Strategies used by healthcare practitioners to manage fatigue-related risk: beyond work hours

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ABSTRACT
Objectives: Fatigue in healthcare practitioners presents a risk to both patient safety and the safety and well-being of doctors and nurses. Management of fatigue-related risk is largely focused on hours of work limits, but these limits are fallible. The aim was to investigate the ways in which healthcare professionals manage fatigue-related risk beyond the hours.

Methods: Qualitative data extracted from semi-structured interviews and focus groups with 189 healthcare practitioners from nursing and medical disciplines were subjected to thematic analysis to identify key themes of causes and consequences of fatigue, as well as strategies deployed within teams and by individuals.

Results: The majority of fatigue risk management beyond hours of work limits occurs as informal processes that have evolved within teams. These processes can be characterised as non-technical skills and include error protection practices and fatigue-proofing strategies.

Conclusions: The informal practices we identified represent a key layer of defence in a fatigue risk management system – that of recognising and responding to fatigue. A process to assess and formalise the error protection practices and fatigue-proofing strategies is required and any formal implementation should be supported by effective and fair incident reporting systems.

Keywords: Risk management, fatigue-related risk, fatigue-proofing strategies, error protection

INTRODUCTION
Healthcare practitioner fatigue presents a risk for both patient safety, and the safety and well-being of health professionals in hospitals and clinics. Fatigue arises as a result of work-related and non-work-related factors including night work, extended hours, inadequate sleep and high workload (Williamson et al., 2011; Gander et al., 2011). Impaired performance associated with elevated fatigue can manifest in various ways, including slowed reaction times, poor decision-making and increased rates of error (Åkerstedt, 1991; Folkard and Tucker, 2003; Harrison and Horne, 2000). In healthcare, fatigue is associated with human error and adverse outcomes for patients and healthcare professionals (Wilson et al., 1999; Committee on Quality of Health Care in America, 2000; Committee on Optimizing Medical Trainee (Resident) Hours and Work Schedules to Improve Patient Safety, 2008; Nichols et al., 2008). Risk management systems are designed to reduce the likelihood and consequences of workplace errors and incidents (Reason, 1995; Standards Australia, 2009) including human error associated with fatigue.
Fatigue risk management systems manage the likelihood and consequences of fatigue-related incidents using a system of multiple defences. While variations exist, broadly the defences focus on hours of work and staffing for workload, sufficient sleep, recognising and responding to signs of fatigue or lowered alertness, and learning from errors and incidents (Dawson and McCulloch, 2005, Lerman et al., 2012). It is often the case that fatigue is characterised as being largely about work hours. While there is no doubt that work schedules impact sleep and clinical performance (Lockley et al., 2004, Landrigan et al., 2004), a reduction in total work hours may not always equate to a reduction in risk. For example, indirect effects such as diminished quality of teaching for trainee doctors through reduced exposure to cases, increased workload for senior physicians and disrupted continuity of care have been discussed in other forums (Dawson and Zee, 2005, Dawson and McCulloch, 2005, Gorman et al., 2005) and will not be revisited here. Either way, although hours of work limits are necessary, they are not sufficient to manage risk. Compliance with hours of work limits does not guarantee adequate sleep and low fatigue-related risk. Thus, while management of work hours must remain a focus, fatigue-related risk to patient and healthcare practitioner safety should be managed using multiple layers of defence (Reason, 1990) that involve not only organisational elements but also individual and team-level elements.

Healthcare professionals, both as individuals and as teams, use a range of essential technical skills and competencies, to ensure appropriate management of patients. Importantly however, non-technical skills and competencies are also critical to safety and efficacy and complement procedural or technical elements (Kodate et al., 2012). Non-technical skills are broadly defined as the cognitive and social skills needed to perform a role and include teamwork, communication, monitoring, leadership and decision-making (Kodate et al., 2012, Flin et al., 2008). Within healthcare teams, recognising and responding to fatigue could be categorised as a non-technical skill and represents a potential layer of defence against a fatigue-related incident. However, the use of non-technical skills to specifically manage fatigue-related risk in healthcare has not been investigated. The types of fatigue management strategies used by healthcare professionals (if any) are not well described, and there has been little research focus on the management of fatigue-related risk in healthcare beyond work hours. In order to shed some light on how fatigue-related risk is managed in healthcare, the current study investigated (i) the causes and consequences of fatigue for patient, individual healthcare professional, colleagues and community, and (ii) the strategies used by healthcare practitioners to manage fatigue-related risk. In addition we elicited information about perceived barriers to fatigue management.

METHOD

Design

The design was qualitative and used focus groups and semi-structured interviews to collect data. Focus groups were conducted in semi-structured format with individuals from the same unit, during 90-120 minute sessions (n=164 participants in 11 focus groups). Semi-structured, one-on-one interviews were conducted over 30-60 minutes either in person, or over the phone (n=25 participants). Topics covered in the focus groups and interviews included – causes and consequences of fatigue, strategies used (or have knowledge of) to manage fatigue, barriers to fatigue management in healthcare. The protocol was approved by the Human Research Ethics committee of the University of South Australia.
Participants
Participants volunteered to be involved in the study and were medical and nursing staff who worked in: one of seven Australia states/territories (SA, NSW, QLD, WA, VIC, TAS, ACT); public or private facilities; emergency medicine, surgery, obstetrics and gynaecology, pathology, intensive care, anaesthesia or mental health departments; tertiary teaching hospitals, secondary or peripheral hospitals, or rural/remote medical centres/clinics.

Data analysis
Interviews and focus groups were transcribed and analysed using thematic content analysis (Braun and Clarke, 2006). A coding framework was developed for each of the main questions – Causes of fatigue, consequences of fatigue and strategies to manage fatigue - using an inductive approach. This allowed subthemes to emerge without restriction.

RESULTS
Causes of Fatigue
Causes of fatigue were categorised into personal and organisational themes (Figure 1). Organisational sub-themes of workload and culture emerged and were linked to personal sub-themes of sleep and stress. Sub-sub-themes under the workload and culture sub-themes included work hours scheduling, work role and work practices. For example, participants reported that long and extended shifts reduced the opportunity to sleep and resulted in extended periods of wakefulness.

Figure 1 – Causes of fatigue as reported by healthcare professionals, categorised into key themes.

Consequences of Fatigue
The consequences of fatigue were categorised into themes of ‘Who was affected’ and ‘How they were affected’. Figure 2 presents specific consequences, grouped into category of
consequences and further categorised according to the impacted party. Consequences ranged from direct impact on patient safety as a result of error, through indirect effects as a result of poor communication or negative mood, to risks to the individual healthcare professional and other road users on the work commute. At the extreme end of the scale, respondents discussed examples of direct harm and even fatal consequences to patients as a result of fatigue-related error. More common however were errors such as incorrectly administered medication and reduced legibility of hospital documentation (e.g. notes, patient charts). The consequences in the mental fatigue sub-theme included decreased concentration, slowed reaction time, and impaired ability to perform reflex tasks. Respondents also reported increased irritability and mood changes which were associated with changes in communication and interactions with both colleagues and patients.

The personal sub-theme included elements of individual safety and wellbeing, in particular an increase in fatigue related illness, poor nutrition and prescription drug use to aid sleep. Fatigue-related incidents on the road included situations where the safety of participants was compromised, as well as other road users and pedestrians. The majority of crashes were reported to occur in the early morning, as individuals returned home from night shift.

![Figure 2 – Consequences of fatigue as reported by healthcare professionals, categorised into key themes.](image)

**Strategies used to manage fatigue-related risk**

Strategies were categorised based on their current formal or informal use, and potential strategies (participants have heard about their use in other facilities, or believed them to be a viable option). Table 1 provides characteristic responses for each Strategy sub-theme.

**Current strategies**

Formal strategies discussed by participants were almost exclusively related to work hours or the roster. The only other formal strategy discussed was the supply of taxi vouchers, however where the policy was in place, very few participants reported using the vouchers.

Individual fatigue countermeasures identified in the analysis included the use of caffeine and taking breaks, in addition to keeping busy. Informal strategies used by individuals within
teams were categorised into work practices and error proofing practices. Work practices included prioritising finishing times for those staff with the shortest break between shifts, facilitating napping by batching night-shift tasks, and rotating night-shift naps across a block of consecutive shifts within the team. Error-proofing practices included a conscious increase in communication, double checking oneself or asking colleague to double check, focusing on one task at a time, undertaking an alternative task for a period of time, and deferring decisions either to later or to a colleague.

Potential strategies

Discussions of potential strategies for managing fatigue-related risk in workplaces focused mainly on working hours and staffing, but participants also discussed incident reporting as a strategy (Table 1). Other potential strategies could be categorised as system-wide issues such as increasing both the system-level and consumer-level acceptance of continuity of care as opposed to continuity of carer through education or different approaches to handover, or organisational-level strategies such as rostering more appropriately for workloads.

Barriers to implementation of strategies

Barriers to fatigue management fell into three categories: individual factors, largely in relation to personal responsibility for work and non-work time; organisational factors including staffing, workload, financial, cultural issues; and community-based issues such as expectations for service delivery or availability (Table 1).
TABLE 1 – Representative quotes from focus groups and interviews illustrating strategies and barriers

### Strategies for managing fatigue-related risk

#### Informal strategies

“When we have a late-early, the person with the early the next morning, they do handover first.”

“an informal process is to write down all the non-urgent things and when the list gets to 12 then call the doctor”.

“Have been in theatre and said I am not doing the next one and went home, called the consultant in”

“I said if we don’t cancel this elective surgery I’m resigning, it’s unsafe.”

#### Potential strategies

**Work hours**

“perhaps if more of a break or a sleeping day could be included when coming off night shift…”

“Practical strategies written into policy would be useful, like breaks…. Do what the nurses do…”

“Certain people cope better with nights than others. If people don’t sleep at all don’t put them on nights.”

**Reporting**

“Educate more people, consultants, nursing staff and team leader so that when someone says they are tired then they are supported.”

“A process to tell senior person. If same people frequently reports then can investigate.”

“It would have to be anonymous, might be good for a nation-wide database, would need to be very supportive.”

**Work practices**

“Better handover like nursing.”

“Friend in the US works in a facility where patients are referred to and admitted to the ‘clinic’, not to individual doctors. The patients belong to the clinic not to individuals. This is easier for physicians than for OG or surgery.”

“We have three regular meetings now that are reflection meetings. … discussion of cases and reflection of things that have gone wrong. … balance between accumulation of experience and learning from errors.”

**Barriers to fatigue management strategies**

“Junior doctors starting out are not given any advice on how to deal with late nights, or night shifts i.e. what to eat, how to program body clock, what to expect with regards to decision making, memory and emotional response” (Junior Medical Officer, Questionnaire)

“The crux of the discussion of balancing fatigue with clinical work is that we work as individuals rather than as a team. You can't easily substitute one person for another.”

“In big centres they always say take your breaks and put your hand up if you are struggling but you know that if you are struggling and very busy then everyone else probably is and stopping just loads of the rest of the team.”

“Its not a problem til it’s a problem for the people who can fix it.”

“Community expectations are that if someone is going to cut your head open, then you want to talk to them.”

“Don’t think the community is that unreasonable of we put the case to them, what they do want is appropriate handover.”
DISCUSSION
The goal of the current study was to understand the ways in which fatigue-related risk is managed in healthcare facilities, beyond the roster or scheduling of work hours. Using qualitative data analysis, we investigated the causes and consequences of fatigue for healthcare practitioners in both medical and nursing disciplines in a range of facilities, in addition to the strategies used by these professionals. The analysis showed that a large portion of fatigue risk management in healthcare occurs by way of informal processes that have been tailored to the specific workplace or team. Despite the current informal use, there is significant potential for implementation of more formal processes, possibly through or proceduralisation of effective fatigue-proofing strategies and error protection practices. The contribution of informal strategies and practices to fatigue risk management in healthcare will be discussed in conjunction with the critical role of incident reporting in safety management systems.

Risk management and safety management system science provides strong evidence for the effectiveness of multiple layers of defence against the risk of incidents and accidents (Reason, 1990). In relation to fatigue risk management, work hours are a critical component in managing fatigue-related risks to patient safety and healthcare practitioner health and well-being. However, fatigue risk management systems should also include additional layers of defence such as recognising and responding to signs and symptoms of fatigue, and reporting errors and incidents (Dawson and McCulloch, 2005, Lerman et al., 2012, Gander et al., 2011). Recognising and responding to elevated fatigue risk could be characterised as a non-technical skill, and a critical layer of defence in a fatigue risk management system. The current study demonstrates that while that layer does exist in healthcare, it appears to be largely informal in its application.

Beyond work hours, fatigue risk management in healthcare facilities is almost exclusively situated in informal strategies deployed at the individual and team level. These strategies represent non-technical skills and include communication, teamwork, leadership and monitoring functions (Flin et al., 2008, Kodate et al., 2012). Participants in the current study identified both individual and team-based strategies that they used routinely to mitigate the risk of error. Interestingly, the strategies focused either on reducing the likelihood that an error was made (e.g. defer decisions, focus on one task etc.) or on reducing the consequences of an error (e.g. double checking to catch errors). The modifications to work practices and use of specific error protection practices closely align to the suite of non-technical skills taught in crew resource management training in aviation (Helmreich, 2000, Helmreich and Merritt, 2000). Our study did not investigate the methods by which these strategies and routines are transmitted between individuals and teams. It would be interesting to examine the degree to which these safety behaviours are universal and to identify the signals that are used by healthcare practitioners to trigger the implementation of the strategies. On the surface, the use of these error protection and fatigue-proofing strategies appears to be a ‘recognising and responding’ layer of defence against fatigue-related risk but participants were not so explicit in their explanation of how and why they use the strategies. An obvious but as yet unanswered question is whether the strategies are actually effective in maintaining patient safety.

The current investigation demonstrates a significant lack of reporting of fatigue-related error or incidents by healthcare practitioners. Reporting errors and incidents in order to facilitate continuous improvement of the system is a critical element of FRMS (Lerman et al., 2012, Gander et al., 2011) and safety management systems more generally (Anderson et al., 2013). Our analysis indicates a willingness to report if the information is used appropriately.
and fairly. Indeed, the use of incident reports should form the basis of an evidence-based continuous improvement process, provided they are implemented and function appropriately (Thomas et al., 2012). Thus, while organisational culture is considered important in the management of fatigue-related risk, it is currently considered a significant barrier.

The culture of the organisation, including the way in which decisions are made about staffing and workload, was a major subtheme discussed in terms of barriers to fatigue management in healthcare. One of the quotes that characterised the view in relation to organisational barriers was "It's not a problem til it's a problem for the people who can fix it". There was a view that little could really be done in relation to formal changes to work hours or work practices. Of note was the acknowledgement of the community's role in some work practices, including the expectation of continuity of carer. This is exacerbated by the view within teams or facilities that healthcare practitioners are not interchangeable, with obvious distinctions between specialities (e.g. anaesthetics versus obstetricians). Such obstacles are not, however, insurmountable (Landrigan et al., 2007, Dawson and Zee, 2005).

The limitations of the study should be noted. It is possible that respondents volunteered because they had experienced a fatigue-related error, and/or considered fatigue to be a significant problem in their workplace, or in general in the sector. The sample, as a result may not be representative of the general population. Further, the current design cannot given any indication of the prevalence of fatigue or fatigue-related errors in Australian healthcare facilities. Instead the findings describe the perceived causes and consequences of fatigue-related errors when they do occur, and most importantly, the fatigue management strategies used by healthcare practitioners.

In summary, healthcare professionals reported that work hours, scheduling practices and organisational culture influenced fatigue levels, work performance, health and well-being, and patient safety. More importantly however, participants identified specific error protection practices and fatigue-proofing strategies they use to manage the risk of fatigue-related error. These practices appear to have been tailored and tested in the local settings and are now part of routine, albeit, informal practice. The findings identify clear opportunities for the management of fatigue-related risk through two avenues – (a) reducing the likelihood of a fatigue-related error through appropriate scheduling, fatigue countermeasures such as napping, and workplace procedures that include error protection practices, and/or (b) reducing the consequences of fatigue-related error by developing error tolerant systems of work which catch errors before they become consequential. Tailored, evidence-based fatigue risk management programs that incorporate the ‘fatigue proofing’ practices developed by the experts on the wards and in the theatres represent a step-change in fatigue management in healthcare.

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REFERENCES


