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Nurses of 2010: The Dichotomy Between Continuity of Patient Care and Nursing Fatigue As  
Related to Shift Length

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Literature Review

A Paper Presented to Meet Partial Requirements

For NRSG-497

Research Methods of Nursing

Southern Adventist University

School of Nursing

### Abstract

Nursing shift lengths are widely debated, and the implications on both nurse and patient safety are quite large. This work seeks to present a current review of literature describing the current work schedules of nurses in comparison to the Institute of Medicine's 2004 recommendations and both the positive and negative effects that these schedules have on nurses and their patients. Eleven studies from the past five years (2004-2009) are included, with particular emphasis on those studies that address the dispute between continuity of care and nursing fatigue. Results show that nurses are regularly working longer than is recommended, and this overtime is having a negative effect on the quality of patient care. However, longer shift lengths also bring increased continuity of care, which improves quality outcomes. Very few studies sought to determine whether continuity of care or decreased fatigue was the most important. Further research specifically addressing this contention is needed in order for health agencies to make an evidence based decision on nursing shift length.

Nurses of 2010: The Dichotomy Between Continuity of Patient Care and Nursing Fatigue As  
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The date was January 6, 2010, and I was lying flat on my back in the hospital bed while nurses bustled in and out of the room. I had just had major facial surgery after a motor vehicle accident, and the anesthesia had not yet worn off. Dozing in and out, I awakened at each shift change when the new nurse poked her head in to greet me and take my vital signs. Over the course of one night I had three different nurses and experienced two shift changes. I never mentioned that I was a nurse.

The next morning my doctors were dismayed when they made rounds and discovered that the head of my bed was down and there was no ice on my face – two direct contradictions to the instructions they had given to the nurse. As I lay there after they left, the head of my bed now raised and the nurse scrambling for an ice pack, I began to understand firsthand a controversy that I had only heard about before. It was the conflict of shift length and nursing errors.

The debate over medical errors and patient safety has intensified in the past decade as public knowledge has increased regarding the number of errors that actually occur in the workplace (Lorenz, 2008). In 1999, the Institute of Medicine (IOM) published a report entitled, “To Err is Human, Building a Safer Health System.” This report directly addressed the mounting number of health care errors occurring and the heavy toll this is taking on our lives. It was estimated that between 44,000 and 98,000 Americans die each year because of a preventable error. In addition to presenting hard facts and numbers, this report sought to address the reasons behind medical errors and explore specific areas such as extended work hours and fatigue (Kohn, Corrigan, & Donaldson, 1999).

A second, more extensive IOM report was published in 2004. “Keeping Patients Safe: Transforming the Work Environment of Nurses” recommended that nurses work no longer than 12 hours in a day and no more than 60 hours in a week. This was due to evidence showing that fatigue causes “slowed reaction time, lapses of attention to detail, errors of omission, compromised problem solving, reduced motivation, and decreased energy for successful completion of required tasks” (Institute of Medicine, 2004, p. 12). This report is one of the most referenced voices regarding patient safety and many view its recommendations as the ideal for current nursing practice.

Despite research that widely explores the negative effects of extended shift work (Frone, 1999; Klerman, 2005; Lockley et al., 2007; Raediker, Janben, Schomann, & Nachreiner, 2006; Knauth, 2006), it is an unavoidable reality in the modern world of healthcare where patients need around-the-clock care. For nurses, each day is usually divided into three 8-hour shifts or two 12-hour shifts, while interns and residents can work even longer shift rotations (Smith, Folkard, Tucker, & Macdonald, 1998). “Extended shift work” refers to “a schedule that varies from the standard one of eight hours per day, 35-40 hours per week” (Trinkoff, Geiger-Brown, Brady, Lipscomb, & Muntaner, 2006 p.61). Currently, there is no regulation in place to restrict the number of hours nurses may voluntarily work in a 24-hour or 7-day period (Page, 2004).

The dichotomy between shorter shifts and longer shifts seems to grow more confusing with each new study that is completed. Shorter shift lengths mean decreased nursing fatigue while longer shift lengths have been purported to bring better continuity of care for the patient. Both of these positive outcomes reduce costly nursing errors and improve patient well-being (Borges & Fischer, 2003; Keating, LaRusso, & Kolars, 2005). Unfortunately for both nurses and

patients, these two issues appear to require contradictory shift lengths as evidenced by the large amount of conflicting research that exists on this topic.

The phrase “continuity of care” is a comprehensive term for quality patient care where there is consistency in the healthcare provider and fewer patient “handoffs,” or transfers of care from one provider to the next. Increased continuity of care decreases the chance of something getting missed as the nurses relay important information and instructions to each other during shift change (Keating et al., 2005; Kalisch, Begeny, & Anderson, 2008). Shorter shifts, however, mean that nurses are less tired and more alert to potential errors (Smith et al., 1998). Many studies have shown a strong correlation between fatigue level and errors, and in defense of patient safety, there are some who strongly insist upon shorter shift lengths (Keating et al., 2005). However, they argue in direct opposition of those who say that the continuity of care brought on by longer shifts is the most important (Bollschweiler et al., 2001). A conflict clearly exists.

A current review of literature is needed to determine what is currently being discovered in this critical area of nurse and patient safety. Are the nurses of 2010 following the IOM’s evidence-based recommendations? What research has been done that sheds new light on the effects shift length has on continuity of care and nursing errors?

### **Review of Literature**

The aim of this literature review is to discover how long nurses are working and what effects these current practices have on nursing errors related to fatigue and continuity of care. By including only research that has been published in the last five years (since 2004), this review seeks to reveal the current work hours of American nurses and how this contributes to nursing errors. Multiple databases available through Southern Adventist University’s McKee Library

were searched, including CINAHL, MEDLINE, Ovid Nursing, and PubMed. Keywords on the topics of shift length, work patterns, nursing errors, fatigue, and continuity of care were used. A total of 10 significant references were found using these databases. Furthermore, cited references of applicable articles were screened to find additional sources.

## **Description of Studies**

### **Current nurse scheduling practices.**

In 2006, Trinkoff, Geiger-Brown, Brady, Lipscomb, and Muntaner published a large-scale descriptive study focusing on the prevalence of extended work schedules among nurses across a wide variety of nurse work settings. Using quantitative survey data that was obtained in a longitudinal nursing study funded by the National Institute of Occupational Safety and Health, the researchers specifically compared their findings with the IOM's 2004 recommendations for safe work patterns. The study also sought to rectify the gap in research regarding shift patterns across a wide range of nursing settings, including several subgroups of nurses that are often overlooked such as single parents, those working more than one job, and those over 50 years old.

A sample of 2,273 randomly selected respondents was taken from nurses in two states that best represented the diversity of nurses across the country. Data were collected via a confidential mailed survey and were analyzed using Statistical Package for the Social Sciences (SPSS) software. Distributions of work-schedule variables were analyzed in relation to the total sample and then within the subgroups using the normal-theory method for a one-sample test for a binomial proportion.

The results indicated that 28.4% of the sample regularly work 12 or more hours per day. One-third of the entire sample reported working greater than 40 hours in a week, but only 6% indicated that they worked more than 60 hours per week. Eleven percent reported that they

generally did not take a break during their shifts. Other work patterns included overtime, on-call status, and work breaks. Seventeen percent of the sample reported working mandatory overtime, and two-thirds of those who worked overtime stated that prior notice was less than two hours. Of the entire sample, 38.6% reported having on-call requirements. Jobs with on-call requirements were very likely to have mandatory overtime requirements as well. Both of these factors were related to respondents working significantly longer hours.

Subgroup data indicated that hospital staff nurses were the most likely to work 12 or more hours per day and to work off-shifts. Nurses working more than one job and single parents had similar results, as well as being more likely to work 50 or more hours per week and for long periods of days with no breaks in between. They also were more likely to get insufficient rest between shifts and to work during scheduled time off. Conversely, nurses who were 50 years of age or older were more likely to work day shifts and less likely to work over 12 hours a day.

When compared with the IOM's work guidelines, 17% of staff nurses, 4% of managers, and 7% of advanced practice nurses surpassed these guidelines. A total of 4% of staff nurses worked over the maximum recommendation of 60 hours of work per week, most of these nurses working in hospital settings. Critical care nurses, both adult (36%) and pediatric (27%), were more likely to work extended work schedules, followed by ER nurses (26%).

The results of this study indicate that many of today's nurses are working extended shifts and exceeding IOM's recommendations. A huge strength of the study was its large sample size and inclusion scope, which allowed several subgroups to be analyzed. The results are best applied to nurses in hospital settings where 12-hour shifts are routinely worked, as other nursing areas were much less affected by long shift length.

Rogers, Hwang, Scott, Aiken, and Dinges (2004) also completed a comprehensive study that examined the correlation between shift patterns, work hours, and the number of errors or near errors made by hospital staff nurses. Over four thousand members of the nationwide American Nurses Association were asked to participate, and a final sample of 393 participants was included in the study. Respondents had to be unit-based hospital staff nurses working full time in order to be included.

This quantitative study used logbooks with questionnaires to collect information about work patterns (including scheduled and actual work hours), sleep habits, and error data over the course of four weeks. Once returned by mail, all data collected was then summarized using descriptive statistics and frequency tables. Scheduled shift durations were set for 8.5 hours and 12.5 hours because typical nursing shifts usually account for a 30-minute handoff allowance. Logistic regression models were used to correlate the risk of errors with overtime and length of shift. Multivariate analyses were used to look for similar correlations, while also accounting for other variables such as demographics, hospital size, and unit type.

Results showed that nurses of all shift lengths are consistently working longer than scheduled. On average, nurses worked an additional 55 minutes longer than scheduled, and a total of 81.4 % of the shifts included overtime. Two-thirds of the participants worked overtime 10 or more times during the log period, and one-third worked overtime every day. Fourteen percent stated that they had worked 16 or more continuous hours during the 28-day period.

During this same time, 199 errors and 213 near errors were recorded, over half of those being medication administration errors. Analysis showed that error rates were significantly affected by shift patterns, including shift length, overtime, and hours worked per week. Nurses were three times as likely to make an error when working 12.5 hours or more, and overtime

increased the likelihood of making at least one error. In addition, there was a higher risk of errors if overtime was worked after a 12-hour shift than in overtime following a shorter shift.

These findings support the researchers hypothesis that the work schedules of today's nurses are getting longer and longer. Although this study did not account for other possible contributing factors to errors such as workload or patient acuity, the results still show a growing trend of long work hours and its relation to risk of medical errors.

A third nation-wide study was performed by Scott, Rogers, Hwang, and Zhang (2006), focusing specifically on critical care nurses and their work hours related to patient safety. Because critical care nurses take care of acutely ill patients, it is imperative that they stay alert to minute changes in their patient's condition. The aim of this quantitative study was to analyze work patterns among critical care nurses, discover if a correlation exists between work trends and errors, and reveal more information about the effect work hours have on vigilance.

A random sample of 502 nurses from the American Association of Critical-Care nurses who were employed full-time was used. Eighty-eight percent of the respondents worked 12-hour shifts, as is typical for critical-care units. Advanced practice nurses, nurse managers, or other specialized nurses were not included in the study. Respondents used logbooks to record data about work patterns, sleepiness at work, days off, and sleep habits at home. Errors and near errors were also documented. Once collected, the data were summarized using descriptive statistics and frequency tables. Standard shift lengths were defined as 8.5 hours and 12.5 hours, and if shift duration exceeded scheduled shift length, overtime was considered to have occurred. The relationship between errors and shift patterns was calculated by univariate analysis. Multivariate analysis was used to account for other factors that may have affected the data.

Data received on 6,017 work shifts indicated that critical care nurses are regularly working longer than scheduled. Eighty-six percent of the shifts were longer than scheduled, and on average they worked 49 minutes overtime. Only one nurse left all his or her shifts on time over the course of the study. Vigilance was calculated by looking at the nurses' struggle to stay awake at work. Sixty-five percent of these nurses reported having at least one time when they struggled to stay awake and 20% fell asleep at least once. Contrary to popular opinion, sleepiness did not just occur on night shifts; 479 occurrences of sleepiness and 40 occurrences of actual sleep occurred during the day (between 6 am and midnight).

Errors (224 occurrences) and near errors (350 occurrences) happened to many of the nurses. Twenty-seven percent of the nurses recorded that they made at least one error, while 38% reported at least one near error. Analysis showed that longer shift durations were positively correlated with error rate and decreased vigilance. Notably, nurses who worked 12.5 hours or more were twice as likely to make an error. The results of nurse vigilance were similar; longer hours were associated with a greater risk of struggling to stay awake or falling asleep. However, no relation between risk of errors and decreased vigilance was found.

The results show that critical care nurses are working much longer than scheduled, and these additional work hours increase the likelihood of an error or near error occurring. In addition, the 49 minute overtime usually followed a 12.5 hour shift, adding up to a work duration that was much longer than the IOM's recommendations.

#### **Negative effects of longer shifts.**

Trinkoff, Le, Geiger-Brown, and Lipscomb (2007) researched nurses' work schedules and frequency of needle use in relation to needlestick injuries. Other factors such as psychological and physical demands were considered as well. A 3-wave longitudinal Nurses Worklife and

Healthy Study survey was used and resulted in a final sample of 2,273 nurses who had all worked within the previous year prior to wave 1. Questionnaires were returned by mail, and the data were analyzed using descriptive statistics and categorized by nurse position. Logistic regression models and principal-components analysis were also used.

The cumulative needlestick injury rate of 16.3% was calculated over the three wave period (15 months). The greatest number of needlestick injuries occurred in hospitals with staff nurses among the specialties of emergency, critical care, operating rooms, and catheterization laboratory, diagnostics, or hemodialysis. These nurses also had a higher daily needle use frequency. It was also found that extended work schedules (hours worked per day, weekends worked per month, working other than day shifts, working 13 or more hours per day, working with fewer than 10 hours off between shifts, past days worked in a row, and work on days off) were significantly associated with a higher needlestick risk.

Much has been done to reduce these costly needlestick injuries but, as demonstrated by this study, safer needle systems are not a complete answer to the problem. This study shows that abnormal schedules and long hours are also contributing to needlestick injuries, which can lead to serious blood-borne diseases such as HIV/AIDS, among others.

Drowsiness, another negative effect of working long hours, may be experienced during a nurses' drive home after work. Scott et al. (2007) conducted a quantitative descriptive study on this very subject in order to determine what correlation work schedule has with driving incidents. The variables included frequency of drowsy driving, drowsiness on duty, falling asleep on duty, the number of hours worked, and total sleep duration.

A nation-wide sample composed of full-time hospital nurses from the American Nurses Association and the American Association of Critical Care Nurses were randomly selected to

complete two logbooks, resulting in a final sample number of 895 nurses. Demographic and questionnaire data were condensed using descriptive statistics and frequency tables. Both univariate and multivariate analyses were used to discover the correlation between work schedule and driving incidents.

An average of  $11.92 \pm 2.28$  hours worked each shift was reported and 54% of the shifts were greater than 12.5 hours. Drowsy driving was experienced at least once by two-thirds of the nurses studied. While nurses reported drowsy driving even when working 8-hour shifts, the risk doubled when working 12.5 hours or more. Two-thirds of the nurses reported struggling to stay awake while at work and 17% reported actually falling asleep. This was also strongly correlated with struggling to stay awake while driving. Nurses also reported sleeping much less ( $6.70 \pm 1.79$ ) than the recommended 7 to 8 hours and often recorded reporting to work without getting enough sleep prior to their shift (median =6.5 hours). A 9% increase of the risk of drowsy driving was seen for every hour of sleep lost.

Motor vehicle crashes (MVC) or near-MVCs were experienced 281 times during the study and at least once by 16% of the nurses. Fifty-nine percent of MVCs/near-MVCs followed shifts longer than 12.5 hours, and the chance of an MVC/near-MVC occurring was significantly increased when longer hours were worked. In fact, the risk for an MVC/near-MVC almost doubled when following a shift longer than 12.5 hours.

After multivariate regression analysis was performed, it was concluded that episodes of drowsiness while driving was significantly related to shift length, alertness at work, working nightshift, and sleep duration. In particular, nurses who worked greater than 12.5 hours reported drowsiness at work an average of 1 in 3 shifts, much more than nurses working less than 12.5 hours. Due to the number of hospital nurses who work 12-hour shifts, these findings indicate

that long work hours increase the risk of an MVC/near-MVC and/or a drowsy sleeping episode when returning home from work.

A cross-sectional qualitative study by Geiger-Brown et al. (2004) was conducted to determine themes that nurses expressed in regards to their work environment, health, and well-being. The sample included 1,428 nurses from New York and Illinois who were part of the Nurses' Worklife and Health Study. Data were collected from the thoughts and comments section at the end of the study's survey. Out of the 394 comments that were submitted, 309 addressed nursing experiences and were included in this study. Comments were transcribed into Microsoft Word, verified for accuracy, and coded into categories. Major themes were condensed and verified by data saturation and constant comparative analysis.

Three main themes were identified: excessive work demands, injustice and unfairness, and nurses' personal solutions to problems in the workplace. The category of excessive demands included long hours, heavy lifting, low staffing, and lack of support. Nurses felt that financial issues were the foundation for their long hours and understaffing. They also felt like the long hours they were required to work gave them insufficient time for rest and personal recuperation activities. One nurse stated, "I work one weekend each month along with a five day work week. This means a 12 day nonstop stretch... Over the past two weeks in my position...I worked nearly 20 hours overtime" (p. 18, 19). Nurses also reported many personal solutions to these problems. Many changed jobs, pursued higher education, or retired early because of the demands at work.

The researchers recommended adjusting schedules to better promote rest and recuperation as well as limiting compressed work schedules. Because this study included nurses from many different settings and positions, it shows that working long hours is not just a problem restricted

to hospital nurses. Not only do quantitative studies show that long hours are a growing problem, but nurses themselves are voicing these same concerns as well.

The operating room (OR) is an area in the hospital where accuracy and alertness are crucial to patient safety. However, unexpected emergencies require off-hour surgeries and long hours for OR staff. This final study (Warren & Tart, 2008) discussing the negative effects of longer shifts is unusual because a reduced call schedule was actually implemented, and the number of charting errors before and after the schedule change was compared. The OR's "reduced call schedule" guidelines included that no surgical team would work for longer than 12 hours, and relief teams would cover any additional hours required due to emergencies. It was hypothesized that a reduction of long hours would lessen fatigue and "allow for greater flexibility in staffing, decrease overtime, and reduce perioperative errors" (Warren & Tart, 2008, p. 89).

Based at a non-profit community hospital where 10,000 surgeries are performed each year, this retrospective causal comparative study compared the charting errors of a 16-room OR. The sample included 24 nurses on 8-hour, 12-hour, and on-call shift schedules. Data on charting errors were collected, coded, and put into an archiving database over a six month period divided into two phases of three months each. The first phase was before the call schedule reduction was implemented (2, 642 surgeries), and the second phase followed the change (2, 635 surgeries). Analysis was performed using descriptive and inferential statistics.

When the number of errors between phase I and phase II were compared, it was shown that there was a substantial decrease (26%) in errors following implementation of the reduced schedule. Nurses working 8-hour shifts had similar rates before (5.74%) and after (5.03%). However, 12-hour shift nurses (phase I: 14%, phase II: 11%) and on-call nurses (phase I: 22%, phase II: 8.5%) had significant decreases. The two error categories that were most reduced by

the new call schedule were procedural (50%) and counts (43.5%). Error reduction varied for each surgical service analyzed, but in six of the seven categories, fewer errors were made in phase II. The most reduction (33.3%) was in general surgery. A total annual savings of \$115,525 was made due to the reduced call schedule.

As predicted, charting errors that were related to fatigue in 12-hour and on call nurses were drastically reduced. None of the staff were aware of the study so a Hawthorne effect was not a factor in the results. Not only was patient safety enhanced, but the facility realized large monetary savings as well. These findings support the IOM's recommendation to limit the number of hours that healthcare workers are allowed to work.

### **Positive effects of longer shifts**

A quantitative study by Kathryn McGettrick and Anna O'Neill (2006) used both a survey and a focus group interview (FGI) "to elicit care nurses' perceptions of working 12-hour shifts" (p. 188). Based on these perceptions, it was the researchers' goal to determine whether 12-hour shifts were appropriate for critical care nurses. Fifty-four critical care nurses from four different units all on 12-hour shift rotations made up the non-probability, convenience questionnaire sample from a large National Health Service hospital. Out of this sample, six nurses representing each unit with a range of skills and genders responded to participate in the FGI. Descriptive statistics and frequency counts were used for the questionnaire while content analysis was used on the open-ended questions in the survey, as well as to quantify the data from the FGI.

Patient care was felt to be a very positive aspect of 12-hour shifts because of the increased continuity and additional time to plan care. Job satisfaction was also very positive, except for in the part-time staff. Additionally, 12-hour shifts positively contributed to the nurse's domestic

life, allowing them to spend an increased time at home and be more flexible with their schedules. However, 12-hour shifts were perceived as having adverse effects on communication and causing increased fatigue and stress. Another negative aspect was the affect on education. It was felt that nurses did not have as much time to participate in “ward-based” sessions and this hindered their in-hospital educational opportunities.

Overall, the nurses in this sample group expressed a general satisfaction with 12-hour shifts and felt like patients received adequate care. They also felt that the “sequencing and the timing of the shifts” (p. 196) was just as important as or more important than the actual length of the shift. This means that units that utilize 12-hour shifts need be well managed and have measures in place to curtail scheduling so that safe scheduling rules are followed. These results contradict some recent literature trends while supporting others and indicate that further research is needed.

Richardson, Turnock, Harris, Finley, and Carson (2007) studied the impact and implications of 12-hour shifts on critical care nurses. Two focus groups (junior staff and senior nurses) were held to gather themes regarding 12-hour shifts, which were then used to design the survey portion of the quantitative study. Focus group themes were determined using Polit and Hungler’s principles of thematic analysis, and the survey data were analyzed using descriptive and inferential statistics. A sample of 114 nurses from three critical care units at a National Health Services hospital responded to the survey.

Continuity of patient care was seen as a huge positive factor of 12-hour shifts. Eighty-nine percent felt that planning care was easy on 12-hour shifts and 78% felt that there was ample time for documentation. In addition, over 80% felt that nurse-patient relationships were improved with 12-hour shifts. However, mixed views were expressed over education as nurses who work 12-hours do not have as much time for in-hospital training. A large number of nurses (87%)

reported tiredness at the end of 12-hour shifts, and there was a general agreement that no more than three consecutive days should be worked. Sixty-six percent of the staff felt that 24 hours was a safe amount of time off between working a day shift and then working a night shift. Longer periods (48 hours) before working a night shift and then switching to a day shift were reported by 64% of the nurses. Home life, as well as work life, was seen as very positive when 12-hour shifts were worked. Overall, 88% of the nurses felt that the 12-hour shift system should continue.

In this study, nurses really appreciated the increased continuity of care and quality of home life that 12-hour shifts bring. However, mixed opinions were held regarding educational opportunities and the impact of 12-hour shifts on difficult or complex cases. By uncovering new themes and patterns, this study opens the door for further exploration of this topic.

A cross-sectional study by Stone et al. (2007) using 13 New York City hospitals was conducted to compare the effects of 8-hour and 12-hour shift schedules on the nurse, system, and quality patient care. Different nursing units offered different shift lengths, and nurses were allowed to pick what shift they wanted to work. Eight hundred and five participants from 99 nursing units were surveyed, and administrative and patient record data were obtained from each unit. All data were analyzed using descriptive statistics, and multivariate general estimating equations were rendered for each variable.

Results showed that the majority of the participants worked 8-hour schedules (63%). However, those working 12-hour shifts indicated that they had a higher job satisfaction rate, experienced less emotional exhaustion, and were more than 10 times as likely to be satisfied with their work schedule. In addition, they were twice as likely to feel that 12-hour shifts were important and 58% less likely to report missing shifts. Most importantly, no difference was

found between 8-hour and 12-hour shifts in relation to patient care outcomes, which included medication errors, patient falls, and decubitus ulcer prevalence, as well as nurses' perceptions of quality of care.

This study was the first of its kind to measure quality of patient care using three different methods: administrative data, incident report data, and nursing perceptions. When all these were examined, no difference was noted between shifts. This is in direct opposition to many studies that have been published and indicates a huge need for more comprehensive studies. However, this study was conducted due to a union and employer bargaining deal, and its findings may be biased because of the publicity of this conflict.

In Queensland, Australia, an 8-hour shift intensive care unit (ICU) implemented the 12-hour shift system for a 12-week trial. Although this was not an American study, research in Australia is beneficial for evaluation because of the similarities that exist between the shift lengths and scheduling trends of the two countries. In this particular study, research was done to provide an evidence-based decision on whether to continue the 12-hour shifts and was made into a quantitative exploratory study by Dwyer, Jamieson, Moxham, Austen, and Smith (2007). The researchers wanted to document nurse preferences between 8-hour and 12-hour shifts and record the trial's affect on sleep habits, nurses' beliefs about patient care, and overall impact on the whole ICU team. Questionnaires were given to three groups of staff who worked regularly on the unit: nurses working the 12-hour rotation (group 1,  $n=12$ ), other caregivers on the unit including nurses who chose to continue working 8-hour shifts (group 2,  $n=6$ ), and nurse managers (group 3,  $n=1$ ). Quantitative data were summarized using descriptive statistics and  $t$ -tests, while open-ended questions were transcribed and categorized.

Nurses in group one felt that continuity of care was much improved (75%) on 12-hour shifts when compared to care on 8-hour shifts. Quality and length of sleep was less positive, although the majority still felt that it was better (58%). All of the nurses agreed that 12-hour shifts provided more time to complete patient care. Fifty percent of these nurses felt that their physical health was improved while 58% felt that their psychological well-being was better. Sixty-seven percent stated that they were “generally less drained.” Overall, nurses from group one stated that they were satisfied with the 12-hour shift system (92%) and that it had improved the functioning of the unit (75%).

Healthcare givers in group two felt that nurses working the 12-hour shifts had increased patient knowledge and were more efficient with their time. They also felt that continuity of care was improved. However, they noted that nurses looked more tired at the end of the day. Nurses who continued to work 8-hour shifts reported that complications arose with the inconsistent shift lengths for all nurses. Unfortunately, there were not enough responses in group three to report any findings. Overall, the ICU determined that there was an initial acceptance of the 12-hour shifts, and the nurses felt it should continue. Continuity of care was the biggest positive element, and recruitment and retention was also fostered.

### **Findings**

According to this literature review, nurses of 2010 are currently working longer and more condensed schedules than recommended by the IOM, which includes working less than 12 hours per day and no more than 60 hours per week. Trinkoff et al. (2006) found that in the United States, 17% of staff nurses, 4% of managers, and 7% of advanced practice nurses surpassed the IOM guidelines. Certain groups of nurses, such as those working more than one job and single parents, were found to be at an increased risk for working extended schedules. In another study,

54% of the nurses reported working more than 12.5 hours (Scott et al., 2007). Qualitative data also indicates that nurses are feeling the strain of long work hours, and some even leave their jobs because of it (Geiger-Brown et al., 2004).

It was also found that nurses working both 8-hour and 12-hour shifts are consistently working overtime. In one study, nurses worked an average of 55 minutes overtime, and a total of 81.4 % of the shifts were longer than scheduled (Rogers et al., 2004). Another study reported that 86% of critical care nurses work beyond their scheduled shift and averaged 49 minutes of overtime (Scott et al., 2006). Also, mandatory overtime was reported by 17% of the nurses in a study by Trinkoff et al. (2006), and two-thirds of those who worked overtime stated that prior notice was less than two hours.

The main negative aspect related to long work hours that was revealed in this literature review was an increase in nursing errors. In one study, errors were three times as likely to occur when a nurse worked 12.5 hours or more, and overtime increased the likelihood of making at least one error, especially following a 12-hour shift (Rogers et al., 2004). Similarly, a study by Scott et al. (2006) showed that nurses who worked 12.5 hours or more were twice as likely to make an error, and longer shift durations were positively correlated with both an increased error rate and decreased vigilance. When long hours were reduced in an operating room (Warren & Tart, 2008), charting errors that were related to fatigue in 12-hour and on call nurses were drastically reduced and large monetary savings were realized.

In addition to nursing errors, needlestick injuries (Trinkoff, 2007) and drowsy driving incidents (Scott et al., 2007) were more likely to occur when nurses worked longer hours. The risk for a MVC/near-MVC nearly doubled following shifts longer than 12.5 hours. When nurses had the chance to express their own perceptions about 12-hour shifts, they felt that longer shifts

had unfavorable effects on communication and in-hospital education (McGettrick & O'Neill, 2006; Richardson et al., 2007).

In contrast to the adverse results that were reported, many positive elements emerged as well. Patient care was felt to be a very positive aspect of 12-hour shifts because of the better continuity and additional time to plan care. Quality of job satisfaction and domestic life was also increased, allowing nurses to spend more time at home and have flexible schedules (McGettrick & O'Neill, 2006; Richardson et al., 2007; Stone et al., 2006; Dwyer et al., 2007). In addition, the study by Richardson et al. (2007) showed that over 80% of the nurses felt that the nurse-patient relationship was improved with 12-hour shifts. When Stone et al. (2006) did a comparison of 8-hour and 12-hour shifts, nurses working 12-hour shifts indicated that they were more than 10 times as likely to be satisfied with their work schedule than those working 8-hour shifts. In this same study, no difference was seen in patient care outcomes, including errors, which directly contradicts previous studies indicating an increase in errors.

### **Utilization of Research Findings**

#### **Utilization**

In light of nurses' clear neglect to follow the IOM's recommendations, Trinkoff et al. (2006) advise that hospital management should limit long hours and overtime, which would thereby increase nurse staffing by encouraging nurses to remain in the profession. On a larger scale, however, the researchers advocate getting involved in nursing legislature to promote bills that call for scheduling limits. More specifically, Rogers et al. (2004) recommend that "routine use of 12-hour shifts should be curtailed, and overtime – especially that associated with 12-hour shifts – should be eliminated" (p. 210).

Regarding the risk of patient safety caused by extended schedules, researchers advise limiting 12-hour shifts and/or enforcing strict 12-hour limits to shift duration to promote patient and nurse safety (Scott et al., 2006; Trinkoff et al., 2007). Similarly, the researchers who studied charting errors in the operating room report that their findings indicate that health care providers should ensure that long consecutive patient care hours in surgical environments should be minimized (Warren & Tart, 2008). Scott et al. (2007) proposed taking a short nap before driving home as a possible short-term solution. However, system level changes are most needed. Geiger-Brown et al. (2004) encourages occupational nurses to serve on committees and dialogue with management in order to communicate the possible risks involved in overtime and extended work hours. Whatever the findings, Stone et al. (2006) recommend that applicable results be applied to the workplace of interest in order to encourage and utilize evidence-based practice.

When addressing the positive aspects of 12-hour shifts, McGettrick and O'Neill (2006) felt that the shift sequence and timing was more important than duration, and therefore suggested the following: no more than three or four shifts should be worked in a row; shift pattern switching should allow for a sleep day then another day off (two days) before returning to work, ensure nurses have opportunities for equal education, and make provision for appropriate and successful communication. Overall, they recommend careful management of 12-hour shifts in order to ensure that the negative effects are minimized and the positive effects enhanced.

Similarly, Richardson et al. (2007) suggested a number of ways that critical care units on a 12-hour shift system could utilize their findings. They advised that nursing units should implement creative ways to train and educate staff. The researchers also felt that charge nurses should consider the difficulty of a nurse's previous day's patient load when assigning patient loads for the current day. In addition, they recommend that the maximum number of day shifts

that should be worked was three, and a minimum of 24 hours should follow each day shift.

Finally, clear guidelines regarding scheduling rules should be communicated and posted. Dwyer et al. (2007) also agreed that 12-hour shifts should be used to recruit and retain nurses. However, caution was expressed over the mixing of varying shift lengths on one unit.

Because of the controversy in research findings, many of the suggestions stated here have not been implemented, as observed by the author in her clinical experience as a nursing student in the Chattanooga, TN area. However, it seems to be universally agreed upon that if 12-hour shifts are used, barriers need to be in place to ensure that shifts are not overworked or lengthened by excessive overtime. These well-known recommendations have still not been seen in the workplace. There are few restrictions placed on the number of hours nurses are allowed to work, and there are few to no rules in place to guide self-scheduling. On the contrary, many floors implement mandatory overtime and have a high patient-nurse ratio, which is a direct contradiction to current IOM recommendations. Furthermore, few system-wide changes have been seen or made public. If the IOM's recommendations were followed, nurses would be less fatigued and commit fewer errors, resulting in a higher quality of patient care.

### **Further Research**

Trinkoff et al. (2006) suggest following up on impending nursing federal legislation that promotes shorter nursing work hours with new research studies in order to determine what impact the changes will have on nursing retention and shortages. More comprehensive research with larger sample groups that include additional variables (such as patient acuity and nurse workload) and more precise error measurement is also advised (Rogers et al., 2004). Warren and Tart (2008) recommend doing duplicate studies in other nurse settings similar to the one they implemented in the operating room in order to determine the generalizability of their findings.

Also, Scott et al. (2007) advise another study on the relationship between drowsy driving and work hours, while adjusting for variables not previously addressed such as alcohol consumption, medication use, and previous medical conditions. They also suggest that a more conclusive method of measuring MVCs/near-MVCs should be used.

It was noted by McGettrick and O'Neill (2006) that more qualitative studies are needed, as well as studies that address nurses' perceptions of continuity of care, patient's experiences, impact of shift length on patient outcomes, and an experimental or quasi-experimental study comparing nurses' fatigue and performance on both 8-hour and 12-hour shifts. Richardson et al. (2007) also agree that studies involving the patient's perspective, as well as other staff's views, should be conducted in regards to tiredness and fatigue related to shift length.

Stone et al. (2006) felt that a limitation to their study was the inability to gather enough management and hospital administrative data, such as aggregate payroll and unit-based recruitment and turnover statistics. Studies that utilize new technology to collect comprehensive management data should be conducted to better analyze this area's relation to shift length. Also, the researchers regarded their study as unique because of its immediate application to the nursing practice of several New York hospitals. They recommend that other hospital groups conduct similar studies to see what is best for their specific area. Furthermore, Dwyer et al. (2007) recommend that a follow-up study on the same sample group be done after one year of 12-hour shifts. Since their current study was 12 weeks after implementation, long-term effects and opinions may not have been accounted for.

Only one of the studies included in this literature review mentioned when fatigue or errors occurred in each shift. If errors were occurring at the beginning of shifts, it is reasonable to say that fatigue would not be the causative factor. Scott et al. (2006) were the only researchers to

include a chart of when nurses were the most tired (2-4 am). However, this does not directly address when errors are occurring in relation to the beginning of the shift. In order for error rate findings to be significant, timing should be addressed. More research needs to be done with this specific variable included.

### **Conclusion**

After reviewing the literature, it is clear that the work hours of nurses in 2010 are far exceeding the IOM's recommendations, and this reality appears to be contributing to the rise in nursing errors. While errors are more likely to occur when longer shifts are worked, longer shifts were also found to be conducive to continuity of care, patient-nurse relationships, and job satisfaction. Neither the 8-hour nor the 12-hour shift length can be definitively promoted as the optimal shift length. The research is simply too contradictory.

Because of the research that supports the responsible use of 12-hour shifts, the researcher proposes that it may be the overtime, condensed scheduling (too many consecutive work days), and absence of enforced work length restrictions that are causing the increased errors, not necessarily the 12-hour shift itself. This question needs to be the basis for additional research specifically geared towards determining, in the absence of overtime and condensed scheduling, whether shorter shift lengths or increased continuity of care is more important to patient safety. Until this is clearly delineated, researchers will continue to be divided over this important issue.

If the IOM's recommendations were followed, not only would patient safety be improved by reducing nursing errors, but also health facilities would save money from decreased overtime. This would cycle back to the unit, increasing staffing, decreasing patient loads, and ultimately further increasing patient safety. Additionally, if the responsible and careful use of 12-hour shifts was more consciously upheld, continuity of care and job satisfaction would increase.

While each nurse differs in the way they handle workplace and home-life stress, one nurse may be able to safely work a 12-hour shift and another nurse may not. It is impossible to schedule shifts on a nurse-by-nurse basis; standards need to be created that will promote patient safety for all, regardless of what nurse is on duty. Since researchers have not conclusively determined whether shorter shift lengths or increased continuity of care is more important to the patient's health, a conclusive decision cannot be made. Until this is determined and changes are made accordingly, the IOM's recommendations should be firmly upheld.

The controversy between 8-hour and 12-hour shifts still remains and will continue until more extensive and conclusive research is conducted to determine what is actually causing the errors – the actual length of shift or overworking. Most importantly, however, patient outcomes need to be the deciding factor, not nurse preference. Many of the studies conducted in the past five years were based on surveys of nurse opinions. More research focusing on specific and measurable patient outcomes is needed in order for an evidence-based decision to be made.

Nurses who are currently facing this dilemma in their workplace can be instrumental in changing the standards by ensuring their supervisors are aware of the IOM's recommendations and current research on the issue. It is undeniable that there are many barriers to change, but that should not prevent the nurse from speaking up about patient safety and expressing his or her wishes to curtail extended schedules. Individual nurse voices can join together to create a movement for change.

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