Rest during shift work in the emergency department

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Abstract

The aim of this study was to pilot a program to encourage shift breaks for emergency department doctors and analyse the effects of breaks on tiredness and fatigue as well as possible effects on overall departmental performance.

During Phase 1, medical staff were asked to fill out a survey regarding their working day at the end of every shift. A 30-minute uninterrupted break was promoted during Phase 2 by provision of a cover doctor on the roster as well as educational sessions and posters.

There were 233 completed surveys received over the 4-week period. Only 33% of shifts worked included an uninterrupted break in Phase 1, which improved significantly to 60% during Phase 2. Subjective tiredness was significantly lower at the end of a shift when a break was taken ($P<0.001$), while fatigue levels were also lower, but not significant ($P=0.060$). There were significant improvements in some key performance indicators.

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What is known about the topic?

The Australian Medical Association National Code of Practice — Hours of Work, Shiftwork and Rostering for Hospital Doctors[2] provides guidance on the hazards and risks associated with extended working hours. It is not mandatory, but compliance with the code provides evidence of meeting relevant regulations.

What does this paper add?

This paper provides evidence of lack of compliance with breaks during emergency department work shifts. A pilot project was introduced to promote sufficient rest periods.

What are the implications for practitioners?

Simple rostering initiatives, without an increase in staffing levels, can enhance the practice of taking regular breaks during a shift, improving some key performance indicators.

OCCUPATIONAL INJURIES are responsible for a significant proportion of worker absenteeism and disability. A number of demographic, lifestyle and workplace factors have been reported to be associated with the risk of being injured in an occupational adverse incident. These include age, alcohol consumption and smoking and shift work with associated fatigue levels.

Under the recently amended Australian *Occupational Health and Safety Act 2004* (OH&S Act)[1] the hospital's primary duty is to ensure the health, safety and welfare of all persons in the workplace. This duty covers employees and visiting members of the general public. In particular, there is a provision for "ensuring that systems of work and the working environment are safe and free of health and safety risks."

The new Act does not provide for making new Codes of Practice. However, old Codes still continue to be a source of practical guidance to those who have OH&S duties. The Australian Medical Association's (AMA) National Code of Practice – Hours of Work, Shiftwork and Rostering for Hospital Doctors[2] was developed through a consultative process involving all Australian hospitals, state health administrations, medical and regulatory organisations, doctors, and a range of

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other bodies and individuals. The code provides guidance on the hazards and risks associated with extended working hours. It is not mandatory, but compliance with the code provides evidence of meeting relevant regulations. In Europe, the European Working Time Directive dictates hours of work and rest. It is included in UK law as the Working Time Regulations 1998 and Working Time Amendment Regulations 2003 (WTR), which are not optional.[3]

One of the provisions of the AMA code is mandatory 30-minute meal breaks, which have been postulated to reduce fatigue during a shift. The WTR dictates a minimum of 20 minutes rest after very 6 hours worked. Anecdotally, we had observed that doctors undertaking shift work in the emergency department (ED) were not taking breaks during their shift. The aims of this study were to:

- Study the work practices of doctors in the ED with respect to taking breaks during the shift
- Quantify fatigue levels in ED doctors at the end of their shifts
- Introduce a culture of taking breaks during an ED shift and measure its effects with respect to doctors' fatigue levels and departmental performance.

Methods

Setting

The setting was a 300-bed suburban hospital located in eastern Melbourne. The hospital has been accredited with the independent Australian Council of Healthcare Standards. The ED is a 24-hour service staffed by 12 full-time consultants, seven registrars, 11 residents, three interns and locum medical officers as required. Doctors are rostered onto one of three shifts: morning shift between 08:00 and 17:30 hours, afternoon shift between 14:00 and 23:30 hours and night shift between 23:00 and 08:30 hours.

Subjects

Medical staff working in the ED were required to fill out a survey at the end of every shift regarding their work practice with regard to taking breaks during the shift, fatigue and tiredness levels. This was on a voluntary basis. The objective of the study was to improve working conditions, and this was explained at a weekly staff meeting before study commencement. Phase 1 of this project titled "Emergency Department Work and Rest Study" ran for 2 weeks from 15 May 2006 to 28 May 2006.

Phase 2 of the project was undertaken in the subsequent 2 weeks from 29 May 2006 to 11 June 2006. During this Phase, staff rosters were amended to include the provision of cover for a doctor going on a break. Doctors working together were paired to act as cover for each other while a break was taken. The importance of taking a break during the shift was also reinforced during education sessions and by posters around the department.

Data

Data were collected on the number of breaks and duration and also sub-grouped by staff designation and shift worked. A tiredness score was recorded as reported by subjects on a visual analogue scale of 0 to 10. An objective Fatigue Severity Scale[4] was also used to determine the level of fatigue in doctors at the end of each shift.

Departmental performance, as measured by routine key performance indicators, was used as a further end-point. Hospital bypass occurred when a hospital requested non-urgent ambulances to be redirected to another hospital during periods of high demand. The Victorian Government has set a quarterly target for hospitals, which requires them to spend no more than 3% of time on bypass. Targets are also set for the percentage of patients to be seen within the desirable time, according to triage categories set by the Australasian College of Emergency Medicine. These targets were 100% of patients of Category 1 to be seen immediately, 80% of Category 2 patients to be seen within 10 minutes, 75% of Category 3 patients to be seen within 30 minutes while no targets have been set for Category 4 and 5 patients.[5]

From 2005–06 the Victorian Government has also set a new standard to encourage more timely admission of ED patients to a hospital bed. The

1 Baseline characteristics of surveyed doctors and departmental activity

Characteristic	Phase 1 (*n*=112)	Phase 2 (*n*=105)	*P*
Survey return rate (% of shifts worked)	41.8%	39.6%	0.769
Staff designation (% in total surveys returned)			
Consultants	19.6%	19.1%	0.926
Registrars	20.5%	23.8%	0.559
Residents	54.5%	52.4%	0.988
Interns	5.3%	4.8%	0.866
Shift timing			
Day shift	37.5%	29.5%	0.211
Afternoon shift	42.8%	46.7%	0.564
Night shift	19.6%	23.8%	0.454
Triage category			
Category 1	0.44%	0.30%	0.495
Category 2	10.95%	10.27%	0.514
Category 3	32.24%	32.41%	0.914
Category 4	48.80%	50.0%	0.478
Category 5	7.67%	6.85%	0.981
Average daily ED attendance	128.6 ± 12.9 (total = 1799)	121.1 ± 14.4 (total = 1694)	0.147

2 Departmental performance

Characteristic	Phase 1 (*n*=112)	Phase 2 (*n*=105)	*P*
Breaks taken, by staff designation (% of shifts worked)			
Overall	33.03%	60.95%	<0.001
Consultants	4.54%	70.00%	<0.001
Registrars	43.48%	44.00%	0.939
Residents	37.70%	63.63%	<0.001
Interns	50.00%	80.00%	<0.001
Subjective tiredness (median score ±IQR)			
Overall	7.0 (5–8)	6.0 (4–7)	0.019
Consultants	6.5 (4–8)	6.0 (4–7)	0.212
Registrars	9.0 (8–10)	4.0 (2–6)	0.003
Residents	7.0 (5–8)	6.0 (5–7)	0.497
Interns	6.0 (5–8)	5.0 (4–7)	0.009
Fatigue Severity Score (median ±IQR)			
Overall	36.0 (29–42)	34.0 (29–40)	0.475
Consultants	40.5 (32–48)	40.0 (35.5–49.5)	0.425
Registrars	36.0 (34–41)	29.0 (29–34)	0.081
Residents	31.0 (29–39.5)	36.0 (30–41)	0.232
Interns	34.0 (27–42)	33.0(33–34)	0.035

new standard encourages hospitals to admit these patients to a hospital bed within 8 hours of arrival, with a target of 80%. The government has also introduced a new standard to encourage more timely treatment of patients who do not require admission to a bed. The new standard requires that 80% of non-admitted patients should stay in the ED for less than 4 hours.[5]

Analysis

Data were stored using Microsoft Excel (Microsoft Corporation, Redmond, Wash, USA). Proportions of results in the two phases were compared using Fisher's exact test. Two tailed *P* values of less than 0.05 were considered to be statistically significant. Parametric and non-parametric values were tested with Student's *t*-test and the Mann-Whitney *U*-test respectively. Continuous variables such as times were subjected to a log transformation to normalise the distribution before using the Student's *t*-test to determine differences. The coefficient of determination (R^2) was used to determine the linear relationship between two variables.

Results

A total of 233 completed surveys were received over the 4-week study period, which included 121 from Phase 1 and 112 from Phase 2. This represented 42.7% of shifts worked in Phase 1 and 40.7% of shifts worked in Phase 2. A further 20 surveys (9 from Phase 1 and 11 from Phase 2) were excluded due to being incomplete. Baseline characteristics of the two periods with regards to surveys returned and departmental activity are listed in Box 1.

During Phase 1, only 33 of the 112 returned surveys (33.03%) reported taking an uninterrupted 30-minute break during their shift. During

3 Results before and after intervention

Performance indicator	Phase 1	Phase 2	*P*
Time on bypass	Nil	Nil	–
Average time to be seen – Category 2 (mins)	8.77 ± 8.33	9.24 ± 8.95	0.594
Triage Category 2 patients seen within 10 mins	76.9%	68.6%	0.074
Average time to be seen – Category 3 (mins)	35.06 ± 37.24	26.58 ± 25.4	< 0.001
Triage Category 3 patients seen within 30 minutes	58.6%	72.2%	< 0.001
Average time to be seen – Category 4 (mins)	50.14 ± 51.63	46.85 ± 41.71	0.031
Average time to be seen – Category 5 (mins)	40.17 ± 41.27	45.91 ± 40.09	0.405
Number of presentations	128.57 ± 12.39	121.07 ± 14.40	0.147
Admissions from emergency department	21.3%	22.7%	0.306
Time to ward admission	9.43 ± 8.06	7.28 ± 6.38	< 0.001
Admitted to ward within 8 hours	60.31%	74.54%	< 0.001
Admitted to ward within 12 hours	77.02%	91.12%	< 0.001

the 2 weeks when a scheduled break was encouraged, there was a significant increase in the number of breaks taken to 60.95% (Box 2). Doctors who took a break also reported a significantly lower subjective tiredness score ($P < 0.001$), while the objective fatigue scores were also lower when a break was taken, although not significant ($P = 0.065$). The responses from surveys sub-grouped by staff designation are presented in Box 2.

The daily total patient-to-doctor ratio for the entire period was 6.5 ± 1.2 per shift. The subjective level of fatigue did not appear to be related to the daily workload ($R^2 = 0.0056$), and neither were the objective fatigue severity scores ($R^2 = 0.0046$). Departmental performance during the study period is illustrated in Box 3. All Category 1 patients were seen immediately. Significant improvements were seen for Triage Category 2 and 3 waiting times as well as time to ward admissions.

Discussion

We have shown in this pilot study that in the majority of shifts worked doctors were taking insufficient breaks according to national and international codes. This may have contributed to significantly higher levels of tiredness at the end of the shift. We have also shown that simple rostering initiatives, without an increase in staffing levels, significantly improved the practice of taking regular breaks during a shift. This practice did not result in any adverse effects on departmental activity — to the contrary, some key performance indicators improved significantly.

The quantification of tiredness and fatigue remains a challenge and there are no standardised tools to measure these parameters. Furthermore, both fatigue and tiredness have multiple contributing factors such as personal/interpersonal issues and situations outside of the workplace. The tools we used, developed in patients with chronic medical problems, while unlikely to be as relevant to ED shift workers, still showed improvement in some areas.

It is commonly held that prolonged periods of work lead to reduced wellbeing, increased levels of sleepiness and decreases in performance.[6] Shift work can have adverse effects on physical and mental health, as well as social relationships and activities. Shift work has been shown to cause high levels of subjective sleepiness and fatigue, thereby increasing the possibility of falling asleep on the job and increasing the risk of workplace accidents.[7]

Fatigue-related adverse events in medicine have been well described.[8] Fatigue reduces performance and the effects have been previously described, showing concentration, data process-

ing and short-term memory significantly impaired.[9] The variability of performance increases, normal performance alternates with periods of poor work, and decisions are mixed with lapses in judgment. Performance declines sharply as the duration of a task increases, and fatigued workers sacrifice accuracy to speed.

Fatigue causes less performance decrement in workers with more control over their work because they can schedule non-urgent tasks for periods when they are at their best. Effort can compensate for fatigue, but as fatigue worsens the ability to summon an effort of concentration declines and the time for which it can be maintained shortens.[10] Fatigue frequently leads on to adverse events. Reports from the Quality in Australian Health Care Study[11] demonstrated that the second most frequent category of adverse events was wrong or delayed diagnosis. This situation is most likely to happen in the ED because of the intensity of decision making. With fatigue levels much higher in ED doctors who do not take breaks, it is important to implement a risk management strategy, that is, identify the foreseeable hazard in the workplace and apply appropriate control measures.

Short breaks have been shown to improve performance and decrease subjective fatigue in a range of workers from airline pilots to data entry personnel.[12-14] However, the importance of break scheduling and timely breaks is not emphasised among health care shift workers. The problem is widespread, including dentists,[15] surgeons[16] and nurses.[17] With current evidence highlighting the adverse effects of a continuous long shift, working without breaks represents an important occupational health and safety risk.

Attempts to increase current numbers of doctors taking breaks require an understanding of the reasons behind not taking breaks. It appears to be entrenched in the tradition of long working hours and impersonification of doctors as invincible human beings. This was further highlighted in this study by the consultant group who, although appearing most fatigued, were subjectively realising their level of tiredness at a much lower level. In designing a safer health system, the health organisation must develop a culture of safety such that an organisation's design process and workforce are focused on a clear goal — the improvement of health and safety of its workers. It is important that this risk management system involves management.

While employers have the primary duty of care, there is an employee duty to assist the employer in meeting health and safety obligations and to take reasonable care not to put themselves, or others, at risk. Translating this duty to the current issue, this would involve employees:

- Participating in education sessions to gain an understanding of the hazards of shiftwork and extended hours;
- Ensuring that breaks provided within shifts are used for rest and recuperation;
- Reporting incidents arising from hazards related to shiftwork and extended hours;
- Recognising signs of sleep deprivation or fatigue and the impact on themselves and others;
- Reporting to supervisors on circumstances in which fatigue and lack of sleep is impacting on individual wellbeing and patient care.

According to the risk management process set out in the Australia/New Zealand Standards on risk management,[18] we have established a context, identified a risk and analysed the current risk of high doctors' fatigue levels secondary to continuous work during a shift, as a high likelihood risk. The consequences in terms of patient safety and doctors' health are more difficult to quantify, but are likely to be of moderate consequence. In opting for a treatment strategy, we have successfully suggested and implemented a strategy to encourage breaks during ED shifts without incurring additional costs to the department. The continuation and proliferation of such strategies across EDs remain a challenge.

This study was limited in being a single-centre study over a short period of time. It is difficult to obtain identical periods of patient load in any ED, and although the patient load was lighter during Phase 2, it was not significantly different.

The participation rate in this research project by emergency staff was low.

Multiple reasons can be assumed for the low response rates. Non-response due to being too tired to fill out the survey would further strengthen the conclusions of this study. On the other hand, non-response due to a lack of interest could have biased the results either way. Given the limited sample population, it is unlikely that non-response was secondary to lack of awareness.

Recent studies have suggested that non-responsiveness rates do not necessarily alter survey estimates.[19] However, current rules of thumb of good survey practice dictate striving for a high response rate as an indicator of the quality of all survey estimates.[20] In follow-up studies, strategies to increase response rate could follow the recommendations by Edwards et al. in their recent Cochrane review[21] and include monetary incentives, recorded deliveries, envelope teasers, follow up questionnaires and institutional sponsorships, which were all associated with significantly higher participation rates.

Emergency department staff were poorly compliant with taking breaks during their shift. Facilitating shift breaks improved tiredness levels and was associated with improved departmental performance. Further studies are required to assess the possible impact of ensuring regular breaks for ED doctors on overall ED performance. More sophisticated tools for measuring endpoints, such as standardised tasks and further measures of quality control, could improve reliability of conclusions. Further studies over longer periods are required to provide further evidence regarding the importance of taking breaks.

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Competing interests

The authors declare that they have no competing interests.

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