

Is there a relationship between sleep deprivation and patient and practitioner safety?

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Abstract

The issue of sleep deprivation in regards to practitioners in the health-care setting is important in the prevention of errors in care and maintaining the safety of both patients and practitioner. The problem of sleep deprivation is also important in maintaining health and well-being for the practitioner. Sleep loss resulting in fatigue is common among health care professionals working in healthcare settings. With minimal chance to sleep, fatigue sets in which contributes to impairments in cognition, motor function, and impaired judgment which not only affects patient safety but the safety of the practitioner is also hindered. Sleep deprivation has implications for patient safety as well as physician career longevity and workforce turnover, (Machi et al.).

Key words: sleep deprivation, shift work, patient safety, and safety outcomes.

CHAPTER ONE: INTRODUCTION

Relationship between sleep deprivation and patient safety

The issue in the literature review is an attempt to find a relationship between sleep deprivation for practitioners and the effects lack of sleep and fatigue have on patient and practitioner safety. Sleep loss resulting in fatigue is common among health care professionals working in healthcare settings. According to Machi, et al, contributing factors include shift work, and long continuous hours of duty (> 12-hour shifts), rotation of work between day and night shifts, and those shifts which reduce sleep opportunity. With minimal chance to sleep, fatigue sets in which contributes to impairments in cognition, motor function, and impaired judgment which can affect patient safety, cause significant personal well-being and health issues for the practitioner, as well as a decline in professionalism and performance of job-related tasks, (Machi, et al.).

Are there general safety issues for all parties and adverse patient outcomes when care is provided by a practitioner who has had less than 8 hours of sleep before providing care? The problem statement is, is there a relationship between sleep deprivation and patient and/or practitioner safety? There is concern from both practitioners and patients regarding the effects lack of sleep has on safety for the patient and health and well-being for the practitioner. In one study it was stated there was evidence of a high risk for behavior and health-related morbidity amongst shift workers associated with sleep disorders (Hanna, A. et al., 2008).

The issue of sleep deprivation in regards to practitioners in the health-care setting is important in the prevention of errors in care and maintaining the safety of both patients and practitioner. The problem of sleep deprivation is also important in maintaining health and well-being for the practitioner. In a review of the literature by Machi et al., found data indicating

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short-term memory appears to decline after day and overnight shifts and confirms the high incidence of disturbed sleep in Emergency physicians. Shift work has detrimental effects on health, concentration, mood, and metabolism. Sleep deprivation has implications for patient safety as well as physician career longevity and workforce turnover, (Machi et al.).

In another review of literature sleep disorders associated with morbidity among shift workers was greater significantly than that experienced by workers who worked daytime hours with symptoms that were identical, such as depression, sleep-related accidents, missed social and family activities, and absenteeism (Hanna, A., et al., 2008). These results indicate a greater reason for further research on sleep deprivation on healthcare practitioners.

According to Machi, M. S. et al. (2012), shift work provided by emergency physicians who rotate day, afternoon, and an overnight shift has effects on concentration, mood, general health and well-being, metabolism from both desynchronizes of circadian rhythm and sleep deprivation. According to Tewari, et al., in the analysis of their review of the literature, after periods of sleep deprivation physicians have poor retention of information, worse numeric and language skills, impaired concentration and short-term memory. These two articles both agree that concentration and short-term memory are affected by sleep deprivation. These are only two articles that describe what is known about sleep deprivation for healthcare practitioners.

Practitioners are responsible for patient safety at all times and expected to deliver high-quality care 24/7. Further research is needed to associate sleep deprivation with patient safety. We need to find research on the impact of sleep deprivation in regards to the harmful effects on patient safety. It's sad to state that to make a change there usually has to be some horrible patient outcome within most health care organizations. Therefore, my literature review project aimed at discovering data supporting patient safety is directly related to sleep deprivation

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in practitioners and harm can occur to both the practitioner and the patient when the practitioner gets less than 8 hours of sleep.

CHAPTER TWO: LITERATURE REVIEW**Does our sleep debt affect patients' safety?**

The researcher posed to determine if sleep deprivation affects performance of an anesthesiologist. The researcher reviewed various articles which pertained information in the effects of sleep deprivation configuring into five categories. The categories are as followed: Physiology of sleep, health effects of sleep loss, adverse effects of sleep deprivation on performance, research on sleep-deprived residents, and strategies to prevent the negative effects of sleep deprivation. Within each category, the researcher was able to find articles correlating sleep deprivation with altered performance. Tewari, A., et al. (2011), states "decreased performance of motor and cognitive functions in fatigued anesthesiologist may results in impaired judgment, late and inadequate responses to clinical changes, poor communication, and insufficient record keeping, all of which affect the patient safety, showing without a doubt the association of sleep debt to the adverse events and critical incident" (p.12).

Are the results of the study valid? In this particular literature review completed by the researcher, the articles at hand all pertain to sleep deprivation, and the effects sleep debt has on patient safety. This study shows valid because the research shows there is a relationship between sleep deprivation and patient safety which answers the researchers question at hand. This particular literature review also answers my research question, which is, is there a relationship between sleep deprivation and patient and practitioner safety? Within each study reviewed results were similar, and they were displayed. The common theme within the report with each result was the deprivation of sleep equates to a lack of performance.

What are the results? The results of the literature review by the researcher suggest anesthesiologists must be involved in educational programs dealing with the risk of sleep debt. Caffeine should be limited and regular nonrigorous exercise is beneficial when sleep debt is

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present to prevent errors from occurring and protect patients from harm. The effects of sleep deprivation become vital among anesthesiologist and should not be ignored. Sleep demands need to be met to prevent adverse effects of sleep debt. Decreased performance of motor and cognitive functions in fatigued anesthesiologist result in poor judgment, inadequate and late responses to clinical changes, inadequate record keeping and poor communication (Tewari, A., et al.).

Will the results help locally? The literature reviewed various articles within five different categories, and each category proved to have implications that sleep deprivation leads to lack of performance on the individual. Although the investigation focused on gathering the information for the anesthesiologist, these findings hold true for all practitioners involved in patient care. According to Tewari, A., et al., "sleep debt impairs our ability to make decisions, handle stress, and to control our emotions...regulation and guidelines need to be formulated at national and institution level" (p.16). With the results of the literature review, one can determine the effects sleep debt has on patient and practitioner safety, health and wellbeing and determine laws must be implemented to assure practitioners are getting enough rest between shifts. This study helps me to answer my research question by showing there is a definite relationship between sleep deprivation and patient and practitioner safety. Not only did the study prove this, but also proved that the wellbeing of the practitioner is also affected by sleep debt.

Shift work in Nursing: Is it really a Risk Factor for Nurses Health and Patients

This study was based on a questionnaire along with a sleep study questionnaire which was sent out to a total of 688 nurses (92%) in Israel in 2003. The sample consisted of 195 nurses (175 females and 20 males) worked only days, and 493 nurses (414 females and 79 males) worked flexible rotating shifts (morning, evening, and night shifts). A total of 589 females and 99 males completed the two surveys. According to Hanna, A. et al. (2008) "In this study, the results of health problems and sleep disorders between female and male nurses, between daytime and

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shift nurses, and between sleep-adjusted and non-sleep adjusted shift nurses were compared" (para. 2).

Are the results valid? Given that nursing is still mostly a women's career and the survey took place in 2003, nursing population surveyed seems valid. The nurses in the study all completed the same survey questionnaire. Items on the survey included demographics, sleep habits and disorders; and health history and complaints. Error and incident data was obtained for each participant from an ongoing systematic database gathered by the risk management nurses for the purpose of quality improvement (Hanna, A., et al.). The method to determine the data proved to be valid as well. The comparison from males to female nurses was made by the researcher and found the main gender difference in the study was female nurses had lower BMI and were relatively older than male nurses. The researchers were surprised to find that more of the daytime nurses when compared to the shift workers, complained about sleep disturbances and health problems (Hanna, A., et al.).

What are the results? Sample demographics had significant differences between male and female nurses. Female nurses complained more about thyroid problems, back aches, and leg pain than males. Female nurses had more complaints about falling asleep and morning fatigue than males which had more complaints about snoring. In determining the well-being of the nurse, weight, gender and age were more significant factors than shift work (Hanna, A., et al.) According to the researchers, the two hypothesis made were not supported by the data. The researchers expected that the nurses who worked rotating shifts would report on more involvement in adverse incidents and errors when compared to nurses who worked a day or evening shift. It was also assumed that the nurses who worked rotating shifts would also have a higher rate of absenteeism due to illness when compared to nurse's working day or evening

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shifts. The researchers can conclude that there is no relationship between performance and reported sleep disorders within the study (Hanna, A., et al.).

Will the results help locally? Since the researchers concluded further exploration of the reasons that nurses were working night shift did not have higher absentee rates and were not more involved in errors and incidents than the day shift or evening nurses. The question is raised in regards to if there is a tendency of the night shift nurse to under report on professional errors and incidents. Although, there is not enough evidence for a comparison of female to male shift workers. It appears that age, gender, and weight are significant factors more so than shift work in determining the well-being of nurses. Two additional findings were added to the study of shift work 1) females complain more about shift work than males 2) there is no more of an impact on health, absenteeism rates, or performance when comparing shift work to those that work days (Hanna, A., et al.).

The Relationship Between Shift Work, Sleep, and Cognition in Career Emergency Physicians

The study was a prospective repeat measure study of cognition that took place at a University hospital ED. The study sample characteristics included 13 ED Physicians at a level 1 trauma center and stroke center. All of which were males, ten white and 3 Asian. They worked at least one daylight shift and one overnight shift per month. Physicians who were taking prescription medications known to affect cognition were excluded. Participants were tested 30 minutes before and immediately after at least one daylight shift and at least one overnight shift. Participants completed four neuropsychiatric test in a private room adjacent to the ED. The study was completed using the University of Southern California Repeatable Episodic Memory Test (REMT), the Paced Auditory Serial Addition Test (PASAT), the Stroop Color-word Test and the Trail Making Test (TMT). The participant's fatigue and sleep quality were also examined using

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the Chanlder Fatigue Questionnaire (CFQ) and Pittsburg Sleep Quality Index (PSQI) (Machi, M.S., 2012).

Are the results valid? The results of this study are valid. According to the article, data indicates that short-term memory appears to decline after day and overnight shifts and confirms the high incidence of disturbed sleep in Emergency physicians. This study also proves shift work has detrimental effects on health, concentration, mood, and metabolism. This has implications for patient safety as well as physician career longevity and workforce turnover, (Machi, M.S., 2012). Although the article did not state the actual effects of patient safety, the researcher did suggest implication for patient safety. With the REMT test, short term memory impairments were noted which could suggest errors in omission if facts learned during Physician interview or physical examination are not recalled during order entry, such as a recent change in medication and medical history of the patient (Machi, M.S., 2012). This study proves my research question as well. According to this study, there is a relationship between sleep deprivation and patient safety.

What are the results? Fewer words were recalled on the REMT after both day and overnight shifts. Sleep quality was worse in Emergency Physicians compared to the normal population. Post-fatigue was correlated with the perceived difficulty of the shift. The results suggest that shift work and sleep deprivation both effect short term memory (Machi, M.S., 2012). Limitations of the study were shift lengths varied from 6 to 8 hours, and most physicians did not end their shift at times scheduled resulting in longer periods worked. Often varying by more than 2 hours.

Will the results help locally? Although the study did not include female participants and those of other races other than white and Asian, these results can be repeated in other Emergency room settings which include various ethnic backgrounds and gender. The results could be

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repeated in this study. One suggestion by the researcher with future studies suggested the inclusion of longer test of attention (Machi, M.S., 2012). The results of the study could help locally because the outcomes of the study suggest sleep deprivation affects short term memory loss which could cause an error with patient safety. As stated by Machi, M.S., (2012), "Awareness of these vulnerability should prompt exploration of system improvements to reduce changes of error: for example, increased use of memory aids, scribes, or other adjuncts towards the ends of the shifts or decreased tolerance for interruptions during patient care on night shifts" (p.91).

Impact of 12 h shift patterns in nursing: A scoping review

This article is a scoping review in which a search of the academic literature was collected in electronic databases (AMED, MEDLINE, CINAHL, PsychInfo, Scopus, HMIC, the Cochrane Library, Business Source Premier, Econ Lit, ASSIA, and Social Policy and Practice). Two reviewers independently reviewed the articles using Arksey and O'Malley's (2005) methodological framework in which 85 primary research studies and ten review papers in the nursing field were included in the scoping review. "The objective of this review was to review evidence of the impact and effectiveness of 12 h shift in the international nursing literature, supplemented by a review of the evidence in other, non-nursing related industries," as stated by Harris, R. et al., (2015, p. 605). The research question asked by the scoping review was "What is the extent, range, and nature of the evidence available around the impact of 12-hour nursing shift patterns?"

Five key themes were identified among the reports which include risks to patients, patient experiences, risks to staff, staff experience, and impact on the organization of work. Of the 85 papers reviewed 63 were quantitative research designs, three were qualitative, and 19 were mixed methods approach.

Are the results valid? The review is legitimate research. The researchers justified the study design and discussed why they chose those methods. A discussion of how the research was conducted and how the review was completed, which studies were included and which were not, as well as the reasons those did not appear in the review. The researcher also included literature to review for non-nursing professional which worked 12-hour shifts to provided evidence if the impact of 12-hour shifts in other types of occupations. Those occupations included metal plants, energy plants, transportation, administration and police force. 298 non-nursing papers were identified in which 23 primary research papers and eight review papers were included in this study. There were also documented themes within non- nursing occupations which include, staff experience, staff risks, impact on work and productivity/quality of work (Harris, R. et al., 2015). Validity is proven with this research review in the way data was collected to address the research question. This research study also helps to justify my research question in that it states there is more research needed that focus on the impact of 12-hour nursing shifts on patient safety. "...there is strong evidence for a detrimental impact of shifts lasting more than 12 hours on the quality and safety of patient care, and this does give cause for concern," as stated by Harris, R., et al., (2015, p. 631).

What are the results? The researchers used flow charts, graphs, tables, and mapping methods to show the different aspect of the results of the review. Research into 12 hours nursing fell into five themes 1) risk to patients 2) risk to staff 3) patient experience 4) team experience and 5) impact of the organization of work.

According to the results of the review, there was inconclusive evidence of 12 hours shifts having an impact on either of these themes. The quality of research is weak, and most focus on the risk, experience and work life balance for staff (Harris, R. et al., 2015). The research

review also concludes there is inconclusive evidence to withdraw or justify the implementation of 12-hour shifts. It is not understood where there are real and unacceptable risks to patients and staff as well as benefits. More research is needed that focuses on the impact of 12-hour nursing shifts on patient safety (Harris, R. et al., 2015).

Will the results help locally? There were no ethical issues to be taken into consideration, and there was an in-depth review of the literature by the researchers. According to Harris, R., et al. (2015), " Some studies conclude that it is the combination of various work schedule characteristics that have a substantial impact on nurses' health and wellbeing, rather than extended shift lengths alone," (p. 611). Although there were various finding from each paper reviewed, the authors concluded more studies are needed that address the impact of 12-hour shifts in regards to patient safety. These results will help locally by noting where there are 12-hour shifts in place there is a need for risk reduction strategies to be implemented as suggested by Harris, R., et al.

Effects of extended work shifts on employee fatigue, health, satisfaction, work/family balance, and patient safety?

In this study, a survey was sent to 77,898 nurses from 146 hospitals, 185 nursing homes, and 76 home care agencies. According to the researchers Estrin-Behar, M., & Van der Heijden, B., (2012), the objective of the study "...was to perform a secondary analysis of a large European database, collected in 2003, in order to determine the effects of work schedule among paramedical staff on these three parameters (work/family balance, health and safety), after adjustments for various risk factors" (p. 4283). Included in the survey were indicators for health problems which included Work ability index, Burnout, and questions. The questions covered

asked the nurses if they got sufficient sleep in periods they were working, how often did they feel tired, and what was the number of sick days declared. Work schedules were broken up into different categories: 8 hours, 10 hours, and 12 hours worked (Estrin-Behar, M., & Van der Heijden, B., (2012). The researchers also used several single questions which included, how often do you have to get up before 5 o'clock in the morning to go to work, how many weekend (Saturdays and Sundays) do you have to work per month, how often do you have to take over shifts on a short notice, and how often in one month do you have to work a split shift?

Are the results valid? For the validity of the results, the researchers used Pearson's Chi-square test for the significant variables and tables were included with this information. A multivariate analysis using SPSS 12.0 software was performed. " Fewer than 10% of the different questions yielded missing data... all significant relationships reached a .001 significance level" per Estrin-Behar, M., & Van der Heijden, B., (2012, p. 4284). This research review is valid for my research question because it includes information on the effect of longer shifts and employee fatigue and patient safety which address my research question.

What are the results? According to Estrin-Behar, M., & Van der Heijden, B., nurses working 10 to 12 hours shifts have worse health when compared to nurses working 8-hour shifts although those nurses state they are satisfied with family life balance. Those nurses are more often tired and have high burnout scores. Having to work at short notice and having to get up before five o'clock am are strong risk factors for health and safety problems. Working 12-hour night shifts creates 50% more worries of making a mistake among nurses. There is an increase of 3% for both medication error and needle stick injury with each additional three hours worked per week. These results show a relationship between patient and practitioner safety and longer shift hours such as 12-hour shifts.

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Will the results help locally? These results will help locally when local facilities implement a 12 hour work day shift. There are legitimate concerns about the safety of the employee and the patient in an extended work time environment. According to the article, "in a recent review by Wagstaff and Sigstad (2011) concluded that work periods > 8 hours carry an increased risk after 8 hours worked," (p.4290). Although implementation of 12-hour shifts is appealing to nurses because of work/home conflicts, it may not be what's best for both the nurse and the patient.

Delinking resident duty hours from patient safety

In this narrative review, Osborne, W., and Parshuram, C.S., (2014), review various studies by literature and published articles an attempt to delink resident hours of duty from patient safety. They presume to state four reasons why data does not conclude that resident duty hours or prolonged shifts assume to cause harm to patients, rather it hinders patient safety. The four potential explanations for their findings include 1. Resident fatigue is a minor determinant of serious errors. 2. Resident duty hours are a minor component of resident fatigue. 3. There are adverse consequences of reducing resident duty hours. 4. Residents are of limited immediate consequence to patient safety (Osborne, W. & Parshuram, C.S.).

Are the results valid? Osborne and Parshuram make logical statements to support the four statements on reasons why fatigue is not the only issue in regards to patient safety. In regards to the first statement, they state fatigue may be used as a proxy for other system level factors contributing to unfortunate events. These include limited patient or content knowledge, limited experience, inadequate supervision, and high workload (Osborne, W., & Parshuram, C.S.). Secondly, the authors suggest if an acceptance of fatigue to harmful medical errors is significant, then there is warranted closer consideration for duty hours to resident fatigue. Contributing fatigue only to resident duty hours is not the only likely factor contributing to fatigue. The

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authors suggest other factors such as tolerance of sleep loss, circadian rhythm, overlooked workloads, and other sleep-related factors. As stated by Osborne and Parshuram, "...after duty hour reduction, workload-associated fatigue may be increased if the same work is compressed into fewer hours, and small workloads rotations may be transformed into high workload rotations" (2014, p. 4).

Third, the authors' state reducing resident working hours is harmful to patients relating to continuity of care. Continuity of care will be omitted mediated by an increased frequency of hand overs and reduction of patient contact. Fundamental aspects of today's modern health care include health care provider's knowledge to appropriately investigate, rapidly know and understand, efficiently transfer care of patients and provide optimal treatment. The need for relational and management continuity is essential for care. According to the authors, duty hour reduction compromises continuity of care by increasing intervals between exposure to patients, reducing the duration of clinical exposure to patients, and reducing the available time providers have to interact with patients and other members of the health care team (Osborne, W., & Parshuram, C.S.).

Fourth the two authors suggest with the use of technology and the advances in healthcare, that residents may not be the only essential aspects of health care. Residents may be able to delegate some of the workloads to counterparts of the health care team, thus supporting the notion that residents have limited ability to detract or add to patient safety (Osborne, W., & Parshuram, C.S.).

The author's notions are of valid findings although they do not support my research question. The author's review rather states "An increasing body of evidence undermines the assumption that long duty hours for resident's compromise patient safety and quality of care. Conversely, the evidence that short duty hours compromise patient safety is weak" (2014, p. 5).

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What are the results? Overall review of data by the two author's suggests that resident duty hour reduction does not cause harm nor does it improve patient safety and quality outcome. According to the authors, the assumption that long duty hours for resident's compromise patient safety and quality of care is undermined by the studies in the review. There is weak evidence that shorter duty hours protect patient safety and longer duty hours compromise patient safety.

Will the results help locally? As suggested by Osborne and Parshuram, other studies need to be conducted. These finding by the two authors are helpful in supporting long resident duty hours and may be applied when one is trying to defend the current working hours of residents. The authors were able to state several other factors that can lead to resident fatigue which I feel were of importance. The fact of duties done during the working hours can contribute to fatigue alone is one I can relate to as a health care worker. There are days I work extra hard caring for a very ill patient, although my day may not be longer, the workload is heavier which leads to increase fatigue. These authors brought up some great points which make me think there may be other work related factors which cause fatigue leading to decreased safety of both patient and practitioner.

The link between fatigue and safety

This article was a literature review conducted by Williamson, A. et. al., in 2009. The analysis examined the relationship between three leading causes of fatigue which include circadian influences, sleep homeostasis, and nature of task effects. The primary goal of the review was to examine the evidence for a link between safety and fatigue. Although the focus was on occupational setting and transport, I felt it relevant to include in my research review to have various sides of information present which provides like data regarding fatigue and safety for all occupations including practitioners in medical settings. According to the authors, the review states evidence which proves sleep homeostatic effects and creates accidents and

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impaired performance. In regard to task effects, there was a lack of supporting studies which evaluated the effects of injuries and accidents according to Williamson, A., et. al. With circadian influences, the researchers suggest increased levels of fatigue and sleepiness leads to decrease in performance capacity. There is a need for rest which falling asleep being the extreme of the performance capacity (Williamson, A., et. al.).

Are the results valid? This article is valid for my research for two reasons. The first being the authors suggest a relationship between sleepiness and fatigue with a decrease in performance. This demonstrates a correlation between fatigue and practitioner safety (the practitioner could potentially fall asleep on the job with limited rest). Secondly, the authors suggest little sleep or a disruption in sleep homeostatic creates impaired performance, which also shows a relationship between practitioner safety and fatigue.

What are the results? Evidence was clear for sleep homeostatic effects showing accidents and impaired performance. According to Williamson, A., et. al., (2009) "evidence did not support a direct link between circadian-related fatigue influences and performance or safety outcomes and further research is needed to clarify the link" (p. 498). Time on task is also associated with workplace fatigue. This can affect cognitive, mental and physical wellbeing and is often looked at another exposure measure to gage associated with accident and risk injury in the industrial setting. Suggested by the researchers there is a lack of appropriately designed studies to contribute to the impact in the medial field which controls time adjusted for breaks, time of day, shift start and wake start times, as well as shift scheduling per Williamson, A., et. al.

Will the results help locally? Further research is needed to clarify the link between circadian-related fatigue and performance and safety outcomes. Limitations included in this review suggests the study highlighted gaps in the literature, therefore, there are opportunities for further research.

Resident fatigue in otolaryngology residents: a Web-based survey

This study surveyed 190 otolaryngology residents. They were interviewed on topics including demographics, residency structure, perceived stress and sleep habits. Of the 190 residents, 178 of them also completed the Epworth Sleep Scale questionnaire to evaluate fatigue which indicated a significant amount of residents are excessively sleepy. There was a total of 48 questions the residents answered (Nida, A.M., et al., 2015).

Are the results valid? According to Nida, A.M., et al., The purpose of the survey was to evaluate the sleep prevalence of residents and assess its consequences. Otolaryngology students were picked for their rigorous variations of call. The survey was obtained through SurveyMonkey.com and was kept secure with password protection. 106 ACGME-accredited otolaryngology residency programs in Puerto Rico and the United States were asked to participate in the survey and asked their residents to take the questionnaire electronically. The survey was open for six weeks allowing for all to be included and data was taken for analysis.

What are the results? 14% of the residents reported working 80+ hours a week, and according to data obtained from the survey, residents who took a call from home had more sleep hours when compared to residents taking a call in house ($p=0.01$). Residents on rotations for head and neck surgeries had higher sleep scale and significantly fewer hours of sleep ($p=.003$) and had more work hours. Residents with lower mean Epworth Sleep Scale scores reported no motor accidents or near needle stick incidents per Nida, A.M., et. al. (2015). Residents who slept less than 6 hours a night had higher ESS scores which indicate those residents are more fatigued.

Will the results help locally? These results will help locally by contributing data to resident programs. The data will also contribute to local hospitals in our area in regards to facilities which make their staff work hours of overtime to meet the needs of the patients. The

supervisor can review the results and learn that fatigue and lack of sleep can cause errors in care such as needle stick injuries and medication errors as well. Correlations were found with the respondents between the ESS and trouble concentrating, sleep quality satisfaction, ability to control important things in life, irritability, sleep impact on daily functioning and motivation as discussed by Nida, A.M., et al.

Effects of Reducing Interns' Work Hours on Serious Medical Errors in Intensive Care Units.

This study was a Prospective randomized study. The study took place in the MICU and CCU between July 2002 to June 2003. Two teams were formed with 6 Interns, three third year residents, and 2 second year resident. A comparison study of hours worked between the two teams. One team worked traditional hours averaging 77 to 81 hours per week, with up to 34 continuous hours of work. The second team worked 60 to 63 hour of work per week with work limited to only 16 hours of consecutive work hours (Landrigan, C.P., MD et al.).

Are the results valid? The results of this study were valid. There is a legitimate concern of long work hours can cause medical errors as it relates to medical, procedural, diagnostic and other medical errors. Although the cohort recruited was only focused on interns I believe that resident staff should have also been included. With this cohort, there was a very minimal bias. The observers in this study were extensively trained and none which were study investigators. There was an inability to blind the medical observers to the schedule of the interns which in turn may have helped in the primary detection process.

What are the results? According to Landrigan, C.P., MD et al., interns made 36% more serious medical errors during traditional work schedules than during an intervention schedule that eliminated extended work shifts. Interns made more serious medical errors when they

worked frequent shifts of 24 hours or more than when working shorter shifts. About 5.6 more times serious diagnostic errors were made by the interns working the traditional schedule. Suggested by the authors, in the intensive care unit, eliminating extended work shifts and reducing the number of hours worked per week can reduce serious medical errors.

Will the results help locally? The results of this study I feel can be replicated in any ICU setting when interns work a traditional schedule of working 24 hour or more long shifts. The results of this study also fit with other available evidence from previous studies, such as the study conducted by Nida, A.M., et al., (2015), Resident fatigue in otolaryngology residents: a Web-based survey, which also concludes resident hours worked relates to errors in patient care.

Long Shifts may suit some staff, but patient care is suffering.

The article reviewed is regarding longer shifts (greater than 8 hours) and the results of patient care. This article reviews the impact of a 12-hour shift has on nursing care and patient safety and quality of care. According to the editorial article written by Dean, Erin (2014), the study suggested the longer the shift such as 12 hours, there is a decline in patient safety and a decline in quality of care that occurs. The purpose of the study was to survey nurses in 12 countries as a part of the RN4CAST study finding links between patient outcomes and the nursing workforce. 30,000 nurses were polled. Results of the survey showed that 1/3 of nurses in England work more than 12 hours and are more likely to report poor care when compared to nurses working 8-hour shifts. 41% of those nurses were likely to report unsafe care and leave necessary nursing care undone (Dean, E., 2014).

Are the results of the study Valid? This particular article states the survey polled 30,000 nurses in 12 countries which might be a large number and a good representation of the profession. Of those nurses surveyed only 1/3 worked 12 hours shifts or longer. This may not be

a good representation. It's hard to tell if everyone that needed to be included was added. A question of concern is, was there more countries to survey than just the 12? Although there are some questions regarding the appropriate number of nurses surveyed, there is validity to this article. According to the article, although the study in the article did not report on the exact causes of patient safety and the quality of care during longer shifts, the researchers suggested fatigue does increase the number of errors and leads to loss of alertness and loss of efficiency (Dean, E., 2014).

What are the results? Results of the survey showed that 1/3 of nurses in England work more than 12 hours and are more likely to report poor care when compared to nurses working 8-hour shifts. 41% of those nurses were likely to report unsafe care and leave necessary nursing care undone (Dean, E., 2014). The editor also states in another study of US nurses whom also worked 12-hour shifts, found nurses who work 12-hour consecutive shifts accrue a considerable amount of sleep debt with accompanying sleepiness and fatigue (Dean, E., 2014). Longer hours of work equal fewer hours of sleep and decreasing alertness and increased fatigue.

Will the results help locally? These results of the study will help locally by providing information to local hospitals. Being that most of the hospitals in our area, Fresno County, and surrounding counties have nursing shifts of 12 hours. From a managerial or supervisor standpoint, this information can help determine if the managers or supervisors want to allow their staff to work a 12-hour shift or rather an 8-hour shift for patient and practitioner safety.

Short sleep duration is dose-dependently related to job strain and burnout in nurses: A cross-sectional survey

The study's aim was to assess whether short sleep duration is related to job stress and burnout status and whether such relationship is in a dose-dependent manner. The study included

female nurses in secondary referral health centers in Taiwan using a self-administered structured questionnaire. Stratified sampling was conducted by region, and patient bed number was selected for the survey. About 10% of all secondary centers were randomly selected from each stratum. The non-linear dose-response relationship between sleep duration and job strain and burnout scores were assessed by general additive models (GMA), adjusting for personal characteristics, situation of the family, and work conditions.

Are the results of the study Valid? The results prove valid for female nurses. Since no male nurses were included in the study, it's difficult to state if the results would prove valid for male nurses. For those nurses who sleep less than 6 hours a work day, the increase of work-related, client-related and personal burnout affects them (Weishan, C., et al., 2013). Although the article does not state any issues with patient safety, it does imply that the practitioner who has less than eight hours of sleep will have an increase in burnout rates, which can affect patient care.

What are the results? The results included out the 39 hospitals chosen to participate, 2268 full-time nurses were invited to participate in the study, 1384 (61%) satisfactorily completed the questionnaire. There were 169 (12.2%) nurses who slept less than 6 hours per working day. 37% (n= 512) were classified into high strain groups. The mean scores of personal burnout were 59.4 (SD=22.0), work-related burnout was 54.6 (SD=21.7), and client-related burnout was 42.4 (SD=18.6). Nurses who slept less than 6 hours per working day had higher risk for job strain compared to those who slept longer than 7 hours. GAM analysis found a linear relationship between sleep duration and job stress, and client related burnout (Weishan, C., et al., 2013).

Will the results help locally? The results could help locally because as stated previously, a manager can determine the hours worked based on the results of this study. If the manager chooses to have his or her employees work 8 hours vs. 12 hour shift in his or her clinic, then they

will know that the employee who works more hours is going to get less sleep between shifts and may have an increase in burnout.

Six out of the 10 articles suggest the effects of sleep deprivation decrease performance of motor and cognitive function. Shift work (12 hour shifts and night rotations) has detrimental effects on health, concentration, and patient safety. Practitioners perform less effectively and less safely due to fatigue. There is an increase of 3% for both medication error and needle stick injury with each additional three hours worked per week (Estry-Behar, M. and Van der Heijden, B. (2012).

Four out of ten articles suggest there is no more of an impact on practitioner health with shift work. One article suggest there is weak evidence that longer duty hours compromise patient safety. There are further studies needed to clarify the link between fatigue, performance and patient safety.

I would have assumed that it would be easy to find information that proves a relationship between sleep deprivation and patient and practitioner safety. Although the articles in this review favor that assumption, there is still those reviews and articles that suggest further research is needed to determine the relationship. During the research of articles I found myself being biased with the articles reviewed and picked to include in the literature review. I found myself choosing articles that favored a relationship between sleep deprivation and patient and practitioner safety.

Synthesis of my literature review indicates there is a relationship between sleep deprivation and patient safety. The review of the literature not only found an association with sleep deprivation and patient safety but indicated there was also a relationship between lack of sleep and fatigue with associated harm to the practitioner's health as well. The few articles

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reviewed shared common finding which included lack of sleep resulted in associated risks including decreased performance of motor and cognitive functions, resulting in poor judgment, inadequate and late responses to clinical changes, inadequate record keeping, poor communication, decline in short-term memory, detrimental effects on health, concentration, mood, and metabolism for the practicing practitioner. Although it is stated there is a relationship between sleep deprivation and patient safety, the outcomes of patient safety issues are not stated in most the articles reviewed.

According to Machi, M. S. et al (2012), shift work provided by emergency physicians who rotate day, afternoon, and an overnight shift has effects on concentration, mood, general health and well-being, metabolism from both desynchronization of circadian rhythm and sleep deprivation. According to Tewari, et al, in the analysis of their review of the literature, after periods of sleep deprivation physicians have poor retention of information, worse numeric and language skills, impaired concentration and short-term memory. These two articles both agree that concentration and short-term memory are affected by sleep deprivation. Unfortunately, most of the studies reviewed in these two articles were self-reported data, therefore the validity of the errors resulting from fatigue cannot be determined. We know that harm can happen due to a decrease in cognition from lack of sleep, but it is difficult to pinpoint what the harm associated is. I need to review more literature findings in order to include what harmful patient outcomes are associated with sleep deprivation.

CHAPTER THREE: METHODOLOGY

I have conducted an Integrative review of the literature as my project. The approach taken is outlined by Whittemore and Knafl (2005). An integrative review methodology is the broadest literature review approach and includes synthesizing mixed-methods, quantitative and qualitative evidence, Whittemore and Knafl (2005). The review was conducted in the academic setting, using both past and current research to obtain the most comprehensive information for my project. I followed the review process of Whittmore and Knafl which entails, problem formation, data collection and literature search, evaluation of data, data analysis, and interpretation and presentation of results (2005).

ELIGIBILITY CRITERIA

The studies included in this integrated literature review focused on effects of sleep deprivation (less than 8 hours of sleep) within the health care community personal, such as MD's, surgeons, anesthesiologist, interns, residents, nurses, and any other medical personnel with direct patient care. Criteria also included some non-experimental research studies with relevant findings and validity. Meta-analysis and systematic reviews were included, as well as expert opinions. Expert opinions were included to add substance and to offer support for the problem of patient safety being an issue within health care when providers are sleep deprived. The studies included required a report on the effects that sleep deprivation (less than 8 hours of sleep), sleep variables, fatigue, shift work, daytime sleepiness, and less inter-shift recovery has on patient safety and health of the practitioner. I did not limit the type of study included as I wanted to gain as much information on the effects of sleep deprivation concerning patient safety. Various types of studies reviewed include integrative reviews, case-control studies, qualitative, quantitative, cross-sectional studies, systematic reviews, cohort studies, and expert opinions.

INFORMATION SOURCE AND SEARCH STRATEGY

For this integrative review, the following databases were searched CINAHL, Pubmed, Cochrane library, up-to-date, Google scholar, and Ebscohost. Utilization of the University of Phoenix Library for articles, books and dissertations included as well. MESH terms were used in each database and included words such as "sleep deprivation," "shift work," "patient safety," and "safety outcomes." There was no identifiable timeline chosen. I decided not to limit studies based on the date, as I wanted to include the availability of all articles, books, and studies about the research topic to show if there is a relationship between sleep deprivation and patient and practitioner safety concerning various years/dates/centuries. The search was conducted with the aim of finding a correlation between sleep deprivation and patient and practitioner safety.

The search was not limited to the United States alone but included international articles and studies. I wanted to gain an insight of international information on data about sleep deprivation and patient safety.

PEOPLE INVOLVED

For completion of this project assistance from a committee is warranted. The committee includes a faculty adviser, content expert and a mentor. Faculty adviser is Dr. Chris Patty DNP, RN. His experts in research will assist me in writing a literature review for my thesis. Valley Children's Hospital librarian took part in assisting with review of the literature and locating relevant studies to be included in this integrative literature review.

For a mentor I chose Judy Kelly who has been very beneficial to my education and an important support person. She is an experience FNP in the field of nursing and provided encouragement, support and knowledge throughout my internship. Judy provided encouragement and assistance with writing the final chapters of this thesis. As a content expert I chose Lisa

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Helm who has helped guide me with the essentials to comprehend my project, and gather important literature pertinent to my project. She was vital in assisting with time management and the completion of this project.

INSTRUMENTS

The Critical Appraisal Skills Program (CASP) tool was used in the appraisal of each article and examination to ensure the validity of each study. The CASP tool assisted in enhancing the review of the literature and determine the applicability of each item.

BUDGET AND SUPPLIES

The only cost associated with the integrative literature review was paper and ink for printing reports. There was no budget needed as the school library, and personal supplies were used. A cost for editorial purpose of \$125.

TIMELINE

A schedule was created to meet the deadline put forth by Fresno Pacific University. The review continued throughout July 2017 to August 2018. The Final completed project and literature write up was completed on December 1, 2018. A final copy has been submitted to the Committee for final review. Final copy will then be turned in by December 8, 2018.

Literature Review Matrix Table:**Table 1**

<ul style="list-style-type: none"> • Author • Year Published • Country 	Level of Evidence i-vii	Study Design	Sample Size	Sample Characteristics	Methods	Results	Conclusions and limitations
Dr. Anurag Tewari Jan. 2011 India	ii	Literature review with Meta-analysis	29 studies	Anesthesiologist Medical residents in ICU, Interns at various medical facilities in India and USA.	Review of literature pertaining to inadequate sleep habits, demanding work load, long work hours and increased fatigue which causes judgmental errors.	Anesthesiologist must be involved in educational programs dealing with the risk of sleep dept. Caffeine should be limited and regular non rigorous exercise is beneficial.	The effects of sleep deprivation becomes vital among anesthesiologist and should not be ignored. Sleep demands need to be met to prevent adverse effects of sleep dept. Decreased performance of motor and cognitive functions in fatigued anesthesiologist result in poor judgement, inadequate and late responses to clinical changes, inadequate record keeping and poor communication.
Dr. Anurag Tewari Jan. 2011 India	ii	Literature review with Meta-analysis	29 studies	Anesthesiologist Medical residents in ICU, Interns at various medical facilities in India and USA.	Review of literature pertaining to inadequate sleep habits, demanding work load, long work hours and increased fatigue which causes judgmental errors.	Anesthesiologist must be involved in educational programs dealing with the risk of sleep dept. Caffeine should be limited and regular non rigorous exercise is beneficial.	The effects of sleep deprivation becomes vital among anesthesiologist and should not be ignored. Sleep demands need to be met to prevent adverse effects of sleep dept. Decreased performance of motor and cognitive functions in fatigued anesthesiologist result in poor judgement, inadequate and late responses to clinical changes, inadequate record keeping and poor communication.

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Hanna A. et. al. (2008)	vi	Questionnaire, and Sleep Questionnaire,	688 nurses	Nurses in Israel in 2003. 195 nurses (175 females and 20 males) worked only days and 493 nurses (414 females and 79 males) worked flexible rotating shifts (morning, evening, and night shifts)	738 hospitals in N. Israel during 2003 were investigated. A total of 688 nurses (93.2%) including 589 females and 99 males completed a questionnaire.	Sample demographics had significant differences between male and female nurses. Female nurses complained more about thyroid problems, back aches, and leg pain than males. Female nurses had more complaints about falling asleep and morning fatigue than males which had more complaints about snoring.	There is not enough evidence for comparison of female to male shift workers. It appears that age, gender and weight are significant factors more so than shift work in determining the well-being of nurses. Two additional findings were added to the study of shift work 1) females complain more about shift work than males 2) there is no more of an impact on health, absenteeism rates, or performance when comparing shift work to those that work days.
Machi, M.S. (2012)	iv	Prospective repeated measure study	13 Emergency Physicians	13 ED Physicians at a level 1 trauma center and stroke center. They worked at least one daylight shift and one overnight shift per month. Physicians taking prescription medications known to affect cognition were excluded.	Participants were tested 30 minutes before and immediately after at least one daylight shift and at least one overnight shift. Participants completed four neuropsychiatric test in a private room adjacent to the ED.	Fewer words were recalled on the REMT after both day and overnight shifts. Sleep quality was worse in Emergency Physicians compared to the normal population . Post fatigue was correlated with the perceived difficulty of the shift.	Data indicates that short term memory appears to decline after day and overnight shifts and confirms the high incidence of disturbed sleep in Emergency physicians. Shift work has detrimental effects on health, concentration, mood, and metabolism. This has implications for patient safety as well as physician career longevity and workforce turnover.

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<p>Harris, R. et al. (2015)</p> <p>USA</p>	<p>ii</p>	<p>A scoping Review</p>	<p>85 primary research studies and 10 review papers in the nursing field were included in the scoping review.</p>	<p>A search of academic literature was collected in electronic databases (AMED, MEDLINE, CINAHL, PsychInfo, Scopus, HMIC, the Cochrane Library, Business Source Premier, Econ Lit, ASSIA, and Social Policy and Practice)</p>	<p>A total of 158 publishes reviews and research papers pertaining to nursing were published between 1973 and 2014. Two reviewers independently reviewed the articles which 85 primary research studies and 10 review papers in the nursing field were included.</p>	<p>Research into 12 hours nursing fell into five themes 1) risk to patients 2) risk to staff 3) patient experience 4) staff experience and 5) impact of organization of work. There were inconclusive evidence of 12 hours shifts having an impact on either of these themes. The quality of research is weak and most focus on the risk, experience and work life balance for staff.</p>	<p>There is inconclusive evidence to withdraw or justify the implementation of 12 hour shifts. It is not clearly understood where there are real and unacceptable risks to patients and staff as well as benefits. More research is needed that focuses on the impact of 12 hour nursing shifts on patient safety.</p>
<p>Estry-Behar, M. and Van der Heijden, B. (2012)</p> <p>Netherlands</p>	<p>vi</p>	<p>Survey</p>	<p>77,681 Nurses</p>	<p>Survey sent to 77,898n Nurses</p>	<p>146 Hospitals 185 Nursing homes 76 Home Care were the chosen places of employment. 77,681 Nurses sent survey 39,898 (51.7%) respondents</p>	<p>Nurses working 10 to 12 hours shifts have worse health when compared to nurses working 8 hour shifts although those nurses state they are satisfied with family life balance. Those nurses feel more often tired and have high</p>	<p>Having to work at short notice and having to get up before five o'clock am are strong risk factors for health and safety problems. Working 12 hour night shifts creates 50% more worries of making a mistake among nurses. There is an increase of 3% for both medication error and needle stick injury with each additional three hour worked per week.</p>

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						burnout scores.	
Dean Erin Oct. 2014	vii	Expert opinion based on Survey results	30,000 nurses in 12 countries.	Survey sent to 30,000 nurses in 12 countries.	Expert opinion.	Results show nearly 1/3 of nurses in England work 12 hour shifts and are 1/3 more likely to report poor care when compared to those working 8 hour shifts. 41% more likely to report unsafe care and to leave important nursing care undone.	Nurses accrue sleep debt which leads to sleepiness and fatigue when working 12 hour shifts. With 12 hour shifts nurses perform less effectively and less safely. 41% of nurses are more likely to report unsafe care and to leave important nursing care undone.
Osborne, W. and Parshuram, C.S. Dec. 2014	vii	Narrative review	Unknown	Review focused on the relationship between resident duty hours and patient safety	Literature review to explore four possible reasons why the literature does not confirm the expectation that shorter duty hours for residents improves patient safety.	Overall data suggest that resident duty hour reduction does not cause harm nor does it improve patient safety and quality outcome.	According to the authors, the assumption that long duty hours for residents compromise patient safety and quality of care is undermined by the studies in the review. There is weak evidence that shorter duty hours compromise patient safety.
Williamson, A. et al. Nov. 2009	vii	Literature Review	Multiple	Literature that examined evidence for the link between safety and fatigue.	The review examined the relationship between three major causes of fatigue which include circadian influences, sleep homeostasis, and nature of task effects.	Evidence was clear for sleep homeostatic effects showing accidents and impaired performance. Evidence did not support a direct link between	Further research is needed to clarify the link between circadian related fatigue and performance and safety outcomes. The review highlighted gaps in the literature. There are opportunities for further research.

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						circadian related fatigue influences and performance or safety outcomes.	
Nida, A.M. et al Dec. 2015	vi	Survey	190 otolaryngology residents	Survey sent to 190 residents	Topics included demographics, residency structure, perceived stress and sleep habits.	178 residents also completed the Epworth Sleep Scale questionnaire to evaluate fatigue which indicated a significant amount of residents are excessively sleepy.	Data suggests the effects of fatigue play a role in resident safety and wellbeing. A substantial number of otolaryngology residents are excessively sleepy.
Landrigan, C.P. et al. Oct. 2004	iv	Prospective randomized study	6 Interns, 3 third year residents, and 2 second year resident	Comparison study of hours worked between the two teams.	One team worked traditional hours averaging 77 to 81 hours per week, with up to 34 continuous hours of work. The second team worked 60 to 63 hour of work per week with work limited to only 16 hours of consecutive work hours.	Interns made 36% more serious medical errors during traditional work schedules than during an intervention schedule that eliminated extended work shifts.	Interns made more serious medical errors when they worked frequent shifts of 24 hours or more than when working shorter shifts. In the intensive care unit, eliminating extended work shifts and reducing the number of hours worked per week can reduce serious medical errors.

CHAPTER FOUR: RESULTS

This chapter presents the results of the data collected within the literature reviews including integrative reviews, case-control studies, qualitative, quantitative, cross-sectional studies, systematic reviews, cohort studies, and expert opinions. Key findings highlighted.

The issue of sleep deprivation in regards to practitioners in the health-care setting is vital in the prevention of errors in care and maintaining the safety of both patients and practitioner. The problem of sleep deprivation is also essential in maintaining health and well-being for the practitioner. Practitioners are responsible for patient safety at all times and expected to deliver high-quality care 24/7. Tewari, A., et al. (2011), states "decreased performance of motor and cognitive functions in fatigued anesthesiologist may results in impaired judgment, late and inadequate responses to clinical changes, poor communication, and insufficient record keeping, all of which affect the patient safety, showing without a doubt the association of sleep debt to the adverse events and critical incident" (p.12).

The researcher reviewed a total of 10 articles for this project — the reports that were researched attempted to find a direct correlation between sleep deprivation and patient and practitioner safety. The reports that were reviewed are summarized in Table 1. The studies included in this integrated literature review focused on effects of sleep deprivation (less than 8 hours of sleep) within the health care community personal, such as MD's, surgeons, anesthesiologist, interns, residents, nurses, and any other medical personnel with direct patient care.

One of the pieces of literature reviewed confirms nurses accrue sleep debt which leads to sleepiness and fatigue when working 12-hour shifts. 41% of nurses are more likely to report unsafe care and to leave essential nursing care undone. With 12-hour shifts nurses perform less

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effectively and less safely. In the study conducted by Landrigan, C.P. et al., the researchers found Interns made 36% more serious medical errors during traditional work schedules than during an intervention schedule that eliminated extended work shifts. Therefore more extended shifts worked by health care professionals increases the risk of patient and practitioner harm and decreases safety for both.

As the literature review indicates six out of the ten articles suggest the effects of sleep deprivation decrease performance of motor and cognitive function. There is an increase of 3% for both medication error and needle stick injury with each additional three hours worked per week (Estryn-Behar, M. and Van der Heijden, B. (2012).

Four out of ten articles suggest there is no more of an impact on practitioner health with Shift work. One article suggests there is weak evidence that more extended duty hours compromise patient safety. There are further studies needed to clarify the link between fatigue, performance and patient safety. Data indicates that short-term memory appears to decline after day and overnight shifts and confirms the high incidence of disturbed sleep in Emergency Physicians. Fewer words were recalled on the REMT after both day and overnight shifts. Sleep quality was worse in Emergency Physicians compared to the average population. Post-fatigue was correlated with the perceived difficulty of the shift (Machi, M.S., 2012).

CHAPTER FIVE

The issue of sleep deprivation in regards to practitioners in the health-care setting is essential in the prevention of errors in care and maintaining the safety of both patients and practitioner. The problem of sleep deprivation is also vital in maintaining health and well-being for the practitioner. The review of the literature not only found an association with sleep deprivation and patient safety but indicated there was also a relationship between lack of sleep and fatigue with associated harm to the practitioner's health as well.

A review of the literature found shared common finding which included lack of sleep resulted in associated risks including decreased performance of motor and cognitive functions, resulting in poor judgment, poor communication, inadequate and late responses to clinical changes, decline in short-term memory, insufficient record keeping, and detrimental effects on mood, health, concentration, and metabolism for the practitioner.

Sleep loss resulting in fatigue is common among health care professionals working in healthcare settings. Within the healthcare, arena fatigue has been a topic of study and discourse. Dating back to the 20th-century studies were conducted on the phenomenon of mental fatigue by Edward Thorndike, and later Henri Pierson's research brought light to the physiological aspects of sleep (Noy et al., 2009). Despite the hundreds of studies done on fatigue, much remains to be done in regards to improving our understanding and ability to alleviate fatigue and its consequences.

Limitations

A limitation to the research was finding articles which provided information regarding harm and safety caused by fatigue to patients. There were limited studies reviewed stating harm to patients in the literature reviewed. The majority of the research studies suggested harm to the

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practitioner. The literature review served as a developmental starting point for this research project.

Implications for Nursing Practice/Conclusion

Further research is warranted, particularly in regards to ways in ensuring providers received greater than or equal to 8 hours of sleep between shifts to prevent harm to either patient or practitioner. One suggested a fix to alleviating fatigue includes, medical and nursing leaders should encourage workplace cultures which support vacation time, days off, prompt departure at the end of shifts worked as well as allow and encourage nurses to refuse to work overtime without retribution. Providing workplace break rooms and napping areas for staff working long periods of greater than 10 hours and splitting more extended shifts between two practitioners have also shown better outcomes with patient safety and practitioner health.

References

- Admi, H., Tzischinsky, O., Epstein, R., Herer, P., & Lavie, P. (2008). Shift work in nursing: Is it a risk factor for nurses' health and patients' safety? *Nursing Economics*, 26(4), 250-7. Retrieved from <https://search.proquest.com/docview/236965315?accountid=458>
- Dean, E. (2014). Long shifts may suit some staff, but patient care is suffering. *Nursing Management (2014+)*, 21(7), 8. doi:<http://dx.doi.org/10.7748/nm.21.7.8.s1>
- Estryn-Béhar, M., Eijden, B. I. J. M. v. d., & NEXT Study Group. (2012). Effects of extended work shifts on employee fatigue, health, satisfaction, work/family balance, and patient safety. *Work: A Journal of Prevention, Assessment and Rehabilitation*, 41, 4283-4290.
- Harris, R., Sims, S., Parr, J., & Davies, N. (2015). Impact of 12 h shift patterns in nursing: A scoping review. *International Journal of Nursing Studies*, 52(2), 605
- Landrigan, Christopher P,M.D., M.P.H., Rothschild, Jeffrey M,M.D., M.P.H., Cronin, J. W., M.D., Kaushal, Rainu,M.D., M.P.H., Burdick, E., M.S., Katz, J. T., M.D., . . . Czeisler, Charles A,PhD., M.D. (2004). Effect of reducing interns' work hours on serious medical errors in intensive care units. *The New England Journal of Medicine*, 351(18), 1838-48. Retrieved from <https://search.proquest.com/docview/223936126?accountid=458>
- Machi, M. S., Staum, M., Callaway, C. W., Moore, C., Jeong, K., Suyama, J., & ...Hostler,D.(2012). The relationship between shift work, sleep, and cognition in career emergencyphysicians. *Academic Emergency Medicine: Official Journal Of The Society For AcademicEmergency Medicine*, 19(1), 85-91. doi:10.1111/j.1553-2712.2011.01254.x
- Nida, A. M., Googe, B. J., Lewis, A. F., & May, W. L. (2016). Resident fatigue in otolaryngology residents: A web based survey. *American Journal of Otolaryngology*, 37(3), 210-216. doi:<http://dx.doi.org/10.1016/j.amjoto.2016.01.017>
- Noy, Y. I., Horrey, W.J., popkin, S.M., Folkard, H.D., & Courtney, T.H. (2009). Future directions

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In fatigue and safety research. *Accident Analysis and Prevention*, 43(2011), 495-497.

- Osborne, R., & Parshuram, C. S. (2014). Delinking resident duty hours from patient safety. *BMC Medical Education*, 14 Suppl 1(Suppl 1), S2-S2. doi:10.1186/1472-6920-14-S1-S2
- Tewari, A., Soliz, J., Billota, F., Garg, S., & Singh, H. (2011). Does our sleep debt affect patients' safety? *Indian Journal of Anesthesia*, 55(1), 12-17.
doi:<http://dx.doi.org/10.4103/0019-5049>
- Weishan, C., Yue Leon, G., Yu-Ju, H., Chiu-Yueh, Y., & Judith Shu-Chu, S. (2015). Short sleep duration is dose-dependently related to job strain and burnout in nurses: A cross sectional survey. *International Journal Of Nursing Studies*, 52(1), 297-306.
doi:10.1016/j.ijnurstu.2014.09.003
- Williamson, A., Lombardi, D. A., Folkard, S., Stutts, J., Courtney, T. K., & Connor, J. L. (2011). The link between fatigue and safety. *Accident Analysis and Prevention*, 43(2), 498-515.
doi:10.1016/j.aap.2009.11.011

PICO

- **Population:** APNS, PA, MDs, all Practitioners
- **Intervention:** Sleep Deprivation (less than 8 hours of sleep)
- **Comparison:** I do not need a comparison
- **Outcome:** Patient and Self Harm
- **Research Question:** Are there general safety issues for all parties and harmful patient outcomes when care is provided by a practitioner who has had less than 8 hours of sleep?
- **Problem Statement:** Is there a relationship between sleep deprivation and patient and practitioner safety?

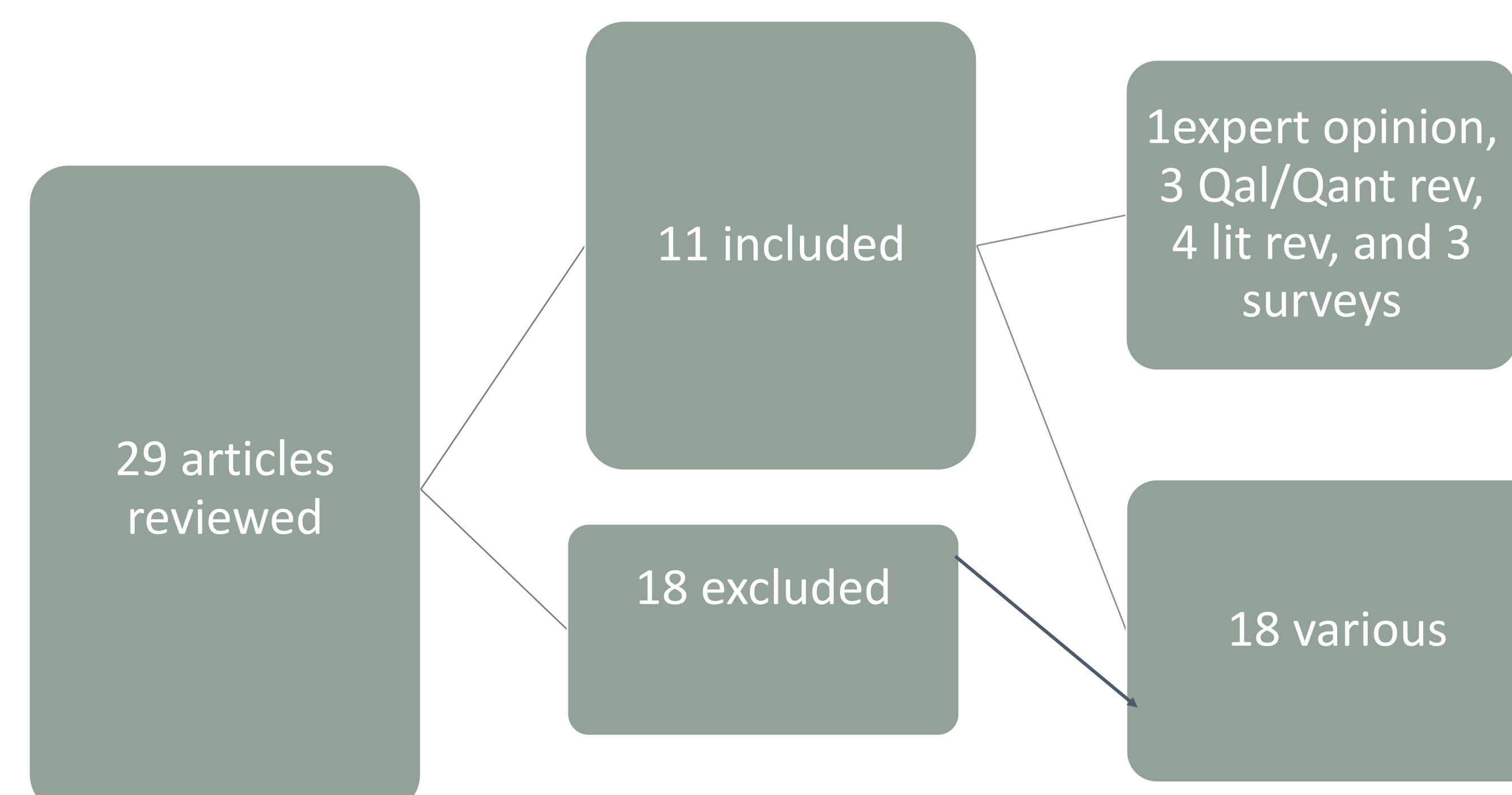
INTRODUCTION

- Attempt to find a relationship between sleep deprivation for practitioners and the effects lack of sleep and fatigue have on patient and practitioner safety.
- Sleep loss resulting in fatigue is common among health care professionals working in healthcare settings.
- Contributing factors include shift work, and long continuous hours of duty (> 12-hour shifts), rotation of work between day and night shifts, and those shifts which reduce sleep opportunity (Machi, et al.).
- With minimal chance to sleep, fatigue sets in which contributes to impairments in cognition, motor function, and impaired judgment which can affect patient safety, cause significant personal well-being and health issues for the practitioner, as well as a decline in professionalism and performance of job-related tasks, (Machi, et al.).
- The issue of sleep deprivation in regards to practitioners in the health-care setting is important in the prevention of errors in care and maintaining the safety of both patients and practitioner.
- According to Tewari, et al., in the analysis of their review of the literature, after periods of sleep deprivation physicians have poor retention of information, worse numeric and language skills, impaired concentration and short-term memory.
- Therefore, my literature review project aims to discover data supporting patient safety is directly related to sleep deprivation in practitioners and harm can occur to both the practitioner and the patient when the practitioner gets less than 8 hours of sleep.

METHODS

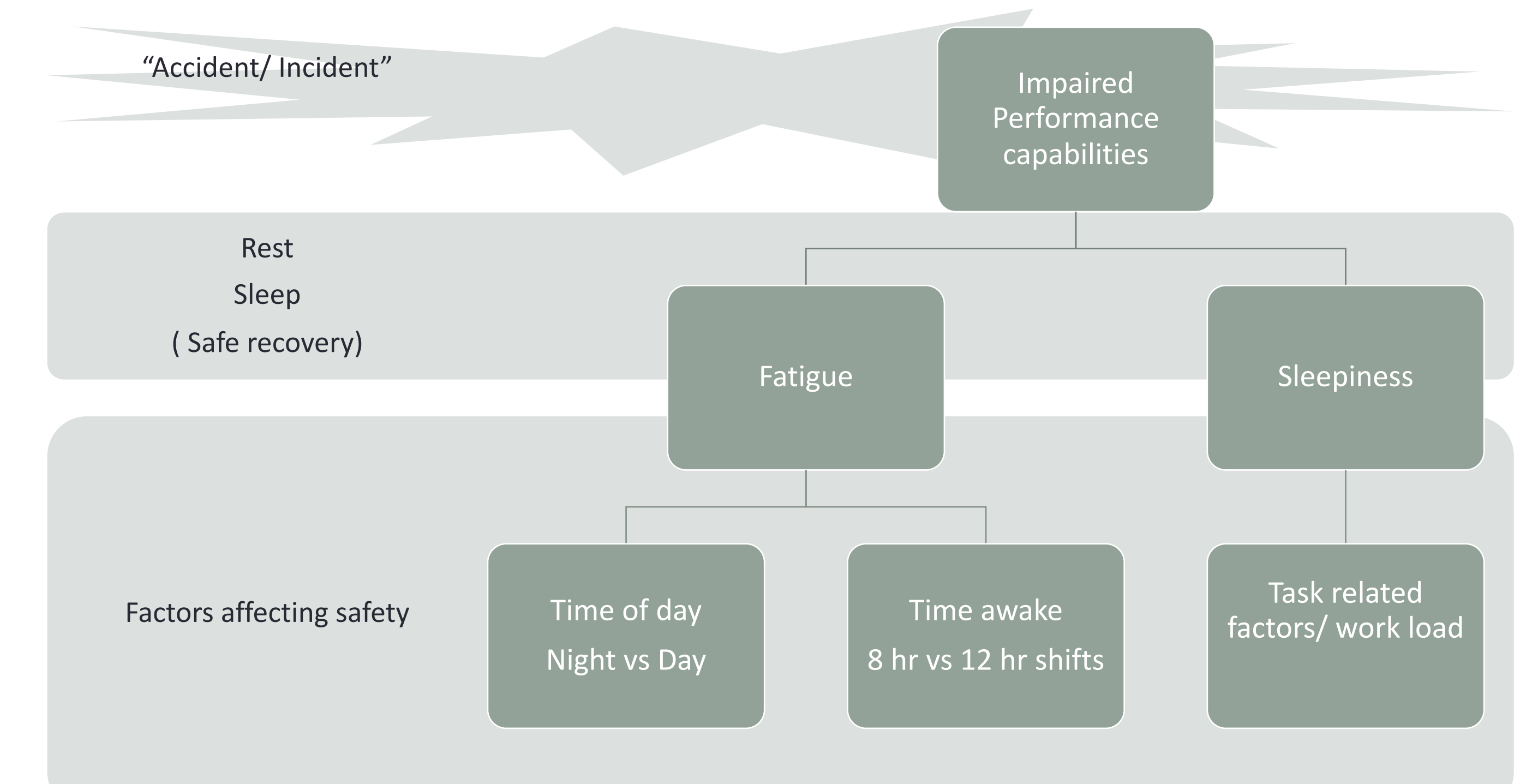
- I have completed an Integrative review of literature. The review was conducted using both past and current research to obtain the most comprehensive information for the literature review. I followed the review process of Whittmore and Knafl which entails, problem formation, data collection and literature search, evaluation of data, data analysis, and interpretation and presentation of results (2005).
- Literature review focused on effects of sleep deprivation (less than 8 hours of sleep) within the health care community personal, such as MD's, surgeons, anesthesiologist, interns, residents, nurses, and any other medical personnel with direct patient care.
- The studies included required a report on the effects that sleep deprivation (less than 8 hours of sleep), sleep variables, fatigue, shift work, daytime sleepiness, and less inter-shift recovery has on patient safety and health of the practitioner.
- Various types of studies reviewed include integrative reviews, case-control studies, qualitative, quantitative, cross-sectional studies, systematic reviews, cohort studies, and expert opinions.
- Databases searched were CINAHL, Pubmed, Cochrane library, up-to-date, Google scholar, and Ebscohost.
- MESH terms were used in each database and included words such as "sleep deprivation," "shift work," "patient safety," and "safety outcomes."

METHODS



RESULTS

- 7/11 articles suggest the effects of sleep deprivation decrease performance of motor and cognitive function.
- Shift work (12 hour shifts and night rotations) has detrimental effects on health, concentration, and patient safety. Practitioners perform less effectively and less safely due to fatigue.
- There is an increase of 3% for both medication error and needle stick injury with each additional three hours worked per week (Estryn-Behar, M. and Van der Heijden, B. (2012)).
- 4/11 articles suggest there is no more of an impact on practitioner health and patient safety with shift work.
- Once article suggest there is weak evidence that shorter duty hours compromise patient safety.
- Despite the hundreds of studies done on fatigue, much remains to be done in regards to improving our understanding and ability to alleviate fatigue and its consequences.



DISCUSSION

- I would have assumed that it would be easy to find information that proves a relationship between sleep deprivation and patient and practitioner safety. Although the articles in this review favor that assumption, there is still those reviews and articles that suggest further research is needed to determine the relationship.
- During the research of articles I found my self being biased with the articles reviewed and picked to include in the literature review. I found my self choosing articles that favored a relationship between sleep deprivation and patient and practitioner safety.
- A review of the literature found shared common finding which included lack of sleep resulted in associated risks including decreased performance of motor and cognitive functions, resulting in poor judgment, poor communication, inadequate and late responses to clinical changes, decline in short-term memory, insufficient record keeping, and detrimental effects on mood, health, concentration, and metabolism for the practitioner.
- Further research is needed to improve and alleviate consequences of fatigue.