaining new behaviors even if there is motivation to do so (the “New Years Resolution” problem. Indeed, behavior is strongly mediated by system affordances, and external and contextual influences. Understanding the relationship between content, transference, and work context can help improve these approaches.

Simplistic Thinking

This has particularly been a feature of improvement. For example, the common narrative “A new thing...will lead to improvements which will lead to better outcomes” does not reflect anything about attitudes, behaviors, ease-of-use, integration, availability, maintenance, process change, or the mechanism of effect for those outcomes. Such interventions often exhibit the application of linear deterministic thinking to systems that instead are complex and adaptive. Furthermore, while clinical outcomes are a desirable outcome, in safety and clinical human factors science they are rarely directly associated with any intervention, and thus can be misleading. The science of the Surgical Safety Checklist, and the subsequent observations of spread, use and success will be reappraised within this light. Arguably, safety interventions should not be designed based on the number of people who died in a context. Another challenge with measuring outcomes is that process variation is important for patient-centered care, yet is difficult to measure, and the introduction of a standardized approach may simply lead to a more reliable measure of process, rather than necessarily and improvement.

10.10 Handle with care: Bridging the gap between evidence and practice to promote safe patient handling in long-term care

Author: Mrs Justine L Estey¹, Dr Wayne Albert¹, Dr Michelle R. Cardoso²

Affiliations: ¹University Of New Brunswick, ²Université de Moncton

Keywords: safe patient handling, musculoskeletal injuries, long-term care, LTC, training, ergonomics

Introduction

Research indicates that nurses working in long-term care (LTC) experience higher rates of musculoskeletal injuries (MSIs) compared to other healthcare sectors, and despite the availability of safe-patient handling (SPH) interventions, workplace injury rates in LTC remain persistently high (Mayeda-Letourneau, 2013). Significant gaps in the literature further complicate this issue, as systematic reviews reveal variability in methodologies and intervention components, with limited focus on organizational and individual factors influencing SPH adoption (Kugler et al., 2024; Wahlin et al., 2022). The purpose of this study is to establish baseline measures of SPH practices, training, equipment use, and workplace culture among LTC nurses in New Brunswick, Canada. By identifying barriers and facilitators to SPH adoption, this research aims to provide a comprehensive understanding of the current challenges faced by LTC staff with the aim of developing tailored interventions to promote SPH practices in subsequent studies.

Methods

The present study includes 24 nurses from a LTC facility in New Brunswick, who will complete a comprehensive survey capturing data on demographics, lifestyle habits, and work-related factors. The survey will assess familiarity with SPH policies, participation in training, and perceptions of training adequacy while also examining access to SPH tools, availability of second-person assistance, and the sufficiency of equipment. Participants will provide insights into their likelihood of using SPH equipment, openness to new technologies, and barriers to effective equipment use. Workplace culture, including organizational support for SPH practices and enforcement of related policies, will also be evaluated.

Results

The results will provide a detailed snapshot of SPH practices among LTC staff. Insights will include gaps in training, including hands-on practice and mentoring, as well as challenges in accessing and utilizing SPH equipment. The analysis will explore barriers to SPH adoption, such as time constraints, inadequate training, and equipment-related limitations, while gauging staff openness to new technologies. These findings will identify opportunities to enhance staff safety, optimize equipment use, and address barriers to SPH implementation.

Discussion

This baseline study underscores the importance of understanding frontline staff experiences to create evidence-based, practical interventions. The insights gained will guide tailored strategies to improve SPH adoption, enhance training and the use of new equipment, and help to promote a culture of safety in LTC settings. By leveraging the results of this study, a subsequent exploratory sequential design will focus on developing interventions that respond to the unique needs of LTC staff across New Brunswick, ultimately creating safer and more sustainable LTC work environments to be modeled across Canada.

10.11 Just Culture in Surgery Survey

Author: Ms Aurélie Hay-David¹, Captain Mike Davidson², Prof. Peter Brennan³

Affiliations: ¹University of Derby, ²Airbus A380 Captain, British Airline Pilots' Association, UK, ³Consultant Maxillofacial Surgeon, Portsmouth Hospitals University NHS Trust, UK

Keywords: just culture, surgery, safety culture, survey, blame-free reporting

Introduction

"A Just Culture considers wider systemic issues where things go wrong, enabling professionals and those operating the system to learn without fear of retribution" (Williams N., 2018). The approach encourages clinicians to feel safe – to create an atmosphere of trust in which to speak up. Rather than "right" or "wrong" it is about learning from events, moving forward to pro-actively improve patient safety (Murray et al., 2022; Boskeljon-Horst et al., 2023).

Methods

We present our results of an investigation into the current level of understanding and experience of Just Culture in practice. A 27-point questionnaire was circulated to Anaesthetists and Surgeons in the UK. Data points were collected on specialty, grade, location / trust (when the question was answered) and lastly on gender. The questions were divided into background / working knowledge of the principles; information provided by their trust and knowledge of internal procedures / investigations; personal experience; and, on a practical level, what can be done to improve awareness and implementation of Just Culture principles.

Answers were provided on a Likert scale and free text. All results were confidential and anonymised. Links were provided for support if the content was either uncomfortable or triggering for participants (local departmental managers, occupational health and the BMA Advice and Support Service).

Discussion

This study is unique: to gain a contemporaneous snapshot in the context of Just Culture understanding and clinician exposure to investigations. It provides a veritable platform to empower clinicians – to share their experience and the changes that they wish to see. Increasing awareness and encouraging dialogue are all positive steps to achieve a more Just Culture – to improve patient safety, overall. It was done in parallel with one in Aviation which received 2200 responses.

(please note – at time of abstract submission survey still active / in progress 500 responses so far)

11 Lessons From Other Industries

Theme Keywords: resilience, proactive risk management, teamwork, incident investigation

Rationale and Objective

Healthcare has much to learn from high-reliability industries like aviation, nuclear power, and manufacturing. Submitted abstracts in this theme bring cross-sector insights into resilience engineering, proactive risk management, teamwork, and incident investigation. These studies demonstrate how importing methods and mindsets from other industries, when adapted thoughtfully to healthcare's complexity, can accelerate the evolution of safer, more resilient systems.

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- 11.1 Safety management systems past present and future: a state of the art review to inform potential applications in healthcare
- 11.2 Opening the door to fatigue risk management in healthcare
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- 11.4 Improving telemedicine systems for future public health emergencies: Lessons from Integrated Urgent Care telephone triage during the COVID-19 pandemic

11.1 Safety management systems past present and future: a state of the art review to inform potential applications in healthcare

Author: Mrs Brook Howells¹, Associate Prof. Gemma Louch¹, Prof. Carl Macrae², Prof. Jane O'Hara^{1,3}, Dr Lauren Ramsey¹, Prof. Patrick Waterson⁴

Affiliations: ¹University Of Leeds, ²University of Nottingham, ³This Institute, ⁴Loughborough University

Keywords: safety management systems, healthcare, systematic review, regulation

Introduction

Safety Management Systems (SMSs) are formal, organised approaches to managing safety across an organisation. They are widely adopted, and in some cases enforced through regulation, in safety critical industries. There is increasing attention on SMSs in healthcare, given their potential to facilitate more effective and systematic patient safety. However, whilst SMSs are well researched in other safety critical industries, there is limited understanding about how the structures and principles might be translated into healthcare settings. This review sets out to assess the state of the art in SMSs in safety critical industries, by providing an overview of current practice, the history and evolution of present SMSs, and potential future developments of SMSs. This will help to inform successful adoption of SMS into healthcare settings and also identify gaps for future research.

Methods

Using systematic literature searching of Scopus, Web of Science and Ovid (including Global Health, APA PsycInfo and Transport Database), plus targeted hand-searching and recommendations from a network of key stakeholders, key sources were identified from both academic and professional literature. The analysis focused on two areas of interest 1) the common elements of SMSs as defined in national and international regulation of safety critical industries, and 2) what has influenced the development of these SMSs to their current forms. A process of sense-checking followed, with key stakeholders working in patient safety in the English NHS, to identify possibilities and challenges for healthcare.

Results

There is no single definition of an SMS and there is variation between industries in how SMSs are defined, although there are common features such as leadership commitment to safety, clarity of roles and responsibilities, identification and management of hazards and a continuous improvement approach. 2) The development of SMSs has been influenced by advances in safety science, often triggered into implementation in each industry by major incidents that serve as a motivational turning point to safety management. 3) Aspects of SMS that are particularly pertinent to their application in healthcare are the effect of accountability structures within SMSs, the potential to manage adaptive and proactive safety behaviours, and the representation of all stakeholders (including service users) in developing the SMS.

Discussion

SMSs are mandated through regulation in several safety-critical industries but take many forms. The principles of SMS are derived from safety science and may support improvements in patient safety but implementing them in healthcare will not be a simple "lift-and-shift". Appreciation of the unique context of healthcare, including the role of professional accountability and involvement of patients in care will need further research. There is a growing evidence base for the use of SMSs in complex adaptive systems, showing that this approach could support resilience in healthcare, but this too requires further research before SMSs can be adopted successfully.

11.2 Opening the door to fatigue risk management in healthcare

Author: Dr Laura Pickup, Mr Ashley Sweeting, Ms Claire Haley, Ms Katherine Grant, Mr Andy Landon, Prof. Deirdre Fowler

Affiliation: University Hospitals Bristol And Weston

Keywords: fatigue risk, healthcare, shift work, workload, safety culture

Introduction

Fatigue risk management is well understood in many industries and recognised as a 'must have' and regulated for [1]. This is not the case for health and social care services in the UK, which currently does not adopt robust and systemic approaches to the management of this risk [2]. This paper will outline how a large NHS teaching hospital in the UK has used the scientific evidence of fatigue and the example from other industries to inform a programme of work and implement the early stages of fatigue risk management.

Approach

The approach to implementation draws from normalisation process theory [3] starting with a workshop to introduce the concept of fatigue management and engage key stakeholders from across the organisation including patient representatives. The workshop provided organisational context and developed a gap analysis of existing processes against the core components of fatigue risk management, as applied by other industries. A programme of work followed to develop and implement an organisational approach to fatigue risk management, tailored pragmatically to existing resources. Early actions have focused on developing a fatigue data dashboard and collection of baseline data. Data collection has been embedded into existing organisational processes and actions developed to reflect the findings and include predictive, proactive and reactive components for fatigue risk management.

Results

The programme of work has obtained widespread engagement across the organisation and 'fatigue' entered onto the organisation's risk register. This ensures

future engagement of senior leaders as now embedded into organisational governance and assurance processes.

Early survey data received from 1,347 staff indicates issues relating to the opportunity for breaks, workload and limited strategies for dealing with the impact of shift work. Tools have been piloted to provide input from staff on the immediate impact of a shift relative to workload and levels of fatigue, which has supported management of work patterns, staffing resources and breaks.

A fatigue dashboard is being developed as a practical approach to triangulation and increasing visibility of relevant data, which can provide feedback to managers and the organisation on factors influencing or influenced by fatigue. Tools to examine shift patterns, guidance on rostering, fatigue education and resources have been developed.

The opportunity to identify proactively and reactively safety concerns associated with fatigue have been introduced with questions included into occupational health reviews, annual staff reviews and safety investigations.

Discussion

This ambitious programme of work has recognised the need to balance the existing challenges of demand and capacity within the UK healthcare system. Pragmatism is at the heart of this work, whilst seeking to reflect through the approach to data collection how managing the risk of fatigue can support organisational performance as well as safety.

Key challenges remain in how healthcare staff perceive reporting fatigue as fatigue risk management remains an immature concept in healthcare and often seen as an individual risk rather than shared with their organisation. This work shows early success with the integration of core elements of fatigue risk management into existing organisational processes and senior leadership support to progress.

11.3 Practical tips inspired by aviation to strengthen patient safety in the Spanish national health system: the Use Before Surgery initiative

Author: Prof. Carolina Díaz Piedra¹, Prof. Leandro L. Di Stasi

Affiliation: University of Granada

Keywords: aviation safety, surgery, non-technical skills, teamwork, checklist

Introduction

In operating theatres, errors are more frequently due to poor nontechnical skills than technical incompetence. Hospital management has implemented various initiatives to enhance the nontechnical skills of surgical teams, with mixed success. Many of these initiatives are based on crew resource management programmes, since the aviation industry has worked extensively on minimising human errors caused by poor decision-making, communication, or situational awareness. Although aviation has consistently inspired improvements in the healthcare system [1-3], differences in safety cultures can hinder the transfer of advances between these industries.

Here we present the Use Before Surgery (UBS) initiative, a complementary, easy-to-use, culturally-driven didactic programme designed to enhance patient safety and surgical performance. It comprises a short list of ten practical and proactive tips, partially inspired by the aviation industry. All tips are embedded within an extended NonTechnical-Skills for Surgeons (NOTSS) training system framework. To define these tips, we used an iterative, evidence-based process involving 30 professionals (7 men) from various surgical teams (20 nurses, 2 attending surgeons, and 8 surgical residents) across surgical centres in Granada and Malaga, Andalusia, Spain. They participated in either focus group sessions (five groups, 5-7 people per group) or semi-structured interviews (with 5 hospital managers, 2 military flight nurses and pilots, and 2 surgical nurses). We also asked participants to evaluate the importance and feasibility of each tip. Finally, the development process and operationalisation were complemented by a literature review to weigh the tips' efficiency, cost-effectiveness, usability, and ease of implementation. As a result, the UBS initiative promotes: (1) team chair flying, (2) surgical marking adhesives, (3)

standardised layouts, (4) self-checklists, and (5) tactical napping to improve situation/self-awareness; (6) closed-loop communications, (7) labelled and colour-coded surgical caps, and (8) cross-check procedures to enhance communication and teamwork; and (9) the two-challenge rule procedures and (10) sterile cockpit rules to improve decision-making processes and leadership. Overall, participants rated most tips as important and feasible for improving patient safety (average scores: 17 and 14 out of 20). However, although participants considered the self-checklists and tactical napping utterly relevant (scores 17 ± 3 and 17 ± 4), they were considered unfeasible in the current Spanish healthcare system (scores 6 ± 5 and 10 ± 6). On the other hand, while the “labelled and colour-coded surgical caps” tip was considered highly feasible nowadays (score: 17 ± 4), it would have the lowest importance (score: 11 ± 7).

Based on these results, we have made the UBS initiative available as a free online repository, including infographic video-based materials and documents (in Spanish, link: <http://www.neuroergonomia.es/use-before-surgery/>), to strengthen nontechnical skills among Spanish healthcare professionals. Familiarising healthcare providers with nontechnical skills concepts and procedures in a pocket format might encourage surgical teams and patient safety boards to find more suitable initiatives for specific contexts. The UBS initiative represents a first step towards a tailored approach, offering concrete measures for developing safety practices at both individual and team levels.

11.4 Improving telemedicine systems for future public health emergencies: Lessons from Integrated Urgent Care telephone triage during the COVID-19 pandemic

Author: Dr Jill Poots¹, Mr Stephen Elliott³, Dr Jim Morgan², Dr Matteo Curcuruto⁴, Dr Andrew Catto³

Affiliations: ¹Trinity College Dublin, ²Leeds Beckett University, ³Integrated Care 24, ⁴European University of Rome

Keywords: telemedicine, triage, COVID-19, workflow, patient safety

Introduction

Telemedicine use increased during the COVID-19 pandemic and remains a popular option for healthcare triage, diagnosis, and treatment. Alongside emerging technologies, like artificial intelligence, telemedicine will likely assist in future public health emergencies (Scott et al., 2020). Here, findings are reported from an evaluation of a telemedicine system, specifically, an Integrated Urgent Care telephone triage system. The system integrates many digital health technologies, including electronic health records, algorithm-based decision support software, service directories, and digital communication tools. The aim of the research was to identify patient safety risks and their contributing factors using human factors principles. Since the research took place during the COVID-19 pandemic, and since telephone triage particularly is an under-investigated area (Poots et al., 2024), it is hoped findings presented can help inform design of similar telemedicine systems, before future public health emergencies.

Methods

This study used multiple methods to investigate patient safety risks in a telephone triage organisation, adopting a 'whole systems' approach. The Systems Engineering Initiative for Patient Safety (Carayon et al., 2006) supported design, collection, and analysis throughout. First, a system scan was conducted, using data from organisational and process documents, stakeholder meetings, and observations. Then, interviews with frontline staff (n = 23) identified safety risks and contributing systemic factors. Data were analysed via automated content analysis, followed by validation using reflexive thematic analysis and employee focus groups. Finally, an

observational study in two live call centres took place over three days ($n = 13$ observations), to identify workflow challenges arising due to usability, wider system properties, and responsive adaptive behaviours.

Results

The study identified timeliness and accessibility as important indicators of patient safety in telemedicine. Factors across the entire system affected these. Lengthy wait times, for both patients (calling the service; awaiting call-backs) and workers (waiting on advice from colleagues) contributed to delays, increasing risks for patients, especially those with more life-threatening symptoms. Patient factors (e.g., health literacy), sub-optimal technology (e.g., inability to input multiple symptoms, atypical accommodation), and staffing factors (e.g., under-staffing) contributed to workflow obstacles. Accessibility challenges underscored the importance of a responsive integrated healthcare system. High demand during COVID-19 strained resources, such as ambulance and GP availability, making some telemedicine advice (e.g., same-day appointments) impractical. As a result of increased demand, and repetitive COVID-19 symptom presentations, staff reported increased stress, fatigue, and confusion amid high call volumes, and distractions in the environment, potentially increasing the likelihood of human error.

Discussion

Findings can inform the design of telemedicine systems used in future public health crises to support timely, accessible care. The research emphasises the necessity of adopting a whole-systems approach to integrated care, especially when introducing new protocols amidst challenges to operating conditions (e.g., demand surges, novel illnesses). There are pragmatic opportunities to align existing technology with real-world conditions, as well as the potential to embed future technologies (e.g., machine learning or speech analytics) to adapt quickly to changing symptom presentation and demand. Outstanding research challenges include co-designing systems with patients, and the effects of the physical call centre environment.

12 Patients & Public Perspectives on Digital / Artificial Intelligence Literacy

Theme Keywords: AI, barriers to engagement, empowerment, patient-centred design, transparency

Rationale and Objective

The move toward digital health and AI-supported care requires attention to digital literacy and public trust. Submitted abstracts explore how patients and the public perceive new technologies, what barriers to engagement exist, and how to design tools that are understandable and empowering. Contributors stress that patient-centred design must extend to digital and AI systems, ensuring transparency, explainability, and equity in access and use.

Content

12.1 The Impact of Artificial Intelligence Integration on Patient Safety: Insights and Recommendations from a Delphi Study with Human Factors Experts

12.2 Co-Designing Effective, Safe and Ethical AI Use Cases for/with People with Learning Disabilities

12.3 Teamwork makes the dreamwork: Factors influencing human-AI collaboration in skin cancer diagnosis

12.1 The Impact of Artificial Intelligence Integration on Patient Safety: Insights and Recommendations from a Delphi Study with Human Factors Experts

Author: Ms Katharina Wenderott¹, Mr Jim Krups¹, Prof. Matthias Weigl¹, Prof. Abigail Wooldridge²

Affiliations: ¹Institute for Patient Safety, University Hospital Bonn, ²Department of Industrial and Enterprise Systems Engineering, University of Illinois Urbana-Champaign

Keywords: AI, patient safety, Delphi study, human factors, implementation

Introduction

The integration of artificial intelligence (AI) into healthcare processes offers numerous potential benefits for patient safety, including the reduction of healthcare-associated infections, the prevention of adverse drug events, and the prediction of surgical complications. [1] Despite these promising advantages, there is a notable lack of studies focused on AI implementation, particularly regarding its effects on patient safety outcomes in real-world clinical settings. [1] Along this research gap, less attention has been paid to human-factors-related issues, which are crucial, as AI will change the physicians' role in how healthcare work is performed and care delivered. [2] With the integration of human factors approaches into the development and especially in the implementation of AI in healthcare, a better understanding of how AI can augment healthcare delivery will be generated. [3]

This study aims to assess the potential impact of AI on patient safety and to identify recommendations for a successful integration into clinical workflows, from the perspective of Human Factors/Ergonomics and Systems Engineering experts who are embedded in healthcare settings or collaborate closely with healthcare professionals.

We are conducting a Delphi study in two rounds. In the first round, we held semi-structured interviews with human factors experts to identify patient safety consequences and recommendations. Qualitative data analysis of interview

transcripts is used to extract key statements that will be included in the second round, where we will distribute a survey through healthcare and human factors research networks to gather consensus among healthcare professionals and human factors experts on the extracted statements.

We conducted ten interviews with human factors experts from the US, Germany, France, and Israel and identified 184 statements regarding the effects of AI in healthcare. Experts highlighted the potential of AI to enhance the quality and safety of care, for example by providing better access to health information or accelerating the time to diagnosis. However, negative impacts centered around the lack of transparency of AI solutions and the potential for automation bias. We also identified a total of 162 statements on recommendations, with most centering around the implementation process (41 statements), followed by the design and development of AI solutions (40 statements). The compilation of the survey is currently ongoing. Second round data collection is expected to be completed by January 2025.

This study is expected to provide valuable insights into how the integration of AI into clinical workflows can be designed to enhance patient safety. We anticipate generating a set of recommendations that will guide future AI implementation processes in clinical practice. By incorporating the perspectives of experts in human factors or systems engineering and healthcare professionals, this study extends the scope of previous research and addresses a critical gap in the literature. Furthermore, the study's focus on patient safety directly addresses one of the primary promises of AI in healthcare—improving the quality and safety of care. The findings will help identify key factors for successfully integrating AI into clinical workflows, enabling AI to reach its full potential in improving patient safety and enhancing patient care.

12.2 Co-Designing Effective, Safe and Ethical AI Use Cases for/with People with Learning Disabilities

Author: Dr Eleanor Harvey¹, Dr Cecilia Landa-Avila¹, Dr Alison Drewett¹, Prof. Gyuchan Thomas Jun¹, Sarah Rabbitte², Amy Wilkins², Dr Satheesh Gangadharan^{1,2}

Affiliations: ¹Loughborough University, ²Leicestershire Partnership NHS Trust

Keywords: AI, learning disabilities, co-design, ethics, multiple long-term conditions

Introduction

Artificial intelligence (AI) is already improving patient outcomes by assisting clinical decisions and optimising operations management in healthcare. Its powerful predictive capability has the potential to drive a shift away from the traditional medical model – diagnosing and treating single conditions – towards a proactive and multidisciplinary understanding of Multiple Long-Term health Conditions (MLTCs). Harnessing AI to personalise medicine could be revolutionary: Improving individuals' health as well as addressing wider health inequalities.

This is important for the 1.1 million people in the UK living with a Learning Disability (LD) who are significantly more likely to die a premature and avoidable death compared to the general population[1]. People with LD are predisposed to long-term health conditions because of genetic factors, but other preventable conditions develop due to lifestyle and side-effects of medications. These are exacerbated by the barriers they face accessing care[2]: People with a LD may need extra support to process complicated information, interact with others, and communicate their needs which can lead to “diagnostic overshadowing” – when their symptoms are misattributed to their disability or mental health.

Thanks to AI, we now know more about the unique pattern of MLTCs people with a LD develop. Abakasanga and colleagues' analysis[3] showed 90% of people with LD have at least two long-term health conditions and revealed age-specific patterns, gender differences, and higher rates of some conditions (epilepsy, mental-health issues, swallowing issues, and constipation) compared to people without an LD. These algorithms could enable personalised risk prediction and thus a proactive

approach to managing MLTCs. However, there are many factors which need to be accounted for to ensure its effective, safe and ethical development and implementation.

This presentation shares our work to firstly identify gaps and opportunities where this AI could be integrated into existing health and social care systems (interviews, n=36); and secondly, to co-design AI use cases that would be acceptable to a wide range of LD-stakeholders (8 workshops, n=60). With specialist support from our Speech and Language Therapist (SALT), LD nurse, and Public and Patient Involvement (PPI) partners we adapted participatory research methods to include people with a mild LD alongside health and social care professionals, paid carers, and family or voluntary carers. Together we co-designed prototype use cases for products, services, and policies where our AI could be deployed. These use cases included tools to support clinical decisions; integrate electronic records; promote health literacy; empower shared decisions about care; and ensure services are fit for the future. The ethical implications and feasibility of the final three use cases were evaluated in a World Café conversation (n=27).

Funding Statement

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Ethical Approval

This research has ethical approval. IRAS Number: 315569.

12.3 Teamwork makes the dreamwork: Factors influencing human-AI collaboration in skin cancer diagnosis

Author: Dr. Justine Staal¹, Mr Christof Schulz¹, Dr. Art Papier^{2,3}, Dr Marlies Wakkee¹, Dr Laura Zwaan¹

Affiliations: ¹ErasmusMC, ²University of Rochester School of Medicine and Dentistry, ³VisualDx

Keywords: AI, skin cancer, diagnostic accuracy, trust calibration, automation bias

Introduction

Human-AI collaboration can improve the diagnostic accuracy of clinicians when diagnosing skin lesions (Tschandl, 2020), but may also introduce new errors. An important source of errors related to human-AI interaction is automation bias (Challen, 2019), the tendency of individuals to rely too heavily on AI, without verifying it. Conversely, insufficient trust prevents AI from meaningfully contributing to clinical practice. This is related to trust calibration (Wischnewski et al., 2023), or the alignment between a person's trust in a tool and its actual capabilities. We aimed to investigate whether providing information about AI-tool accuracy before diagnosis influences clinicians' trust calibration.

Methods

General practice (GP) residents diagnosed 50 clinical images of skin lesions as malignant or benign. The images sourced from publicly available skin lesion databases were confirmed using histopathology or expert review. Participants first diagnosed the lesions without AI-tool support. They then received a diagnostic suggestion, framed as coming from an AI-tool, and were asked whether they wanted to change their original diagnosis. The images were presented in two (counterbalanced) blocks: In one block, the residents were informed that the AI-tool had a low accuracy (sensitivity: 70%, specificity: 60%) and in the other block, the AI-tool supposedly had a high accuracy (sensitivity: 90%, specificity: 80%). In reality, the suggestions were equally accurate in both blocks (true sensitivity: 80%, true specificity: 71%, overall accuracy: 74%).

Results

Forty-eight GP residents (M=30 years old, SD=3.3 years, 34 female) completed the study. Overall accuracy improved after receiving an AI suggestion (before: M=0.70, SD=0.08; after: M=0.75, SD=0.08, $t(47)=-4.75$, $p<0.001$). Specifically, sensitivity increased from 0.82 to 0.85, and specificity from 0.65 to 0.70. However, accuracy did not differ between the low and high AI-tool performance instructions ($t(47)=-0.77$, $p=0.443$). Furthermore, instructions did not affect how often participants changed their diagnosis. Of 2400 total observations (48 participants times 50 cases), participants initially disagreed with 41.38% (993/2400) of the AI-suggestions. When the AI-suggestion differed from the initial diagnosis, clinicians changed their diagnosis to align with the AI-prediction in 41.99% (417/933) of the cases. Of the 417 cases, 63.79% (266/417) led to a correct diagnosis, while 36.21% (151/417) resulted in incorrect diagnoses. Decision-switching was unaffected by high or low AI performance instructions ($t(47)=-0.31$, $p=0.755$).

Discussion

Providing GP residents with AI accuracy information before diagnosis did not affect their diagnostic performance or the number of times residents changed their diagnosis based on AI-suggestion. However, AI supported diagnosis improved overall diagnostic accuracy beyond the accuracy of residents or AI alone, suggesting that collaboration is key for optimal performance. Despite this benefit, the substantial number of incorrect diagnostic changes cannot be overlooked, especially as real-life AI performance may vary. Future research should explore methods aimed at calibrating trust and minimizing incorrect changes.

13 Promoting Cultures of Innovation & Excellence in Patient Safety

Theme Keywords: co-design, leadership development, resilient teamwork, human-centred innovation

Rationale and Objective

Innovation in patient safety depends not only on technical solutions but also on fostering cultures that encourage curiosity, learning, and excellence. The submitted abstracts show how co-design, leadership development, resilient teamwork, and human-centred innovation methods can create environments where continuous improvement flourishes. They argue that promoting innovation is not a side project but central to building safer, more adaptive healthcare organisations.

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13.1 Safe and Secure Showers: A Nurse-led Project in Singapore

Author: Ms Ser Ning Lua

Affiliation: Khoo Teck Puat Hospital, Singapore

Keywords: falls prevention, shower chairs, stroke patients, nurse-led, Kaizen

Introduction

Inpatient falls continue to pose significant challenges for healthcare organizations worldwide and have been associated with poorer patient outcomes and increased financial costs to the healthcare system. Stroke survivors commonly experience one-sided weakness, and up to 63% develop pusher syndrome, where they involuntarily lean towards their weaker side (Karataş et al., 2023). This leads to difficulties in balancing and higher risks of falls. Between 14% to 65% of stroke survivors experience falls while inpatient, resulting in activity limitations, increased dependence and fear of falling (Wei et al., 2019). Improving the design and usability of healthcare equipment may mitigate falls and improve patient safety.

Methods

A nurse-led project in a 33-bedded Acute Stroke Unit in a local restructured hospital aimed to reduce the number of inpatient falls relating to falling off shower chairs by redesigning existing shower chairs based on patients' needs. Adjustable armrests offer enhanced support and stability for patients with pusher syndrome. The five-step Kaizen method, which promotes continuous change within organisations, was adopted (Shatrov, et al., 2021). By analysing fall incidents from 2020 to 2022, it was identified that a significant number of falls in the Acute Stroke Unit were attributed to falls from shower chairs, highlighting a critical need to address this safety issue. Following a thorough process of brainstorming, consultations with the hospital's logistics department, and a site visit, new shower chairs with adjustable armrests were installed throughout the unit in September 2022. Continuous evaluation and root cause analysis were conducted to monitor fall incidents and assess the effectiveness of the redesigned shower chair.

Results

Prior to the installation of redesigned shower chairs, there were six fall incidents between September 2020 and August 2022, accounting for 16% of all patient falls. Since the new shower chairs were introduced, there has been no falls from shower chairs from September 2022 to August 2024.

Discussion

This nurse-led project successfully reduced the incidence of inpatient falls associated with shower chairs, highlighting the potential of small and focused innovations to create meaningful improvements. By actively understanding patients' needs and the fundamentals of effective care, nurse-led projects can drive lasting changes that improve patients' safety and comfort.

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13.2 The implementation and safety culture effects of After Action Reviews in healthcare: Findings from a mixed-methods effectiveness-implementation study.

Author: Dr Siobhan McCarthy¹, Dr Mairead Finn¹, Dr Gintare Valentelyte², Dr Fiona Boland³, Ms Loretta Jenkins⁴, Ms Theresa Keane¹, Dr Lisa Mellon⁵, Ms Catherine Hogan⁴, Ms Lorraine Schwanberg⁴, Dr Aisling Walsh⁶, Dr David J William⁷, Dr Natasha Rafter⁶

Affiliations: ¹Graduate School of Healthcare Management, RCSI University of Medicine & Health Sciences, ²Healthcare Outcomes Research Centre, RCSI University of Medicine & Health Sciences, ³Data Science Centre, RCSI University of Medicine & Health Sciences, ⁴National Quality & Patient Safety Directorate, Office of the Chief Clinical Officer, Health Services Executive, ⁵Department of Health Psychology, RCSI University of Medicine & Health Sciences, ⁶Department of Public Health & Epidemiology, RCSI University of Medicine & Health Sciences, ⁷Department of Stroke & Geriatric Medicine, RCSI University of Medicine & Health Sciences

Keywords: AAR, safety culture, mixed-methods, second victim, learning from events

Introduction

In healthcare, evidence for After Action Review (AAR), a structured facilitated discussion of an event among a team or group, is limited. Yet AARs are promoted in the Irish health system for learning from patient safety and everyday events. Our study examined AAR implementation and measured safety culture and second victim experience and support, before and after introduction of AAR at an Irish hospital¹.

Methods

A mixed-methods effectiveness-implementation study was conducted during health system shocks². Simulation-based training of hospital selected staff as AAR facilitators occurred. The intervention was the hospital introduction of AAR over 12-months. Prior to training, the Hospital Survey on Patient Safety 2.0 (HSOPS 2.0) and Second Victim Experience and Support Tool (SVEST) were distributed to all staff, and after 12-months. The post-implementation HSOPS 2.0 included additional questions

on staff awareness of and participation in AARs i.e. number, frequency, and duration². At 6-months, focus groups were held with trained facilitators³. Survey data were analysed using Stata version 17. Costs of the training and of the AARs were estimated. Findings across all dataset were triangulated to address the overall study aim².

Results

Fifty (12%) staff were trained as AAR facilitators^{2,3}. After 12-months, 37% of staff were aware of AAR and 10% had participated in one, at €48 average cost. Nearly 40 AARs took place despite barriers at the outset. More informal than formal AARs were conducted². There was no change in overall safety culture but response to error improved and this was associated with staff awareness and participation in AAR. There were no changes in second victim experience and support except for higher reported low professional self-efficacy, insufficient organisational support and desire to quit or take a job outside patient care, with no association with AAR adoption².

Discussion

AAR is valuable for promoting responses to error, which are fair and focussed on learning and supporting staff². However, AARs alone are not sufficient for addressing second victim experience and additional supports are required. Future policy initiatives should innovate strategies to promote AAR awareness and participation among all staff².

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13.3 MEDication Self-Management After Discharge home (MEDS-MADE)

Author: Mrs Hadeel Mohamed¹, Dr Justine Tomlinson¹, Mrs Heather Smith², Prof. Beth Fylan^{1,3,4}, Prof. Peter Gardner^{1,4}

Affiliations: ¹School of Pharmacy and Medical Sciences, University of Bradford, ²NHS West Yorkshire Integrated Care Board, ³NIHR Yorkshire and Humber Patient Safety Research Collaboration, Bradford Teaching Hospitals NHS Foundation Trust, ⁴Wolfson Centre for Applied Health Research

Keywords: medication safety, self-management, discharge, older adults, QI

Introduction

Medication-related harm (MRH) poses significant risks to patients and financial burden to healthcare systems, making its reduction a global priority¹. Some factors make MRH more likely to occur, such as older age and transitions of care, particularly from secondary to primary care². While various interventions have been introduced, there is limited understanding of how to develop the patient role in medicines management (processes and behaviours enacted by patients and healthcare professionals (HCPs) which support safe and effective medication use) and improve medication self-management (MSM) practices to help mitigate MRH³. This study aims to explore the meaning of MSM for older people and their caregivers, identify MSM activities during hospital discharge, and examine how discharge processes and ward environments influence older adults' preparedness for self-managing their medications at home.

Method

A qualitative multi-centre study across three hospitals in North England, focusing on ward observation of medication-related interactions between older people and HCPs prior to discharge. Observations were also conducted of HCP medication-related interactions. Participants included individuals aged 65 or older, taking 5 or more medications and discharged to their own home without professional support for all prescribed medication. Data collected from observations will be analysed using Ideal Type Analysis³ to form typologies of patient MSM behaviours and will be underpinned by behaviour change theory.

Results

Preliminary findings from ward observations identify that decisions about discharge occur during multi-disciplinary team meetings, yet the subsequent pathway remains unclear, with timely discharge dependent on several circumstances aligning. The discharge medication process is central to this, and transport logistics can complicate discharge success. Hospital transport is limited to specific hours and staff should only book transport once discharge medications are on the ward, often resulting in hurried discharges. While formal assessments of MSM capability are lacking, staff occasionally make informal judgments about patients' readiness. Generally, it appeared that MSM was not perceived as an activity of daily living (ADL) by ward staff, consequently it is not actively included when considering preparedness for discharge, alongside other ADLs. Interactions where patients tried to prepare themselves for discharge included asking about medication administered and making notes of medication changes as they occurred during hospital admission.

Discussion

Medication self-management capability is not formally assessed for older people prior to hospital discharge. This study aims to identify the necessary capabilities, opportunities, and motivations to support the assessment of MSM across care transitions. The discharge medication process is central to facilitating older people's return home, with various teams involved at different stages. To improve this, the study suggests designing a pathway where one person co-ordinates the discharge medication process at ward level, as well as behaviour change regarding understand of ADLs, to explicitly include MSM. Insights from this study will help co-design and develop a comprehensive assessment tool measuring MSM capability prior to hospital discharge. We propose using patient typologies will enable more individualised support on discharge, leading to increased implementation of supportive interventions. Additionally, understanding the setting the tool will be utilised in, seeks to strengthen tool adoption.

13.4 Stress by Alarms: Physiological and Psychological Stress Responses to Medical Alarms During an Immersed Virtual Intensive Care Environment

Author: Ms Salvatore Luca Cucinella¹, Dr Carolina Varon², Dr Jos J Kraal¹, Dr Elif Özcan¹

Affiliations: ¹Delft University of Technology, ²KU Leuven

Keywords: medical alarms, stress, ICU, VR, physiological response

Introduction

Both acute and chronic stress can impact the quality of people's lives, and stress-related symptoms can drastically influence our health. In healthcare, stress can negatively influence patients' health outcomes, resulting in discomfort, persistent conditions, and increased length of stay [1]. Within the context of intensive care units (ICUs), medical alarms are a major contributor to patient stress, especially when they are unfamiliar and frequent.

Methods

In this study, we explored the extent to which stress responses vary as a result of exposure to alarms and their associated cognitive demands by interpreting alarms, using objective and subjective stress measurement methods. Participants were placed in an immersive virtual reality set-up simulating a typical ICU scenario to evaluate these effects. Thirty-one healthy young adults (16 females and 15 males, with an average age of 27.8 ± 4.1 years) were assigned to three groups that were exposed to different alarm conditions designed to induce different levels of stress. Participants were exposed to (i) medical alarms with visual and auditory identification tasks to increase cognitive load, (ii) medical alarms without identification tasks, or (iii) no medical alarms. Our hypothesis is that exposure to medical alarms induces stress among patients, and such stress is more prominent if patients have to identify the purpose of the alarms. The theoretical basis for our hypothesis derives from Lazarus's transactional model of stress [2], when environmental demands exceed the coping capacity, individuals experience stress because of a lack of resources. In the context of ICU patients, the experience of

stress occurs when patients are exposed to too many alarms that are both perceptually unfamiliar and- cognitively difficult to interpret.

In the current study, stress measures included the State-Anxiety questionnaire (self-reported and subjective) of the State-Trait Anxiety Index (STAI), which describes the individual's anxiety-induced stress, and heart rate variability (HRV) derived from electrocardiogram recordings (automated and objective). Data were analyzed using the Friedman test for repeated measures to compare subjective and objective stress across different phases of the experiment (e.g., before or after exposure to alarms), while group differences were assessed with the Kruskal-Wallis test and post-hoc Bonferroni correction. State-Anxiety scores were evaluated for within-subject and between-group differences using the same statistical tests.

Results

Results suggest that participants who are exposed to medical alarms with an identification task experienced a significantly higher level of self-reported stress compared to those who received no identification task or alarms ($p < .05$). However, objective measures yielded a different result. HRV analysis did not show any difference for different alarm conditions ($p > .05$). Instead, a significant increase ($p < .05$) in sympathetic activation (i.e., heart rate) was observed only early the experiment in two groups (exposure to alarms, alarms and identification task). This could be associated with a higher level of stress, most likely induced by the uncertainty of starting the experiment.

Discussion

Our findings suggest a discrepancy between the objective and subjective measurements of stress. We suggest that a more holistic view is needed when quantifying stress in healthcare settings, and novel approaches to disentangle perception from physiologically experienced stress need to be developed.

13.5 Relationship between length of employment of health professionals and factors that ensure patient safety: A cross-sectional study

Author: Prof. Dr. Guido Offermanns^{1,2}, Ms Alexandra Kratki²

Affiliations: ¹Karl Landsteiner Institute For Hospital Management, ²University of Klagenfurt

Keywords: patient safety culture, teamwork, communication, cross-sectional, PaSKI

Introduction

Patient safety culture has many different facets, which could be researched in more depth. Effective communication between healthcare professionals and the establishment of robust teamwork within the hospital staff are of paramount importance in the identification, rectification and minimisation of potential errors, thus ensuring the safety of patients. The study examines how the duration of employment and experience of staff influence the quality of teamwork and communication, as crucial elements of a positive patient safety culture, and what impact this can have on patient safety.

Methods

The cross-sectional study was conducted between June and September 2023 in two Austrian hospitals, involving health professionals from different disciplines. The validated Patient Safety Climate Inventory Austria (PaSKI AUT) was used in paper-pencil format. The sample consisted of 456 healthcare professionals (response rate of 42%), including 86 physicians, 158 qualified nursing staff, and 212 employees of the medical therapeutical service. Data were analysed using SPSS. The Spearman correlations were used to examine the relationships between scales such as teamwork within units and communication openness and length of service.

Results

The Spearman correlations indicate profession-specific correlations: physicians and employees in the medical therapeutical service have a negative correlation

between professional experience and teamwork. The results show the longer physicians ($\rho = -.26$, $p = .02$) and medical therapeutical service ($\rho = -.16$, $p = .02$) have been in the profession, the worse teamwork is rated. In contrast, there is a positive correlation between the length of employment and communication among qualified nursing staff ($\rho = .17$, $p = .03$). The more professional experience the nursing staff had, the better the communication between employees was rated.

Discussion

Results indicate complex correlations between professional experience and teamwork as well as openness in communication, which need to be evaluated in more detail in a follow-up and a replication study. About the replication study, it is important to find out whether similar correlations are found in other hospitals. The two hospitals are insufficient to make a generalisable statement about these correlations. The follow-up study should include a further survey within the two hospitals, using a qualitative interview to determine why these negative correlations between the duration of employment and teamwork skills arise. If there is an explanation for this correlation, procedures can be established accordingly to improve team skills. Improving teamwork among employees would also have a positive impact on enhancing patient safety.

13.6 Barriers and Facilitators to Implementing the Preoperative Team Brief – a survey-based study

Author: Dr Andras Kelecsenyi^{1,2}, Dr Emily O'Dowd², Prof. Eva Doherty², Prof Marie E. Ward³

Affiliations: ¹Children's Health Ireland At Crumlin, ²Royal College of Surgeons in Ireland, ³St. James's Hospital

Keywords: preoperative brief, teamwork, barriers, facilitators, pediatric surgery

Introduction

One in ten patients suffer from avoidable harm during their treatment in healthcare, and the operating theatres are the most significant location of adverse events, as about 40% of patient harm occurs during the provision of surgical care (Leong et al., 2017). The preoperative safety brief performed by the surgical team and the World Health Organisation (WHO) surgical checklist were introduced to mitigate patient harm (WHO, 2024). The preoperative team brief was introduced in an Irish tertiary paediatric hospital, but compliance remained low despite the clear benefits. This survey study attempts to identify barriers and facilitators to implementing the preoperative team brief.

Method

A single centre, cross sectional online, voluntary, and anonymous survey was carried out amongst all theatre staff involved in direct patient care in a tertiary paediatric hospital. Descriptive statistics and the Kruskal-Wallis non-parametric test were used to analyse simple answers and the Likert scales, while thematic analysis was used to analyse free text answers.

Results

Forty-eight responses were collected, yielding an overall response rate of 23.4%. Of the responders, 93.8% (n=45) were aware of the team brief, only 16.7% (n=8) had received previous training and 54.2% reported the team brief was performed every day. Participants agreed that the team brief should be performed every day, that it improves patient safety, efficiency, and the safety culture in the theatre. Four main themes emerged as barriers following thematic analysis: (1) staff presence in

theatre during brief, (2) lack of awareness and education, (3) negative staff attitudes, and (4) missing patient information. The themes revealed as facilitators were: (1) training and education, (2) ensuring team presence, (3) agreed time for brief, (4) enforcement by management, and (5) altering the format and content of the team brief.

Discussion

Despite the proven benefits of the preoperative team brief, adherence has remained low in this tertiary paediatric hospital. The self-reported incidence of daily team briefs was 54.2%, despite staff reporting positive attitudes. The most significant barrier identified in this report was staff unavailability during the team brief most frequently due to other conflicting tasks. Similarly important themes were lack of education, lack of staff engagement and of key patient information. To ensure improvement in compliance with the team brief, education was found to be the most significant facilitator either by learning about the positive effects of the team brief or observing other centres with a good practice. Suggestions to improve staff presence during the brief were: deputising consultants by senior registrars or not allowing other conflicting duties. Setting a convenient time for the team brief, organisational changes such as endorsing theatre managers to enforce adherence and re-formatting the theatre brief to a succinct, oral version are key to support attitudes to the brief and to increase staff adherence.

13.7 Clinical perspectives of manual massage and negative pressure on caesarean section scar recovery.

Author: Mrs Hannah Poulton, Associate Prof. Alexandra Lang, Prof. Donal McNally

Affiliation: Nottingham University

Keywords: caesarean section, scar therapy, negative pressure, massage, rehabilitation

Introduction

Year on year caesarean sections rates worldwide are increasing, with recent data pointing to an overuse of this procedure (with no medical indication).¹ Despite this growth it is well established that there is a lack of aftercare, advice and attention given to caesarean mothers.² The objectives of this study are to investigate the clinical experience and work associated with current caesarean scar recovery practices and to understand clinical views on scar massage and negative pressure therapy.

This formative study will present new understanding of the current scar therapy guidance and treatments for caesarean section mothers and elicit opportunities and barriers to formal intervention in caesarean section recovery pathways, as an identified system of work. The data captured provides important information for the design of a future intervention trial with women who have experienced a caesarean section.

A full-scale scoping review of current literature regarding caesarean procedures, aftercare, wound-healing, scar management, scar rehabilitation and negative pressure devices on scars was conducted. It appears, although evidence is limited, that scar therapy has a role in caesarean section rehabilitation and improving health outcomes for women.³⁻⁵

From this literature review a questionnaire was developed, to ask clinicians about their experiences of postnatal care delivery for women, who have had caesarean sections. The questionnaire captured data on current practices and guidance in postnatal care, including how and why they might implement certain therapies for

scar rehabilitation. This questionnaire was sent out to over 300 clinicians within the UK via clinical professional networks and organisations. Where available, it also elicited insight into the clinicians' perceived outcomes of massage therapy and negative pressure on women's scars, including the measures used for assessment such as Scar Q and Visual Analogue Scale (VAS).⁶ Finally, the questionnaire asked clinicians to consider the application of scar therapies in clinical practice in relation to professional and patient work and wider organisational and socioeconomic factors.⁷

Participants to this study are being recruited from both public and private healthcare providers to understand the wide-ranging pathways of care available to women. Recruitment is ongoing. We are aiming to recruit between 100-150 participants for the study. The results will identify:

1. The prevalence of scar massage in the aftercare of caesarean scar recovery.
2. The potential impact of negative pressure on scar healing.
3. The feasibility of negative pressure device use in current care pathway.
4. Directions for the provision of scar rehabilitation interventions in the post operative pathway for women who have had a caesarean section

Since this is the first study of its kind, we anticipate our results will enhance the information health care professionals disseminate to their postnatal patients. Therefore, empowering the mother with informed choices on how to look after her own scar and potentially decrease further scar related problems down the line.⁸ Additionally, it will add new knowledge to the underrepresented literature on service design for caesarean sections, working towards innovation and step change improvement in pathways of care for caesarean mothers.

13.8 Be Safe When you Medicate – Reducing medication errors among staff nurses in an intellectual disability in-patient ward

Author: Ms Teresa Greene^{1,2}, Mrs Amanda Scott², Mrs Deborah Jones², Mrs Deirdre Murray²

Affiliations: ¹Queen's University Belfast, ²Belfast Health and Social Care Trust

Keywords: medication errors, intellectual disability, QI, Theory of Planned Behavior, PDSA

Introduction

Medication errors can pose a serious threat to patient safety, resulting in ineffective treatment that may lead to severe health complications or even death. Additionally, they can contribute to increased costs and reputational damage to health services and the staff within them. An intellectual disability in-patient ward for children and young people was identified as a service experiencing increased avoidable drug errors in September 2024. Preliminary analysis of the available data relating to the errors indicate that 90% of errors relating to medication in the ward are perpetrated by nursing staff at the point of administration.

Aim

The overall aim of the project is to reduce medication errors in an in-patient assessment and treatment unit for children and young people with intellectual disabilities by 20% in 6 months. The project was commenced in September 2024.

Methods

Quality Improvement (QI) methodology is being utilised in this project. A full audit of errors from the period of September 2023 – September 2024 was undertaken. A questionnaire has been issued to administering staff in the service to gain deeper insight into the context of medication errors. Findings from the audit and staff questionnaire will be mapped to The Theory of Planned Behaviour (Ajzen, 1991) and strategies to support staff nurses to engage in safer medication practices will be implemented and reviewed using Plan Do Study Act (PDSA) cycles (Christoff, 2018).

Results

Results of preliminary medication error audits, the staff questionnaire data and the content and outcomes of each PDSA cycle will be presented.

Findings

This study will provide insight into the process of applying QI and behaviour change methodology in addressing medication errors within a children's intellectual disability service. This project will have relevance for services staffed primarily by registered nurses and will provide suggestions for practical changes that can be implemented to ward environments and to supporting registered nurses to engage in safer medication administration practices.

13.9 Enhancing patient safety through improved adverse event reporting systems: a quality improvement initiative in a private healthcare facility, Greater Accra.

Author: Mrs Mabel Adobea Owiredo, Miss Joy Dede Okrah, Dr. Irene Adokor Wulff

Affiliation: FOCOS Orthopaedic Hospital

Keywords: adverse events, reporting systems, QI, just culture, Ghana

Introduction

Patient safety is a cornerstone of quality healthcare, yet adverse events (AEs) remain a persistent challenge globally. These events, ranging from medication errors to surgical complications, pose risks to patient outcomes, including prolonged hospital stays, morbidity, and mortality. Despite their critical importance, AEs are often underreported due to barriers such as fear of blame, lack of awareness, and complex reporting processes. This study sought to address these challenges at FOCOS Orthopaedic Hospital in Ghana's Greater Accra Region by implementing a targeted quality improvement (QI) initiative to optimize AE reporting and enhance patient safety.

Methods

The QI project employed the Plan-Do-Study-Act (PDSA) framework, which involved iterative testing and refinement of interventions. A review of hospital documentation for 2020 and 2021 revealed significant underreporting, with only 7 AEs reported in 2020 and 11 in 2021. A multidisciplinary team conducted a cause-and-effect analysis to identify barriers to reporting. Key issues included the absence of a standardized incident management policy, complicated reporting forms, and inadequate staff training. Interventions were designed to address these barriers and included:

1. Developing an incident management policy to provide clear reporting guidelines.
2. Simplifying reporting forms to make them user-friendly.
3. Increasing accessibility by distributing reporting forms across all hospital departments.

❖ Promoting Cultures of Innovation & Excellence in Patient Safety

4. Conducting comprehensive staff training on AE identification and reporting procedures.
5. Promoting a "just culture" that encourages reporting without fear of blame or punishment.

Progress was monitored using run charts to evaluate trends in AE reporting over time, and key performance indicators (KPIs) included the number of reported incidents and the number of departments participating in reporting.

Results

The interventions led to a significant improvement in AE reporting. The number of reported incidents increased from 7 in 2020 to 70 in 2023, representing a tenfold rise. Similarly, departmental participation expanded from 3 departments in 2020 and 2021 to 21 departments in 2023. These results highlight the success of the implemented measures in creating a more robust and inclusive reporting system.

Discussion

The study findings underscore the effectiveness of targeted interventions in overcoming barriers to AE reporting. Simplifying reporting forms and improving accessibility significantly reduced procedural challenges, while staff training addressed knowledge gaps. Promoting a "just culture" was critical in fostering a safe and transparent environment where staff felt empowered to report incidents without fear of blame. The increase in departmental participation further demonstrates the widespread cultural shift toward prioritizing patient safety. Sustaining these gains will require ongoing support, including regular training, monitoring, and reinforcement of a safety-focused culture.

13.10 Interprofessional protocol for patient handling and movement: promoting ergonomics and patient safety

Author: Ms Anna Carolina Albertini, Ms Angélica Juns, Ms Ester Lopes, Ms Edy Silva, Mr Igor Moraes, Ms Lorena Montesanti, Dr Renato Righetti

Affiliations: Sírio- Libanês

Keywords: patient handling, ergonomics, ICU Mobility Scale, falls prevention, musculoskeletal injuries

Introduction

During patient movement in the hospital environment, patient falls increase the risk of health complications, length of hospitalization, healthcare costs and the risk of death. Another adverse event during these procedures involves work accidents with the healthcare workers, which can lead to musculoskeletal disorders, work absences, and healthcare costs for these professionals. Therefore, the standardization of patient functionality assessment to define recommendations for safe patient transfer/movement is necessary to prevent patient falls and healthcare workers injuries. The objective of this study is to develop and evaluate the effectiveness of a safe patient movement protocol that correlates the degree of patient functionality with recommendations for patient movement/transfer procedures and the use of different types of support equipment.

Methods

This is a non-randomized longitudinal clinical study being conducted in a critical care unit with 45 beds and a semi-critical care unit with 31 beds in a private philanthropic hospital with approximately 600 inpatient beds. The study was approved by the institution's clinical research ethics committee. A committee of experts, composed of 4 Nurses, 5 Physiotherapists, 1 Ergonomist, 1 Occupational Therapist, and 1 Occupational Safety Technician, standardized the method for safe patient movement for several procedures according to the Intensive Care Unit (ICU) Mobility Scale score. The ICU Mobility Scale scores the level of patient collaboration and functionality, ranging from 0 to 10 points (the lower the score, the higher the level of dependence for movements and transfers). The included

procedures were bathing, bladder and bowel eliminations, in-bed procedures, transfer from bed to armchair/wheelchair/commode chair, transfer from bed to stretcher, transfers for exams/procedures with and without sedation and/or anesthesia, long-distance movement and ambulation.

Based on the protocol already defined by the committee of experts, a theoretical-practical training will be conducted by a specialized professional for the physiotherapy, nursing, and nursing technician teams. This training will include the assessment of patient functionality using the ICU Mobility Scale every 24 hours or significant clinical change to define patient movement procedures based on patient safety and ergonomics principles. The committee of experts will organize a monthly meeting with the healthcare team to follow up and discuss adjustments to the protocol. In the 6 month follow up, an impact analysis of the study will be conducted through patient fall indicators from the Falls Prevention Committee, work accidents, and musculoskeletal injuries related to patient movement/transfer from the Occupational Health and Safety Management, as well as the perception of protocol feasibility by the healthcare professionals.

Discussion

The use of scales is common in healthcare routines, however, the decision-making process for patient movement protocols is often based on clinical practice and there is difficulty in team communication regarding which procedures are indicated. After the implementation of a standardized protocol in the institution, improvements in evidence-based practice are expected during the decision-making process for the definition of patient movement procedures. Consequently, it is expected that good patient movement practices will be solidified, and the institutional culture will be increased to promote a safer environment for healthcare workers and patients.

13.11 Timely Nutrition – A QI project based in the Northern Ireland Cancer Centre (NICC)

Author: Dr Ellen Reid, Gillian Lindsay, Heather Kearney, Joanne McCaughan, Karlee Brown, Dr Kirsty Taylor, Dr Keith Rooney, Dr Nicola Hill, Dr Jin Tee, Dr David Johnston

Affiliation: Northern Ireland Cancer Centre

Keywords: nasogastric feeding, nutrition, QI, radiation exposure, PDSA

Introduction

Treatment, tumour and patient factors can result in inadequate oral intake among oncology inpatients. Malnutrition limits effective wound repair and immune functions [1]. Supplemental nasogastric (NG) feeding is commonly utilised in the Northern Ireland Cancer Centre (NICC), particularly for patients undergoing head and neck radiotherapy. Baseline data suggested a large number of confirmatory chest radiographs were completed, despite trust policy advising pH testing as first line for confirmation of NG position [2]. Delay in commencing feeding for patients in need of nutrition was raised as a key issue within the department, alongside the unnecessary radiation exposure involved in chest radiographs.

Methods

Key MDT stakeholders were involved in early resolution-focused discussions, including Consultant Oncologists, a Consultant Radiologist, Consultant Radiographer, Oncology Nurse-Specialists, and junior doctors. Our SMART aim was for 90% of inpatients in NICC to commence NG-feeding within 2-hours of NG placement by August 2024. A 'plan-do-study-act' (PDSA) approach was adopted, with three strategies for change. Initially (Cycle 1), MDT-led education of junior doctors focused on the use of pH testing to replace radiological confirmation of NG position. Cycle 2 updated the NICC induction document, clarifying this guidance. Lastly, Oncology Nurse-Specialists delivered ward-based teaching to nursing staff. Snapshot inpatient audits measured time between NG insertion and commencement of feeding (TTF) at baseline and following each cycle.

Results

Baseline average TTF was 16-hours (range 4-35-hours). Following cycle 1, in all documented cases, TTF was within 2-hours. Poor documentation limited analysis of results following cycle 2, with only one documented TTF (9-hours). Data collection following cycle 3 is ongoing at present.

Discussion

Results to date show a vast improvement in time taken to commence NG feeding (the primary aim). This improvement reflect the delivery of nutrition and medications to patients in a more timely manner. We also demonstrate a reduction in the number of confirmatory chest radiographs and therefore a reduced patient radiation exposure. Analysis of findings was somewhat limited by poor documentation, improvement of which will be the focus of future strategies for change.

13.12 Engagement in patient safety improvement: the role of organisational discourse

Author: Dr Denham Phipps, Dr Christian Jones, Prof. Darren Ashcroft, Dr Adam Sutherland

Affiliation: The University of Manchester

Keywords: patient safety culture, organizational discourse, community pharmacy, qualitative study, improvement

Introduction

Research on patient safety culture has highlighted the importance of an organisational setting that fosters learning and improvement. For example, job characteristics, leadership and psychological safety have been identified as organisational characteristics that determine a strong patient safety culture. However, one aspect of organisational life that has had little examination in patient safety research is the discourse (writing, speech and signs) used by organisational members. From the perspective of discursive psychology [1], discourse shapes how organisational members view their work, and in particular creates or closes down possibilities for action with respect to their work. Therefore, the discourse that occurs within a healthcare organisation can set the context for engagement in patient safety improvement activities.

Aim

The aim of our study was to examine the discourse presented by community pharmacy staff during a patient safety improvement exercise.

Methods

The study used a longitudinal qualitative design. Ten pharmacies, all located in a metropolitan county in the north of England, were invited to take part in a quality and safety improvement exercise [2] over a twelve-month period. As part of the exercise, the staff at each pharmacy reviewed their perceptions of safety culture in their organisation, using an established safety culture assessment tool. They then identified and carried out improvement actions for the remainder of the study period. During the initial review session and at three month intervals afterwards, we

facilitated and recorded discussions between the staff members at each pharmacy. In addition, we carried out a group discussion with managerial staff at each of three pharmacy head offices. The transcripts of the discussions, alongside field notes taken from site visits, were analysed using Potter and Wetherell's [3] discursive approach.

Results

The pharmacies were seen to vary regarding their engagement with the review sessions and their subsequent identification and implementation of improvement activities. When accounting for their level of engagement, staff members invoked the notion of their pharmacy having “core” work that takes precedence over other activities. Improvement activities were positioned as being either an intrinsic part of this work or outside of it. Participants' accounts also attributed responsibility for improvement; responsibility was attributed either to the participants themselves or to parties or events outside their control. Similarly, participants made reference to managerial control over pharmacies, with improvement activities being linked to pharmacists' exercise of autonomy in their work. Finally, some participants referred to an affective aspect of quality and safety (inducing, for example, shame or irritation). These features of the participants' accounts appeared to reflect their engagement in the improvement exercise and subsequent activities.

Discussion

Our study illustrates how power and politics within a healthcare organisation, as reflected in its members' discourse, can influence organisational commitment to quality and safety improvement. When implementing a patient safety intervention, it is important to attend to the way staff talk about their work and about improvement, as this can create the context for successful engagement in improvement activities.

13.13 Applying a Human Factors Approach to Improve Medication Safety Outcomes in a Hospital Setting: A Systematic Review

Author: Ms Aoife Delaney¹, Dr Suzanne McCarthy², Dr Kirstyn James³, Dr Aoife Fleming²

Affiliations: ¹Cork University Hospital & University College Cork, ²Pharmaceutical Care Research Group, School of Pharmacy, University College Cork, ³Department of Geriatric Medicine, Cork University Hospital, Cork, Ireland

Keywords: medication safety, systematic review, intervention studies, healthcare technology

Introduction

Medication errors in healthcare pose a significant global health challenge, with substantial cost associated (WHO, 2017). Using a Human Factors Ergonomics (HFE) approach to improve patient safety may be beneficial in reducing the risk and incidence of error (Institute of Medicine, 2000). It is important to address a current gap in the literature. We set out to determine 1) how HFE methodologies have been utilised in medication safety research in a hospital setting and 2) if these studies have demonstrated any change in medication safety related outcomes.

Methods

The protocol for this systematic review was registered with PROSPERO: CRD42023417909. Four databases were searched in April 2023 and November 2024. These included: EMBASE, PubMed, Web of Science and PsycINFO (EBSCOHOST). Reference and grey literature searching was also undertaken. All interventional studies that used a HFE methodology to improve medication safety were included. A synthesis of study characteristics, focusing on the HFE methodology and medication related outcomes was conducted.

Results

A total of 5826 studies were identified from searches, with 32 papers eligible for inclusion. Human factors methodologies were often utilised in a simulated clinical

setting by specialists working in anaesthetics and paediatrics. These studies primarily focused on healthcare technology interventions and redesign of medication storage. Task analysis, workload assessment, system usability scores and failure mode effect analysis were the most frequently reported HFE methodologies. However, the degree to which HFE was embedded in these studies was variable. Observed medication error number/ rate was the most frequently reported medication safety outcome. Most of these studies demonstrated a positive safety outcome.

Conclusion

This review has found that the application of HFE methodology in medication safety research is variable and not reported in the literature consistently. The findings support the need for future research to assess the impact of HFE on medication safety practices and interventions, and to report in detail the application of HFE in the research design and implementation.

14 Role of the Regulator in Designing Safer & Better Systems

Theme Keywords: compliance, system learning, human-centred design, proactive risk management, system performance

Rationale and Objective

Regulators play a powerful role in shaping healthcare system safety. Abstracts under this theme examine how regulation can move from compliance-based approaches toward models that incentivise system learning, human-centred design, and proactive risk management. Contributors call for a reframing of regulation: not as a constraint, but as an enabler of better system performance and safer patient outcomes.

Content

- 14.1 Using safety and quality standards to bridge the gap between innovation and regulation in health technology integration.
- 14.2 Consultation and the Role/Experience of Safety Representatives in the Irish Health and Social Care Sector.
- 14.3 How to Encourage Self-helping Behavior of Students in Academic Institution

14.1 Using safety and quality standards to bridge the gap between innovation and regulation in health technology integration.

Author: Ms Ash Norman

Affiliation: Norman Quality In Healthcare Solutions

Keywords: health technology, safety standards, regulation, innovation, quality assurance

Introduction

The rapid advancement of health technology, including artificial intelligence (AI), has substantial potential to address critical challenges in healthcare. However, a significant gap persists between innovation and regulation, limiting the effective integration of these technologies into healthcare settings. While numerous technologies are available to improve efficiency and patient outcomes, no universally accepted safety and quality standards currently exist to meet the varied needs of patients, healthcare providers, and technology developers.

Methods

This study investigates the barriers hindering the integration of health technology into healthcare and proposes key elements required to develop inclusive, adaptable standards that meet regulatory requirements while supporting innovation. Through a qualitative review of industry insights, expert perspectives, and literature, this research offers a framework for creating robust safety and quality standards that enable health technology to meaningfully enhance care quality and resilience in healthcare systems.

Results

Findings highlight an urgent need for standards that address both the operational and technical aspects of healthcare technology. Essential components include mechanisms for quality assurance, risk accountability, and safeguards that respect clinical judgment. Such standards would also support healthcare services in conducting cost-benefit analyses, determining whether resources are sufficient for

sustainable implementation, and assessing impacts on sustainability strategies. Additionally, real-world data and evidence are essential for evaluating the performance and safety of health technologies, especially applications, which often lack consistent assessments for quality, cost, and health outcomes.

Discussion

The study reveals that health technology providers and healthcare services need a shared framework to promote effective collaboration. Suggested elements include real-time monitoring units, comprehensive digital quality management systems, and strategies to address data bias, security, and digital inclusion. Stakeholder engagement, encompassing policymakers, accreditation bodies, developers, healthcare professionals, and patients, is critical to achieving a unified approach.

By establishing an agreed-upon set of standards for health technology integration, patients can be assured of systematic technology evaluation and healthcare providers can assess new technologies consistently. This framework also facilitates collaboration between healthcare services and technology providers by offering a common language that reduces the need for healthcare professionals to learn technical jargon in an already resource-constrained environment. The standards aim to create a cohesive safety culture, empowering healthcare staff to identify errors, share insights, and celebrate improvements, ultimately advancing safety and quality in healthcare.

The safety and quality standards proposed by this study are not yet developed, and the next phase involves drafting and reviewing these standards with a diverse group of stakeholders. Challenges in this development include creating standards resilient to future technological shifts and ensuring thorough consultation with patient groups and healthcare providers. For parties interested in contributing to or consulting on the development of these standards, please contact Ash Norman at ash.norman@nqihs.com.

14.2 Consultation and the Role/Experience of Safety Representatives in the Irish Health and Social Care Sector.

Author: Dr Joan Cahill

Affiliation: Health And Safety Authority, Dublin, Ireland

Keywords: occupational safety and health, OSH, safety representatives, consultation, health and social care, safety culture

Introduction

The health, safety and wellbeing of healthcare workers has an impact on patient safety. There is a relatively high incidence of non-fatal injury and occupational illness in the Health and Social Care sector in Ireland. Of the 8,707 non-fatal injuries reported to the Health and Safety Authority (HSA) in 2022, the highest number was reported in Human Health and Social Work Activities, which accounted for 22.8% (n=2,070) of all incidents (HSA, 2023). Research undertaken by EUOSHA (2019), indicates that organisations with a Safety Representative (SR) have better compliance with occupational safety and health (OSH) regulations, and better safety outcomes.

The purpose of this study was to examine the perception of consultation around OSH in Irish workplaces including the Health and Social Care sector, and specifically, the role of SRs. Consultation means both (1) providing your workers with information and (2) obtaining feedback and input before making decisions affecting worker safety and health. As outlined in the Safety, Health and Welfare at Work Act (Irish Statute Book, 2005), employers must consult their employees about establishing arrangements to secure co-operation on safety, health and welfare in the workplace. Not all organizations have a safety committee and/or safety representative(s). However, employers still need to establish mechanisms for consulting with workers on safety matters.

Methods

An anonymous online survey was administered by the HSA between April and June 2024. Convenience sampling was used. Survey findings were analysed using R/R

Studio. Statistical analysis included CHI squared tests, linear regression and binary logistic regression.

Results

N=854 respondents completed the online survey, with 17% of respondents (n=147) identifying as from the health and social care sector. 84% of respondents across all sectors indicated that there was a SR at their organisation, with 86% of respondents from the Health and Social care sector having a SR. Agreement on the adequacy of consultation systems was lower for health and social care (44%) as opposed to all sectors (49%). Differences in the perception of the adequacy of safety representation in Health and Social care as compared with other sectors including construction was found to be statistically significant. Statistical analysis indicates that the odds of respondents agreeing that systems of consultation are adequate was 5.6 time higher for organisations with a Safety Representative, as compared with organisations with none.

Discussion

This research highlights the importance of promoting the role of SR in health and social care. As evidenced in this research, SR's play an important role in relation to preventing adverse OSH events, supporting compliance with regulation and promoting a safety culture. However, there are many barriers to recruiting SR's and enabling this role at an operational level. Key barriers include time to perform functions and management support. Addressing these barriers will strengthen OSH for health and social care workers in Ireland. This in turn has an impact on patient safety. Further statistical evaluation is in progress.

14.3 How to Encourage Self-helping Behavior of Students in Academic Institution

Author: Mr Shahrukh Aadil¹, Mr. Vrashal Verma¹, Dr. Manish Kumar Asthana^{1,2}

Affiliations: ¹Department of Design, Indian Institute of Technology, Roorkee, India,

²Department of Humanities and Social Sciences, Indian Institute of Technology, Roorkee, India

Keywords: mental health, student wellness, self-awareness, academic pressure, India

Introduction

India being country with largest college going population. Academic pressure in India can negatively impact student mental health, leading to depression and even suicide. It was recorded (as per government of India) thirty-three students from national universities being committed suicide in the span of five years (2018–2022). The current study was aimed to identify and address gaps in student wellness at the institute. We observed increase in students approaching “Wellness Centre” of the institute. Further into the investigation, the student’s feelings when they are going through emotional phase was a prime concern. Even since there are tools and scales available for self-evaluation (like depression, anxiety and stress), the lack of self-understanding and self-awareness among students is one of the important factors that stops themselves from seeking help they want. It opens the door for addressing new steps in the educational system to close the gap between students in well-being need and the help they require.

Methods

The current study conducted at the Indian Institute of Technology, Roorkee, was through observation, qualitative surveys, and expert analysis. The focus group for the qualitative survey includes students (graduate, postgraduate and PhD.) of the institute, along with walk-in interviews with “Wellness Centre” of the Indian Institute of Technology, Roorkee, for experts’ opinions and analysis. In addition, reaching out to doctors for expert opinions on mental wellness, self-actualization, self-awareness and tools and scales that can be used for the same, backed by secondary literature studies and research. Firstly, a comparative study analysis

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among self-evaluation tools and scales for understanding which tool can be implemented for the betterment of students of Indian Institute of Technology, Roorkee. And secondly, implementing a system design using the scale in the Institute to bridge the gap and uplift the self-awareness and mental wellness of the students.

Discussion

Once the implementation of healthcare system design is completed, we will evaluate the number of students approaching the “Wellness Centre” to analyze the success rate. These analyses will help in, suggesting betterment to be implemented among the other institutes. It will bring down the people affected by mental breakdown and enhance the well-being awareness among them.

15 Simulation and Virtual Reality

Theme Keywords: decision-making, safe experimentation, learning, real-world practice

Rationale and Objective

Simulation and VR technologies offer powerful tools for training, system testing, and human-centred design in healthcare. Submissions highlight the use of full-scale simulations to study clinician decision-making, the testing of airway management protocols, and VR-based ergonomic studies. These abstracts show how simulation enables safe experimentation, enhances learning, and bridges the gap between theoretical knowledge and real-world practice.

Content

15.1 Understanding Clinical Decision-Making Across Diverse High-Risk Situations

15.2 Deep understanding of positioning for midwives using modern technologies AR/VR (PROGRESSION)

15.3 Enhancing patient safety through in situ simulation: Utilising in situ simulation to understand work as done in the Emergency Department

15.1 Understanding Clinical Decision-Making Across Diverse High-Risk Situations

Author: Dr Megan Salwei^{1,3}, Ms. Laura Militello^{2,3}, Ms. Carrie Reale^{1,3}, Ms. Janelle Faiman^{1,3}, Ms. Christen Sushereba^{2,3}, Dr. Matthew Weinger^{1,3}, Dr. Jason Slagle^{1,3}, Dr. Michael Andreae³, Dr. Arna Banerjee^{1,3}, Dr. John Boulet³, Dr. Amanda Burden³, Dr. Jeffrey Cooper³, Dr. Hoang Tram Duran³, Dr. David Gaba³, Dr. Anne Harman³, Dr. Steve Howard³, Dr. Jeffrey Huang³, Dr. Meredith Kingeter^{1,3}, Dr. Adam Levine³, Dr. William McIvor³, Dr. John Rask³, Dr. Elizabeth Sinz³, Dr. Randolph Steadman³, Huaping Sun³, Dr. Laurence Torsher³, Dr. Shilo Anders^{1,3}

Affiliations: ¹Center for Research and Innovation in Systems Safety, Vanderbilt University Medical Center, ²Applied Decision Science, ³Simulation Assessment Research Group (SARG)

Keywords: clinical decision-making, simulation, anesthesiology, high-risk situations, cognitive interviews

Introduction

Failure to appropriately manage patients in critical situations remains a major patient safety concern. Acute care clinicians must respond to dynamic and uncertain patient situations under time pressure. We previously investigated how anesthesiologists managed simulated acute patient scenarios. However, why such actions were undertaken has not been explored. There remains limited information about the decision-making and action strategies that lead to successful performance in these situations. To address this gap, herein, we identify and describe the decision-making processes used by high and low performers across diverse, high-risk clinical situations.

Methods

We recruited 102 anesthesiologists who participated in four 15–17-minute scenarios in a high-fidelity simulation center. Each scenario posed a unique crisis, such as a rapidly deteriorating patient in the post-anesthesia care unit (PACU). All sessions were video recorded. After each scenario, we conducted cognitive interviews (CIs) to understand the decision-making processes of participants [1]. CIs lasted approximately 40 minutes and were audio-recorded. We uploaded CI

transcriptions into Dedoose for analysis. Independently, trained raters scored the video recordings from 1 (lowest performance) to 9 (highest performance).

Teams of two researchers, blinded to performance ratings, deductively coded each CI in a consensus-based approach. Building on existing models [2, 3], we developed a hybrid model of decision-making, which was used as a framework for coding. High-level categories included problem detection and framing, assessing & recognizing, acting, and critiquing & refining. For each clinical scenario, we selected transcripts of 8 low and 8 high performers (total: 64 coded transcripts). We compared the prevalence of decision-making approaches across clinical scenarios and between high and low performers.

Results

Different clinical scenarios elicited different decision-making approaches from anesthesiologists. Specifically, we found that the assessing codes ‘recognition’, ‘pattern matching’, and ‘mechanistic thinking’ occurred in some scenarios and not at all in others. Thus, clinicians adapt their decision-making approaches, depending on the immediate problem in context. There were differences in decision approaches between high and low performers. Notably, ‘confirming and disconfirming’ appeared more often for high-performing than low-performing clinicians across all scenarios. In one of the scenarios, high performers engaged more often in ‘mental simulation’ (i.e., thinking actions forward to determine an appropriate next step). These findings suggest that high and low performers may use different approaches for critiquing and refining their initial assessments. In crisis situations, we found that both high and low performers temporized, although this varied by scenario. For instance, in one scenario, more high performers temporized compared to low performers.

Discussion

This research contributes to our understanding of how clinicians manage acute crises. These findings can inform the design of decision support tools and clinical scenarios for training and education. For example, scenarios should be long enough to allow activities of ‘confirming/disconfirming’ as this appears to be an important skill for high performance; recognizing and avoiding fixation can be included in these activities. Next, we will expand our work and analyze the remaining

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CI transcripts (408 interviews). We will also compare the assessments, cues, and strategies that high and low performers described as important to glean additional insights.

15.2 Deep understanding of positioning for midwives using modern technologies AR/VR (PROGRESSION)

Author: Mrs Selina Kim,

Affiliation: Institute for Emergency Medicine and Management in Medicine, LMU University Hospital, Munich, Germany

Keywords: midwifery, AR/VR, simulation, positioning, anatomy visualization

Introduction

Within current midwifery curricula, there is a significant gap in training the assistance of adequate positioning of the pregnant women, as necessary to ensure safe labour and a positive experience for the woman. The anatomical structures targeted by specific positioning manoeuvres are not visible, thus impairing the development of a mental model. Currently, initiating skill development for assisting during labor and delivery is a subject of ethical debate. Hence, it is advocated that future professionals should hone these skills in a controlled environment before transitioning to clinical practice.

Extensive evidence from other fields supports the idea that enhanced visualisation of the teaching contents improves learners' proficiency, learning speed and depth of understanding. Combining simulation activities with advanced technology such as Augmented or Virtual Reality (AR/VR), further improves learners' self-confidence and awareness of the need to intervene [1-3].

Currently, visualisation measures such as AR/VR are limited to demonstrating the birthing process, but not in use for training positioning manoeuvres to depict the subtle movements of the internal soft tissue and bone structures. This abstract introduces PROGRESSION, an Erasmus+ project, aiming to address this gap by developing a learning concept for midwifery students using AR/VR technology to visualise these otherwise invisible anatomical structures.

Methods and results

To develop a relevant and effective learning programme for midwifery students, PROGRESSION includes international experts with different professional backgrounds (obstetrics, computer science, psychology, healthcare simulation), throughout the process of developing the AR/VR technology and its integration into the educational programme. VR is used to enhance procedural understanding in the beginning, while AR integrates the haptic and motor memory with the visualisation of anatomical structures.

Our learning concept consists of a theoretical introduction to the topic, followed by an introduction of the VR technology and AR technology later during the course. The learning modules consist of class training and free training. Thus, each student can deepen their knowledge individually and repeat different scenarios at will. The project includes a pilot study to gather feedback on the developed learning concept and the technological application. Subsequently, midwifery students will undergo training in spring 2025 with both the traditional method (without visualisation of anatomical structures) and the newly developed concept, allowing for a comparative assessment of learning outcomes. The usability of the developed AR and VR technology will also be assessed.

To disseminate the benefit of PROGRESSION, all course material and information about the used AR/VR technology will be freely accessible online, facilitating replication by educators in other simulation centres.

Discussion

This research project introduces an innovative learning concept for midwifery students across Europe, using AR/VR technology to emphasise the importance of correct positioning of women in labour to improve the safety of the pregnant woman and the foetus.

By promoting independent, interactive training with immediate feedback, this approach seeks to establish a standardized and inclusive framework for midwifery training, ensuring equitable access to high-quality obstetric care.

15.3 Enhancing patient safety through in situ simulation: Utilising in situ simulation to understand work as done in the Emergency Department

Author: Dr Emma Greenwood, Dr Louise McKee, Mrs Nadine Brown, Dr Nicola Weatherup

Affiliation: Belfast Health And Social Care Trust

Keywords: in situ simulation, ED, patient safety, work as done, human factors

Introduction

Several incidents involving the administration of incorrect fluids during continuous bladder irrigation (CBI) for clot retention, specifically the use of sterile water instead of sodium chloride 0.9%, had been identified within the ED and other areas across the Trust. These incidents mainly occurred outside the urology ward. Utilising sterile water for CBI for clot retention can lead to dilutional hyponatraemia and significant harm.

Methods

To better understand these incidents, we conducted an in situ simulation in the Emergency Department (ED), inviting observers from other affected clinical areas. A medical student (patient), an ED clinician and three staff nurses of varying experience levels participated in a scenario involving a 74-year-old male presenting with frank haematuria and clot retention. Following the assessment by an ED clinician, nursing staff were tasked with obtaining the appropriate equipment and fluids for CBI, an action closely monitored during the simulation.

Using the SEIPS framework (1) during the debrief, we discussed multiple systems interactions and performance-influencing factors encountered during the simulation. Contributing issues included a crowded environment, frequent interruptions, disorganized paperwork, and the inability to locate an up-to-date Standard Operating Procedure (SOP). Additionally, a 1-liter bag of normal saline 0.9% was found adjacent to a similar-looking bag of sterile water, both marked with red writing. Notably, the simulation enhanced learning, with participants, including a fifth-year medical student, citing it as their most informative experience on three-

way catheters and bladder irrigation. Participants in the simulation also generated and discussed improvement ideas.

We compared the anticipated workflow (work as imagined) with both the recent incident and the simulation outcomes (work as done). A Bowtie analysis (2) was conducted to identify potential controls and safeguards to mitigate future risks.

Results

The findings were presented to the review team investigating the patient safety incidents. Key recommendations included co-designing the SOP for non-urology staff relevance, redesigning electronic prescriptions to prevent water prescription, implementing double-checking protocols, alerting the MHRA regarding the fluid similarity issue, collaborating with universities on CBI education, providing e-learning for all staff, and establishing a designated CBI cupboard.

To disseminate our findings and foster a culture of safety, we organised a learning lunch for all staff, encouraging collaborative discussion and feedback.

Discussion

This holistic approach not only enhanced understanding of the incidents, but also generated realistic improvement initiatives and also promoted engagement amongst healthcare staff in implementing safety practices.

16 Translating Research Into Practice & the Role of Embedded Researchers

Theme Keywords: participatory ergonomics, ethnographics, collaboration, clinical teams, embedding HFE

Rationale and Objective

Bridging the gap between research and practice is vital to sustainable improvement. The abstracts in this theme showcase the power of embedded researchers and co-creation processes to translate insights into action. Through participatory methods, ethnographic studies, and close collaboration with clinical teams, contributors demonstrate how embedding research expertise within healthcare systems accelerates change, builds local capacity, and grounds improvement efforts in real-world complexity.

Content

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- 16.3 Clinically Embedded HF Practice: Maintaining the Momentum

16.1 Human Factors Integration in Healthcare: Lessons learnt from top-down and bottom-up approaches

Author: Dr Laura Pickup¹, Ms Giulia Miles², Dr Eva Carman², Mrs Anne Reader¹

Affiliations: ¹University Hospitals Bristol And Weston, ²Nottingham University Hospitals NHS Trust

Keywords: human factors integration, healthcare, organisational change, maturity model, implementation strategies

Introduction

The application of Human Factors and Ergonomics (HFE) in healthcare within the UK has grown significantly over the last 10 years. Despite the increased interest, the sustainability and breadth of HFE application remains variable and underused across the different health and social care settings in the UK. Although more dedicated HFE roles are becoming available within the UK healthcare domain, how HFE is integrated into programmes of improvement and within organisations is relatively unknown and uncharted territory. Human Factors Integration (HFI) refers to the strategy for embedding HFE into a work system and existing organisational processes, which has been well applied in other safety critical industries. In healthcare, however this is still under-developed.

In this paper, two case studies from acute hospitals in England will be presented, demonstrating different strategies for HFI. The aim is to share the learning and challenges to date as HFI gains greater recognition within healthcare settings across the UK.

Case study 1 presents a top-down approach that has enabled the introduction of a HFE organisational strategy focusing on four key areas, building HF capacity, processes for system safety, procurement and human performance. A HFE maturity model [1] has been used to communicate the vision and evaluate progress in each of these areas. This strategy has been directed at organisational priorities to ensure senior leadership support. The practical work has included the development of a hub-and-spoke model of HFE support, a Trust wide HFE champion education program, consultancy responsive model to safety issues, system review of

equipment evaluation and procurement processes and the introduction of fatigue risk management.

Case study 2 offers a bottom-up approach to HFI that builds on the experience of a clinical simulation team supported by a small team of qualified HFE specialists who in turn either lead or mentor a range of HFE projects. An internal consultancy model was taken to demonstrate the value of HFE in healthcare which has resulted in greater HFE awareness in the organisation and closer alignment with organisational functions including Clinical Engineering, Procurement, Patient Safety and Quality Improvement (QI). It has also highlighted the need for HFE to be more formally integrated into the organisation's management structure to maximise the impact of HFE and to be able to respond to the high demand.

Results and Discussion

These two case studies illustrate top-down and bottom-up initiation of HFI highlighting both are required to achieve strategic and organisational change. The use of a HFE maturity model is suggested here to communicate the goal of HFI, steer implementation planning but also benchmarking and demonstrating meaningful impact in the context of change within a complex system. Widespread integration of HFE in healthcare would benefit from national requirements as observed in other industries and the commitment that has been offered to embed QI into organisational improvement. HFI has the opportunity to learn from the experience of embedding QI in healthcare, by identifying the receptive contexts for change and the importance of the social context to effect change at macro, meso and micro levels [2].

16.2 Co-creation and value in an Australian partnership network to improve patient safety

Author: Prof. Tracey Bucknall^{1,2,4}, Prof. Alison Hutchinson^{1,3,4}

Affiliations: ¹Deakin University, ²Alfred Health, ³Barwon Health, ⁴Centre for Quality and Patient Safety Research, Deakin University

Keywords: academic–health partnerships, patient safety, knowledge translation, embedded researchers, capacity building

Introduction

Research frequently fails to reach knowledge users or impact healthcare consumers (1). Partnerships between health services and universities are a recognized strategy to address challenges faced in healthcare and to reinforce the relevance of research to health services. They focus on creating new knowledge together, to innovate and positively impact (1). Deakin Partners in Nursing and Midwifery is a strategic academic–health service partnership network comprising Deakin University’s School of Nursing and Midwifery and Centre for Quality and Patient Safety Research, and six health services in the state of Victoria, Australia. The partnership network facilitates academic and professional research leadership for clinical and academic staff, mobilising research and its use in health services’ priority areas, as well as mentorship and research training for health service staff and students. Mutually agreed research foci are tailored to clinical priorities of health service partners, informed by State and National priorities, and local areas of identified clinical risk. Each health service partner has a team of embedded academic researchers. Our research aimed to explore the perceived benefits, facilitators and barriers to achieving successful partnerships from the perspective of the academic and health service leaders within the partnership network.

Methods

We used a descriptive exploratory qualitative study design. Individual interviews were conducted with 14 academic and health service leaders within the partnership network. Six academic leaders were embedded, on-site clinical professors, six were health service leaders and two were academic leaders within the Deakin Partners in Nursing and Midwifery. Interviews were conducted by an

independent researcher, audio-recorded, transcribed, and thematically analysed using the Framework approach. Transcripts were reviewed by participants before analysis.

Findings

Overall, participants saw the partnerships to be professionally and organisationally rewarding, and mutually beneficial to meet strategic priorities. Four themes were identified: core activities of the partnership researchers; essential elements for success; benefits of the partnership; and management of challenges within and beyond the partnership.

Discussion

Pivotal to the partnership network was an appreciation of the mutual benefits for health services and the University. The partnerships required a mutually agreed research agenda, a transparent and trusting relationship, a focus on improving patient outcomes, capacity building of the workforce, development of professional recognition, and the optimisation of policy and practice through knowledge translation. Embedded researchers were involved in strategic, operational, and clinical activities. Their presence was perceived to inform healthcare delivery by bringing expertise in research, education, and practice. The value propositions of the partnership network include a deep commitment to quality and safety research, co-funding of research positions, increased research training opportunities, unparalleled scale of access to clinical points of care, collaboration with a broad range of professions and international recognition. This unique and longstanding partnership network is an exemplar of how such partnerships can contribute to more efficient health services, clinical practice, education and research.

16.3 Clinically Embedded HF Practice: Maintaining the Momentum

Author: Prof. Ken Catchpole

Affiliations: Medical University of South Carolina, Charleston, USA & International Ergonomics Association Healthcare Technical Committee

Keywords: embedded practitioners, human factors, professional development, healthcare safety, peer support

Introduction

The last decade has seen an encouraging adoption of HF principles into frontline clinical care through the deployment of embedded clinical HF practitioners. They:

- (i) usually working alone or in very small teams
- (ii) are widely distributed nationally/internationally, often working on similar or related problems such as falls, central line blood stream infections (CLABSI), sepsis, failure to rescue, deterioration, wrong site surgery, retained foreign objects, sterile processing, diagnostic failures, handovers, or pathology
- (iii) usually experience a very challenging professional environment, both in terms of complexity and opacity, and in acceptance of the ideas in general (“you’re not medically qualified what are you doing here?”).

In order to maintain this momentum, there is a need to support this new way of conducting HF/E in three different ways:

1. Professional. Since ECHF practitioners are usually professionally isolated, mechanisms are needed for sharing good practice, application of methods, solving problems and sharing the results. There are many common themes across the work – wrong site surgery, deterioration, central lines, medication safety – and while a particular approach will vary in different hospitals, learning from each other will mean we don’t need to reinvent the wheel entirely. This is also an important method for dissemination. Writing papers is not the only, and definitely not the best, way of dissemination.
2. Personal-Professional. ECHF practitioners also need to be supported in their professional development. As they are isolated, they may not get access to

new methods, techniques, ways of thinking, or other aspects of professional support. Continuous learning mechanism are needed for spreading new methods, both from developments in HF techniques and science, but also within clinical, quality improvement, patient safety domains, and to help each other improve our promotion of HF and influential soft skills.

3. Personal. it can be difficult to deal with the people and the stuff in healthcare. For example, seeing stuff continually going wrong, knowing there's a better way, yet being unable to do anything about it can be distressing. This can make ECHF professionals feel complicit in the harm that happens. Sometimes we will see deaths or develop relationships with patients or clinicians who experience bad outcomes. Clinicians are not always welcoming and can be mistrusting of HF expertise, which they see as less important as clinical knowledge. HF professionals unfamiliar with the challenges of healthcare can also be dismissive of the particular issues faced in healthcare and by ECHF professionals. Connecting with others who are having the same experiences is really valuable. We need to recognize this and support each other to avoid trauma, cynicism and burnout.

For these reasons, Embedded Clinical Human Factors Practitioners are a new form of professional HF/E model that has unique features and demands that are considerably different from traditional systems engineering models (such as defence, transport and power generation) or consultancy and will require different professional support and strategies if we wish to maintain this momentum.