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12 Hour shifts amongst Healthcare Assistants: Systematic Review of the

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This report describes the findings of a systematic review conducted by the Institute of Mental Health which aimed to explore the existing evidence on the impact of Healthcare Assistants' (HCAs') working 12 hour shifts. This review considers the impact these shift patterns have upon patient care as well as the effects upon HCA staff both within and outside of work. The work was commissioned by NHS England (Midlands and East Region) as part of the Compassion in Practice programme.

The review is one part of a wider research program commissioned by NHS England (Midlands and East Region) into the impact of 12 hour shifts worked by HCAs. Another strand of the project consists of an exploratory interview study with HCAs completed by the Institute of Mental Health. This interview study fed into four stakeholder events delivered by NatCen Social Research at which a wider audience of HCAs and other stakeholder discussed the headline findings from this interview study. The outputs of these events will be described in a report by NatCen. A further area of the research programme, which is being conducted by the National Nursing Research Unit, looks at the impact of 12 hour shifts upon registered nurses and their patients.

Institute of Mental Health

Formed in 2006, the Institute of Mental Health (IMH) is a partnership between two highly respected organisations, namely Nottinghamshire Healthcare NHS Foundation Trust (NHT) and the University of Nottingham (UoN). It brings together the healthcare and education sectors to achieve 'Research Excellence for Innovation'. Housed since 2012 in a new dedicated building on UoN's Jubilee Campus, with over 200 staff and 21 Professors and Associate Professors, we also host the East Midlands Clinical Research Network, part of the East Midlands CLAHRC, East Midlands Leadership Academy and the East Midlands Academic Health Sciences Network.

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Abstract

Background

12 hour shifts are commonly worked by healthcare staff in the UK. However, much of the existing research on the outcomes of this shift length within healthcare has considered only Registered Nurses (RNs). Although much of the hands-on patient care is carried out by Healthcare Assistants (HCAs) comparatively little work has been done to examine the impact of 12 hour shifts upon HCAs. This systematic review sought to identify the extent and nature of the current evidence on the relationships between shift length, patient care and workforce impact amongst healthcare assistants.

Methodology

Systematic searches of ten online databases were carried out using search terms relating to unregistered healthcare workers and 12 hour shifts. Independent screening by two reviewers was conducted on titles, abstracts and full papers, using inclusion and exclusion criteria

Results

Of the 1380 titles identified through the searches, 12 satisfied all the inclusion criteria. These 12 final studies included 2 cohort designs, 7 cross-sectional designs, 1 qualitative study and 2 studies used a mixed methodology of cross-sectional survey and qualitative analysis. Eight of the studies included both registered and non-registered nurses within their sample populations. The study participants came from a wide variety of countries and regions: England (5), Northern Ireland (2), the Republic of Ireland (1), Brazil (1), the US (2) and across the whole of Europe (1). The primary outcomes evaluated were: quality of patient care; job satisfaction of healthcare assistants; other work-related outcomes. There were mixed findings between the studies, including between the better quality papers.

Conclusions

No consistent pattern of findings was found, with studies reporting both beneficial and negative impact of 12 hour shifts upon staff and patients. This is consistent with mixed findings for the impact of 12 hour shifts amongst RNs (Estabrooks et al, 2009), and may be due to the differences in the care setting and other factors in the workplace that influence the outcomes measured. Findings from the qualitative literature suggest that rotation patterns, self-rostering and steps to ameliorate the impact of longer shifts upon fatigue would be key factors.

Existing studies are generally quite dated, of poor design and used predominantly mixed samples of RNs and HCAs which does not allow for strong conclusions to be made of the impact of 12 hour shifts upon patient care or HCAs. Further well-designed studies are needed to provide more robust evidence of the impact of 12 hour shifts on patient care and HCA outcomes.

Introduction

1.1 Background

Many NHS trusts have now incorporated 12 hour shifts into their working practices. There are a variety of different scheduling patterns in which these have been implemented, including day and night shifts and alternating rotas. A survey of Royal College of Nursing members found that of those respondents working shifts (76%), 45% worked a 12 hour shift system and 55% 8 hour (Royal College of Nursing, 2008). Figures for healthcare assistants (HCAs) are unavailable but might be assumed to be broadly comparable. The impact of these long hours on the ability of healthcare staff to deliver compassionate care has recently been questioned (Cavendish Report, 2013).

Some of the negative outcomes that have been associated with 12 hour shifts in registered nurses (RNs) include tiredness and levels of alertness (Geiger-Brown et al 2012), mortality (Trinkoff et al., 2011), time spent of direct patient care (Reid et al., 1993) and overall poorer quality care (Stimpfel et al., 2013; Griffiths et al., 2014). Not all studies on RNs have found a significant difference in patient outcomes between shift patterns, however. Stone et al. (2006) examined various measures, including incident report data and nurses' perception of quality of care, and did not find significant differences between 8- and 12 hour shifts. It has also been noted previously that there are some advantages to 12 hour shift patterns. Josten et al. (2003) note that patients see fewer different faces each day, which may improve continuity of care and improved efficient through less handovers. A systematic review comparing 12 hour and 8 hour shifts amongst nurses concluded that the effect of shift length upon the quality of patient care could not be determined from the existing literature (Estabrooks et al., 2009). Similarly, a scoping review on the impact and effectiveness of 12 hour shifts in nursing found inconclusive evidence on their effect on five broad outcomes of risks to patients, patient experience, risks to staff, staff experience and impact on the organisation of work (Harris et al., 2015).

However, the majority of this previous research into shift length within healthcare has considered only RNs as the staff population of interest. Comparatively little work has been done to examine the impact of 12 hour shifts upon unregistered HCAs. Yet there are a number of key differences between these staffing groups which might moderate the impact of 12 hour rotas. RNs have a number of responsibilities, including administration of medication and other therapies, care planning, attending multidisciplinary meetings, and some supervisory and mentoring responsibilities (of HCAs, student nurses and junior nurses), that HCAs do not hold. HCAs meanwhile may take on more physical activities. These different types of workload may have a varying impact upon stress and fatigue for these healthcare workers. The work practices of RNs and HCAs may also differ to the degree that 12 hour shifts impact each in a different manner. For instance, variable shift patterns, self-rostering and flexible use of annual leave may differ between staffing groups. As part of a programme of research exploring the impact of 12 hour shifts within the health and social care sectors, this systematic review of the literature was performed looking at existing evidence on the relationships between shift length, patient care and workforce impact amongst healthcare assistants.

1.2 Review Question

This review aims to assess the evidence on the impact of shift length, in particular 12 hour shifts, upon patient care and HCA individual outcomes. The three research questions considered are whether 12 hour shifts amongst HCAs has any effect upon:

Quality of patient care

Staff well-being

2. Methods

This systematic review follows the guidance outlined by the Centre for Reviews and Dissemination (CRD). Literature searches were conducted from 1946 to January 2015.

2.1 Inclusion and exclusion criteria

Research design

All types of study design were included in the original search, as due to the wide-ranging nature of the topic the research evidence is likely to be made up of many different methods and approaches. All types of quantitative study, including cross-sectional, were included. Qualitative study designs, such as focus groups, interviews or non-participant observation were also considered.

Types of participants

Participants were defined as adults working as unregistered healthcare staff (healthcare assistants, unregistered nurses, nursing auxiliaries, nursing aides, support staff). Studies were excluded if the population included solely registered nurses but studies of mixed populations, including both registered and unregistered nursing staff, were retained.

Types of outcome measures

Any reported indices of patient care quality, other occupational-related outcomes or impact upon staff was considered relevant.

General characteristics

The studies could be performed in any country as long as the results were applicable to the UK health care system. There was no limitation on the time period of interest.

2.2 Literature search strategies

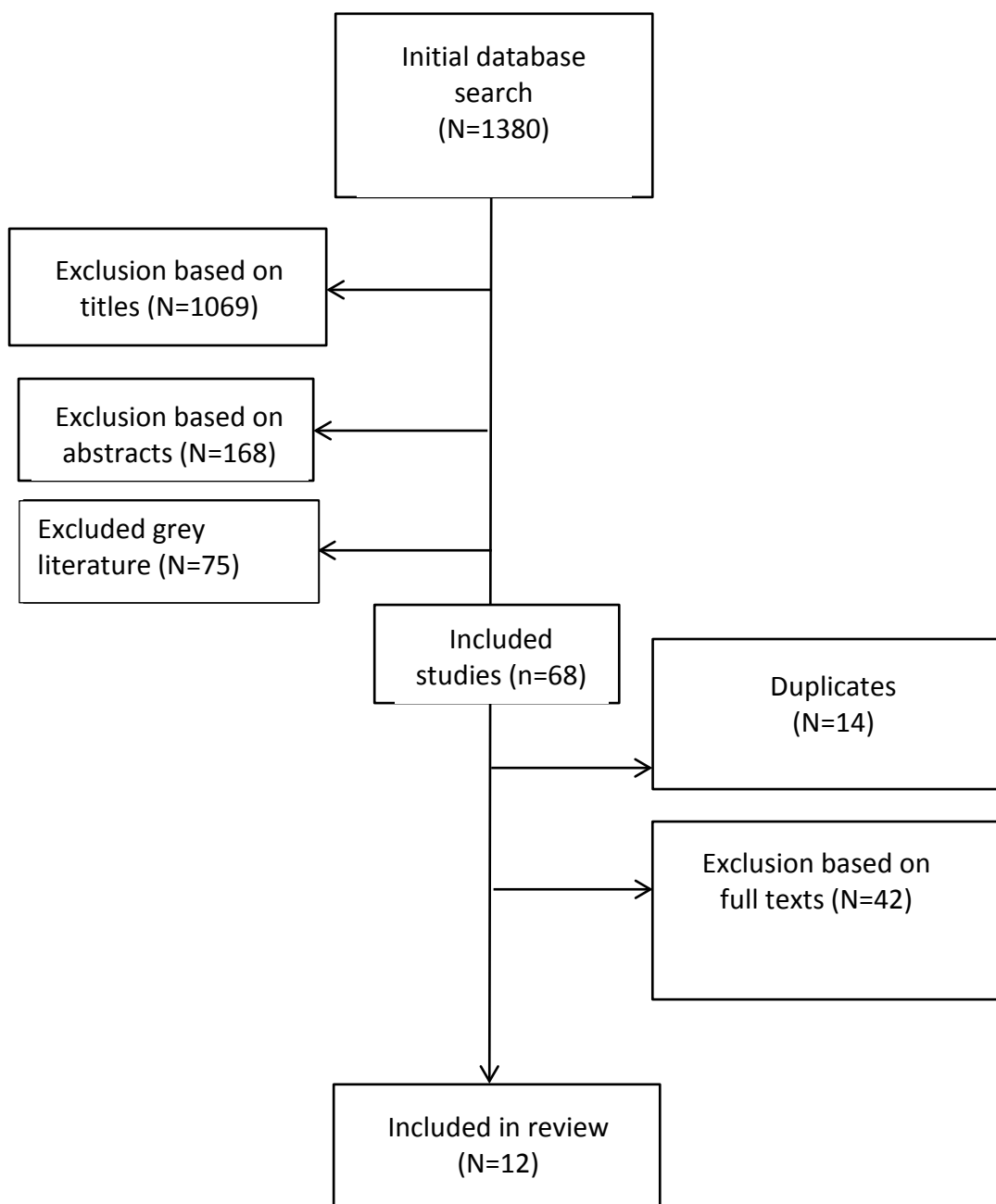
Attempts were made to identify all relevant studies regardless of publication status and search strategies were developed specifically for each database used. The search strategy is described in full in Appendix 1. The following databases were searched: Ovid(MEDLINE), Embase, PsychINFO, CINAHL (Ebsco), BNI (HDAS), HMIC (HDAS), AMED, ABI Inform (Proquest), Google Scholar, TRIP database, Open Grey. The following keywords, with the addition of relevant subject headings and truncation, were used :

Non-registered nurse related terms: non-registered nurse, health care assistant, healthcare assistant, health care support worker, nursing assistant, nursing aide, clinical support worker, nursing auxiliary

12 hour shift terms: 12 –hour shift, twelve hour shift, long days, long shifts

Screening of the titles of each reference was performed independently by two reviewers and non-relevant references and duplicates were discarded. In the second level of screening, abstracts of potentially relevant references were read and those that did not meet the inclusion criteria were excluded. In cases of disagreement, the full article was obtained, independently inspected, and inclusion criteria applied by the two reviewers. Disagreement was resolved through discussion and checked by a third reviewer where necessary. Justification for excluding studies from the review was recorded. Following this process, 68 articles were included for review.

Figure 1. Flow chart for the identification of studies



2.3 Final screening process

Following the screening process outlined above, the 68 included full articles were reviewed by a researcher as part of the data extraction process. Through this process, a further 41 articles were excluded for not having material or information relevant for the review and 14 were excluded as duplicates. The remaining 12 articles were included for data extraction. Of these, 2 studies used a mixed methodology, 9 used quantitative measures and 1 was qualitative. Eight of the studies included both registered and non-registered nurses within their sample populations. The sample characteristics for each study are detailed in Table 1.

Table 1. Staff sample characteristics of included studies

Author(s)	Staff group/setting	Non-registered nurses (sample %)
Burtney & Buchanan (2015)	Care assistants (nursing homes and homecare)	100%
Estry-Béhar et al. (2012)	All-grade nursing staff (hospitals, nursing homes and homecare)	17% of the British sample. For countries with available data, it was estimated that 18% of total sample were non-registered nurses.
Fischer et al. (2006)	All-grade nursing staff (hospital)	77% of the sample were either nursing aides or nurse technicians
Ganong et al. (1976)*	Nursing assistants (hospital)	100%
He (2013)	Nursing aides (nursing home)	100%
Hlatschwayo (2014)	Healthcare assistants (nursing homes and homecare)	100%
Hodgson (1995)	All-grade nursing staff (independent hospice)	18%
Richardson et al. (2003)	All-grade nursing staff (hospital)	Not stated
Richardson et al. (2007)	All-grade nursing staff (hospital)	3 of 9 focus group attendees. 8% of the survey respondents.
Todd (1989)	All-grade nursing staff (hospital)	Not stated
Todd (1993)	All-grade nursing staff (hospital)	40% (15% auxiliary nurses; 25% State Enrolled Nurses).
Wooton (2000)	All-grade nursing staff (hospital)	Not stated

* Part of a mixed nursing sample but with HCA results reported separately.

2.4 Quality Assessment

Two different tools were used to assess the quantitative and qualitative papers respectively, with the 2 mixed-methods papers assessed twice using both tools. The three qualitative papers included for review were assessed using tool for appraising qualitative research from the Critical Appraisal Skills Programme (CASP, 2013). The quality assessment scores are presented in Table 2.

Table 2: CASP Qualitative Research Checklist Scores for Journal Articles

Author	Year	Score(0-10)
Hodgson	1995	9
Richardson et al.	2007	8
Wooton	2000	8

The quantitative papers were assessed using a checklist adapted from a tool developed for a systematic review investigating the effects of hospital restructuring on staff nurses (Cummings and Estabrook, 2003; see Appendix 2).

Table 3. Quality appraisal checklist for quantitative observational studies

Author(s)	Year	Score (0-1)
Hlatschwayo	2014	0.44
Todd et al.	1989	0.44
Estry-Béhar et al.	2012	0.38
Fischer et al.	2006	0.31
He	2013	0.31
Todd et al.	1993	0.31
Wootton	2000	0.31
Burtney & Buchanan	2015	0.13
Richardson et al.	2003	0.06
Ganong et al.	1976	0.06
Richardson et al.	2007	0.06

Using the rating system developed by Cummings and Estabrooks (2003), whereby scores are grouped into weak (≤ 0.5), moderate (0.51 to 0.79) and strong (≥ 0.80), all of the studies included in this review can be described as of weak design. Although four of the studies included pre-post designs, collecting data before and after the introduction of 12 hour shifts, these study designs had other weaknesses such as low response rate, unclear selection criteria, unvalidated measures, no comparison group, no assessment of intervention delivery and implementation, no assessment of confounding variables, and single time measurements before and after the intervention.

2.5 Data Extraction

Data were extracted from each of the 12 included studies for any measure relating to the overall aim of the review. For data extraction and reporting purposes, the studies were divided into qualitative and quantitative papers. The 2 mixed-methods studies were included in both of these categories, leading to data extraction from 11 quantitative studies, and from 3 qualitative studies.

3. Quantitative Results

Table 4 summarises the features of the 11 studies reporting quantitative results, describing the study population, design, outcomes measured and results. The study participants came from the NHS in England in five of the studies, with the remaining studies based on samples from N. Ireland (2), from Ireland (1), Brazil (1), the US (2) and in one large study, the whole of Europe. Whilst most used a cross-sectional survey design at a single point in time, Todd et al (1989, 1993), Richardson et al. (2003) and Wootton et al. (2000) used longitudinal study designs collecting data at two time points. Different shift patterns were observed, but most included a 12 hour shift for comparison.

Table 4. Summary of Quantitative Papers

Author(s)	Study population	Design	Shift patterns	Outcomes/measures	Results
Burtney & Buchanan (2015)	Care workers in different social care settings (care homes, domiciliary, community day care) in the UK (n=131)	Cross-sectional online survey	<8 hour; >9 hour	Single items: impact on staff and quality of care	Mixed results for quality of care Longer shifts associated with staff fatigue
Estryn-Béhar et al. (2012)	Registered and unregistered nursing staff in different settings (hospitals, care homes and home care) across Europe (n=25,924; British respondents n=2,578).	Cross-sectional survey	Day 8 hour; Day 10 hour; Day 12 hour; Night 8 hour; Night 10 hour; Night 12 hour; alternating morning/afternoon<6 times/mth; alternating 12 hour day/night >6 times/mth	Quality of care: Work Ability Index (WAI). Impact on staff: Work-family conflict scale; Personal Burnout Scale of the Copenhagen Burnout Inventory; sick leave	Significant findings compared to part-time nurses: Nurses working 12 hour nights more frequently worry about making mistakes Night 10 hour and 12 hour nurses more likely to report burnout Day 8 hour, night 8 hour, night 10 hour and rotating morning/afternoon (<6) each more likely to be dissatisfied with work/private life and report lower well-being
Fischer et al. (2006)	Registered and unregistered nursing staff working in a hospital in Brazil (n=696)	Cross-sectional survey	6 hour day; 9 hour day; 12 hour night	WAI	12 hour nurses non-significantly more likely than 6 hour to have inadequate WAI but 9 hour have an even greater likelihood
Ganong et al. (1976)*	Nurse assistants working in a hospital in the US (n=24)	Cross-sectional survey	12 hour day; 12 hour night	Single items: impact on staff	12 hour shifts associated with sleep disruption
He (2013)	Female nursing aides in five long-term care facilities in the US Midwest. (n=54)	Cross-sectional survey	8 hour day; 8 hour evening; 8 hour night; 12 hour day; 12 hour night	Impact on staff: Quality of Worklife Questionnaire; Job Content Questionnaire; Dundee Stress State Questionnaire	No difference between 8 hour and 12 hour shifts on job satisfaction, motivation or fatigue
Hlatschwayo (2014)	Healthcare Assistants in nursing homes, residential homes and home care in Ireland (n=93)	Cross-sectional survey	1-5 hour all times of day; 6-8 hour; 9-12 hour	Impact on staff: Job satisfaction Survey scale; Job-related affective well-being scale	No significant differences found between shift lengths and job satisfaction or well-being
Richardson et al. (2003)	Registered and unregistered nurses working in 3 critical care units in an NHS Trust	Mixed methods. (1) Cross-sectional survey, 3 months	12 hour unspecified time of day. Previously 7.5 hour.	Single items: job satisfaction and quality of care; sickness rates, incident reports.	Mixed findings for quality of care Most nurses prefer to stay working 12 hour. No observed trend in sickness rates.

	(n=41)	after the implementation of 12 hour shifts from 8 hour and 10 hour. (2) Audit of hospital data at pre-post time points			
Richardson et al. (2007)	Registered and unregistered nurses working in 3 critical care units in an NHS Trust (n=147)	Cross-sectional survey	12 hour day, 12 hour night rotation system	Single items: quality of care, fatigue	Perceived improved quality of care under 12 hour Half report fatigue at the end of the shift
Todd et al. (1989)	Registered and unregistered nurses working in 2 hospitals (10 wards) in a Northern Irish town during implementation of 12 hour shifts (n=10 wards)	Pre-post design, ward-level measure taken 1 month prior to introduction of 12 hour shifts and 6 months following	8 hour and 12 hour day	MONITOR index of quality of care (ward-level measure)	Significantly lower quality of care scores following implementation of 12 hour shifts
Todd et al. (1993)	Registered and unregistered nurses working in 2 hospitals in a Northern Irish town during implementation of 12 hour shifts (n=320)	Pre-post cohort, 1 month prior to introduction of 12 hour shifts and 6 months following	8 hour and 12 hour day	Job satisfaction scale	Significantly lower job satisfaction following implementation of 12 hour shifts Significantly increased fatigue
Wooton (2000)	Registered, unregistered and student nurses working on an NHS ward	Pre-post analysis of hospital data 3 months before and 12 months during 12 hour shift pilot	7.5 hour; 12 hour, days and nights	Total care time: GRASP system	Total amount of care delivered increased during the 12 hour pilot period

3.1 Quantitative Studies

A number of different outcome measures were used by the studies reviewed. Five studies used previously validated scales. Two studies used the Work Ability Index (WAI: Tuomi et al., 1998); a self-report measure of covering an individual's current work ability compared with their lifetime best, their work ability in relation to the demands of the job, their diagnosed illnesses, their estimated impairment due to illness or limiting conditions, sick-leave, their own prognosis of their work ability in two years' time and an estimate of their mental resources (Estry-Béhar et al., 2012; Fischer et al., 2006). He (2013) measured job satisfaction, motivation and fatigue by combining three established scales (Quality of Worklife Questionnaire, Golden & Wiens-Tuers, 2005; Job Content Questionnaire, Karasek et al., 1998; Dundee Stress State Questionnaire, Matthews et al., 2002). Hlatschwayo (2014) used two previously validated scales: the Job-related affective well-being scale (Guerrero & Herrbach, 2008), and the Job satisfaction survey scale (Haggard et al., 2011). Todd et al. (1993) used a job satisfaction scale previously developed by Clark (1975) and validated on their own data.

Seven studies used un-validated measures. Todd et al. (1989) used the MONITOR index of quality of nursing care, a ward-level composite measure administered through participant observation covering care planning, the degree to which patients' physical and non-physical needs are met, and how nursing care objectives are evaluated with scores corresponding to a quality rating of 0-100%. Hospital data was used to calculate the total amount of care delivered (Wooton, 2000) as well as sickness rates and incident reports (Richardson et al. 2003). One study asked about care planning (Richardson et al., 2007) and other studies also used a number of measures that can be taken as proxies for quality of care. These include self-reports of the completion of duties (Burtney and Buchanan, 2015), staff worries about making mistakes (Burtney and Buchanan, 2015; Estry-Béhar et al., 2012) and motivation, concentration and irritability during work (Burtney and Buchanan, 2015, Richardson et al., 2007). Ganong (1976) used single items to measure job satisfaction and fatigue and Richardson et al. (2003) used single items to measure job satisfaction and quality of care.

3.2 Results from Quantitative Studies

For each outcome variable, the studies using pre-post measures (Todd et al. 1989; 1993) or hospital data (Richardson et al., 2003; Wooton, 2000) are presented first in recognition of their relatively stronger internal validity than the other cross-sectional studies.

Impact on quality of care

Three studies used pre-post designs to examine the impact of 12 hour shifts on patient care. In N. Ireland, Todd et al. (1989) found that quality of care on 10 wards significantly decreased 6 months after the introduction of 12 hour shifts with the total MONITOR score of quality falling from a median of 67.1% under the 8 hour system to 55.7% after the introduction of 12 hour shifts. There were also significant decreases across each of the MONITOR subscales: planning of nursing care reduced from 52.4% to 36.2%, catering for patients' non-physical needs reduced from 76.7% to 68.8% and evaluation of nursing care objectives fell from 55.9% to 40.6%. There was a further reduction in the subscale in catering for patients' physical needs which fell from 76.6% to 68.1% though this was only of trend-level significance.

Richardson et al. (2003) looked at the number of incident reports 3 months prior to, and 3 months during a 12 hour shift pilot in 3 NHS hospital wards and noted a marginal increase of 10 incidents to 12.

By contrast, Wooton (2000) analysed hospital data from an English NHS ward before and during a pilot adoption of 12 hour shifts and found that the total amount of care delivered to patients increased by 9% overall during the pilot period.

These three studies by Todd et al. (1989), Richardson et al. (2003) and Wooton (2000) provide the strongest data available for causal inference as measurements were taken before and after the introduction of 12 hour shifts. However, there remain significant weaknesses in the designs of these studies as described in section 2.4. And, whilst Todd et al. (1989) reports a clear deterioration in care following the introduction of 12 hour shifts in the 10 wards selected for their study, the hospital data considered by Richardson et al. (2003) and Wooton (2000) do not support this finding.

Five studies employed a cross-sectional survey design and self-report measures to investigate the perceptions of staff working different length shifts. The largest of these was conducted by Estryn-Béhar et al. (2012) which compared the results from part-time (<7 hours) registered and unregistered nurses with those working 8 hour, 10 hour and 12 hour shifts both during day and night-time schedules. Respondents from the UK were included in the sample but not reported separately. They found that only those nurses working 12 hour night shifts had a significantly increased likelihood of reporting more frequent worries about making work mistakes. There were no significant differences between part-time workers and any of the shift patterns in WAI scores.

Fischer et al. (2006) compared quality of care in Brazil between nurses (unregistered and registered) working 12 hour nights, 9h days and 6 hour day shifts. The authors' found that there was a significant difference in the proportions of those scoring inadequately on the WAI (defined as WAI<37) between these three shift patterns. In further analysis, those working both 12 hour nights and 9h days were significantly more likely to score inadequately on the WAI than 6 hour days, though nurses working 9h days had a higher likelihood of inadequate WAI scores than those on 12 hour nights.

Burtney and Buchanan (2015) examined the impact of shift length upon quality of care given by care assistants in the UK with mixed results. Whilst they found that 62% of care assistants believed that they were either 'always' or 'sometimes' more likely to make mistakes towards the end of a shift when working longer than 8 hours, 70% reported that the quality of care did not differ between 8 hour shifts and longer schedules. Meanwhile, when asked whether care quality differs at the end of an 8 hour shift compared to the close of longer shifts there were again mixed results with 43% believing that it did and 45% said that patient care did not vary between these time periods. In addition, half of respondents believed that working longer than 8 hours has an impact upon patient safety but only 19% said that they could not complete all their duties within an 8 hour shift. Two-thirds of staff (64%) stated that they felt more irritable either all or some of the time when working longer than 8 hours and a similar proportion (62%) said that they felt more motivated on the job when working 8 hours or less.

Richardson et al. (2003) found similarly mixed findings amongst a sample of registered and unregistered nurses in England. Roughly half of respondents reported that 12 hour shifts had positively affected patient care (54%), improving continuity of care (41%) and higher quality of handover (54%) whilst other respondents generally reported no change in these areas. However when the authors later surveyed staff working on the same wards, they found much more positive results with 89% stating that 12 hour shifts allow for good patient care planning, 78% that it provides opportunities to document care during a shift, 59% said that it ensures a good shift handover (with 35% being neutral). In terms of concentration 74% denied that working this long it makes it difficult to focus at work (Richardson et al., 2007).

Meanwhile, the majority of staff denied the possible disadvantages of 12 hour shift length with 87% disagreeing that it makes it difficult to prioritize patient care during a shift, 72% disagreeing that it makes it hard to remember events during a shift when completing the care plan evaluation and 83% disagreeing that it provides insufficient time for nurse-to-nurse handover at end of the shift. In terms of the impact upon work ability and functioning, there was a mixed response for maintaining motivation on the job, with 48% stating that 12 hour shifts make them more motivated and 37% neutral. This is consistent with He's (2013) finding that there was no significant differences in job motivation between nursing aides working 12 hour and 8 hour shifts in the US.

Staff fatigue, burnout and sick leave

Six studies looked at shift length and fatigue, two in social care settings and one in healthcare. Using a pre-post design Todd et al. (1993) found that registered and unregistered hospital nurses reported feeling significantly more mentally and physically tired 6 months after the introduction of 12 hour shifts than they had been previously on an 8 hour shift.

In the cross-sectional papers, from which causal inference is more difficult, the results were more varied. Estryn-Béhar et al. (2012) found that registered and unregistered nurses working 10 hour and 12 hour night shifts reported significantly increased rates of burnout compared to part-time nurses, though this was not the case for the day shifts. In smaller cross-sectional studies, Richardson et al. (England; 2007) found that half of registered and unregistered nursing staff (52%) reported feeling tired at the end of a 12 hour shift, rising to 60% after working two or more consecutive shifts. Ganong (US; 1976) found that 25% of hospital nursing assistants reported some level of sleep disruption whilst working 12 hour shifts.

Results from social care settings such as nursing homes are less consistent. Comparing nursing aides working 12 hour/day, 12 hour/night, 8 hour/day, 8 hour/evening, and 8 hour/night shifts in nursing homes He (US; 2013) found that ratings for 'energetic arousal' did not differ significantly between these five shift patterns. By contrast, in the survey conducted by Burtney and Buchanan (2015), 87% of care assistants stated that they were more likely to feel tired at the end of a longer working shift compared to working 8 hours or less.

Sick leave

Estryn-Béhar et al. (2012) found that compared to those nurses working 10 hour night shifts, those working 12 hour shifts which alternate between day and night schedules were more likely to report taking over 5 days of sick leave. However, when Richardson et al. (2003) looked at the average number of hours lost to nurse sickness absence for the 3 months before and 3 months during the introduction trial 12 hour shift period from a 7.5 hour shift they identified no notable change in sickness rates.

Job satisfaction

Todd et al. (1993) used a variety of measures to assess the change in registered and unregistered nurses' job satisfaction 6-months after the introduction of 12 hour shifts. Several of these measures indicated a significant decrease in satisfaction following the increase in shift length. Nurses felt that:

- it was a less satisfying occupation for an ambitious person,
- they would be more content in another occupation,
- nursing was more poorly paid, less exciting
- hours of work were bad and
- working conditions were poorer.

There were no significant differences between shorter and longer shift systems in the ways that respondents rated items indicating how proud they were to tell others they were nurses, their views

concerning opportunities for promotion, their chances to show initiative, the pleasantness of co-workers, the creativity of nursing, nor the security of nursing as a career.

Similarly, in the large European survey Estryn-Béhar et al. (2012) found that people working 10 hour and 12 hour night shifts had a significantly increased likelihood of stating their intention to change their work setting (though not to leave nursing) compared to part-time staff.

By contrast, He (2013) found no significant differences in job satisfaction among the nursing aides working 8 hour and 12 hour shifts. In a much smaller study restricted to care homes and home care in Ireland, Hlatschwayo (2014) found that healthcare assistants working 1-5 hour, 6-8 hour or 9-12 hour shifts did not significantly differ in their reported levels of job satisfaction.

Richardson et al. (2003) asked registered and unregistered nursing staff about their perceptions of 12 hour shifts and found that 83% believed that these shifts were 'sufficiently flexible' while 85% stated that they would prefer to continue on 12 hour shifts rather than returning to their previous 8 hour shift pattern. A similar percentage of nursing staff in the cross-sectional survey conducted by Wooton (2000) stated their preference to continue 12 hour shifts rather than return to a previous 8 hour pattern (79%).

Personal well-being

Estryn-Béhar et al. (2012) found that registered and unregistered nurses working 8 hour and 10 hour nights and those on a pattern of alternating mornings/afternoons under 6 times per month were significantly more likely to report lower well-being than those working part-time. Again, Hlatschwayo (2014) found no significant relationship between working hours and job-related affective well-being in community settings.

Work-life balance

Todd et al. (1993) reported several items indicating that the work-life balance of registered and unregistered nursing staff had worsened after the introduction of 12 hour shifts. These results include significant changes in the following ways:

- nurses felt that they had to put their personal lives second more often,
- they had less time with their families,
- housework was harder to manage, and
- arranging childcare was more difficult.

Estryn-Béhar et al. (2012) also found that nurses working 8 hour and 10 hour nights and those working patterns which alternated between morning and afternoon schedules were significantly more likely to report dissatisfaction with their work-life balance when compared to part-time nurses.

4. Qualitative Results

4.1 Qualitative Studies

Three studies included qualitative approaches. In the context of a UK hospice (non-NHS) Hodgson et al. (1995) conducted retrospective interviews with 11 staff who had experienced a change to longer shifts. Wooton (2000) used a similar retrospective interview approach as part of a mixed-methods evaluation of a change in shift patterns for 12 NHS cardiology personnel, while Richardson et al. (2007) used a focus group of 9 participants from three units to contribute to their cross-sectional study. The small size and highly specific context of these three qualitative perspectives means that general inferences cannot be drawn from them. They may however serve to highlight important issues for discussion, as well as variations between different settings.

Table 5. Summary of qualitative papers

Author(s)	Study population	Design	Shift patterns	Summary conclusions
Hodgson (1995)	All permanent staff working 12 hour shifts in an independent UK hospice (n=11)	Cross-sectional, open question survey conducted 14 months after implementation of 12 hour shift pattern	6-week rotating system: 4 weeks 12 hour day, 2 weeks 12 hour night	Perceived advantages (continuity of care, more time off) outweighed the disadvantages (fatigue)
Richardson et al. (2007)	Junior nurses and HCAs working 12 hour shifts on three critical care units in an NHS Trust (n=9)	Focus group	12 hour day, 12 hour night rotation system	Improved relationships with patients and families Continuity of care through less handovers Tiredness towards the end of the shift.
Wooton (2000)	All registered and unregistered nursing and student staff on an NHS cardiology nursing development ward (n=20)	Cross-sectional open question survey during a 12 month pilot period of 12 hour shifts instead of 7.5 hour	12 hour day; 12 hour night	Improved continuity of care Tiredness during and after the shift, impacting quality of care

4.2 Results from Qualitative Studies

Quality of care

Hodgson (1995) identified both advantages and disadvantages of 12 hour shift systems in a hospice context, though concluded that on balance longer shifts were beneficial to patient care. Continuity of care and being able to deliver 'total patient care' was improved, as were handovers (Hodgson, 1995). By contrast, some of the drawbacks highlighted that continuity of care can be hampered by the longer periods of time off between shifts and similarly that handovers could be more problematic with communication issues between rota teams.

In critical care units, Richardson et al. (2007) found that 12 hour shifts helped improve the planning of patient care, as well as improving staff relationships with patients and families.

Wooton (2000) identified a number of specific improvements in quality of care associated with 12 hour shifts. These included drug rounds being performed on time, less handover time, specific needs being fully catered for, more time to plan and prioritize workload and improved nurse-patient relationships. There was some indication that quality of care could deteriorate as tiredness increased towards the end of a shift or stretch of shifts.

Work-life balance

The most frequently reported advantage to 12 hour shifts was the additional free time off from work (Hodgson, 1995; Richardson et al., 2007). Common complaints related to irregular shift patterns meaning that staff were unable to plan evening or weekend activities (Hodgson, 1995). When asked about how 12 hour shifts could be improved nurses commented that they would like to see transparent written guidelines on how shifts could be self-rostered introduced (Richardson et al., 2007).

Staff fatigue, burnout and sick-leave

Tiredness and fatigue was the main issue affecting staff working 12 hour shift patterns. Half of those interviewed by Hodgson (1995) reported feeling tired after longer shifts. Wooton (2000) also found that tiredness during the night shift adversely affected some respondents. Fatigue was exacerbated by increased workload, a fall in staff numbers from five to two after handover and less time to sleep between night shifts. Most staff preferred to work three shifts in a row (i.e. three-day shifts or three-night shifts) because this allowed adequate time to recover between stretches of shifts (Wooton, 2000). None of the studies reported in detail how fatigue might subsequently be affecting patient care or the general well-being of HCAs.

5. Discussion

The studies identified in this review have reported decidedly mixed findings. First, considering length of shift as an independent factor, no consistent pattern has emerged for patient care outcomes. Studies have variously reported care has improved, declined or that there has been no change. Part of the reason for this disparity is very likely to be the heterogeneity in study design and outcome measures used in the studies included in this review, as well as the variance introduced by the wide variety of settings in the studies and the effect of other factors present in those settings, for example; variability in staffing levels. Studies have also taken place in very different time periods, from the 1970's to today, during which time healthcare settings, the nature of healthcare tasks, and patient acuity and dependency, have changed dramatically which may also have had an impact upon results.

Similarly, results for the impact of 12 hour shift on the job satisfaction and work-life balance of HCAs have not been consistent either with some studies reporting an improvement in these areas and other finding no significant difference. Some of the benefits associated with 12 hour shifts, such as the increased numbers of days off work, are more widely reported.

The one convergent finding from this review is that 12 hour shifts are consistently associated with higher levels of fatigue amongst staff. Though as per the mixed findings for patient and staff outcomes, the resultant impact of this fatigue is not universally reported as being detrimental.

The studies with the strongest internal validity also did not provide consistent results. The 2 pre-post studies conducted by Todd et al. (1989; 1993) reported significantly poorer outcomes in patient care, job satisfaction, fatigue and work-life balance amongst all nursing staff 6 months following the introduction of 12 hour shifts. Whilst the pre-post audits of hospital data before and after the introduction of 12 hour shifts did not identify any clear change in incident reports or sickness rates amongst nurses (Richardson et al., 2003) and there was even an increase in total patient care time (Wooton, 2000). Whilst these studies adopted stronger designs, they still had considerable methodological weaknesses, so their results should be interpreted with caution in light of these.

One possible factor behind the mixed results from different studies is that the effect of 12 hour shifts will be localised according to other organisational features. One of the few studies to examine various different shift schedules was Estryn-Béhar et al. (2012). The results of this study were drawn from large samples (with correspondingly high statistical power) in various healthcare settings across Europe and were adjusted for a variety of work-related variables. Hence the findings give a reasonable indication of the impact of shift length itself as an independent predictor. The findings from this study suggested that the shifts with the most deleterious impact upon measures of quality of care, staff well-being and work-life balance were night shifts of different lengths and rotating shift patterns. These results might suggest that it is not the length of the shift per se that matters but that shift length may have an impact alongside certain moderating factors (such as night shifts and irregular rotas). The importance of how other working practices mediate the effect of 12 hour shifts

is further suggested in the qualitative studies wherein participants suggest that it is the scheduling rather than the length of shifts which has the most overall impact.

Thus the results from the better quality studies indicate that there can be some negative effects from 12 hour shifts, though only in certain contexts when mediated by a number of other factors. Some important factors emerging from the literature include the timing of shifts (with night shifts appearing most detrimental), some flexibility in organising rotas, and steps to ameliorate fatigue (e.g. taking regular breaks). Nevertheless, given the wide range of dates, countries, measures, staff groups and work settings featured by studies included in this review, it is very hard to draw any firm conclusions of the impact of 12 hour shifts upon HCA or the patients they care for.

Limitations

One of the main limitations of this review concerns the sample populations included in the literature and their applicability to HCAs working in the UK. Most importantly, only 3 studies used samples consisting exclusively of unregistered nursing staff. Due the limited breadth of the literature, this review included mixed samples with varying ratios of registered to unregistered nurses though there may be significant differences in the impact of 12 hour shifts upon these staffing groups. In addition, 5 of the 13 studies were conducted outside of the UK and given the importance of contextual working practices upon the impact of 12 hour shifts, it is unclear how directly the results of these studies will translate to the 12 hour shift systems operated by NHS Trusts. Moreover, none of the three studies of unregistered nursing personnel were conducted in the UK. Finally, 2 of the papers targeted staff working in social care settings rather than healthcare settings and there are important differences in working practice here as well.

The results from the older studies may equally not be transferable to HCA working in England today. Some of the studies date back over 20 years and healthcare systems and roles in the NHS have changed considerably over this time. The work environment for HCAs has become much more pressurised in recent years which may affect how longer shift lengths impact upon staff and patients.

The quality of the papers included in this review is also generally quite low, with the majority of the literature consisting of cross-sectional surveys and many of these reporting only descriptive statistics. It is impossible to infer any causal relationships from the available literature and without controlling for likely confounders it is difficult to conclude even what the independent effects of 12 hour shifts might be, if any. The cross-sectional nature of the literature, along with the fact that many of the papers used self-report items from a sample group working a single shift pattern rather than multiple shift lengths simultaneously, means that measures comparing 8 hour and 12 hour shifts often relied on respondents' recall of working different shift lengths. This may partly explain the differences in quality of care reported in studies of the same wards by Richardson et al. (2003) and Richardson et al. (2007) for instance.

Finally, many of the studies which measured staff attitudes to 12 hour shifts either through small ward-based surveys or interviews may have been biased if they believed that their anonymity might be at risk or if they perceived the interviewer to be working for their employer.

6. Conclusion

This review aimed to assess the current level of evidence for associations between shift length, patient care and staff outcomes amongst HCAs. Existing studies are generally quite dated, of poor design and used predominantly mixed samples of RNs and HCAs which does not allow for strong conclusions to be made of the impact of 12 hour shifts upon patient care or HCAs.

There were mixed findings between the studies, including those adopting a stronger research design. One possibility for this is that longer shift patterns can have either a beneficial or negative impact upon staff and patients depending on a variety of different contextual factors. This is consistent with mixed findings for the impact of 12 hour shifts amongst RNs (Estabrooks et al, 2009). Implementation of different length shifts for HCAs should therefore be conducted with reference to other working practices. Findings from the qualitative literature suggest that rotation patterns, self-rostering and steps to ameliorate the impact of longer shifts upon fatigue would be key factors. Again, however, there is not sufficient evidence in the current literature to suggest which settings would be most suitable for shifts of longer time durations.

It is clear that there is currently a paucity of research into 12 hour shift patterns amongst HCAs and therefore a lack of evidence as to the impact longer shifts might have within this staff group. Most studies have only considered the impact for RNs, with a smaller literature considering mixed samples of both RNs and HCAs. Only three studies were identified that reported results for the HCA population exclusively, each were of poor design and none of these were conducted in the UK. The 12 hour shift is very prevalent in healthcare settings and given that there is presently no robust evidence into the impact of longer HCA shifts in the UK there is a clear need for high quality research into the effect of these shift patterns on patient care and the HCA workforce.

As part of their research program into 12 hour shifts NHS England (Midlands and East Region) have also commissioned a study to conduct interviews with HCA staff currently working this length of shift in England. It will include HCAs working in a variety of different settings and will directly address questions of the impact on longer shifts upon staff themselves as well as patient care. Given the current lack of evidence on these outcomes, this further study will be important for informing health service management as well as future research.

For further information on the interview study and to find additional research reports on 12 hour shifts please go to: <http://www.england.nhs.uk/6cs/groups/safe-staffing/>

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7. Appendix 1: Search Strategy

Database: Ovid MEDLINE(R) <1946 to February Week 1 2015> 05-02-15

Search Strategy:

- 1 "12 hour shift\$.tw. (190)
- 2 "twelve hour shift\$.tw. (27)
- 3 ("12" adj4 shift\$.tw. (982)
- 4 (twelve adj4 shift\$.tw. (52)
- 5 "12 hour work\$.tw. (22)
- 6 "twelve hour work\$.tw. (1)
- 7 "long shift\$.tw. (36)
- 8 "long day\$.tw. (2328)
- 9 or/1-8 (3395)
- 10 Nurses' Aides/ (3588)
- 11 ("healthcare assistant\$" or "health care assistant\$" or "health care support worker\$").tw. (375)
- 12 "clinical support worker\$.tw. (7)
- 13 "nurs\$ aid\$.tw. (1061)
- 14 "nurs\$ assistant\$.tw. (1253)
- 15 (orderly or orderlies).tw. (4071)
- 16 "auxiliary nurse\$.tw. (228)
- 17 "nursing auxiliar\$.tw. (146)
- 18 "non registered nurs\$.tw. (9)
- 19 "nonregistered nurs\$.tw. (3)
- 20 "unregistered nurs\$.tw. (3)
- 21 "assistant practitioner\$.tw. (29)
- 22 "Personnel Staffing and Scheduling"/ (14322)
- 23 or/10-22 (23445)
- 24 9 and 23 (165)

Database: Embase <1974 to 2015 February 04> 05-02-15

Search Strategy:

- 1 "12 hour shift\$.tw. (237)
- 2 "twelve hour shift\$.tw. (34)
- 3 ("12" adj4 shift\$.tw. (1292)
- 4 (twelve adj4 shift\$.tw. (71)
- 5 "12 hour work\$.tw. (24)
- 6 "twelve hour work\$.tw. (3)
- 7 "long shift\$.tw. (57)
- 8 "long day\$.tw. (2488)
- 9 or/1-8 (3904)
- 10 nursing assistant/ (3873)
- 11 ("healthcare assistant\$" or "health care assistant\$" or "health care support worker\$").tw. (531)
- 12 "clinical support worker\$.tw. (14)
- 13 "nurs\$ aid\$.tw. (1227)
- 14 "nurs\$ assistant\$.tw. (1548)
- 15 (orderly or orderlies).tw. (5151)
- 16 "auxiliary nurse\$.tw. (259)
- 17 "nursing auxiliar\$.tw. (168)
- 18 "non registered nurs\$.tw. (10)
- 19 "nonregistered nurs\$.tw. (1)

- 20 "unregistered nurs\$.tw. (5)
- 21 "assistant practitioner\$.tw. (45)
- 22 personnel management/ (50574)
- 23 or/10-22 (61055)
- 24 9 and 23 (126)

Database: PsycINFO <1806 to February Week 1 2015> 05-02-15

Search Strategy:

-
- 1 "12 hour shift\$.tw. (39)
 - 2 "twelve hour shift\$.tw. (8)
 - 3 ("12" adj4 shift\$.tw. (254)
 - 4 (twelve adj4 shift\$.tw. (17)
 - 5 "12 hour work\$.tw. (8)
 - 6 "twelve hour work\$.tw. (1)
 - 7 "long shift\$.tw. (15)
 - 8 "long day\$.tw. (387)
 - 9 or/1-8 (667)
 - 10 ("healthcare assistant\$" or "health care assistant\$" or "health care support worker\$").tw. (99)
 - 11 "clinical support worker\$.tw. (2)
 - 12 "nurs\$ aid\$.tw. (395)
 - 13 "nurs\$ assistant\$.tw. (567)
 - 14 (orderly or orderlies).tw. (1963)
 - 15 "auxiliary nurse\$.tw. (52)
 - 16 "nursing auxiliar\$.tw. (35)
 - 17 "non registered nurs\$.tw. (5)
 - 18 "nonregistered nurs\$.tw. (1)
 - 19 "unregistered nurs\$.tw. (2)
 - 20 "assistant practitioner\$.tw. (7)
 - 21 work scheduling/ (1285)
 - 22 or/10-21 (4378)
 - 23 9 and 22 (17)

CINAHL (EBSCO) 05-02-15

- S25 S9 AND S24 (1,015)
- S24 S10 OR S11 OR S12 OR S13 OR S14 OR S15 OR S16 OR S17 OR S18 OR S19 OR S20 OR S21 OR S22 OR S23 (39,735)
- S23 (MH "Personnel Staffing and Scheduling") (14,199)
- S22 (MH "Health Personnel, Unlicensed") (2,309)
- S21 TX "assistant practitioner*" (695)
- S20 TX "unregistered nurs*" (81)
- S19 TX "nonregistered nurs*" (7)
- S18 TX "non registered nurs*" (89)
- S17 TX "nursing auxiliar*" (625)
- S16 TX "auxiliary nurse*" (547)
- S15 (MH "Nursing Assistants") (5,083)
- S14 TX (orderly or orderlies) (2,872)
- S13 TX "nurs* assistant*" (10,750)
- S12 TX "nurs* aid*" (5,274)
- S11 TX "clinical support worker*" (114)

S10 TX ("healthcare assistant*" OR "health care assistant*" OR "health care support worker*")
(7,228)

S9 S1 OR S2 OR S3 OR S4 OR S5 OR S6 OR S7 OR S8 (4,277)

S8 TX "long day*" (824)

S7 TX "long shift*" (659)

S6 TX "twelve hour work*" (2)

S5 TX "12 hour work*" (44)

S4 TX (twelve N4 shift*) (172)

S3 TX (12 N4 shift*) (2,823)

S2 TX "twelve hour shift*" (141)

S1 TX "12 hour shift*" (1,917)

BNI (HDAS) 05-02-15

Search History:

1. BNI; "12 hour shift*".af; 116 results.
2. BNI; "twelve hour shift*".af; 3 results.
3. BNI; ("12" adj4 shift*).af; 76 results.
4. BNI; (twelve adj4 shift*).af; 3 results.
5. BNI; "12 hour work*".af; 347 results.
6. BNI; "twelve hour work*".af; 9 results.
7. BNI; "long shift*".af; 143 results.
8. BNI; "long day*".af; 523 results.
9. BNI; 1 OR 2 OR 3 OR 4 OR 5 OR 6 OR 7 OR 8; 1031 results.
10. BNI; HEALTH CARE ASSISTANTS/; 1875 results.
11. BNI; ("healthcare assistant*" OR "health care assistant*" OR "health care support worker*").af; 3641 results.
12. BNI; "clinical support worker*".af; 157 results.
13. BNI; "nurs* aid*".af; 5702 results.
14. BNI; "nurs* assistant*".af; 4453 results.
15. BNI; (orderly OR orderlies).af; 10 results.
16. BNI; "nursing auxiliar*".af; 89 results.
17. BNI; "auxiliary nurse*".af; 62 results.
18. BNI; "non registered nurs*".af; 148 results.
19. BNI; "nonregistered nurs*".af; 0 results.
20. BNI; "unregistered nurs*".af; 21 results.
21. BNI; "assistant practitioner*".af; 551 results.
22. BNI; 10 OR 11 OR 12 OR 13 OR 14 OR 15 OR 16 OR 17 OR 18 OR 19 OR 20 OR 21; 10508 results.
23. BNI; 9 AND 22; 67 results.

HMIC (HDAS) 05-02-15

Search History:

1. HMIC; "12 hour shift*".af; 37 results.
2. HMIC; "twelve hour shift*".af; 9 results.
3. HMIC; ("12" adj4 shift*).af; 53 results.
4. HMIC; (twelve adj4 shift*).af; 14 results.
5. HMIC; "12 hour work*".af; 0 results.
6. HMIC; "twelve hour work*".af; 0 results.
7. HMIC; "long shift*".af; 5 results.
8. HMIC; "long day*".af; 9 results.
9. HMIC; 1 OR 2 OR 3 OR 4 OR 5 OR 6 OR 7 OR 8; 73 results.
11. HMIC; HEALTH CARE ASSISTANTS/; 378 results.

12. HMIC; ("healthcare assistant*" OR "health care assistant*" OR "health care support worker*").af; 520 results.
13. HMIC; "clinical support worker*".af; 10 results.
14. HMIC; "nurs* aid*".af; 57 results.
15. HMIC; "nurs* assistant*".af; 166 results.
16. HMIC; (orderly OR orderlies).af; 40 results.
17. HMIC; "nursing auxiliar*".af; 118 results.
18. HMIC; "auxiliary nurse*".af; 24 results.
19. HMIC; "non registered nurs*".af; 9 results.
20. HMIC; "nonregistered nurs*".af; 0 results.
21. HMIC; "unregistered nurs*".af; 2 results.
22. HMIC; "assistant practitioner*".af; 38 results.
25. HMIC; NURSES/; 12076 results.
28. HMIC; 11 OR 12 OR 13 OR 14 OR 15 OR 16 OR 17 OR 18 OR 19 OR 20 OR 21 OR 22 OR 25; 12745 results.
29. HMIC; 9 AND 28; 38 results.

Database: AMED (Allied and Complementary Medicine) <1985 to January 2015> 05-02-15

Search Strategy:

-
- 1 "12 hour shift\$.tw. (1)
 - 2 "twelve hour shift\$.tw. (0)
 - 3 ("12" adj4 shift\$.tw. (13)
 - 4 (twelve adj4 shift\$.tw. (2)
 - 5 "12 hour work\$.tw. (1)
 - 6 "twelve hour work\$.tw. (0)
 - 7 "long shift\$.tw. (0)
 - 8 "long day\$.tw. (5)
 - 9 or/1-8 (20)
 - 10 ("healthcare assistant\$" or "health care assistant\$" or "health care support worker\$").tw. (16)
 - 11 "clinical support worker\$.tw. (0)
 - 12 "nurs\$ aid\$.tw. (38)
 - 13 "nurs\$ assistant\$.tw. (50)
 - 14 (orderly or orderlies).tw. (24)
 - 15 "auxiliary nurse\$.tw. (2)
 - 16 "nursing auxiliar\$.tw. (3)
 - 17 "non registered nurs\$.tw. (0)
 - 18 "nonregistered nurs\$.tw. (0)
 - 19 "unregistered nurs\$.tw. (0)
 - 20 "assistant practitioner\$.tw. (5)
 - 21 or/10-20 (135)
 - 22 9 and 21 (0)

ABI Inform (Proquest) 05-02-15

Searched for: ("12 hour shift*" OR "twelve hour shift*" OR ("12" NEAR/4 shift*) OR (twelve NEAR/4 shift*) OR "12 hour work*" OR "twelve hour work*" OR "long shift*" OR "long day*") AND ("healthcare assistant*" OR "health care assistant*" OR "health care support worker*" OR "clinical support worker*" OR "nurs* aid*" OR "nurs* assistant*" OR orderly OR orderlies OR "auxiliary nurse*" OR "nursing auxiliar*" OR "non registered nurs*" OR "nonregistered nurs*" OR "unregistered nurs*" OR "assistant practitioner*")

Databases: ABI/INFORM Global
Results: 348

Web of science 05-02-15

23 173 #22 AND #9
Timespan=All years
Search language=Auto
22 Approximately
77,692 #21 OR #20 OR #19 OR #18 OR #17 OR #16 OR #15 OR #14 OR #13 OR #12 OR #11 OR #10
Timespan=All years
Search language=Auto
21 Approximately
14,719 TOPIC: ("Personnel Staffing and Scheduling") OR TITLE: ("Personnel Staffing and Scheduling")
Timespan=All years
Search language=Auto
20 28 TOPIC: ("assistant practitioner\$") OR TITLE: ("assistant practitioner\$")
Timespan=All years
Search language=Auto
19 0 TOPIC: ("unregistered nurs\$") OR TITLE: ("unregistered nurs\$")
Timespan=All years
Search language=Auto
18 0 TOPIC: ("nonregistered nurs\$") OR TITLE: ("nonregistered nurs\$")
Timespan=All years
Search language=Auto
17 0 TOPIC: ("non registered nurs\$") OR TITLE: ("non registered nurs\$")
Timespan=All years
Search language=Auto
16 0 TOPIC: ("nursing auxiliar\$") OR TITLE: ("nursing auxiliar\$")
Timespan=All years
Search language=Auto
15 134 TOPIC: ("auxiliary nurse\$") OR TITLE: ("auxiliary nurse\$")
Timespan=All years
Search language=Auto
14 Approximately
59,819 TOPIC: ((orderly or orderlies)) OR TITLE: ((orderly or orderlies))
Timespan=All years
Search language=Auto
13 1,004 TOPIC: ((nurs\$ NEAR/1 assistant\$)) OR TITLE: ((nurs\$ NEAR/1 assistant\$))
Timespan=All years
Search language=Auto
12 519 TOPIC: ((nurs\$ NEAR/1 aid\$)) OR TITLE: ((nurs\$ NEAR/1 aid\$))
Timespan=All years
Search language=Auto
11 0 TOPIC: ("clinical support worker\$") OR TITLE: ("clinical support worker\$")
Timespan=All years
Search language=Auto
10 142 TOPIC: (("healthcare assistant\$" or "health care assistant\$" or "health care support worker\$")) OR TITLE: (("healthcare assistant\$" or "health care assistant\$" or "health care support worker\$"))
Timespan=All years

Search language=Auto
 # 9 Approximately
 25,019 #8 OR #7 OR #6 OR #5 OR #4 OR #3 OR #2 OR #1
 Timespan=All years
 Search language=Auto
 # 8 Approximately
 16,390 TOPIC: ("long day\$") OR TITLE: ("long day\$")
 Timespan=All years
 Search language=Auto
 # 7 32 TOPIC: ("long shift\$") OR TITLE: ("long shift\$")
 Timespan=All years
 Search language=Auto
 # 6 0 TOPIC: ("twelve hour work\$") OR TITLE: ("twelve hour work\$")
 Timespan=All years
 Search language=Auto
 # 5 12 TOPIC: ("12 hour work\$") OR TITLE: ("12 hour work\$")
 Timespan=All years
 Search language=Auto
 # 4 124 TOPIC: ((twelve NEAR/4 shift\$)) OR TITLE: ((twelve NEAR/4 shift\$))
 Timespan=All years
 Search language=Auto
 # 3 Approximately
 8,330 TOPIC: (("12" NEAR/4 shift\$)) OR TITLE: (("12" NEAR/4 shift\$))
 Timespan=All years
 Search language=Auto
 # 2 14 TOPIC: ("twelve hour shift\$") OR TITLE: ("twelve hour shift\$")
 Timespan=All years
 Search language=Auto
 # 1 158 TOPIC: ("12 hour shift\$") OR TITLE: ("12 hour shift\$")
 Timespan=All years
 Search language=Auto

Google Scholar 05/06-02-15

Searched all the 'shift' keywords individually with 'Health Care Worker' keywords:

"12 hour shift(s)", "twelve hour shift(s)", "12 hour work(ing)", "twelve hour work(ing)", "long shift(s)", "long day(s)"

with

"nurses aide(s)", "nursing aide(s)", "healthcare assistant(s)", "health care assistant(s)", "health care support worker(s)", "clinical support worker(s)", "nursing assistant(s)", "nurse assistant(s)", "hospital orderly" or "hospital orderlies", "auxiliary nurse(S)", "nursing auxiliary", "nursing auxiliaries", "non registered nurse(s)", "unregistered nurse(s)", "assistant practitioner(s)".

TRIP Database 06-02-15

350 records retrieved / 304 records deleted as not relevant for research scope

("12 hour shift" or "12 hour shifts" or "twelve hour shift" or "twelve hour shifts" or "12 hour work" or "12 hour working" or "twelve hour work" or "twelve hour working" or "long shift" or "long shifts" or "long day" or long days") and ("healthcare assistant" or "healthcare assistants" or "health care assistant" or "health care assistants" or "health care support worker" or "health care support workers" or "clinical support worker" or "clinical support workers" or "nursing aide" or "nurses aide" or "nursing aides" or "nurses aides" or "hospital orderly" or "hospital orderlies" or "auxiliary nurse" or "auxiliary nurses" or "auxiliary nursing" or "nurse auxiliary" or "nursing auxiliary" or "non registered nurse" or "non registered nurses" or "unregistered nurse" or "unregistered nurses" or "assistant practitioner" or "assistant practitioners")

Open Grey 06-02-15

"12 hour shift"

"12 hour shifts"

"twelve hour shift"

"twelve hour shifts"

"12 hour work"

"12 hour working"

"long shift" searched individually with each keyword "health care assistant / assistants", nurse, nursing, "assistant practitioner", orderly, orderlies

"long shifts" searched individually with each keyword "health care assistant / assistants", nurse, nursing, "assistant practitioner", orderly, orderlies

8. Appendix 2: Quality appraisal tool

Quality Assessment and Validity Tool for Observational Studies (adapted from Cummings and Estabrooks, 2003).

First reviewer (name):

Date:

Second reviewer (name):

Date:

Impact of 12 hour shifts upon patient care and staff outcomes		
Study: _____ First Author: _____		
Publication Date: _____ Journal: _____		
Design:	NO	YES
Was the study prospective?	0	1
Was probability sampling or census used?	0	1
Was a theory/framework used to inform the research design?	0	1
Was there a sufficient length of time between measures for possible effects to occur?	0	1

(0) If researchers used a convenience sample (i.e., studying all the patients available to them in one or more setting(s) that agreed to participate).

(1) If a random sample or a systematic sample with a random start or a census was used.

Was a theory/framework used for guidance?

Theory: a set of assumptions and principles that underlie methods and interpretation of data.

(0) No

(1) Yes

Was there a sufficient length of time between measures for possible effects to occur?

(0) If pre and post measures were taken at times too close to reasonably expect an effect to have occurred, if one exists. Also if the study is not prospective.

(1) If pre and post measures were taken at a sufficient interval for effects to occur.

Sample

Was sample size justified?

Sample size is justified if it is based on appropriate power calculations (power=80), or follows other rules of thumb such as an N of at least 10 per IV studied. Even if researchers try to justify lower standards, they should meet these cut-offs. This assessment is a judgment based on available information. Two rules of thumb will apply:

If using a multivariate approach 10 cases per IV are required

If using several correlations or t-tests, a sample of 80 or more reflects adequate power.

Sample sizes that suggest very high power, e.g., because it is so large, will also be noted.

(0) If researchers have not met (even their own lower) standards of the cut-offs.

(1) If researchers have met (even their own lower) standards of the cut-offs.

Was sample drawn from more than one site?

This refers to physical location –multiple groups belonging to the same system count as multi-site. Several units within the same hospital do not count as multi-site, but several hospitals within the same system or region do.

(0) Sample drawn from one site (e.g., one unit, or several units in one hospital/organization)

(1) Sample drawn from multiple sites or several hospitals/organizations within the same system or region.

Was ethics approval received?

Usually all the studies receive ethical approval. If a study does not report on ethics approval procedure, then we treat it as it has not received ethics approval.

(0) Ethics approval was not reported.

(1) Ethics approval was reported.

Response rate more than 60%?

Operational definition: the number of people who participated divided by the number of people who were sampled (e.g., given or sent or offered a questionnaire). If not reported, information that allows calculation will be sought and the same rule applied.

Measurement

Shift pattern (IVs) [assess for IVs correlated with DV only]

Was the shift pattern observed rather than self-reported?

(0) For self-reports of healthcare providers on shift pattern.

(1) For observations on shift pattern by outsiders (e.g., researchers, inspectors, etc.).

If a scale was used for cause variables (IVs), was internal consistency \geq .70?

(0) If reliability (internal consistency/Cronbach's alpha) was not reported or it was \leq .70.

(1) If reliability was \geq .70.

Validity

content: 0.25 is scored if instrument was validated by an expert panel

response process: 0.25 if the instrument was pilot tested

internal structure: 0.25 if a score was used to measure a construct (if a single item was used, internal structure is not required) looking for theoretical and/or empirical evidence (i.e., confirmatory or exploratory factor analysis, item-to-item correlations, or item total statistics)

relationships: 0.25 if the findings are consistent with theory or other well-established empirical evidence such as bivariate (e.g., correlations) or regression analysis

Effects of shift pattern on DVs

Were the effects of shift patterns on DVs observed rather than self-reported?

(0) For self-reports of healthcare providers on the effects of shift patterns on DVs.

(1) For observations on the effects of shift patterns on DVs by outsiders.

If a scale was used for the outcome (DV), was internal consistency \geq .70?

(0) If reliability (internal consistency/Cronbach's alpha) was not reported or it was \leq .70.

(1) If reliability was \geq .70.

Validity

content: 0.25 is scored if instrument was validated by an expert panel

response process: 0.25 if the instrument was pilot tested

internal structure: 0.25 if a score was used to measure a construct (if a single item was used, internal structure is not required) looking for theoretical and/or empirical evidence (i.e., confirmatory or exploratory factor analysis, item-to-item correlations, or item total statistics)

relationships: 0.25 if the findings are consistent with theory or other well-established empirical evidence such as bivariate (e.g., correlations) or regression analysis

Statistical analysis

Were the results reported based on descriptive or inferential statistical analyses?

If results reported using descriptive statistics (e.g., means, median, etc.) only

If results reported using inferential statistical analyses (e.g., correlations, multiple regression, or interactions in Discussion noted).

Were missing data managed?

If not, relationship could be spurious.

(0) If omitting any discussion of missing data (e.g., pattern, how much, why, etc.) or mentioning but not managing.

(1) If any discussion about managing (e.g., deleting cases or variables, treating missing data as data, etc.) missing data was reported.