

Drowsy Driving Among Shift Work Nurses: A Qualitative Data Analysis

Alec Smith¹, Farzan Sasangohar^{1,2}, Anthony D. McDonald¹, Nena Bonuel², Holly Shui², Christine Ouko², Lorelie Lazaro²

¹Texas A&M University, College Station, TX; ²Houston Methodist Hospital, Houston, TX

Drowsy driving claims many lives every year. While all drivers are susceptible to the problem of drowsy driving, the nurse population is of particular concern. Studies have shown the severity of drowsiness for night shift nurses both at work and on the drive home. Many work and non-work factors contribute to the drowsiness that nurses experience. This study used a semi-structured interview approach to gain the perception and experiences of nurses concerning drowsy driving and possible interventions. Interviews were conducted at a large hospital in south central Texas with 30 night shift nurses. Visualizations depicting nurses' responses are presented to aid in the understanding of the themes derived from the interviews. The nurses experience drowsy driving on a regular basis, use ineffective mitigation techniques and have differing preferences for an educational and technological intervention for drowsy driving. An emergent theme was how work and non-work factors work in conjunction to impact the nurses experience of drowsy driving. Potential, implementable solutions regarding some of these factors are presented.

INTRODUCTION

Over 160,000 injuries and 3,600 deaths were attributed to drowsy driving between 2011 and 2015 (National Center for Statistics and Analysis, 2017). Recent research has suggests that drivers who are drowsy are three times more likely to be involved in a crash (National Safety Council, 2018). Further exacerbating the problem is the finding that 60% of Americans have driven while drowsy and 37% have fallen asleep at the wheel (National Sleep Foundation, 2018). Drowsy driving crashes are disproportionately common among shift workers, who are at a 6 times greater risk of being involved in a crash compared to other professionals (National Sleep Foundation, 2009). This risk is driven by the frequency of drowsy driving among shift-workers.

In the medical profession, shift workers frequently drive drowsy (Barger et al., 2005; Gold et al., 1992), and as many as 95% of crashes among nurses are due to drowsy driving. These crashes may increase as studies have shown that the rate of driving drowsy among nurses is significantly increasing—49% in 1992, to 79% in 2007 (Gold et al., 1992; Scott et al., 2007). Drowsy driving among nurses often originates as drowsiness during the workday (Caruso & Hitchcock, 2010; Dorrian et al., 2008; Lee & Lipscomb, 2003; Scott, Hofmeister, Rogness, & Rogers, 2010a). The impact on driving is most often observed in night shift nurses (Gold et al., 1992), with the most intense and frequent feelings of drowsiness occurring between 7:00 AM and 9:00 AM, a time when most night shift nurses are commuting home (Dorrian et al., 2008; Ftouni et al., 2013).

Factors both inside the workplace and outside contribute to fatigue which may lead to drowsy driving (Gold et al., 1992). Substantial research has focused on nurses' work experiences in the workplace and how it affects fatigue—both acute and chronic—and sleep quality (Han, Trinkoff, & Geiger-Brown, 2014; Samaha, Lal, Samaha, & Wyndham, 2007). Work factors include shift schedules, long hours, high workload and mental and physical demands (Chen, Davis, Daraiseh, Pan, & Davis, 2014; Han et al., 2014; Samaha et al., 2007). Factors outside of the workplace that contribute to the nurses' sleep loss (Chan,

2009) and fatigue include lack of exercise, psychological factors, home duties and lack of social support (Geiger-Brown, Trinkoff, & Rogers, 2011; Han et al., 2014; Samaha et al., 2007).

Beyond the identification of factors that influence drowsiness, research has focused on interventions to prevent or reduce drowsiness and fatigue. Recommendations for fatigue reduction in include reducing stress, altering work schedules, providing trainings and encouraging naps (Han et al., 2014; Samaha et al., 2007; Scott, Hofmeister, Rogness, & Rogers, 2010b). These solutions may decrease the experience of fatigue and, in turn, drowsy driving among night shift nurses. However, current interventions are limited by a lack of implementation and organizational support. This study aims to identify factors that contribute to nurses' experiences of drowsy driving and provides suggestions for mitigating drowsiness in the workplace and post work commute. Semi-structured interviews were used to gain nurses' perspectives on drowsy driving, their mitigation techniques, contributing factors and preferences for an educational and technological intervention for drowsy driving.

METHODS

Participants

Thirty night shift nurses from a large hospital in south-central Texas were recruited for this study. They worked in different areas, had varying years of experience, and different schedules. A diverse group of nurses participated, incorporating males and females (10 males and 20 females) and a large range of ethnicities and ages ($M = 36.1$). The demographics approximately matched the national averages for nursing although males and individuals who reported Asian or Black as their ethnicity were overrepresented in the study sample (Data USA, 2018).

Protocol

The interviews took place in the hospital immediately following the end of the night shift. Interviews began after the nurses completed an informed consent and gave permission to record audio. The members of the study team used semi-structured interview protocols covering drowsy driving experiences, mitigation techniques, contributing factors, and preferences for an education and technological mitigation. Nurses received \$20 compensation for participating in the study. The researchers' Institutional Review Board approved the study.

Analysis

Members of the study team transcribed the interviews to text following completion of the interviews. The transcriptions were reviewed for detail and accuracy, and then analyzed using a grounded theory approach by a single coder (Braun & Clarke, 2006; Guest, MacQueen, & Namey, 2011). Grounded theory consists of four phases: (1) code creation: creating descriptive bins or categories to place quotes; (2) initial coding: preliminary coding where quotes are placed in the created codes; (3) focused coding: categorizing and grouping previously coded quotes and creating new codes when needed; and (4) thematic coding: identifying themes or broad ideas that bridge codes and quotes. A single coder completed the coding process but the co-authors discussed the coding process for accuracy and guidance. The analysis was completed using MAXQDA 12 software (VERBI Software, 2018). Additionally, MAXQDA 12 was used to create visualizations representing the findings.

RESULTS

The results below are presented with counts of responses from the nurses. While 30 nurses were interviewed, not all questions were asked of all the nurses due to semi-structured interview protocol, and thus counts differ between the responses.

The Problem of Drowsy Driving

All of nurses had experienced drowsy driving and many of the nurses provided anecdotes regarding their experience of drowsy driving. Figure 1 depicts a network diagram of the responses and codes pertaining to the nurses' experiences of drowsy driving, their mitigation techniques and factors that contribute to their drowsiness. The major theme, *Drowsy Driving*, is in the center of the visualization surrounded by supporting codes like *Examples of Problem* and *Mitigation Techniques*. Quotes from the participants stem from the codes as supporting evidence. For example, "I'll roll down the windows" is a quote in the *Mitigation Techniques* code. The figure illustrates that nurses frequently discussed examples of their own, or their colleagues, past experiences with drowsiness, their use of mitigation techniques, and the sources of their drowsy driving. In particular, it illustrates the significant contribution of work to drowsy driving, and nurses strong motivations to continue to drive even when they experience drowsiness.

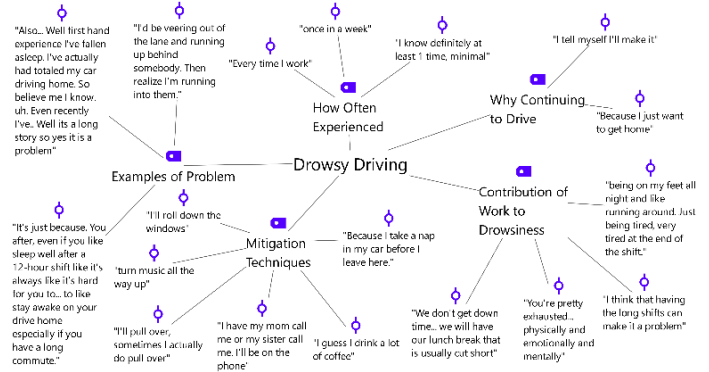


Figure 1. Network diagram of nurses' responses and codes concerning drowsy driving and their experiences.

Preferences for Interventions

Figure 2 depicts a network diagram of the responses pertaining to the nurses' preferences for interventions. The main theme, *Intervention*, is connected to two main topics, *Education Preferences* and *Technology Feedback*. Connected to the main topics are supporting codes and quotes; an example of a quote from *Format* is "I think a lecture would be good". The figure illustrates that nurses responses could be characterized by their preferences for drowsy driving interventions such as an educational program or a drowsy detection device (i.e. technology feedback) in their vehicle. Within the educational intervention, nurses mentioned preferences for the content and format. Within the technological intervention, nurses mentioned their preferred feedback type, specifically auditory, tactile or visual.

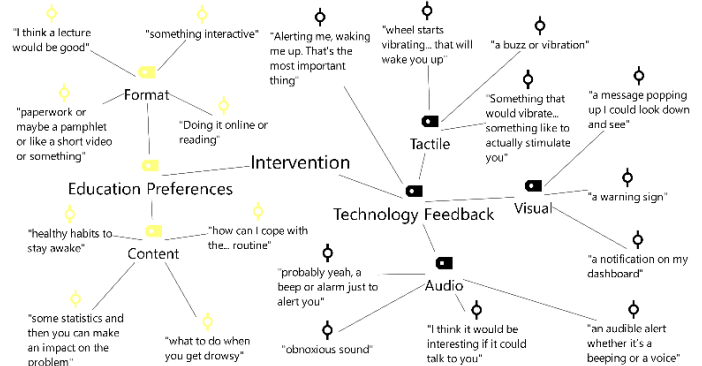


Figure 2. Network diagram of nurses' preferences for educational and technological interventions.

Work Factors Contributing to Drowsiness

The nurses mentioned a variety of work factors that contribute to their drowsiness such as being busy or not, physicality, work schedule and other factors. Figure 3 depicts a network diagram of the nurses' responses concerning work factors that contribute to drowsiness. This diagram provides quotes to supplement each contributor presented below.

Being busy. Over half of the nurses (19) stated that being busy during their shift contributes to the drowsiness they experience on their drive home. In particular, they referenced a rush of energy during their shift followed by a crash from exhaustion after leaving the hospital.

Idle time. About one third of the nurses (9) mentioned that idle time contributes to their drowsiness during the shift. Nurses mentioned that when they are idle, they often nod off or fall asleep so they try to stay busy.

Physicality. Several nurses (8) mentioned that the physicality of their job contributes to their drowsiness. Many of the nurses complete tasks that require them to be on their feet all night or perform other physically demanding tasks (Trinkoff, Lipscomb, Geiger-Brown, Storr, & Brady, 2003). Similar to being busy, nurses stated that after their shift ends and they are in their vehicle, they feel too exhausted to drive.

Consecutive shifts. A little over half of the nurses (16) stated that the number of consecutive days greatly affects their feelings of drowsiness. Many nurses (10) felt that working three nights in a row was the worst for them and that they try to avoid it when possible.

Shift length/time. Many nurses (11) mentioned that both the length (12 hours) and time (night as opposed to day) significantly contributed to their drowsiness because of the effects on their daytime activities. Some nurses mentioned the impact timing and shift length had on their circadian rhythm and sleep quality; nurses had a hard time sleeping during the day, mentioning that it is not natural but necessary to get sufficient rest before their next shift.

Emotional/Mental factors. A few nurses (5) mentioned some emotional factors that they deal with during their shift that impact their experience of drowsiness. The main concern that nurses mentioned was the stress they deal with and how it drains their energy throughout the night.

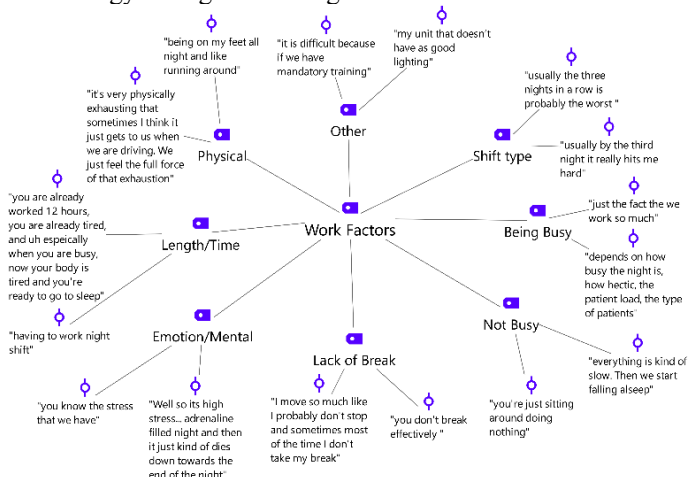


Figure 3. Network diagram of nurses' responses concerning work factors that contribute to their drowsiness both at work and during the drive home.

Lack of break. A few nurses (6) stated that problems arising from breaks influence how they feel drowsiness. Some of the nurses claim that they are too busy or feel bad if they stop working so they do not take a break. Others suggested that the break is too short (30 minutes) to get adequate rest before resuming their work.

Other factors. Some nurses (5) mentioned other factors that contribute to their drowsiness including training after work, bad lighting, delayed feelings of drowsiness, poor coworkers

leading to greater workload, the unit they are working, finishing tasks and temperature.

Non-work Factors Contributing to Drowsiness

Figure 4 depicts a network diagram of the responses concerning non-work factors that contribute to nurses driving drowsy. The nurses mentioned multiple non-work factors that contribute to their drowsiness including their sleep, commute time and other duties around the house.

Sleep. Under half of the nurses (11) mentioned that the quality and quantity of their sleep plays a role in the drowsiness they feel on their drive to work, at work and their ensuing drive home after work.

Other duties. A small number of nurses (5) stated that some of the other duties they have outside of work impact their feelings of drowsiness. All of the duties the nurses mentioned included care for a loved one, family or pet.

Commute. Almost half of the nurses (12) mentioned commute time in relation to their experience of drowsy driving, including the length or type of commute they make. Some nurses mentioned long drives for themselves or their colleagues while others mentioned the type of roads they drive.

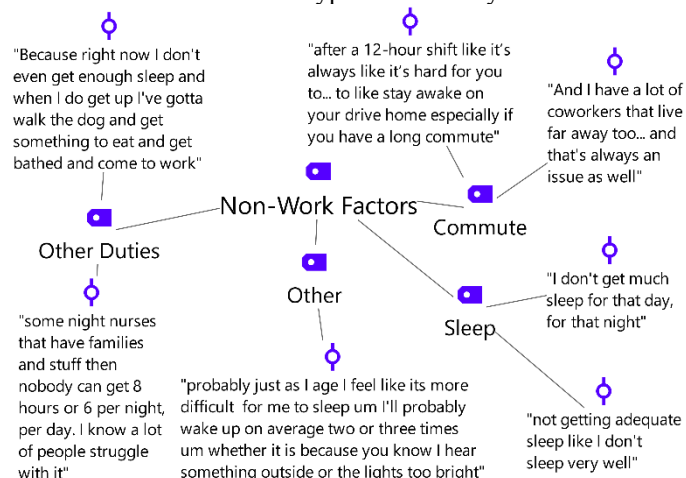


Figure 4. Network diagram of nurses' responses concerning non-work factors that contribute to their drowsiness.

DISCUSSION

Drowsy driving is a serious problem that affects many night-shift nurses, putting them at risk of serious harm. Many factors during and after their shift contribute to the drowsiness they experience on their commute home. This study used semi-structured interviews to gain insight and perspective of night-shift nurses concerning their experience of drowsy driving and its contributing factors.

Factors Contributing to Drowsiness and Fatigue

The nurses suggested many factors that contribute to drowsiness. Many of the responses overlapped with factors that contribute to fatigue among nurses in other studies. These factors include shift schedules, length of work, sleep, poor coworkers, mental and physical demand, lack of breaks, other

duties and being busy (Chan, 2009; Chen et al., 2014; Geiger-Brown et al., 2011; Han et al., 2014; Samaha et al., 2007). Even though these factors were similar between those who experience fatigue and drowsiness, other factors are more specific to the experience of drowsiness.

Factors that nurses mentioned that contributed to their drowsiness did not converge with factors that contribute to fatigue. Some of these factors include not being busy, poor lighting, temperature, time, their commute home and delayed feelings of drowsiness. Various contributors are related to the onset of sleep rather than a physical or mental exhaustion, thus providing rationale for the uniqueness of the experience in contributing to drowsiness rather than fatigue. Not being busy, or being under loaded, can bring about the onset of sleep (May & Baldwin, 2009). Similarly, poor lighting, especially during the night, can increase feelings of drowsiness (Phipps-Nelson, Redman, Schlangen, & Rajaratnam, 2009). While nurses experience many different factors that contribute to their drowsiness, some recommendations for dealing with them can be provided.

Recommendations

Given the concerns raised by the nurses in this study, we suggest several recommendations to address the issue of drowsy driving. These recommendations include both changes to the nurse's behavior as well as changes to institutional policies. Note that institutional policies and practices must be accounted for in implementing these requirements.

Shift Schedule. Prevent nurses from scheduling more than two shifts in a row.

Length of Work. Prevent nurses from working overtime or making sure all tasks are completed within their shift, and reduce shift length to less than 12 hours wherever possible.

Sleep. Provide educational programs covering sleep hygiene and techniques to improve sleep quality. Encourage naps during breaks and after the shift.

Lack of Breaks. Create mandatory breaks for nurses, which could include naps or meals, to provide a short respite from intense work and allow for some recovery. Promote a culture in which breaks are encouraged rather than chastised.

Workload. Monitor and adjust to staff workload to maintain active but not overworked nurses.

Poor Coworkers. Consider training to improve team skills and teamwork among nurses.

Poor Lighting. Perform regular maintenance of the areas where nurses work to ensure consistent lighting quality.

Limitations

This study has a few limitations to note. First, the sample size of the study is relatively small compared to similar studies, with only 30 nurses. Further, the sample is not representative of the national average, having more males and a greater ethnic diversity. These limitations stem from using nurses from a single hospital which introduces other biases in terms of policy, practices or specialties. Finally, some personal biases are present in the qualitative data analysis.

CONCLUSION

Semi-structured interviews were conducted with night-shift nurses to explore their experience of drowsy driving, mitigation techniques, contributing factors to drowsiness and preferences for an educational or technological intervention. Our findings indicate that drowsy driving is a prevalent problem among night-shift nurses with have many factors that contribute to their experience of drowsiness. While there exist techniques to mitigate fatigue, recommendations to mitigate drowsiness during and after the shift are also needed. Current work is focusing on implementing an educational and technological mitigation for drowsy driving.

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