On Bended Knee: Marrying Strategies to Reduce the Impact of Workplace Knee Injuries in a Ship Building Environment

John J. Whale a, Liam McClory a, Anjum Naweed b

aBAE Systems, Maritime, Williamstown, Victoria AUSTRALIA; bAppleton Institute for Behavioural Science; Central Queensland University, South Australia, AUSTRALIA

1. Scope

At the end of 2013, BAE Systems identified that the largest component of expenditure for injury management and lost time in the form of worker’s compensation claims and rehabilitation, was associated with knee injuries. A review of injuries found that knee injuries were largely sustained in the hull fabrication shops which manufacture large sections of complex ship hull assemblies, primarily from workers in the Welding and Boilermaker roles (90% of injuries) and in specific work areas that required crouching, kneeling and accessing awkward spaces (see Figure 1).

This work was driven by Zero-Harm approach to investigate the main factors causing these injuries, and involved the creation of a specific workgroup to develop interventions and best practice strategies to reduce injury. The Zero Harm philosophy is driven by the belief that all injuries are preventable and when undertaken through the engagement of workers, can be both efficient and effective at reducing risk (Sherratt, 2014). At BAE Systems the Zero-Harm message is driven by senior management, but developed through collaboration with workers, embedding systematic processes developed with the shop floor to reduce harm and develop a safer culture.

The Zero-Harm concept and its many variations (e.g. Safety First, Zero-Risk) has received criticism (Besnard & Hollnagel, 2014), but as a concept, still manages to finds its way into high-reliability organisations with complex dynamic working environments to become part of the safety zeitgeist.

2. Project Organisation

The workgroup involved with the project included members from Production and Maintenance (Managers, Supervisors and shop floor), Safety Advisors, Physiotherapist and a Rehabilitation Specialist. Inclusion of a diverse workgroup ensured a high level of consultation and buy-in of the program as well as providing a solutions-focussed approach to the issue.
3. **Project Phases**

The project was broadly divided into five phases:

1. The first phase commenced prior to 2013, and involved a comprehensive historical review of all manual handling injuries and costs up to and including 2012 to analyse the mechanisms and agencies of injury.

2. The second phase commenced in 2013 where a number of Safety and Senior Managers drew on the Zero Harm concept to establish a 'Zero Harm Workgroup' on Manual Handling. During this phase the data clearly indicated the primary injury category and cost to the organisation was knees, and the highest frequency of injury was for the boilermaker/welder trades.

3. In the same year, the third phase was for the establishment of the workgroup to develop a series of strategies and a roll out plan, initially as a pilot and then onto all key knee injury areas. This included a site-wide manual handling task analysis for known high risk activities.

4. In the fourth phase the Manual Handling group implemented the strategies based on work area, in conjunction with an awareness campaign linked to a conditioning program.

5. The final phase was the review of initiatives and data to determine the success of the program.

4. **Conclusion**

The concept of Zero-harm facilitated workgroups to investigate causation and develop interventions to reduce work-related injury, and the workgroups that led the initiative looked at a number of areas. The work identified a number of causations, including the conditioning of workers, use of dangerous postures, the time taken to perform tasks, and carrying heavy loads as proverbial “low hanging fruit” to target in the first instance. Interventions included task and posture analysis; re-conditioning of the knees through warm up and strengthening exercises; education; encouraging job rotation; task assessment; work practice modification; and an increase in promoting early intervention strategies. A number of organisational metrics have demonstrated the success of the interventions with a dramatic fall in lost time injuries (100%; from 10 to 0) and stabilising of injuries that require Medical Treatment. First Aid treatments have also stabilised, though these are mostly indicators of the ongoing early intervention program.

Further initiatives will include a reframed manual handling training program focussing on a “Think Risk” approach, to be rolled out in 2015 in the next phase. The “Think Risk” program is built upon the premise that manual handling is often a dynamic and unplanned activity, and was developed primarily to up-skill supervisors in biomechanics, posture assessment as well as coaching workers to identify manual handling tasks (Van Cleve et al., 2012). Once identified the training emphasises breaking down those activities to mitigate dangerous manual handling environments with a focus on controls. More challenging areas to undertake include the aging workforce and fitness for duties, which were identified as longer term strategies requiring a whole of business approach including recruitment, development and succession / transition planning.

As an approach Zero-Harm has found some academic criticism, but as the concept, was found to offer relative resolve for ‘rallying the troops’ within the organisation. BAE Systems understands that Zero Harm does not equate to “zero risk”, and albeit a potentially unachievable aspiration has an unsupportable alternative of accepting harm as part of normal business. Although knee injuries have not been reduced to “zero” the result and approach to the program overall has contributed significantly to reducing significance of the outcome for the worker.

This case study is intended to extend learning from practical experiences, provide feedback to researchers on the applicability of methods and techniques used, and last but not least, help identify the most relevant issues that the ergonomics community needs to study.

**References**

