

Comment piece: Musculoskeletal Injury Risks for Ambulance Workers

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The provision of emergency and urgent care has been recognised for many years as exposing ambulance workers to high risks of musculoskeletal injuries (Turnbull et al, 1992; Rodgers, 1998; ROSPA, 2000; Lavender et al, 2000; Maguire et al, 2005). Although the tasks and job roles may vary in different countries (e.g. combination of paramedic and fire fighter roles), the evidence seems to be compelling that *'ambulance workers [are] at a relatively higher risk of permanent medical impairment and early retirement on medical grounds than other occupational groups'* and have more *'somatic health problems'* (e.g. musculoskeletal disorders) than the general population (Sterud et al, 2006). Recent research indicates that the prevalence of musculoskeletal discomfort and injuries may not have significantly reduced since the 1990s with over 50% of paramedics continuing to have musculoskeletal pain or discomfort on a regular basis (Arial et al, 2014); it seems reasonable to suggest that these problems may still be contributing to early retirement on medical grounds (Rodgers, 1998).

Manual Handling Risks

As part of their job ambulance workers perform many tasks that expose them to musculoskeletal risks including adopting awkward postures (Doormal et al, 1995; Ferreira and Hignett, 2005), moving patients from a bed/trolley to a stretcher (Lavender et al, 2000); and transporting patients down stairs (Studnek et al, 2010; Arial et al, 2014). In 2003 Hignett et al reported a systematic literature review on patient handling activities across healthcare sectors including three studies of moderate quality which found that ambulance work can result in harmful working postures (in particular over reaching/over stretching), with the highest risk tasks involving transportation of patients (Doormal et al, 1995; Furber et al, 1997; Massad et al, 2000). Several studies have investigated these risks in terms of stretcher loading and design (Jones and Hignett, 2007; Sommerich et al, 2012), working environment

(Ferreira and Hignett, 2005; Hignett et al, 2009a&b), and equipment design for carry chairs (Ferreira and Stanley, 2005), including vertical stair descent (Lavender et al, 2015).

The two most frequently used pieces of equipment to transport patients are carry chairs and stretchers. Ferreira & Stanley (2005) analysed the use of carry chairs to transport patients up and down stairs, and into the ambulance. They reported that lifting the chair from a low level introduced a high risk of injuries to the operator's low back and arms; this would apply to both transporting on stairs and lifting into the ambulance.

Jones and Hignett (2007) compared three ambulance loading systems; easi-loader stretchers, tail lifts and ramp/winch systems. Currently, tail lifts and ramp/winch systems are the most frequently used in the UK. 378 hours of data (observations, task analyses, interviews, questionnaires) were collected over several months to observe the loading systems at different times of day/night, and in a range of environments and weather conditions. The most important operational factors, as prioritised by ambulance workers, were patient and staff safety. Although the tail lift was found to be the most complicated (most task steps), it was the system which was used the most accurately (least misuse). For example the winch was rarely used with the ramp/winch system, and with the easi-loader system patients were rarely transferred to the stretcher from a carry chair before loading - the carry chair was lifted into the ambulance. The ramp/winch had finger traps and the stretcher was observed to be jerked (or bounced) over the vehicle/ramp interface (due to a difference in floor height) resulting in an unsafe and uncomfortable ride for patients. Some of the ramps did not have full-length side barriers to prevent stretchers slipping off. The easi-loader stretcher presented the most problems for patient and staff safety. Difficulties were both reported and observed with the operation of the stretcher legs, for example legs occasionally failing to lock in place. Recently, the use of powered easi-loader stretchers to raise from a lowered (transport) to loading height has been reported from the USA (Studnek et al, 2012). An extensive (10 year)

pre- and post- evaluation found that it was difficult to directly correlate injury reduction to the new equipment. In comparison with the introduction of electric hoists for hospital nursing staff, Studnek et al (2012) commented that introduction of the powered stretchers had been based on a perceived management need rather than an ergonomics analysis of the tasks, saying that in future the '*focus [should be] on implementing evidence-based occupational health interventions based on sound ergonomics*' for example by considering the stretcher as part of a work system.

Human Factors & Ergonomics for ambulance work

Human Factors/Ergonomics (HFE) is the key to good design by focussing on the systems where people interact in physical, organisational and social environments to give two key outcomes of wellbeing and performance (IEA, 2000). Ambulance workers provide pre-hospital emergency and urgent services in a wide range of complex environments so the exposure to musculoskeletal injury risks needs to be considered within the work system. This could be at a micro level e.g. looking at individual and team interactions with patients and other ambulance workers within a confined space (Ferreira and Hignett, 2005; Hignett et al, 2009b) or at a macro level to consider, for example, team work and communication in the ambulance control room (Stammers and Hallam, 1985).

The use of HFE in healthcare has been slow and limited by a false safety dichotomy for either staff (occupational health) or patient wellbeing (safety) with the two issues often being managed by different parts of the organisation (e.g. Human Resources and Clinical/Medical leads including quality improvement) rather than looking at the whole system, interactions and seeking opportunities for integration. Greater use of HFE will create many opportunities for healthcare to take 'giant leaps' in improving safety for both staff and patients. In 2015, there is a renewed interest in HFE in healthcare, with Health Education England taking a

leading role in implementing the NFQ (2013) Concordat as part of the 'Learning to be Safer' initiative (<https://hee.nhs.uk/work-programmes/human-factors-and-patient-safety/>). The pre-hospital emergency and urgent care (ambulance) sector is well placed to lead on this by implementing research recommendations to reduce safety risks associated with moving and handling for both staff and patients. The recommendations include providing vehicles with tail lifts as the preferred loading system; improving the design of stretcher handles; using ergonomic principles and methods to design the patient compartment (work space) of ambulances; eliminating the task of lifting carry chairs into ambulances (with better designs of ambulance loading systems) and using mechanical aids to transport patient up stairs e.g. using powered stair climbing trolleys.

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