

A Measure of Perceived Fatigue among Nurses in Western North Carolina

by

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Abstract

We are anticipating a heightened shortage of nurses as our aging population retires. A shortage of workers tends to lead to overtime for those still in the work force. Previous research has demonstrated a link between working long hours, fatigue, and decreased performance among nurses. Fatigue has specifically been linked to on the job injuries and poorer patient outcomes. This research study examined perceived fatigue among nurses in western North Carolina. A convenience sample of nurses from five hospitals in western North Carolina was surveyed to measure fatigue, as well as compare differences in reported fatigue across varying demographic groups. Study participants totaled 610 and represented a widely heterogeneous group of nurses. Results point to an overall presence of fatigue among nurses in the study. Nurses working 12-hour shifts report the highest levels of fatigue. This is consistent with other studies of fatigue among nurses. Additionally, nurses in the study working night shift report the least ability to recover between shifts. These results raise concerns regarding safe, high quality patient care since so many nurses are working 12-hour shifts in hospitals today.

Keywords: Fatigue, Nurse Fatigue, Survey, Fatigue Survey

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CHAPTER I

Introduction

The American Association of Colleges of Nursing reported that the national registered nurse (RN) shortage was greater than 8% in 2008 in the United States (MacKusick & Minick, 2010). The shortage of nurses in the workforce has led to the use of overtime to meet the healthcare needs of patients. Other industries such as airline, trucking, and railroads have put policies into place to limit the hours employees can work in a week to circumvent fatigue in workers because fatigue contributes to worker errors (Hughes & Rogers, 2004). Such policies have not been implemented in nursing. This research study will examine perceived fatigue among nurses in western North Carolina.

Background

The growing nursing shortage has been well publicized and is expected to worsen as the baby boomers retire. A position statement by the Hospice and Palliative Nurses Association predicts a 29% shortage of nurses by the year 2020 (Association of Hospice & Palliative Nurses, 2003). The Institute of Medicine (IOM) published a report also citing a 29% shortage by 2020, and attributes it to the increased demand for nurses as the population ages (Institute of Medicine, 2004). More recent projections indicate a shortage of registered nurses (RNs) may exceed 500,000 by the year 2025 (American Association of Colleges of Nursing, 2010).

Garrett (2008) explained that managed health care and reduced reimbursement, together with the nursing shortage, is leading hospitals to rely on nursing overtime to meet staffing needs. Nurses surveyed in two states, North Carolina and West Virginia, were asked to state the reason for working overtime: 60% reported overtime was

mandated by employers, 64% reported they worked overtime because they needed the money, and 70% reported working overtime because they did not want to let co-workers down (Bae, 2012). It is not uncommon for nurses in perioperative departments of hospitals to work 36 to 40 hours during the week and be required to cover call duties for the weekend (Monahan, 2012). Working on call can result in nurses being involved in patient care activities for prolonged hours (Beyea, 2004). Although an example is provided for a perioperative department, nurse overtime is not isolated to this one area.

The current trend in nursing is working 12-hour shifts (Beyea, 2004; Dickson & Witkoski, 2010). Working long hours and overtime can lead to fatigue, which leads to patient care errors (Bae, 2012). The 12-hour shift is popular among nurses and most think they fully recover from the long day on subsequent days off; however, fatigue has more impact on a nurse working a 12-hour shift than one working an eight hour shift (Hughes & Rogers, 2004). Evidence shows numerous negative effects of nurse fatigue on work performance. It is well established that fatigue leads to decreased alertness, slowed reaction time, impaired communication, reduced motivation, lower productivity, lapses of attention to detail, compromised problem solving, increased risk of injury, and loss of empathy (Aker & Biddle, 2011; Campbell et al., 2011; Hughes & Rogers, 2004; Garrett, 2008; The Joint Commission, 2011). When surveyed, nurses perceived fatigue and exhaustion to be top factors in causing medication errors (Hewitt, 2010). The well-being of nurses is crucial to their ability to provide the best patient care (Bae, 2012). Managers, as well as staff nurses, need to acknowledge the adverse effects of overtime in order to provide quality and safe care to patients (Bae, 2012).

Fatigue negatively affects quality of life and is associated with acute and chronic illnesses (BeLue et al., 2009). A recent study exploring why nurses leave the profession found fatigue, exhaustion, unfriendly workplace, and emotional distress to be the common themes that emerged (MacKusick & Minick, 2010). Nurses in this study reported feelings of burnout and absenteeism due to fatigue, not enough time to recuperate from the daily stressors, and the opinion that requirements for constant vigilance of nurses is overlooked and under recognized by leaders (MacKusick & Minick, 2010). Garrett (2008) found fatigue to be a factor in burnout, absenteeism, and job dissatisfaction. Furthermore, nurses report job dissatisfaction at a rate four times higher than the average rate of all US workers, and one in five nurses report that they intend to leave their current job within a year (Garrett, 2008). Hospitals must staff adequately enough to avoid nurses having to work long hours in order to retain qualified nurses (Bae, 2012).

Purpose

The purpose of this study is to measure perceived fatigue among nurses in western North Carolina. Further, this study will compare the differences in perceived fatigue between nurses at a trauma center and community hospitals, and compare differences in perceived fatigue among varying demographic groups within the study. This study aims to determine the level of fatigue, acute versus chronic, and the nurses perceived ability to recover from fatigue between shifts.

Theoretical Framework

This study follows the basic assumptions in Betty Neuman's systems model. Neuman's systems model is based on general systems theory (Alligood & Tomey, 2006).

Systems theorist look at interrelated parts of a unified whole; for example, the interactions of internal and external environments of an individual (Decker & Sullivan, 2009). A primary question in Neuman's systems model is how do nurses react to, deal with, and adjust to stress (Meleis, 2007). Neuman has a holistic view of nurses and considers her theory to be focused on wellness (Meleis, 2007). Meleis (2007) explains the major assumptions of Neuman's theory as:

1. The individual is dynamic and constantly interacting with the environment.
2. Each individual has physiological, psychological, sociocultural, developmental, and spiritual variables that determine their responses.
3. The individuals' normal response represents wellness and stability.
4. Stressors attack the individuals' lines of defense.
5. Nurses' responses are focused on primary, secondary, and tertiary prevention.

Neuman explains that the environment may include the internal environment, the external environment, and the individuals' created environment. The internal environment is contained within an individual; the external environment includes forces outside of the individual; and the created environment is a combination of these two environments (Neuman, 2005).

When considering nurse fatigue, examples of external stressors are the nursing shortage, employer's request of the nurse to work overtime, working extra shifts, working more than 12 hours in a 24 hour period, and taking call. An example of an internal stressor is feeling guilty if not agreeing to pick up extra work to help coworkers out of a short staffed situation. The numerous stressors in the nurse's environment may exhaust coping abilities resulting in fatigue which may lead to patient care errors.

Neuman discusses flexible and normal lines of defense. Flexible lines of defense are a protective buffer and prevent stressor invasion (Neuman, 2005). Normal lines of defense are the individual's wellness level or ability to maintain stability (Neuman, 2005). Lines of defense include techniques for coping with stressors to maintain stability. Neuman suggests that stressors have the ability to disrupt stability within the individual (Meleis, 2007). According to Neuman, the individuals' goal is a process called reconstitution. Reconstitution is the return of stability after reacting to a stressor (Alligood & Tomey, 2006). Primary prevention is avoiding stressors or at least reducing the chance of encountering stressors, secondary prevention is reducing the effect of stressors, and tertiary prevention is attempting to reduce the residual effect of a stressor (Alligood & Tomey, 2006). When considering work as a stressor resulting in nurse fatigue, an example of primary prevention is the nurse not answering phone calls to avoid being called into work; secondary prevention is the nurse using caffeine to improve alertness when fatigued at work; and tertiary prevention is the nurse attempting to attain extra sleep on days when not working.

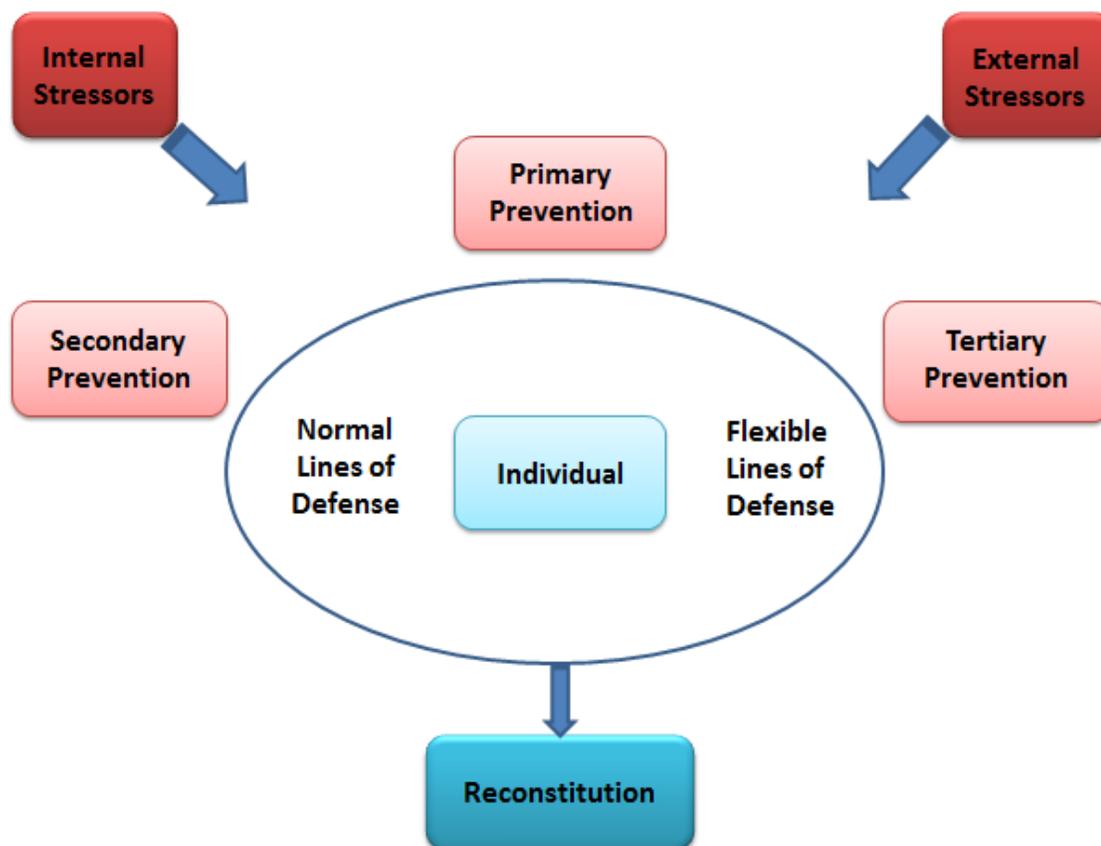


Figure 1. Neuman's Systems Model. This figure illustrates stressors impacting the individual and the implementation of prevention measures to regain and/or maintain stability, thereby achieving the goal of reconstitution.

Definition of Terms

For purposes of this study, acute fatigue will be defined as a temporary condition, a mental or physical tiredness that results in an inability to continue to function optimally. The researcher considers acute fatigue to be a normal adaptive response to work stress from which an individual is expected to recover. In this study chronic fatigue will be defined as unyielding fatigue, which is maladaptive, resulting in an inability to continue to function optimally. The researcher assumes chronic fatigue exists when an individual does not regularly recover from work stress. The researcher considers acute and chronic

fatigue to be subjective and the result of environmental stressors, either internal or external.

Research Objectives

This study aims to measure perceived fatigue among nurses within western North Carolina. Specifically this study aims to:

1. Determine the level of perceived fatigue among nurses, acute versus chronic.
2. Determine the self-reported ability of nurses to recover from perceived fatigue between shifts.
3. Measure the differences between perceived fatigue among nurses working in a trauma center and community hospitals.
4. Measure the level of perceived fatigue among the various demographic groups within the study.

Hypothesis

The researchers' hypothesis was that nurses working 12-hour shifts will report more fatigue than nurses working eight-hour shifts, nurses required to take call will report more fatigue than nurses that do not take call, and nurses working night shifts will report more fatigue than nurses working day shifts. No evidence was discovered to indicate a difference in type of hospital department or hospital size having an effect on nurse fatigue; therefore, the researcher does not speculate on their effect.

Summary

Nurses in today's healthcare environment are commonly working long hours and overtime. Such working conditions may lead to nurse fatigue which increases the risk of committing patient care errors. Fatigue due to the work environment contributes to job dissatisfaction and impacts the nurses' opinion about quality of life. Job dissatisfaction has led some nurses to the decision to leave the nursing profession. The researcher aims to measure perceived fatigue among nurses within western North Carolina.

CHAPTER II

Review of the Literature

The study aims to measure perceived fatigue among nurses in western North Carolina. Many research studies have examined relationships between working conditions, fatigue, commission of errors, and occurrence of occupational injury. The contribution of fatigue in patient care errors has been well documented in previous studies. In preparation for the study, an extensive review of the literature was conducted utilizing databases such as Cumulative Index for Nursing and Allied Health Literature (CINAHL), Educational Resources Information Center (ERIC), Medline, EBSCO Host and OVID. Keywords used in the literature search included fatigue, nurse fatigue, patient care errors, and fatigue survey. A review of research literature follows.

Literature Review

Measuring Fatigue

Barker and Nussbaum (2011) examined nurse fatigue, work performance, and the work environment. Five fatigue survey instruments were compiled for use as a survey tool in this study. A total of 745 nurses completed the survey. Nurses who worked evening shifts reported the highest level of acute fatigue, and nurses who worked a rotating shift reported the highest level of chronic fatigue (Barker & Nussbaum, 2011). Nurses reported higher levels of mental fatigue than physical fatigue. Overall, nurses reported more acute fatigue than chronic fatigue. Nurses working longer shifts and increased hours per week reported the highest levels of all aspects of fatigue (Barker & Nussbaum, 2011). The study indicates fatigue is a factor in decreased performance. Results show fatigue is related to changes in concentration, mood, decisions to take

shortcuts, and a decreased interest in or motivation to work (Barker & Nussbaum, 2011). The nurses' ability to remain vigilant impacts patient monitoring, medication administration, and documentation (Barker & Nussbaum, 2011). This study provides evidence that fatigue negatively effects work performance.

Fatigue and Injury

Amelsvoort, Bultmann, Kant, and Swaen (2003) published a study that examined the relationship between fatigue and work injuries. The researchers gathered data on 12,140 workers for the study. Fatigue was measured by a survey, as was the incidence of being injured in a work related accident. Evidence indicates night shift workers have three times the risk of an experiencing an injury while at work than day shift workers (Amelsvoort et al., 2003). Results revealed that both fatigue and the need for recovery from work are factors in work related injury (Amelsvoort et al., 2003).

A study examining the relationship between working conditions and needle stick injuries among nurses revealed that hours worked per day and specific shift worked were significantly associated with needle stick injury (Geiger-Brown, Le, Lipscomb, & Trinkoff, 2007). The researchers gathered data via survey from 2,624 nurses from Illinois and North Carolina. Results are that working 13 hours or more per day once a week and working shifts other than day shift significantly increases the occurrence of needle stick injury. Other factors contributing to the occurrence of needle stick injury are having fewer than 10 hours off between shifts, working several days in a row, and working on days that were scheduled as off (Geiger-Brown et al., 2007). The researchers suggest reasonable work hours be promoted as a preventive measure in reducing needle stick injury.

Recovery from Fatigue

In 2004, a survey was completed by 1,280 nurses measuring recovery from work related fatigue. The researchers aimed to identify a relationship between domestic responsibilities and recovery from shiftwork. Unexpectedly, the study did not provide evidence of a relationship between domestic responsibilities, fatigue, and recovery (Lushington, Winefield, & Winwood, 2006). The study revealed that being part of a family was actually protective against developing maladaptive fatigue. The researchers discovered that working a rotating shift, which includes nights, was the most important factor in determining maladaptive fatigue among the participants. The study identified that younger nurses require more support than experienced nurses as they learn to deal with the stressors of nursing and that work related stress is far more impactful than the stress related to family commitments (Lushington et al., 2006).

Scheduling and Patient Outcomes

A study conducted by Scott, Rogers, Hwang, and Zhang (2006) determined if a relationship exists between patient care errors, hours worked by the nurse, and nurse vigilance. Rogers has done extensive research surrounding this subject. Participants in the study included 502 critical care nurses who completed a 14 day logbook describing shift worked, hours worked, sleep patterns, and errors. The nurses reported working longer than scheduled 86% of the time; 65% of the nurses reported struggling to stay awake at least once during the study period, and 27% of the nurses reported making at least one patient care error during the study period (Scott et al., 2006). When nurses work 12.5 or more hours the risk of making an error almost doubles; also, when shifts exceed eight hours the risk of falling asleep at work almost doubled (Scott et al., 2006).

Nurses reporting drowsiness were not limited to those working night shift. Evidence indicates longer shifts increases the risk of errors and decreases nurse vigilance (Scott et al., 2006).

Tart and Warren (2008) examined the benefit of reducing the number of hours a nurse is required to be on call. The researchers aimed to determine whether a relationship exists between work related fatigue and documentation errors. This study involved chart review before and after implementation of a reduced call schedule to measure its effect on documentation errors. Prior to implementation of a reduced call schedule 2,642 charts were reviewed and post implementation 2,635 charts were reviewed. Results indicated working 12-hour shifts coupled with scheduled call rotations can leave nurses fatigued and prone to errors (Tart & Warren, 2008). The researchers discussed that prolonged work and lack of adequate sleep “can mimic alcohol intoxication to the extent that arriving at work fatigued is similar to arriving at work intoxicated” (Tart & Warren, 2008, p. 88). As work hour’s increase, so does medication, documentation, transcription, and procedural errors (Tart & Warren, 2008). This study revealed that a reduction in call requirements yielded 26% fewer documentation errors (Tart & Warren, 2008). The reduction in call pay and overtime resulted in \$115,525 savings for the facility (Tart & Warren, 2008).

A study examining the relationship between work schedules, staffing patterns, and patient outcomes was conducted in 2011. The study involved collection of data from 71 hospitals in Illinois and North Carolina regarding patient outcomes and staffing patterns along with surveys from 2,624 nurses regarding work schedules. Nurses were surveyed on hours worked per day, hours worked per week, number of weekends worked per

month, breaks during the workday, and required shift rotation. The study revealed adverse working conditions contribute to patient mortality. Pneumonia deaths are significantly higher in the hospitals where nurses report working long hours (Gurses et al., 2011). Death from aortic abdominal aneurysm is significantly associated with lack of sufficient time off to recover between shifts (Gurses et al., 2011). Hospitals with lower levels of licensed staff experience higher incidence of patient mortality for pneumonia, congestive heart failure, and stroke (Gurses et al., 2011). Results confirmed that work schedules have an effect on patient mortality (Gurses et al., 2011). The researchers suggested work schedules be improved as a means of improving patient care.

A study to determine if a relationship exists between work patterns of nurses and frequency of errors was conducted by Rogers, Hwang, Scott, Aiken, and Dinges (2004). Logbooks covering a 28-day period were completed by 393 nurses for this study. Data collection included length of scheduled shift, overtime worked, and errors or near errors that occurred. There were 199 errors and 213 near errors reported in the study (Rogers et al., 2004). Evidence indicates that work duration, overtime, and number of hours worked per week directly impacts patient care errors. Researchers reported working longer hours, for example 12-hour shift versus eight-hour shift, increases the likelihood of making errors. With shifts lasting 12.5 hours or more the chance of error is three times higher and working more than 40 hours per week significantly increases the risk of making an error (Rogers et al., 2004). Age of the nurse, hospital size, or type of unit did not affect commission of errors. The researchers suggest limiting the use of 12-hour shifts and eliminating overtime for nurses working 12-hour shifts.

Strengths and Limitations of the Literature

Much attention has been given to fatigue of nurses and its implications. Various contributors to fatigue have been examined as well as numerous effects of fatigue have been measured. Strengths of the studies presented include the use of valid and reliable research methods and large sample sizes producing consistent results. Fatigued workers are less safe practitioners. A limitation is that many of the studies presented utilized survey data and logbooks completed by the participant which is subjective data. Using convenience sampling may fail to capture data from the entire study population. Also, the 12-hour shift is very common and more nurses working in hospitals work this shift as compared to shorter shifts. Other studies have not focused on the study population proposed by this researcher. The researcher intends to measure perceived fatigue specifically among nurses working in western North Carolina.

Summary

Numerous studies show that working long hours and overtime contributes to fatigue. Nurses today often work long hours and are expected to care for patients of high acuity. The literature clearly indicates when nurses are fatigued, vigilance is reduced and patients are at risk of error. When working fatigued, nurses are also at increased risk of occupational injuries. Although 12-hour shifts are popular among nurses, findings indicate that the 12-hour shift leads to fatigue and contributes to patient care errors. Consideration should be given to reducing shift length for the safety of both patients and nurses.

CHAPTER III

Methodology

Numerous studies showed that fatigue negatively impacts the nurse's ability to provide safe patient care. Fatigued nurses are less vigilant. They exhibit decreased alertness, slowed reaction time, impaired communication, reduced motivation for work activities, experience lapses of attention to detail, and compromised problem solving (Aker & Biddle, 2011; Campbell et al., 2011; Hughes & Rogers, 2004; Garrett, 2008; The Joint Commission, 2011). Nurses who are fatigued are also at higher risk of experiencing an occupational injury (Geiger-Brown et al., 2007). The purpose of this study was to measure perceived fatigue among nurses in western North Carolina. The study specifically aimed to compare the differences in perceived fatigue between nurses working at a trauma center and community hospitals and to compare reported differences between demographic groups within the study. This study also intended to measure acute versus chronic fatigue, and the nurses perceived ability to recover from fatigue between worked shifts.

Design and Implementation

In efforts to measure perceived fatigue among nurses in western North Carolina, the researcher conducted a survey and followed a descriptive, correlational study design. The researcher combined two existing survey instruments with proven reliability and validity to capture a more comprehensive depiction of fatigue than use of just one survey instrument may have offered. The survey instrument utilized in this study incorporated the Fatigue Assessment Scale and the Occupational Fatigue Exhaustion Recovery Scale (Appendix A). After approval from the Institutional Review Board (IRB), the survey was

distributed through email to registered nurses currently working in hospitals included in the study. The email explained that participation in the study was voluntary and that proceeding forward and completing the survey served as consent to participate in the study. Written consent was not collected. The email contained a link to survey monkey where nurses could complete the survey. Nurses were given three weeks to complete the survey. The study did not involve any interventions or manipulation of the variables.

Setting

The study was conducted in acute care hospitals throughout western North Carolina. It comprised a total of five hospitals. The hospitals varied in size, provided varying levels of care, and are located in both rural and urban settings. Demographic variables measured in the study were present in all hospitals.

Sample

A convenience sampling method was utilized for the study. All registered nurses who provide direct patient care in the hospitals were included in the study. Registered nurses whose primary role is other than direct patient care were excluded from the study. The total number of nurses who could potentially receive and complete the survey was 2,764.

Protection of Human Subjects

Permission to conduct the study was obtained through the hospital IRB, as well as the IRB at the University. Participants' identity was protected through conduction of an anonymous survey. There was no contact between the participants and the researcher. The survey contained no personally identifiable information. Neither IP address nor email addresses were tracked. Participants were informed in a cover letter (Appendix B)

that the survey was voluntary and in no way affected their employment status. Hospital administrators were not given access to the completed surveys.

Instruments

The instruments used in the study included a demographic questionnaire (Appendix C) developed by the researcher, the Fatigue Assessment Scale (FAS), and the Occupational Fatigue Exhaustion Recovery (OFER) Scale. Demographic data collected included the length of the shift worked as well as when the shift is worked, for example day, evening, or night shift. Also gathered in demographics were the type of unit the nurse worked on, whether or not the nurse is required to be on call, type of hospital (trauma center or community hospital), number of hours worked in a week, and age. The two survey instruments were combined to create a survey tool that collected a more extensive assessment of fatigue than either instrument alone would have provided.

Fatigue Assessment Scale

The Fatigue Assessment Scale (FAS) is a 10-question survey instrument with five questions measuring mental fatigue and five questions measuring physical fatigue. It was developed to measure fatigue among the working population (De Vries, Michielsen, & Van Heck, 2003). This instrument has shown to have a high internal consistency and good convergent and divergent validity (De Vries et al., 2003). Two items on this instrument were found to have gender bias; however, these items did not result in noticeable differences in the total score (De Vries et al., 2003) therefore the instrument has not been modified. Permission to use this tool was obtained from the developer Jolanda De Vries (Appendix D).

Occupational Fatigue Exhaustion Recovery Scale

This survey instrument contains 15 items, which includes three subscales measuring chronic fatigue, acute fatigue, and recovery between shifts with each subscale comprising of five questions. The tool was developed specifically to measure work-related fatigue (Winwood, Winefield, Dawson, & Lushington, 2005). The instrument has strong psychometric characteristics of construct and convergent validity and reliability (Winwood et al., 2005). It is also validated as gender bias free among several groups of individuals to include nurses. This tool has the precise ability to identify fatigue associated with work (Winwood et al., 2005). Permission to use this instrument was obtained from the developer Peter C. Winwood (Appendix E).

Data Collection and Analysis

The results of the survey populated from survey monkey into an Excel spreadsheet for analysis. Demographics were coded to assist in ease of analysis. Descriptive statistics with use of Statistical Package for the Social Sciences (SPSS) software was conducted utilizing the data collected from the combined survey instruments. One-way analysis of variance (ANOVA) testing was included in the analysis to measure relationships between the various demographic groups and fatigue.

Summary

Long working hours, high work stress, and the demanding work environments of nurses leads to fatigue. Individuals who are highly stressed and fatigued will not perform at their best. Nurse performance directly impacts patient care activities. The purpose of this study was to measure perceived fatigue among nurses in western North Carolina.

The researcher utilized an anonymous survey to gather information regarding the level of perceived fatigue among nurses at five hospitals in western North Carolina.

CHAPTER IV

Results

The nursing shortage has been widely reported in scholarly journals as well as the general media. Furthermore, it is commonly known in the healthcare arena that the shortage of nurses has led to the use of overtime to meet the staffing needs in healthcare facilities (Garrett, 2008). Previous research has revealed a relationship between working long hours and working overtime to worker injury as well as patient care errors (Bae, 2012; Amelsvoort et al., 2003). When nurses are fatigued they are less capable of performing well while at work.

This research study intended to measure perceived fatigue among nurses in western North Carolina. The Fatigue Assessment Scale (FAS) and the Occupational Fatigue Exhaustion Recovery Scale (OFER) were combined to create the survey tool used for this study. The FAS was utilized for a general measure of fatigue and the OFER was utilized to discern acute versus chronic fatigue and ability for inter-shift recovery. The researcher compared the differences in reported fatigue across the various demographic groups within the study

Sample Characteristics

Five hospitals in western North Carolina were included in the study. One hospital is a regional trauma center and the other four are classified as critical access community hospitals. Only nurses who provide direct patient care were included in the data analysis. The total number of nurses in the study population was 2,764. There were 634 individuals who accessed the survey, of which 22 explicitly declined to participate in the study. Of the completed surveys, two were excluded from final analysis because the

nurses were not functioning in primary care roles. There were a total of 610 study participants. Final analysis of the data included 572 completed surveys and 38 partially completed surveys. The study participants represented a heterogeneous group.

As seen in Table 1, 444 of the participants indicated they work at a trauma center and 113 indicated they work at a community hospital. All five hospitals were represented among the participants.

Table 1

Demographic Data - Facility

Facility Type	Total # of possible participants	Frequency	Percent
Trauma Center	2263	444	77.6
Community Hospital	501	113	19.8

Table 2 shows most of the nurses participating in the study (n=479) indicated they work a 12 hour shift, while 39 participants indicated working a 10 hour shift and 54 indicated working a shift lasting 9 hours or less.

Table 2

Demographic Data - Shift Length

Shift Length	Frequency	Percent
≤ 9 hours	54	9.4
10 hours	39	6.8
12 hours	479	83.7

Among study participants, 336 nurses work a day shift, 213 work a night shift, and 22 nurses reported working an evening shift. Table 3 details the number of participants working the various shifts.

Table 3

Demographic Data – Time of Shift

Time of Shift	Frequency	Percent
Day	336	58.7
Evening	22	3.8
Night	213	37.2

Participants were asked to report the average number of hours they work per week. The majority of participants (n=470) report working less than 40 hours per week with only 69 participants reporting working over 40 hours per week. The mean hours reported worked per week among study participants was 36.7. Table 4 illustrates the average hours worked by participants.

Table 4

Demographic Data – Average Hours Worked per Week

Average hours worked	Frequency	Percent
≤ 40 hours per week	470	82.2
> 40 hours per week	69	12.1

Demographic data was collected relating to the requirement for call coverage beyond regularly scheduled work. Table 5 shows, 362 nurses report call coverage is not a requirement of their role. Participants required to take call assignments totaled 205.

Table 5

Demographic Data – Call Requirement

Required to take call	Frequency	Percent
yes	205	35.8
no	362	63.3

Participants were asked to indicate their age range. The age ranges used for this study were ≤ 34, 35-44, 45-54, 55-64, and ≥ 65. The largest portion of respondents fell into the ≤ 34 years of age group and the smallest portion of respondents fell into the ≥ 65 age group. Figure 2 reveals that there were fewer respondents with each increase in age range.

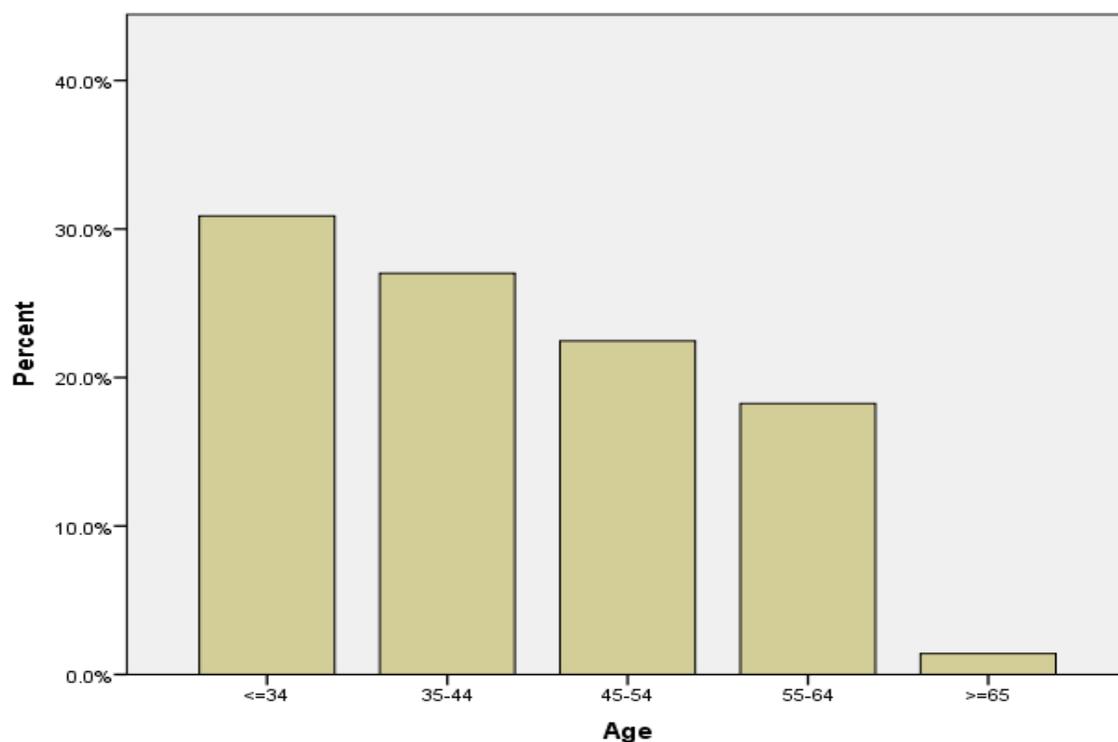


Figure 2. Age Range of Participants. This bar graph represents the percentage of participants within each age range.

Participants were asked to indicate the type of nursing unit on which they work. The options were: Adult medical/surgical unit, adult progressive care/step down unit, emergency department, procedural/interventional department, operating room, PACU/pre op, behavioral health, labor and delivery, critical care unit (adult/pediatric/neonatal), women's /children's inpatient unit, outpatient unit, or other which allowed free text. Figure 3 illustrates the type of units participants worked on while participating in this study.

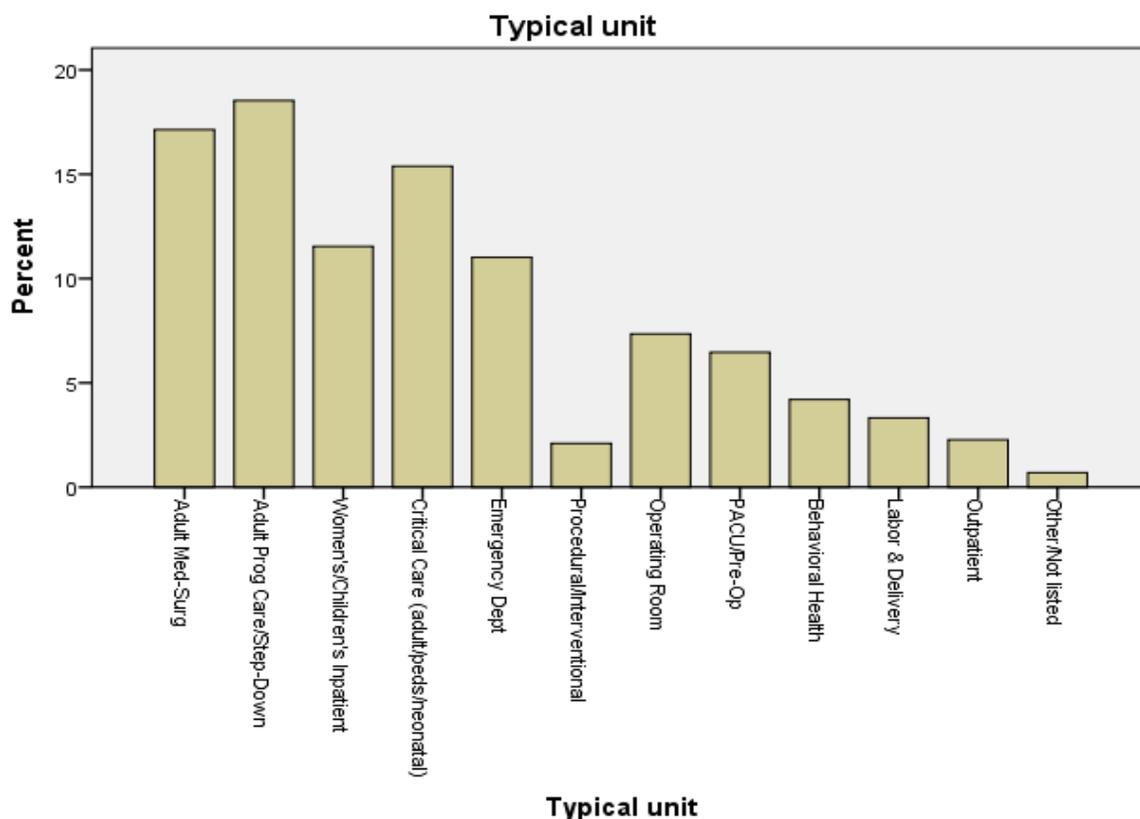


Figure 3. Type of Unit. This bar graph represents the percentage of participants working in each of the units listed.

Major Findings

When looking at the entire group of study participants, results from the Fatigue Assessment Scale indicated an overall presence of fatigue with a mean score of 23.5 utilizing descriptive statistics in SPSS. When analyzing the Occupational Fatigue Exhaustion Recovery Scale, the study participants indicated an overall high level of acute fatigue with a mean score of 67.2. The Occupational Fatigue Exhaustion Recovery Scale also revealed a medium or moderate amount of chronic fatigue with the mean score of 47.1 and a moderate ability to recover between worked shifts represented by a mean of 52.1.

The researcher's hypothesis was that there would be differences in perceived fatigue among the various demographic groups in the study. The researcher hypothesized that nurses working a 12-hour shift, a night shift, and those required to take call would report more fatigue than nurses working an eight hour shift, a day shift, and those not required to take call. Analysis of variance (ANOVA) was utilized to test the null hypothesis which is there will be no differences across groups.

When comparing the different shift lengths, nurses working a 12-hour shift reported a statistically significant higher level of acute fatigue with a mean score of 68.8, ($p < .001$), than nurses working ≤ 9 hours and nurses working 10 hours (Figure 4). When comparing day, evening and night shift nurses, nurses working night shift scored statistically significant higher on the Fatigue Assessment Scale with a mean of 24.9, ($p < .001$), than nurses' working day or evening shifts. Night shift nurses also report a statistically significant lower ability to recover between shifts with a mean of 48.5, ($p < .05$).

Acute Fatigue

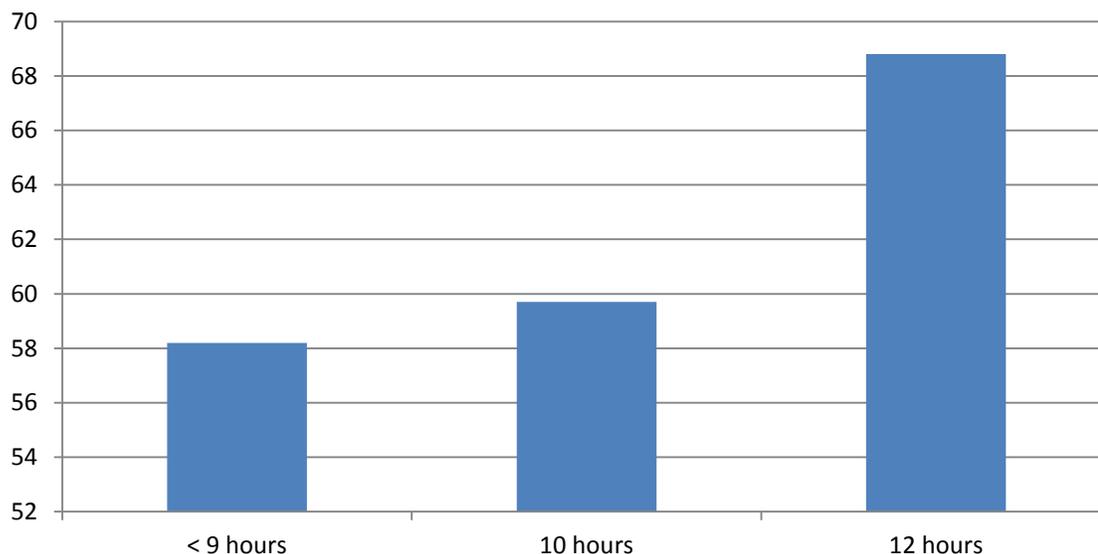


Figure 4. Acute Fatigue. This bar graph demonstrates as shift length increases so does reported fatigue. Nurses working 12-hours shifts report a statistically significant higher level of fatigue.

There was not a statistically significant difference in reported fatigue between nurses who are required to take call and those who are not required to take call.

Moreover, there was no difference between nurses working in a trauma center and nurses working in community hospitals. Although nurses working greater than 40 hours per week reported more chronic fatigue, mean 52.1, than nurses working less than 40 hours per week, mean 46.7, when compared there was not a statistically significant difference between the two groups ($p = 0.08$). There was also no difference in reported fatigue among the various age groups.

When measuring differences in reported fatigue across the various departments, the operating room and outpatient departments reported statistically significant lower levels of acute fatigue with mean scores of 54 and 50.7 respectively, ($p < .001$). With

that being said, these mean scores represent a moderate level of acute fatigue. The departments reporting statistically significant higher levels of acute fatigue compared to the other departments were labor and delivery and medical surgical inpatient units with mean scores of 72.9 and 72.3 respectively, ($p < 0.5$). These mean scores represent a high level of acute fatigue. The behavioral health department reported a statistically significant low capability of inter-shift recovery with a mean score of 37.9 ($p < .05$). This mean score falls at the low end of the range for reporting a moderate ability to recover between shifts. The operating room department reported a statistically significant high capability of inter-shift recovery with a mean score of 62.5, ($p < .05$) which falls into the upper range for reporting a moderate ability to recover between shifts.

Summary

This study incorporated five hospitals within western North Carolina and involved collection of surveys from a total of 610 participants. Results of the survey indicate nurses who participated in the study are experiencing acute fatigue. As many other studies have shown, nurses working 12-hour shifts and night shifts report the most fatigue. Night shift nurses in this study reported the least inter-shift recovery capabilities. Several demographic factors demonstrated no impact on fatigue reported. Factors that did not prove to impact perceived fatigue were the type of facility which employed the nurse, whether or not call duties is a requirement and the age range of the nurse.

CHAPTER V

Discussion

The negative impact of nurse fatigue on patient outcomes is well documented. The current nursing shortage has contributed to the nursing workforce being asked by their employers to work longer hours and overtime to meet demands (Garrett, 2008). These conditions lead to fatigue and poorer work performance (Barker & Nussbaum, 2011). This study intended to measure perceived fatigue among nurses in western North Carolina as well as compare differences between demographic groups within the study. A survey of nurses was conducted at five hospitals in western North Carolina to aid in gathering the required data.

Implication of Findings

Nurses participating in the study in general reported experiencing fatigue. Nurses working 12-hour shifts and those working night shift reported significantly higher levels of fatigue than other nurses. These results are similar to many other studies, which also have found fatigue to be high among nurses working long hours, such as 12-hour shifts. Most nurses working in hospitals today work a 12-hour shift, which means they are at higher risk of working fatigued. Fatigue has been found to be a factor in nurses deciding to leave the profession (MacKusick & Minick, 2010). Moreover, previous studies have proven that fatigued nurses suffer more work related injuries (Amelsvoort et al., 2003) as well as garner poorer patient outcomes (Gurses et al., 2011). Thus, patients along with nurses benefit when nurses are not fatigued while working.

Factors not indicating to have an impact on reported fatigue among study participants were: Working in a trauma hospital versus a community hospital, age of the

participant, and whether or not being on call outside of the regular work schedule is a requirement. Surprisingly, nurses who reported they work > 40 hours per week did not prove to have statistically significant higher fatigue levels. Previous research has indicated that nurses working an increased number of hours per week report greater levels of fatigue along with an increase of errors (Aiken et al., 2004).

Application to Theoretical Framework

In order for nurses to remain vigilant and capable of providing excellent patient care, they must not work in a fatigued state. Betty Neuman's systems model provided the theoretical framework for this study. Neuman has a holistic view of individuals and centers on wellness. Her theory is that individuals utilize prevention measures to defend against stressors in order to maintain internal stability. This study indicated working a 12-hour shift surpassed the nurses' ability to cope with work related stressors resulting in a state of fatigue. Moreover, nurses working night shift were unable to effectively cope with altered sleep patterns and reported a lack of ability to recover between work shifts. Nurses working shorter shifts were better able to cope with stressors of work to maintain internal stability which is evidenced by less incidence of reported fatigue. Neuman's systems model was an appropriate theoretical framework for this research thesis.

Limitations

Limitations of the study included conduction of a survey among nurses within one hospital system limited to western North Carolina. Survey research presents a limitation of reliance upon self-reported data, which can be impacted by recall. Another limitation was the method of the surveys' distribution to the nurses within the study population. The researcher was not permitted to distribute the survey directly to the study population,

but was restricted to relying on the managers to distribute the survey to the nurses. Therefore, the researcher is not aware of how many nurses actually received the survey. The participants' interpretations of survey questions presented a limitation in collection of data. Also, the 12-hour shift is the most commonly utilized shift in the study population; therefore, there is not be equal opportunity to gather data about the other shifts from study participants.

Recommendations

Considering the increased acuity of patients today, the desire for quality patient care and the growing nursing shortage, the retention of experienced nurses should be a top priority. This study and many others illustrate that 12-hour shifts result in a fatigued workforce. Fatigue leads to exhaustion and burnout, which is a factor in nurses deciding to leave the profession (MacKusick & Minick, 2010). Having fewer nurses present on a given shift increases the workload of the available staff contributing to fatigue, thereby increasing the risks of patient care errors (Hewitt, 2010). Shorter work shifts should be implemented in efforts to reduce the incidence of fatigue and burnout among nurses. Future research is recommended to discover other contributing factors to fatigue. The negative impact of fatigue on performance should also be explored further.

Hospital administrators should focus on improving nursing working conditions so that nurses are less fatigued, therefore better able to remain vigilant and provide safe care to patients. Fatigued nurses present a risk to patients (Scott, Hofmeister, Rogness, & Rogers, 2010). Additionally, nurses may benefit from education related to self-care options to combat fatigue. Future research is recommended to explore the effectiveness

of various options to combat fatigue while at work such as quiet spaces for relaxation on each unit, use of essential oils or offering a brief chair massage during work breaks.

Since it has long been known that fatigue contributes to commission of errors, other industries have placed specific limits on work hours to prevent worker fatigue (Gaba & Howard, 2002). Working overtime is common among nurses (Bae, 2012). Laws should be put into place that limit the hours nurses are allowed to work per day and per week due to the risk to patient safety. The number of hours that are required between worked shifts should also be well-defined to allow for adequate recovery. Lastly, hospital leadership should change staffing patterns as well as their expectations of overtime and call duties, and view a fatigued nurse as a hazard to patient safety.

Conclusion

This study adds to the body of evidence that nurses working a 12-hour shift experience more fatigue than those working shorter shifts. It is widely known that fatigue impairs performance. The literature shows nurses working longer shifts experience more injuries and poorer patient outcomes. Additionally, nurses in the study working a night shift reported a significantly lower ability to recover between shifts. These results present an ongoing cause for concern since countless nurses in hospitals work 12-hour shifts. Such a scheduling pattern is incompatible with goals for safe, high quality patient care; therefore the use of 12-hour shifts should be limited. Healthcare leaders must provide healthy work environments to retain experienced nurses and to provide patients with safe experiences.

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Appendix A

Fatigue Assessment Scale (FAS)

	Never	Sometimes	Regularly	Often	Always
1. I am bothered by fatigue	1	2	3	4	5
2. I get tired very quickly	1	2	3	4	5
3. I don't do much during the day	1	2	3	4	5
4. I have enough energy for everyday life	1	2	3	4	5
5. Physically, I feel exhausted	1	2	3	4	5
6. I have problems to start things	1	2	3	4	5
7. I have problems to think clearly	1	2	3	4	5
8. I feel no desire to do anything	1	2	3	4	5
9. Mentally, I feel exhausted	1	2	3	4	5
10. When I am doing something, I can concentrate quite well	1	2	3	4	5

Appendix B

Letter of Consent to Participants

My name is Karen Cochran and I am a graduate nursing student at Gardner-Webb University. I am conducting research to learn about the state of fatigue among registered nurses in western North Carolina. I am interested in the level of fatigue in direct care nurses and the ability to recover between shifts. If you are a direct care (bedside) registered nurse, I am asking that you participate in my research study.

Your participation in this research study will require approximately 5 minutes of your time and involves answering survey questions about your work situations and level of fatigue. This is a brief, anonymous survey. Participation in this research study is voluntary. You may withdraw at any time or decline to answer any question you choose. You will not be identified in the study. Your participation (or non-participation) in this research project **will in no way affect your employment status**.

Proceeding to the survey and answering the questions will serve as your consent to participate in the research study. Please feel free to contact me at 213-7261 if you have any questions or concerns about my research. If you have any concerns about the conduct of this research, you may contact Mission Institutional Review Board at 213-1105. You may request a copy of the completed study from the ProQuest database after April 2014. Thank you for considering this project.

Sincerely,

Karen Cochran

Appendix C

Demographic Questionnaire

Please select the choice which most closely reflects your work environment.

1. Typical Shift Length: ≤ 9 hours 10 hours 12 hours
2. Shift Worked: Day Evening Night
3. Type of Unit:
 - Adult Medical / Surgical Inpatient Unit
 - Adult Progressive Care or Stepdown Unit
 - Women's Inpatient / Children's Inpatient Unit
 - Critical Care Unit (adult / pediatric / neonatal)
 - Emergency Department
 - Procedural / Interventional Department
 - Operating Room
 - PACU / Pre Op
 - Behavioral Health / Psych Department
 - Other (free text)
4. Is call required: Yes or No
5. Facility type: Regional Level II Trauma Center or Community/Critical Access Hospital
6. What are the average number of hours worked in a typical week: _____
7. Age: ≤ 34
 - 35-44
 - 45-54
 - 55-64
 - ≥ 65

Appendix D

Permission to Use Fatigue Assessment Scale

From: J. de Vries [<mailto:J.deVries@uvt.nl>]
Sent: Sunday, September 08, 2013 9:57 AM
To: Karen Cochran
Cc: J. de Vries
Subject: RE: permission to use survey instrument

Dear Karen,

I give you permission to use the FAS and audit the tool. I like to receive your findings of the audit, because we are thinking of removing items 4 and 10 from the instrument. These items consistently perform less well compared with the other items, so I like to know what your findings will be.

At work we are in the middle of moving to another building, but I will try to send you the FAS the coming week.

Yours sincerely,
 Jolanda de Vries, PhD
 Professor of Medical psychology
 CoRPS
 Dept. of Medical and Clinical Psychology
 Tilburg University

Van: Karen Cochran [kcochran1@gardner-webb.edu]
Verzonden: zondag 8 september 2013 15:12
To: J. de Vries
Onderwerp: FW: permission to use survey instrument

Dear J De Vries,

I have read about your work with The Fatigue Assessment Scale (FAS) and feel it would be the ideal survey tool for use in my research study of fatigue among nurses. I am a graduate student in Asheville, NC working towards my master's degree in nursing. My plans are to measure fatigue among nurses in a local trauma center which employs approximately 5000 nurses. I would be grateful for the opportunity to use this tool and more than happy to share the results of the study.

May I have permission to utilize The Fatigue Assessment Scale in my research study? Also, may I have permission to audit the tool if needed? Lastly, if permission is granted, can you send me the actual survey?

Karen Cochran RN
 MSN student Gardner-Webb University

Appendix E

Permission to use Occupational Fatigue Exhaustion Recovery Scale

From: Peter Winwood [<mailto:Peter.Winwood@unisa.edu.au>]
Sent: Wednesday, September 11, 2013 2:52 AM
To: Karen Cochran
Subject: RE: confirm payment

Hi again Karen
 This is the most recent version of the manual.
 It covers the issue of 'recovery' or 'persistent fatigue' or 'fatigue failure'.
 Payment into PayPal HAS arrived
 Many thanks
 Good luck with your research. Let me know how it went.
 Peter Winwood

From: Karen Cochran
Sent: Monday, September 09, 2013 8:57 PM
To: 'Peter Winwood'
Subject: RE: permission to use survey instrument

Payment has been successfully arranged through PayPal. I look forward to receiving the survey tool. Thank you.

From: Peter Winwood [<mailto:Peter.Winwood@unisa.edu.au>]
Sent: Saturday, September 07, 2013 9:38 PM
To: Karen Cochran
Subject: RE: permission to use survey instrument

Good Afternoon Karen
 The OFER scale is a copyright commercial scale.
 However for higher degree students such as yourself I normally licence its use pro bono on the strict conditions:
 1) That its use is strictly confined to the student's work alone and is not allowed or copied to any one else, and
 2) Any publications resulting from the research project fully cite the OFER scale, and
 3) An electronic copy of any such publications is sent to me to add to the growing list of OFER usage indicators.
 In anticipation of your acceptance of these conditions, I attach an invoice for the OFER manual costed at the student rate of \$US 99.00.
 I look forward to your response.
 Peter Winwood

From: Karen Cochran [kcochran1@gardner-webb.edu]
Sent: Sunday, 8 September 2013 5:28 AM
To: Peter Winwood; pwinwood@intermode.on.net
Subject: FW: permission to use survey instrument

Dear Dr Winwood,

I have read about your work on The Occupational Fatigue Exhaustion/Recovery Scale (OFER) and feel it would be the ideal survey tool for use in my research study of fatigue among nurses. I am a graduate student in Asheville, NC working towards my master's degree in nursing. My plans are to measure fatigue among nurses in a local trauma center which employs approximately 5000 nurses. I would be grateful for the opportunity to use this tool and more than happy to share the results of the study.

May I have permission to utilize OFER in my research study? Also, may I have permission to audit the tool if needed? Lastly, if permission is granted, can you send me the actual survey?

Karen Cochran RN
MSN student Gardner-Webb University