

Shift work in hospitals: what are the effects on patient and employee outcomes?

The healthcare sector works around the clock and requires the availability of staff 24 hours a day. This means that shift work is an essential aspect of staffing hospital departments. However, concerns have been raised about the consequences of some shift patterns for both patient and staff. Although there is no “ideal” shift system, this brief reports on evidence of the effect of shift characteristics including the length of the shift, rotation and days off on patient and employee outcomes.

What is the problem?

Healthcare work is characterised by 24-h operations, so that shift work is a necessity for many hospital services. The efficient and effective deployment of staff to deliver this 24-h service poses many challenges.

In common with other healthcare systems, many UK hospitals are moving to shifts of 12 hours or longer as a strategy to reduce costs while maintaining or even enhancing quality. For staff, adopting these longer shifts offers a compressed week, meaning that the work-week is fitted into fewer days by extending daily hours. This change appears to allow organisations to achieve savings on staffing by moving from three to two shifts per day, reducing handovers, minimising overlap and extending the night shift, which often has lower staffing levels.

The introduction of 12-h shifts has raised concerns: long working hours are correlated with fatigue and decreased levels of alertness, potentially resulting in more adverse events [1, 2]. However, shift length is only one of the several shift characteristics that managers must consider when organising shift work. This review aims to give an overview of evidence relating to how patient and staff outcomes and organisational costs are affected by multiple aspects of shift work including:

- Shift length
- Weekly work hours
- Overtime
- Night work / rotating shifts
- Rest opportunities

Data sources

We searched MEDLINE, CINAHL, PsycINFO, SCOPUS, & the Cochrane Library using terms such as “shift work / pattern / length”, “work schedule” linked with terms such as “safety”, “error”, “satisfaction”, “burnout”, “quality”, “performance”, “efficiency”, “stress”. We identified extensive literature across many occupational groups. Most studies were cross-sectional, although a small number of intervention studies exist. Because of the range and diversity of literature, we selected three recent reviews focussing on shift work in nursing as core sources [3-5].

Shift length

Large international studies from Europe, the UK and the USA, report that when nurses work 12-h shifts or longer, they are more likely to report poor quality of nursing care and reduced patient safety [6-8]. There is evidence that 12-h shifts are associated with increased error rates [3] and increased levels of omitted nursing care [6]. This suggests that any direct cost savings from a 2 shift system could be offset by a loss of productivity and adverse outcomes.

Findings have come from a range of diverse inpatient nursing settings and studies correlating long shifts with increased fatigue and decreased alertness derive from a wide range of industries [4]. While performance deficits have been associated with all shifts longer than 8 hours, it is not clear that there is a consistent linear decline [6]. There is evidence that shift length effects may be job specific [4]. We found no economic evaluations of longer vs shorter shifts.

12-h shifts are preferred by some nurses, because they can benefit from more days off work and increased flexibility [9], although studies give a mixed picture. Although some studies have shown increased job satisfaction with longer shifts [9], larger and more recent studies from the UK and Europe indicate lower job satisfaction, increased burnout and intention to leave the job among those working longer shifts [10, 11]. These findings led authors to speculate that some nurses may be prepared to sacrifice job satisfaction for the personal benefits outside work [10]. None of the reviews cited recent quality evidence related to actual turnover or sickness rates. Limited and dated evidence suggests that educational opportunities may be reduced under 12-h shifts for both student nurses [12] and staff [13].

Other shift work factors

While there is clear evidence of potential risks associated with longer shifts and 12-h shifts in particular, few studies considered multiple shift work factors concurrently. This means that for some studies, results may be confounded or that factors not considered might mitigate adverse effects.

Overtime & weekly work hours

Nursing shift work in hospitals: what are the effects on patient and employee outcomes?

Studies on overtime report an association between overtime working and impairments of job performance, in terms of increased likelihood of making errors, reduced cognitive function and of reporting poor quality of care, patient safety and higher rates of missed care [6, 14, 15]. One study reported that voluntary paid overtime was also associated with increased odds of making errors [14]. This suggests that, despite staff having control and choice on the hours they work, extending work hours in order to increase income may not be an ideal strategy. Working more than 40 weekly hours is associated with a negative impact on nurses' job satisfaction and performance, including reports of errors and harms to both patients and staff [16]. Long working hours by nurses have been associated with increased mortality [17].

Night work

While night shifts are inevitable for a health service providing 24-h care, night work has been associated with disrupted performance and safety indicators when such shifts are done as part of a rotating shift schedule [18, 19]. However, results from another study suggest that working fixed night shifts, despite offering adaptation to these shifts on a cumulative basis, can be associated with increased job dissatisfaction [20].

Rest opportunities and breaks between shifts

Studies regarding rest opportunities within and between shifts are important determinants of fatigue and alertness although most evidence is from outside healthcare [4]. An increased number of "quick returns" between shifts (<11 hours between two consecutive shifts) appears to be associated with pathologic fatigue in nurses [21]. However, none of these studies were able to capture the quality of the rest breaks, in terms of activities performed when having a break or a day off.

Conclusions

Shift work is multifaceted. Much of the available evidence relates to the effect of 12-h nursing shifts. Because the evidence comes from observational studies, it would be wrong to make a firm conclusion that 12-h shifts cause harm. However, this evidence clearly establishes that there may be risks to both patient and staff wellbeing that increase as both daily and weekly working hours increase. There may also be a reduced efficiency as staff performance declines on longer shifts.

Research on the economic consequences of 12-h shifts is lacking, even though cost saving is a key motivator for their introduction. While some staff express clear preferences for 12-h shifts, the net effect on employee retention is uncertain.

Much like night shifts, long shifts may be necessary for operational reasons. Risks associated with *any* shift work need to be carefully managed and attention needs to be given to minimising other factors which may be associated with poor outcomes including:

- **Excess working hours and overtime**
- **Cumulative working hours with no rest days**
- **Missing breaks within shifts**
- **Short breaks between shifts**

Rosters need to be carefully managed and scrutinised, particularly when working long shifts. Staff should be enabled and encouraged to take planned breaks. Introducing fixed shift patterns / rosters with these risk factors minimised may represent an option to improve patient safety.

References

- [1] Barker LM, Nussbaum MA. Fatigue, performance and the work environment: a survey of registered nurses. *J Adv Nurs*. 2011;67:1370-82.
- [2] Geiger-Brown J, Rogers VE, Trinkoff AM, Kane RL, Bausell RB, Scharf SM. Sleep, sleepiness, fatigue, and performance of 12-hour-shift nurses. *Chronobiology international*. 2012;29:211-9.
- [3] Clendon J, Gibbons V. 12h shifts and rates of error among nurses: A systematic review. *International Journal of Nursing Studies*. 2015;52:1231-42.
- [4] Dall'Ora C, Ball J, Recio-Saucedo A, Griffiths P. Characteristics of shift work and their impact on employee performance and wellbeing: A literature review. *Int J Nurs Stud*. 2016;57:12-27.
- [5] Harris R, Sims S, Parr J, Davies N. Impact of 12 h shift patterns in nursing: A scoping review. *International Journal of Nursing Studies*. 2015;52:605-34.
- [6] Griffiths P, Dall'Ora C, Simon M, Ball J, Lindqvist R, Rafferty AM, et al. Nurses' shift length and overtime working in 12 European countries: The association with perceived quality of care and patient safety. *Medical Care*. 2014;52:975-81.
- [7] Stimpfel AW, Aiken LH. Hospital staff nurses' shift length associated with safety and quality of care. *Journal of Nursing Care Quality*. 2013;28:122-9.
- [8] Stimpfel AW, Lake ET, Barton S, Gorman KC, Aiken LH. How differing shift lengths relate to quality outcomes in pediatrics. *Journal of Nursing Administration*. 2013;43:95-100.
- [9] Stone PW, Du Y, Cowell R, Amsterdam N, Helfrich TA, Linn RW, et al. Comparison of nurse, system and quality patient care outcomes in 8-hour and 12-hour shifts. *Medical Care*. 2006;44:1099-106.
- [10] Dall'Ora C, Griffiths P, Ball J, Simon M, Aiken LH. Association of 12 h shifts and nurses' job satisfaction, burnout and intention to leave: Findings from a cross-sectional study of 12 European countries. *BMJ Open*. 2015;5.
- [11] Stimpfel AW, Sloane DM, Aiken LH. The longer the shifts for hospital nurses, the higher the levels of burnout and patient dissatisfaction. *Health Affairs*. 2012;31:2501-9.
- [12] Reid N, Todd C, Robinson G. Educational activities on wards under 12 hour shifts. *Int J Nurs Stud*. 1991;28:47-54.
- [13] McGettrick KS, O'Neill MA. Critical care nurses--perceptions of 12-h shifts. *Nursing in critical care*. 2006;11:188-97.
- [14] Olds DM, Clarke SP. The effect of work hours on adverse events and errors in health care. *Journal of Safety Research*. 2010;41:153-62.
- [15] Rogers AE, Hwang WT, Scott LD, Aiken LH, Dinges DF. The working hours of hospital staff nurses and patient safety. *Health Affairs* 2004;23:202-12.
- [16] Artazcoz L, Cortès I, Escrivà-Agüir V, Cascan L, Villegas R. Understanding the relationship of long working hours with health status and health-related behaviours. *Journal of Epidemiology and Community Health*. 2009;63:521-7.
- [17] Trinkoff AM, Johantgen M, Storr CL, Gurses AP, Liang Y, Han K. Nurses' work schedule characteristics, nurse staffing, and patient mortality. *Nursing research*. 2011;60:1-8.
- [18] Han K, Trinkoff AM, Geiger-Brown J. Factors associated with work-related fatigue and recovery in hospital nurses working 12-hour shifts. *Workplace Health and Safety*. 2014;62:409-14.
- [19] Niu SF, Chu H, Chen CH, Chung MH, Chang YS, Liao YM, et al. A Comparison of the Effects of Fixed- and Rotating-Shift Schedules on Nursing Staff Attention Levels: A Randomized Trial. *Biological Research for Nursing*. 2013;15:443-50.
- [20] Burch JB, Tom J, Zhai Y, Criswell L, Leo E, Ogoossan K. Shiftwork impacts and adaptation among health care workers. *Occupational Medicine*. 2009;59:159-66.
- [21] Flo E, Pallesen S, Moen BE, Waage S, Bjorvatn B. Short rest periods between work shifts predict sleep and health problems in nurses at 1-year follow-up. *Occupational and environmental medicine*. 2014;71:555-61.

This work should be cited as Dall'Ora, C & Griffiths P "Nursing shift work in hospitals: what are the effects on patient and employee outcomes?" (2017) Health Work Evidence Briefs, 2, University of Southampton. This publication is licensed under a creative commons attribution CC-BY (4.0) license. You may, copy, distribute, transmit or adapt the work under the condition that you attribute the work as specified but not in any way that suggests that we endorse the user or their use of the work. This research was funded by NHS Improvement. The views expressed are those of the authors and not necessarily those of the NHS or the Department of Health.