2018

Intensive care nurses' attitudes, beliefs and reported practices relating to patient sleep: A descriptive study

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Intensive Care Nurses' Attitudes, Beliefs and Reported Practices Relating to Patient Sleep: A Descriptive Study

A thesis submitted in fulfilment of the requirements for the degree of

Master of Philosophy

School of Nursing and Midwifery

University of Notre Dame Australia, Fremantle

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2018

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List of Abbreviations

CN	Clinical Nurse
CPG	Clinical Practice Guideline
ETT	Endotracheal Tube
GRN	Graduate Registered Nurse
ICU	Intensive Care Unit
NREM	Non-rapid Eye Movement
PSG	Polysomnography
RASS	Richmond Agitation-Sedation Scale
RCSQ	Richards–Campbell Sleep Questionnaire
REM	Rapid Eye Movement
RN	Registered Nurse
SPP	Sleep-promotion Protocol
TPB	Theory of Planned Behaviour
TST	Total Sleep Time
VSH	Verran and Snyder-Halpern Sleep Scale
WA	Western Australia
WHO	World Health Organization

Definition of Key Terms

Attitude: A relatively enduring and general evaluation of a person, group or concept that can be negative or positive (American Psychological Association, 2018).

Belief: Acceptance of truth or validity of something, even in the absence of substantiation (American Psychological Association, 2018).

Perception: The process of becoming aware of objects, relationships and events by means of the senses, enabling organisms to organise and interpret stimuli into meaningful knowledge and act in a coordinated manner (American Psychological Association, 2018).

Behaviour: A person's activities in response to external or internal stimuli, including objectively and introspectively observable activities and nonconscious processes (American Psychological Association, 2018).

Practice: The application or use of an idea, belief or method, as opposed to theories relating to it (Oxford Dictionaries, 2018).

Sleep architecture: The organisation of brain wave activity characteristic of each of the stages of sleep (Venes, 2017).

Sleep deprivation: (1) Prolonged periods of time without sleep. (2) Any lack of sleep that contributes to altered mood, altered thinking or impaired ability to perform activities (Venes, 2017).

Clinical intervention: An intervention undertaken to improve, maintain or assess the health of a person, in a clinical situation (Australian Institute of Health and Welfare, 2000).

Clustered care: Clustering several routine or nursing care events together, rather than spacing them out over time (Valizadeh, Avazeh, Bagher Hosseini, & Asghari Jafarabad, 2014).

Abstract

Empirical evidence suggests that patients treated in the intensive care unit (ICU) experience chronic sleep disturbance, leading to sleep deprivation. Multiple intrinsic and external factors contribute to poor quantity and quality of sleep among critically ill patients. Noise, light and clinical interventions are some of the external factors most disruptive to patient sleep in the ICU. Given that nurses are the gatekeepers to the ICU, understanding their perceptions and practices relating to patient sleep is necessary to elicit change. However, ICU nurses' attitudes, beliefs and practices relating to sleep are poorly understood.

Using a descriptive survey method, this study investigated the self-reported attitudes, beliefs and practices of ICU nurses in a tertiary hospital in the metropolitan area of Perth, Western Australia. A questionnaire with quantitative and qualitative elements was used as the instrument for data collection. Eighty-four nurses from a target population of 180 participated in this study (47%). Over half of the respondents held postgraduate qualifications and nearly all had worked in other ICU settings, given that the study ICU had only opened in 2014. The majority of respondents had not received any education on patient sleep and had not worked in an ICU with a clinical practice guideline or sleep-promotion protocol.

The findings suggest that the nurses believed it is important for patients to achieve adequate quantity and quality sleep while in the ICU; however, the sleep patients currently experience is insufficient and adversely affects a multitude of patient outcomes, including the development of delirium. The nurses believed that patients are concerned about sleep disturbance; however, they were divided in opinion regarding

whether their colleagues were equally concerned. Sleep assessment in this setting is difficult and occurs without the use or knowledge of sleep assessment tools. Most sleep-promotion practices are considered important, yet are not performed consistently. A plethora of barriers to patient sleep were identified, with nurses describing a lack of control in managing these in the ICU setting. A focus on solutions was identified, with respondents unequivocally suggesting that education and routine, policy and culture change is required to better support patient sleep.

The results of this study contribute to the growing body of knowledge on patient sleep in the ICU and the modifiable factors that contribute to sleep disruption. These insights will inform the development of education, policy and protocol to support sleep in the critically ill patient.

Declaration of Authorship

This thesis is the work of Rebecca Hahn and contains no materials that have been accepted for the award of any other degree or diploma in any university or other institution.

To the best of my knowledge, the thesis contains no material previously published or written by another person, except where due reference is made in the text of the thesis.

12/08/2018

Rebecca Hahn

Date

Acknowledgements

Particular thanks to my principal supervisor, Doctor Tracey Coventry, who guided and encouraged me with kindness and patience. You shared with me your wisdom, gave me your time and provided motivation and encouragement when it was needed. I am exceptionally grateful for all the support and assistance you have given me throughout this journey.

To my co-supervisor, Adjunct Associate Professor Elaine Bennett, thank you for all your feedback, your advice and your positive outlook on life. You have helped me to keep things in perspective.

To Doctor Edward Litton, who assisted me with the development of my questionnaire and encouraged me to present a synopsis of this research at the ANZICS CTG conference in Noosa—you have supported me in my research, provided insights and encouragement, and shared your knowledge, for which I am exceptionally grateful.

My friend and mentor, Doctor Kathleen Potter, if it wasn't for you, I may never have found my passion in research. Your sharp wit, excellent sense of humour, and exceptional intellect have made this journey all the more enjoyable.

All the nursing staff in FSH ICU who participated in this survey and shared your insights, without your participation there would be no research, so thank you.

To my parents, you have provided endless support and assistance by caring for Emily and Matilda and listening to me when I was stressed, stuck or otherwise. This would have been impossible without your help.

To my husband, Rohan, thank you for your unwavering support. Through renovations, small children and working away, you have provided the love and space I required to complete this research. You have listened to me, encouraged me and provided much-needed IT assistance. I could not have done it without you. Finally, to

Emily and Matilda for being so patient while I was studying instead of playing—I love you more than you know.

Chapter 1: Introduction

1.1 Background

Sleep is a complex physiological and behavioural process that is essential for human survival (Figueroa-Ramos, 2009; Hardin, 2009; Kamdar, Needham, & Collop, 2012). The exact function of sleep remains unknown (Siegal, 2005) ; however, a certain amount is required to maintain healthy function of body and mind. While quality sleep is required for healing, defensive and energy-preserving functions (Matthews, 2011), its importance to patient recovery and wellbeing in the healthcare setting has previously been overlooked. The importance of sleep in the adult intensive care unit (ICU) has been gaining more recognition through recent research. The extent of sleep disturbance experienced by ICU patients has been found to contribute to poor patient outcomes, thereby impeding recovery from critical illness.

Extensive and ongoing research has identified that sleep disturbance and deprivation has been recognised as a significant complication of admission into the ICU (Aurell & Elmqvist, 1985; Edell-Gustafsson, Aren, Hamrin, & Hetta, 1994; Elliott, McKinley, Cistulli, & Fien, 2013; Freedman, Gazendam, Levan, Pack, & Schwab, 2001; Hilton, 1976). Studies using the gold-standard polysomnographic sleep measurement have consistently shown that patients in the ICU experience abnormal sleep patterns or architecture (Aurell & Elmqvist, 1985; Elliott et al., 2013; Elliott, McKinley, & Cistulli, 2011; Freedman et al., 2001). Specifically, sleep is highly fragmented, with very little slow-wave or rapid eye movement (REM) sleep. There is increased sleep during daylight hours and overall total sleep time is lower (Elliott et al., 2013; Freedman et al., 2001; Gabor et al., 2003). Despite research outlining the contributing factors to poor patient sleep in the ICU (Aurell & Elmqvist, 1985; Edell-Gustafsson et al., 1994; Elliott, Tapan, & McKinley, 2014; Freedman et al., 2001;

Hilton, 1976), other studies have reported that most ICU departments have made few changes to improve the quality and quantity of patient sleep (Kamdar, Needham, et al., 2012). Sleep disturbance continues to be ranked in the top three causes of stress and anxiety by patients during their stay in the ICU (Honkus, 2003; Kamdar, Needham, et al., 2012).

Multiple intrinsic and extrinsic factors have been found to contribute to sleep disturbance experienced by the ICU patient. Intrinsic factors are patient related and are somewhat inherent to critical illness. These include pain, inflammatory response, circadian rhythm disturbance, mechanical ventilation and severity of underlying disease (Bihari, Doug McEvoy, Matheson, & Kim, 2012; Elliott et al., 2014). Extrinsic factors—such as noise, light, frequent clinical interventions, blood samples and diagnostic tests—are recognised as being some of the most disruptive to sleep, as reported by patients and polysomnographic sleep studies (Bihari et al., 2012; Eliassen & Hopstock, 2011; Elliott et al., 2014; Tembo & Parker, 2009). These extrinsic factors are considered modifiable and have been the focus of recent studies exploring the effects of sleep-promoting interventions by adapting the ICU environment and adjusting clinical interventions that are known to impede sleep (Engwall, Fridh, Johansson, & Bergbom, 2015; Hu, Jiang, Hegadoren, & Zhang, 2015; Maidl, Leske, & Garcia, 2014). While many of these studies reported that the sleep-promoting interventions implemented were effective in reducing sleep disturbance in patients, there remains a lack of consensus on evidence-based strategies to promote sleep quality among ICU patients.

Hopper, Fried, and Pisani (2015) reported that the buy-in of healthcare workers involved in studies of patient sleep in the ICU may be particularly important in ensuring that the implementation of sleep-promotion strategies is effective and consistent. The scarcity of data on outcomes associated with poor patient sleep in the ICU indicates that

there is a knowledge gap in this area. Reports on the implementation of clinical practice guidelines and quality improvement interventions are available, yet are not systematically integrated into nursing practice (Elliott & McKinley, 2014; Kamdar et al., 2014), as the importance of sleep for patient recovery is often deprioritised in ICU because of the need to meet increasingly complex care requirements (Delaney, Van Haren, & Lopez, 2015).

1.2 Topic and Purpose

The topic of this research is nurses' perceptions and practices relating to the quality and quantity of sleep experienced by patients in the ICU. This study sought to evaluate the current attitudes, beliefs and behaviours of ICU nurses regarding patient sleep in the ICU of a Western Australian (WA) public tertiary hospital. Research has indicated that noise, light and clinical interventions are the extrinsic factors most disruptive to sleep in intensive care (Elliott et al., 2014). If these factors contributing to sleep disturbance are not appreciated or valued by the nurse delivering care, and if measures such as reducing noise and light and clustering care are not implemented, patient recovery may be hindered. In response to this problem, this study employs a descriptive survey to examine ICU nurses' attitudes, beliefs and reported practices relating to patient sleep.

1.3 Significance

Objective sleep measurement using polysomnography and subjective reporting of patient perceptions of their own sleep has indicated that clinical interventions are ranked as the third most disruptive to patient sleep, after noise and light (Bihari et al., 2012; Elliott et al., 2014; Ugras & Oztekin, 2007). Honkus (2003) further explained that nurses' lack of knowledge about sleep stages and routines and the frequent activities of nursing assessment and clinical interventions affect critically ill patients' ability to

sleep. Given that sleep disturbance is emerging as an indicator for adverse clinical outcomes (Delaney et al., 2015), the effects of ICU nurses' attitudes, beliefs and practices regarding patient sleep need to be described to better inform future education and research on sleep among ICU patients.

1.4 Research Questions

This study's overarching research question is as follows:

- What are the attitudes, beliefs and reported practices of intensive care nurses relating to the quality and quantity of sleep in the critically ill patient?

More specifically, this research examines:

1. What attitudes and beliefs do nurses hold regarding the importance of sleep in the ICU patient?
2. What sleep-promoting practices do ICU nurses report using to promote sleep in the patients for whom they care?
3. Do nurses' attitudes and beliefs regarding sleep in the ICU patient reflect their reported practices?

1.5 Thesis Configuration

The thesis comprises six chapters. Chapter 1 has provided an introduction to the study, with a background on sleep, sleep disturbance experienced by ICU patients, the factors that contribute to sleep disturbance in the ICU setting, the importance of understanding nurses' perceptions and practices in relation to sleep in the ICU, and the research questions. Chapter 2 presents the theory underpinning this research and the historic and current literature on sleep in the ICU patient. Chapter 3 focuses on the methodological approach, including the research design, data collection methods, site and sample, questionnaire development and distribution, data analysis methods to be used and ethical considerations. Chapter 4 presents the demographic, quantitative and

qualitative data and describes the findings. Chapter 5 compares the findings with the relevant literature and theory, addresses the research questions, and outlines the limitations of the study. The final Chapter 6 presents recommendations for education, clinical practice and future research, and provides a conclusion to the thesis.

Chapter 2: Literature Review

2.1 Theoretical Perspectives

This research employed a theoretical framework. Macnee and McCabe (2008) explained that a theoretical framework is an underlying structure that describes the ways in which the abstract aspects of the research problem interrelate, based on developed theories. A theory is an interrelated set of constructs that are formed into propositions that specify the relationship among variables (Creswell, 2013a). The theory of planned behaviour (Ajzen, 1985, 1987, 1991, 2000) was used as a tool in this study to help make sense of the complex phenomena of nurses' attitudes and behaviours relating to sleep in the ICU.

The theory of planned behaviour (TPB) developed by Ajzen (1985, 1987, 1991, 2000) offers a framework for understanding human behaviour and its psychological determinants (Polit & Beck, 2014). In the TPB, attitudes are expected to predict and explain human behaviour. To accurately predict and explain the performance of specific behaviours in a given context, behaviour-specific attitudes can be assessed (Ajzen, 1991). Positive attitudes can predispose individuals to approach tendencies, while negative attitudes can predispose individuals to avoidance tendencies in relation to the compatible behaviour (Ajzen & Fishbein, 2000).

Applied to this research, nurses' decisions and intentions to provide or not provide sleep-promoting interventions may be determined by three key constructs: attitudes, subjective norms and perceived behavioural control (Cornally, 2014). These factors are considered the determinants of intention (Ajzen, 1991). Such factors may mean that nurses' hold their own beliefs regarding the importance or unimportance of prioritisation of sleep (behavioural belief). They may believe that the importance of providing undisturbed sleep to patients is not valued by fellow nurses, and may

subsequently not promote sleep interventions for their own patients (normative beliefs). Alternatively, the nurse may have the knowledge and ability to undertake sleep promotion for their patient, yet perceive that the ICU environment renders it difficult to perform (control beliefs) (see Figure 1). As a general rule, the more favourable the attitude and subjective norm, and the greater the perceived control, the stronger the individual's intention to perform the behaviour (Ajzen & Fishbein, 2000).

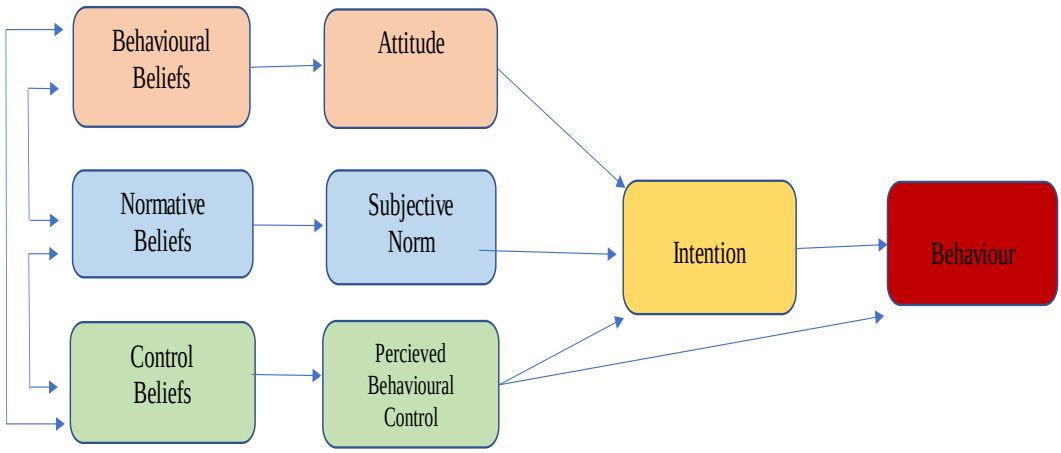

Figure 1. The theory of planned behaviour (Ajzen, 1991).

This theory has been applied to previous nursing research to enhance understandings of nursing assessment, planning, implementation and evaluation of care (Cornally, 2014). However, it is important to note that many nurse researchers who cite a theory or model as their framework are not directly testing the theory (Polit & Beck, 2014). As such, the TPB used in this study is primarily applied as a broad interpretive and organisational tool. The TPB underpins this research and provides a substantive theory for examining nurses' perceptions and practices.

2.2 Related Research

2.2.1 Introduction. A literature review was undertaken to provide background and insight into the current research on sleep. This included examining sleep architecture, function and measurement; assessment of patient sleep in the ICU; sleep promotion; the factors affecting patient sleep, including noise, light, and nursing and clinical interventions; and the knowledge and attitudes of nurses on sleep in intensive care.

A search of the following electronic databases was performed: Cumulative Index for Nursing and Allied Health (CINAHL) Plus with Full Text, MEDLINE (the National Library of Medicine's bibliographic database covering the fields of medicine, nursing, dentistry, veterinary medicine, the healthcare system and preclinical sciences), EMBASE, ProQuest Health & Medical Complete, Cochrane Library and Google Scholar. No date restrictions were applied, as all research relating to sleep among intensive care patients was sought. Book catalogues from university and hospital libraries were also searched. The search terms covered the subject matter under consideration and were as follows: 'nurs*', 'sleep', 'intensive care', 'patient sleep', 'nurses' perceptions', 'critical care sleep', 'sleep disruption', 'sleep in the ICU', 'sleep promotion', 'sleep promoting practices' and 'ICU patient perceptions'. To capture relevant papers, the search was conducted using Boolean logic to allow for a broader pursuit of search results. The reference lists of retrieved papers were hand-searched to ascertain further literature not identified via the electronic database search.

2.2.2 Stages and architecture of sleep. Sleep experts describe sleep as a periodic, reversible state of cognitive and sensory disengagement from the external environment (Carskadon & Dement, 2011). Normal sleep consists of two stages: non-rapid eye movement (NREM) sleep and REM sleep (Berry et al., 2016). The American

Academy of Sleep Medicine further divides NREM sleep into three stages: N1, N2 and N3 (Berry et al., 2016). NREM sleep is usually associated with minimal or fragmentary mental activity and is considered relatively inactive, yet actively regulates the brain in a movable body (Carskadon & Dement, 2011). Sleep begins in NREM Stage 1 (N1), which is the initial movement from wakefulness to light sleep. This progresses through to the deeper NREM Stage 2 (N2), and then to NREM Stage 3 (N3)—also known as slow-wave or delta sleep (Carlson & Birkett, 2017). Stage N3 is significant because of the role it plays in the restorative process, such as memory consolidation (Stickgold & Robert, 2005) . REM sleep follows N3, and is characterised by rapid eye movements, along with autonomic variability and somatic muscle twitches. It is associated with perceptual learning (Kamdar, Needham, et al., 2012). Figure 2 illustrates the progression of sleep stages across a single night's sleep.

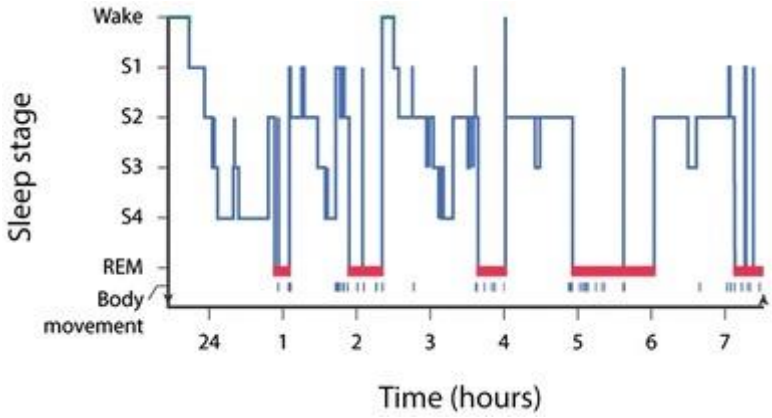

Figure 2. Histogram of the progression of sleep stages across a single night sleep. Source: Reproduced with permission from Carskadon and Dement (2011, pp. 16–22).

Four to six 90-minute cycles of NREM and REM sleep comprise normal sleep architecture, with NREM consisting of 75% and REM 25% of total sleep time (Elliott et al., 2011). Wakefulness accounts for less than 5% of the total nocturnal sleep time in normal sleep (Kryger, Roth, & Dement, 2005). Arousals are also a feature of sleep and

are described as emergence into lighter stages of sleep, with normal sleep consisting of 10 to 22 arousals per hour, with increased threshold for arousal from sleep during the REM stage (Carskadon & Dement, 2011). Generally, in a healthy young adult, total sleep time is 7.5 to 8.5 hours; however, multiple factors—such as genetics and volitional determinants (such as staying up late)—can affect the total hours of sleep per night for individuals (Carskadon & Dement, 2011). Figure 3 depicts the stages and architecture of normal sleep.

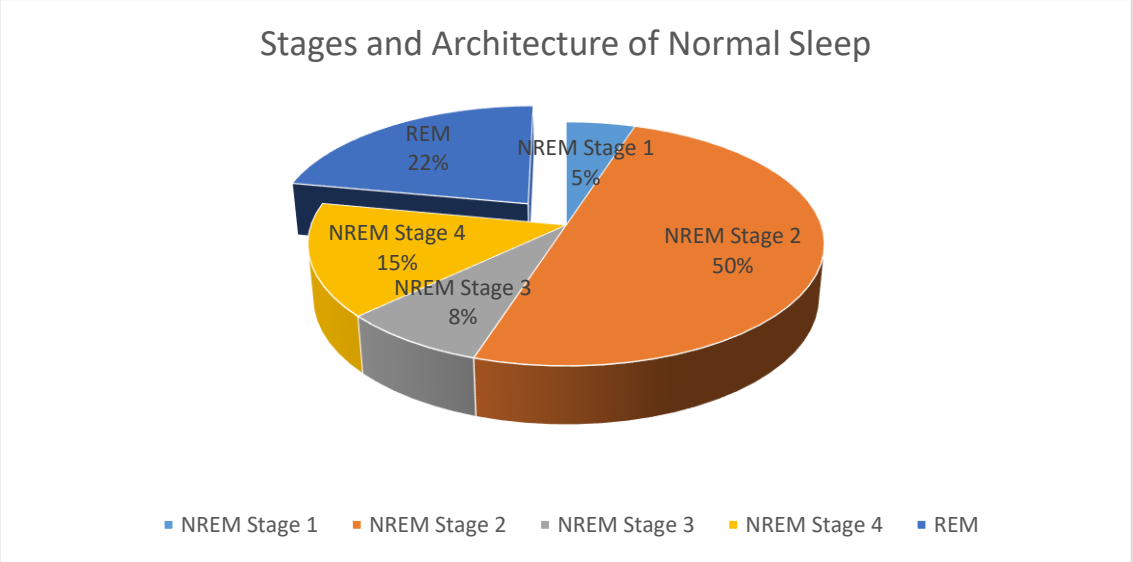

Figure 3. Percentage of total time in each sleep stage.

2.2.3 Sleep function. While much is known about the effect of abnormal sleep on human performance, the question of why we sleep remains unanswered (Lee-Chiong, 2006). The abundance of competing theories around sleep function only explains a portion of sleep behaviour. Most theories suggest that NREM sleep has a role in energy conservation and nervous system recuperation from waking activities, while REM is a recuperative process involving emotional regulation (Siegel, 2007); however, unified consensus on an overarching theory of sleep is yet to be determined (Lee-Chiong, 2006). The study of sleep function has historically relied on the use of the sleep

deprivation paradigm, meaning that learning about the function of sleep occurs through the pathophysiological consequences of sleep deprivation (Assefa, Diaz-Abad, Wickwire, & Scharf, 2015; Vassalli & Dijk, 2009). What is known is that the body undergoes a constellation of physiologic changes during sleep that play important roles in physical restoration, emotional regulation, learning and memory consolidation, and neurobehavioral and neurocognitive performance (Assefa et al., 2015; Kamdar, Needham, et al., 2012).

Physical restoration includes the reduction of energy requirements; release of growth hormone; appetite regulation; and respiratory, cardiac, immune, endocrine, metabolic and inflammatory regulatory functions (Barone & Krieger, 2015; Kaplow, 2016). NREM and REM sleep provide different functions for the health and wellbeing of the human body. NREM promotes physical healing and growth, with 70% of growth hormone secretion occurring during this stage (Lower, Bonsack, & Guion, 2002). Growth hormone stimulates protein anabolism for cell repair and influences the metabolism of proteins, fats and carbohydrates (Kaplow, 2016; Lower, Bonsack, & Guion, 2003). The loss of NREM sleep, as seen during sleep deprivation, has been shown to cause immunosuppression, slowing in tissue repair, lower pain tolerance, fatigue and an increased susceptibility to infection (Honkus, 2003; Kaplow, 2016; Siegel, 2005).

Emotional healing and growth and repair of brain tissue occur during the REM stage of sleep, with cerebral blood flow nearly doubling during this type of sleep (Honkus, 2003; Lower et al., 2002). Response to voice or pain arousal is diminished and cardiac and respiratory changes have also been observed, including increased heart rate, cardiac output and oxygen consumption (Ganz, 2012; Lower et al., 2002; Orzel-Gryglewska, 2010). The loss of REM sleep causes psychological disturbances, such as

apathy, depression, irritability, confusion, combativeness, disorientation, hallucinations, impaired memory and paranoia (Lower et al., 2002). Thus, the function of normal quantity and quality of sleep, while theoretically illusive, has been established as vital for mental and physical health and human survival.

2.2.4 Measurement and assessment of sleep in the ICU. Sleep can be measured among ICU patients with both objective and subjective methods. The objective measurement of sleep in ICU includes polysomnography, the bispectral index and actigraphy. Methods such as actigraphy are known to be inexpensive and easy to implement, with results that are easily interpreted (Delaney et al., 2018). However, the limited research on using the bispectral index and actigraphy to accurately measure sleep depth and stages with reliable algorithms means that these methods of objective sleep measurement have not previously been recommended to measure sleep in the ICU patient population (Bourne, Minelli, Mills, & Kandler, 2007).

The gold standard for objectively measuring sleep in ICU is polysomnography (PSG) (Berry et al., 2016) , which refers to the recording, analysis and interpretation of physiologic signals collected simultaneously to enable sleep to be measured (Berry et al., 2016). Measurement of sleep using PSG involves continuous monitoring of the electroencephalogram, electro-oculogram and sub-mental electromyogram. These are used to identify the stages of sleep and sleep disruption (Beecroft, 2008). Limited PSG studies have been performed on patients in the ICU, and many of these were small studies of 15 to 20 patients (Aurell & Elmqvist, 1985; Demoule, Carreira, Lavault, & Pallanca, 2015; Elliott et al., 2013; Freedman et al., 2001; Gabor et al., 2003; Ritmala-Castren, Virtanen, Leivo, & Kaukonen, 2015). This can be attributed to the technical issues, cost and inherent difficulty in both conducting and interpreting PSG results among critically ill patients (Bourne et al., 2007; Elliott et al., 2013; Ritmala-Castren et

al., 2015). Elliott et al. (2013) performed one of the largest 24-hour PSG studies with simultaneous data collection for the factors that affect sleep. The findings from this study were comparable to those of smaller studies previously performed (Freedman et al., 2001). The results from these studies have been recognised as providing some of the most comprehensive characterisations of patient sleep in the ICU.

A more common method of measuring patient sleep in the ICU is the use of subjective sleep assessment tools. Compared with the objective measurement of sleep, subjective methods have been more broadly studied using larger patient numbers, longer periods and more interventions (Bourne et al., 2007). Subjective methods include patient self-reports using the Verran and Snyder-Halpern Sleep Scale (VSH) and the Richards–Campbell Sleep Questionnaire (RCSQ), and nurse assessment of patient sleep using the RCSQ or direct observation.

The VSH is an eight-item visual analogue scale that has been deemed to have satisfactory validity and reliability (Nicolás et al., 2008) when used by patients to report their own sleep. The correlation between PSG, nurses' observations and patients' perceptions was indicated for this tool in the study by Fontaine (1989). The RCSQ has been validated using PSG (Kamdar, Shah, et al., 2012). The patient self-report questionnaire comprises five visual analogue scales measuring sleep depth, length of time until the onset of sleep (latency), awakenings, time awake and quality of sleep (Kamdar, Shah, et al., 2012). A problem with the RCSQ and VSH is that the patient may not be able to complete the questionnaire because of severity of illness or sedation, which limits the application of these tools in a significant number of critical care patients (Bourne et al., 2007). In their study on patients' and nurses' perceptions of sleep in the ICU, Frisk and Nordström (2003) reported that only 50% of the patients in the ICU were able to complete the RCSQ.

Research in critical care has employed direct nurse observation and a variety of scales and questionnaires to identify patients with significant sleep disorders (Bourne et al., 2007; Ritmala-Castren, 2016; Ritmala-Castren, Axelin, Kiljunen, & Sainio, 2014). The RCSQ can be used by nurses to assess the sleep of their patient; however, the results are mixed regarding the accuracy of nurses using this tool. Frisk and Nordström (2003) reported that no significant difference was seen between nurses' reports of patient sleep and the patients' self-report using the RCSQ. Conversely, other studies have shown that nurses overestimate sleep time and quality compared with patients' self-reports and PSG data (Kamdar, Shah, et al., 2012; Nicolás et al., 2008). Nurses' subjective observation and reporting of patient sleep is a cost-effective method that can be incorporated into nursing care and documentation. However, the accuracy of nurses' evaluation of patient sleep is disputed, with one study reporting that nurses' ability to recognise the patient sleep/wake state corresponded to PSG only 68% of the time, with no correlation for sleep latency, amount of awakenings or movements during sleep (Ritmala-Castren, 2016). Nicolás et al. (2008) found that the agreement between nurses' perceptions of patient sleep and patients' perceptions of their own sleep had only 44% agreement. Currently, there is no gold-standard subjective tool that can be used by nurses in the ICU as a measurement of patient sleep.

2.2.5 Patient sleep in the ICU. Disrupted sleep and poor sleep quality among critically ill ICU patients is considered a significant problem (Boyko, Ørding, & Jennum, 2012). Research indicates that patient self-reports of poor sleep are supported by PSG data (Ritmala-Castren, 2016). PSG recordings indicate that sleep among ICU patients comprises 90% of N1 and N2 stages, severely reduced or no recordable N3 and REM, and a total sleep time significantly less than in healthy adults (Elliott et al., 2013; Freedman et al., 2001; Ritmala-Castren et al., 2015). Sleep is also highly fragmented,

with arousals occurring up to 79 times per hour, leading to interruption of sleep every 46 seconds (Drouot, Cabello, d'Ortho, & Brochard, 2008; Gabor et al., 2003). Elliott et al. (2013) found that sleep fragmentation and abnormal sleep architecture consisting of multiple short, non-contiguous sleep periods was common among ICU patients, with a large percentage of the patients' total sleep time (TST) occurring during daylight hours. Relatively recent sleep studies in ICU support the idea that sleep among ICU patients is characterised by prolonged sleep latency; sleep fragmentation; decreased sleep efficiency; frequent arousals; predominance of N1 and N2 sleep; and decreased or absent N3, N4 and REM sleep (Elliott et al., 2011; Freedman et al., 2001; Friese, 2008; Gabor et al., 2003; Hardin, 2009; Weinhouse et al., 2009).

Achieving restorative sleep in the ICU remains a challenge for most patients (Pulak & Jensen, 2016). Research has also indicated that poor sleep quality continues to occur after treatment in the ICU, with it being a significant issue for more than half of ICU survivors six months after their ICU stay (McKinley, Fien, Elliott, & Elliott, 2013). There are strong correlations between sleep disruption and systemic illness and mortality (Pulak & Jensen, 2016). Specifically, sleep disruption in the ICU has been associated with the development of delirium and poor psychological outcomes (Weinhouse et al., 2009). Delirium is characterised by an acute onset of disturbance in consciousness, in which cognition or perception is altered, and it is associated with disturbances in the sleep/wake cycle (American Psychiatric Association, 2013). Patients in the ICU are at increased risk of developing delirium because of critical illness, comorbidities, sedative and analgesic medications, age and mechanical ventilation (Trompeo, Vidi, & Ranieri, 2006). The diagnosis of delirium results in increased length of stay, longer mechanical ventilation duration, and increased mortality of the ICU patient (Altman, Knauert, Murphy, & Ahasic, 2018). Increasing researcher interest in

the poor sleep of ICU patients is related to cognisance of the detrimental effects that lack of sleep can have on the recovery and morbidity of the critically ill (Friese, Bruns, & Sinton, 2009).

2.2.5.1 Role and assessment of sedation in ICU patients. Sedation of ICU patients using benzodiazepines and anaesthetic agents is often required to help their tolerance of invasive procedures, treatments and monitoring devices (Aitken & Elliott, 2015). Appropriate titration and management of sedation and analgesia to relieve pain and anxiety—particularly for patients requiring mechanical ventilation—is an integral part of the ICU nurse role (Aitken & Elliott, 2015; Elliott, McKinley, & Aitken, 2006; Ely, Truman, Shintani, & et al., 2003). To ensure patients are not over-sedated, which may lead to prolonged mechanical ventilation, or under-sedated, leading to anxiety and increased pain (Elliott et al., 2006), valid and reliable sedation assessment tools are used by ICU staff to measure the level of patient sedation. The Richmond Agitation-Sedation Scale (RASS) has been found to have excellent interrater reliability and is used to measure the sedation level of patients in many critical care units (Ely et al., 2003; Sessler et al., 2002). The RASS scores from -5 (unarousable) to +4 (combative), with 0 being alert and calm. It provides assessment of sedation in less than 20 seconds (Sessler et al., 2002).

Sedatives are recognised as having both positive and negative contributions to sleep. A decrease in time needed to fall asleep, decrease in awakenings and increase in TST contrasts with a decrease in slow-wave and REM sleep (Parthasarathy & Tobin, 2004). While a sedated state may resemble sleep superficially, naturally occurring sleep is spontaneous, circadian and reversible with external stimuli, and sedation is not physiologic, not spontaneous, not fully reversible with external stimuli, and not an

essential biologic function; thus, it may not provide the physiological benefits (Parthasarathy & Tobin, 2004; Weinhouse & Schwab, 2006).

2.2.6 Factors responsible for sleep disturbance. Poor sleep quality in the ICU patient has been attributed to many intrinsic and extrinsic factors. Intrinsic factors such as the critical illness itself, pain, anxiety, underlying sleep problems and abnormal melatonin secretion all contribute to sleep disturbances (Boyko et al., 2012; Kamdar, Needham, et al., 2012). Along with these intrinsic factors, patients admitted to the ICU often require respiratory support with mechanical ventilation, which has also been found to cause sleep disturbance, and require the use of sedative medications that affect the quality and quantity of sleep (Bihari et al., 2012; Tembo & Parker, 2009). These factors are significant sleep disruptors and have been explored and correlated using PSG (Elliott et al., 2013; Freedman et al., 2001).

The external or environmental factors responsible for sleep disturbance in the ICU are considered modifiable and comprise a substantial proportion of the past and present research using descriptive, quasi-experimental and intervention studies (Drouot et al., 2008; Elliott et al., 2014; Tembo & Parker, 2009). Noise, light and clinical interventions rate among the most disruptive, with noise being widely cited as the most common cause of sleep disruption in the ICU (Delaney et al., 2015; Drouot et al., 2008; Elliott et al., 2013; Honkus, 2003).

2.2.6.1 Noise. Both subjective and objective studies have reported noise as a primary source of sleep disturbance, with staff being the main source of generated noise (Delaney et al., 2015; Freedman et al., 2001; Gabor et al., 2003). Noise because of staff conversations, telephones and monitor alarms has been shown to exceed the Environmental Protection Agency guidelines of 45 decibels during the day and 35 decibels overnight, with ICU peak noise levels frequently exceeding 80 decibels

(Kamdar, Needham, et al., 2012). While patients rate noise as one of the most disruptive factors, 24-hour PSG recording has only attributed 11 to 18% of arousals and 17 to 24% of awakenings to noise, showing discrepancies between the self-reports of patients and the PSG data (Elliott et al., 2013; Freedman et al., 2001; Kamdar, Needham, et al., 2012). The exact source of excessive noise pollution within the ICU is multifactorial (Pulak & Jensen, 2016). Staff conversations, alarms and equipment noises (such as suction) all contribute to create an intense noise environment that can produce physiologic changes similar to a generalised stress reaction, which can prohibit the patient from sleeping (Honkus, 2003). Kahn et al. (1998) asserted that the many causes of peak noise levels > 80 decibels are amenable to behaviour modification. Li, Wang, Vivienne Wu, Liang, and Tung (2011); Monsén and Edéll-Gustafsson (2005); and Maidl et al. (2014) all introduced behaviour modification to reduce noise in the ICU with positive results, and indicated that the reduction in noise positively affected patients.

2.2.6.2 Light. The natural cycle of light and dark helps regulate the biological clock, maintaining wake/sleep cycles and influencing circadian rhythm control (Honkus, 2003; King, Bailey, & Kamdar, 2015). Protracted exposure to artificial light—which, in the ICU, is low during the day and high at night—can affect the circadian pacemaker, leading to circadian disturbance and resulting in sleep disturbance (Delaney et al., 2015). Light has been rated by patients as less disruptive to sleep than noise and patient care activities (Kamdar, Needham, et al., 2012). However, Elliott et al. (2014) found that patients rated light as second only to noise as the most sleep disruptive factor. They also found that the illuminance levels during the day were too low and not conducive to encouraging the normal circadian rhythm. Hu, Jiang, Hegadoren, et al. (2015) investigated the effect of earplugs and eye masks on patient sleep in the ICU,

and found that their use resulted in an increase in REM sleep and fewer arousals. Thus, while patients may not perceive exposure to light as a major cause of sleep disturbance, light is still considered a significant disrupter to circadian rhythm and melatonin secretion, resulting in night-time wakefulness and daytime sleepiness among ICU patients (Delaney et al., 2015).

2.2.6.3 Clinical interventions. Clinical interventions are numerous in nature and frequent in application in critical care settings. The acuity of illness requires continuous 24-hour monitoring by nursing and medical staff, and is considered the source of the frequent clinical interventions that disrupt and prevent sleep in the ICU (Honkus, 2003). Specific protocols, such as hourly monitoring of vital signs, have been developed to ensure detection of life-threatening problems; thus, numerous care activities must be performed to maintain physiological homeostasis (Tamburri, DiBrienza, Zozula, & Redeker, 2004). Clinical interventions include, but are not limited to, vital sign measurement, hygiene care, wound care, transportation, medication administration, blood sampling, pressure area care, suctioning of artificial airways, patient assessment and invasive procedures. Clinical interventions are consistently ranked as a major disruptive factor affecting patient sleep. However, while patients' self-reports indicate this factor, there has been difficulty in finding correlation between clinical interventions, arousals and wakefulness in PSG recording (Elliott et al., 2013; Freedman et al., 2001). Elliot et al. (2013) and Freedman et al. (2001) found that ICU patients ranked clinical interventions as the third and fifth most disruptive to sleep, respectively. In contrast to these two studies, a sleep and nursing care study using PSG by Ritmala-Castren et al. (2016) found that the number of nocturnal clinical interventions was significantly associated with less light and deep sleep. They also discovered that patients were receiving up to 144 clinical interventions each between 7.00 pm and

7.00 am. This number was also reflected in Tamburri et al.'s (2004) study examining nursing observation charts for the frequency and type of nocturnal clinical interventions performed. Perhaps one of the most concerning findings from Ritmala-Castren's (2016) research was the less than 22-minute interval between each nursing intervention, possibly indicating that planning and clustering of patient care interventions were not being routinely undertaken. Clinical interventions, combined with the lack of nursing knowledge about sleep processes, the importance of clustering patient care and the physical and psychological benefits of sleep, indicate that the nursing role in sleep disruption is significant (Honkus, 2003).

2.2.7 Sleep promotion. Development of strategies to improve sleep in the ICU is challenging. Non-pharmacologic interventions to improve the sleep of patients—such as earplugs and eye masks, environmental strategies and multifaceted bundled approaches—have had varied degrees of success in improving patient sleep. An intervention on the effects of the use of eye masks and earplugs found that subjective sleep quality improved, and identified an increase in REM time and decrease in arousals (Hu, Jiang, Hegadoren, et al., 2015). Sleep perception was improved in a clinical intervention using earplugs and eye masks, which also identified improvements through the reduction of incidences of confusion in patients (Van Rompaey, Elseviers, Van Drom, Fromont, & Jorens, 2012). Overall, placement of earplugs—when used in isolation or as part of a bundle of sleep hygiene strategies—is associated with a significant reduction in delirium (Litton, Carnegie, Elliott, & Webb, 2016). When used, earplugs have been found to have positive effects on patient sleep in the ICU setting (Kamdar et al., 2014); however, non-compliance because of intolerance of earplugs, earplugs falling out or the intervention being abandoned because of clinical need have been recognised as problematic (Litton et al., 2016).

Quiet time strategies (Lower et al., 2002; Maidl et al., 2014), noise and light reduction (Li et al., 2011; Patel, Baldwin, Bunting, & Laha, 2014) and clustered care/consolidation of patient care interactions (Kamdar et al., 2014; Li et al., 2011; Monsén & Edéll-Gustafsson, 2005; Stuck, Clark, & Connelly, 2011) have all been found to improve patients' sleep to varying degrees. The multifaceted bundled approach (Hu, Jiang, Hegadoren, et al., 2015; Kamdar et al., 2014; Patel et al., 2014) has demonstrated that a combination of strategies—including noise and light reduction; clustered care; daytime activities; and ambient light, earplugs, eye masks and relaxation methods—improved patient perception of sleep more effectively than did implementation of a single strategy.

Effective implementation of sleep-promotion strategies in the ICU involves education and engagement of staff. Elliott and McKinley (2014) developed a clinical practice guideline (CPG) to improve patient sleep in the ICU. The guideline consisted of two main themes: (i) optimisation of the environment and (ii) rest and sleep interventions. The process of implementing these guidelines requires a significant change in culture (Kamdar et al., 2014), and the buy-in of staff when implementing quality improvement or CPGs is required for adoption into practice (Elliott & McKinley, 2014; King et al., 2015).

2.2.8 Nurses' knowledge and perceptions of patient sleep. Despite knowing that nurses' attitudes, knowledge and beliefs can influence their practice (Parahoo, 2014), there is a paucity of research on nurses' perceptions of sleep and the impaired sleep of critically ill patients. The literature search revealed a study on student nurses' knowledge regarding sleep physiology and sleep practices within hospitals. In this descriptive study, McIntosh and MacMillan (2009) found that the nursing students had incomplete and variable knowledge of basic sleep physiology. They also discovered that

the student nurses perceived that sleep was not prioritised by the nurses in the ICU, and that none of the students had ever used a structured tool or protocol for sleep activity.

Other research identifying the attitudes and barriers to patient sleep in the ICU (Hopper et al., 2015) found that uncertainty around the significance of sleep, the tension between providing protocol-driven ICU care and allowing the patient to sleep, and lack of consensus regarding interventions to promote sleep were significant attitudinal barriers faced by doctors and nurses in the ICU. While the study participants recognised previously identified environmental barriers related to the ICU, institutional barriers were also highlighted. This included the lower prioritisation of patient sleep as a trade-off with the current standards of care expected in the ICU (Hopper et al., 2015).

More recently, a survey was conducted on clinicians' perceptions and practices regarding sleep in the ICU using the SLEEPii questionnaire, which was specifically developed for the study by the 'Sleep in ICU Taskforce' (Kamdar et al., 2016). This survey of 1,223 ICU clinicians from 24 countries (59% nurses) found that only 32% of providers worked in ICUs that had sleep-promoting protocols. The majority of respondents rated their patients' sleep as 'poor' or 'very poor' (65%), yet believed that patient sleep in the ICU was 'very' or 'extremely' important (81%). Kamdar et al. (2016) explained that there appears to be a disconnection between perceptions of the importance of sleep and sleep-promoting efforts, which can likely be attributed to the lack of high-level evidence to justify the cost and changes in care required. The lack of empirical research on the knowledge, perceptions and practices of nurses related to patient sleep in the ICU setting indicates the need for further exploration of this topic.

2.3 Summary of Literature Review

Normal sleep in healthy adults consists of two stages of sleep: NREM and REM. Four to six 90-minute cycles of NREM and REM sleep comprise normal sleep

architecture, with NREM consisting of 75% and REM 25% of TST (Elliott et al., 2011). Although the exact purpose and mechanism of sleep remains unknown, adequate quality and quantity of sleep is vital for rest, recovery and healing of body and mind. The gold-standard objective measurement of sleep is PSG, despite the complexities and expense of procedure and interpretation of PSG data in the ICU. This is a persistent and significant issue when attempting to discover the exact causes of sleep disruption. Patient self-reports using valid and reliable tools, such as the RCSQ, consistently indicate the extrinsic factors of noise, light and clinical interventions to be the most disruptive to their sleep. However, this is not necessarily observed by nurses when using the RCSQ for assessing patient sleep, or routinely reflected in the PSG data.

What is consistently reported is that ICU patients have highly fragmented sleep, with little to no slow-wave (N3) or REM sleep, and with frequent arousals and awakenings. The adverse effects of sleep deprivation are likely to be increased among acutely unwell patients, with immunosuppression, poor tissue repair, delirium and a wealth of other detrimental physiological effects causing complications in patient recovery. While noise, light and clinical interventions are recognised as the most likely extrinsic factors to disturb sleep, the problem has been identified by researchers as multifactorial. Much of the research on sleep in ICU patients has focused on the effects of noise and light, with a limited amount of descriptive research exploring nurses' roles in patient sleep disruption.

2.4 Conclusion

There is a dearth of research on nursing knowledge, attitudes, beliefs and behaviours relating to sleep in the ICU patient. Critical care nurses act as gatekeepers for critically ill patients, and are subsequently well positioned to identify the issues that affect the quantity and quality of patient sleep. However, researchers have

acknowledged that nursing routines and a lack of knowledge about sleep stages, combined with frequent nursing assessment and clinical interventions, are thought to contribute to the poor quality and quantity of patient sleep in intensive care.

Chapter 3: Methodology

3.1 Introduction

This chapter will describe the methodology and research design used to develop and describe nurses' attitudes, beliefs and reported practices regarding patient sleep in the ICU. Explanation of the development and adaption of the survey used for data collection and the data analysis strategies will provide the process by which the research questions will be answered.

3.2 Research Design

This study uses a descriptive survey research design to describe the attitudes, beliefs and reported practices of nurses regarding patient sleep in the intensive care department of a public tertiary hospital in WA.

3.2.1 Descriptive survey design. A survey is a data collection method that gathers information to describe, compare or explain views, beliefs, attitudes and behaviours from a population or group (Parahoo, 2014). This is achieved by administering a questionnaire to a group of respondents, with the responses to the questions forming the data for the study (Wang, 2009). The purpose of survey research is to generalise from a sample to a population, so that inferences can be made about some characteristic, attitude or behaviour (Babbie, 2008). Schneider, Elliott, LoBiondo-Wood, and Haber (2003) asserted that a great deal of information can be obtained from a large population sample in an economical and efficient manner using a survey design; therefore, it is a desirable method for collecting detailed descriptions of existing variables. The advantages of the survey method were a consideration in the choice of design for this research. As well as economic and efficiency factors, there is a benefit in accurately identifying the attributes of a large population (ICU nurses) from a smaller group of individuals (whole population of a single-site ICU) (Creswell, 2013b).

Non-experimental studies, such as surveys, have been historically considered less rigorous than experimental research; however, nursing practice often does not lend itself to experimental work (Coates, 2004). Variables that are important to predict the outcomes of nursing care are often not acquiescent to experimental manipulation, and, more specifically, experimental studies rely on the assumption that all relevant variables of the phenomenon have been identified (LoBiondo-Wood & Haber, 2013). Nursing practices that affect the sleep of ICU patients are complex and have not yet been fully articulated. Experimental design would require the manipulation of key independent variables that, in this case, have not yet been identified as being causative factors to sleep disturbance in critically ill patients. For this reason, descriptive studies need to be completed to provide insight into the phenomenon, before any experimental/quasi-experimental interventions can be performed (LoBiondo-Wood & Haber, 2013). Non-experimental research designs, such as surveys, are widely used and valued in nursing research (Coates, 2004). These factors help provide the rationale for the use of a survey methodology in this study.

The most common objective of survey research is to describe (McKenna, Hasson, & Keeney, 2010). The purpose of a descriptive study is to observe, describe and document aspects of a situation (Polit & Hungler, 2013) with the aim of defining a phenomena about which knowledge is limited (Parahoo, 2014). The descriptive survey is a critically important design for acquiring knowledge in an area in which very little research has been undertaken, and particularly in the area of nursing, where current practice may not be sufficient to resolve a problem (Grove, Burns, & Gray, 2013). Nurses' attitudes, beliefs and subsequent behaviours relating to patient sleep in the ICU are a phenomenon that has not yet been clearly delineated by research. Therefore, by using a descriptive survey design to identify nurses' perceptions and possible obstacles

with current practice, further knowledge may be elicited and future research encouraged in this area (Grove et al., 2013).

The problems addressed by nursing research are particularly complex, and, as such, the use of either quantitative or qualitative approaches in isolation may be inadequate to address the complexity of the subject matter (Creswell, 2013b). Thus, this survey design uses a combination of factual, numerical data obtained by closed-ended questions (quantitative), with the rich understanding of data from open-ended questions (qualitative) to provide an expanded understanding of the research phenomena (see Figure 4) within a single questionnaire.

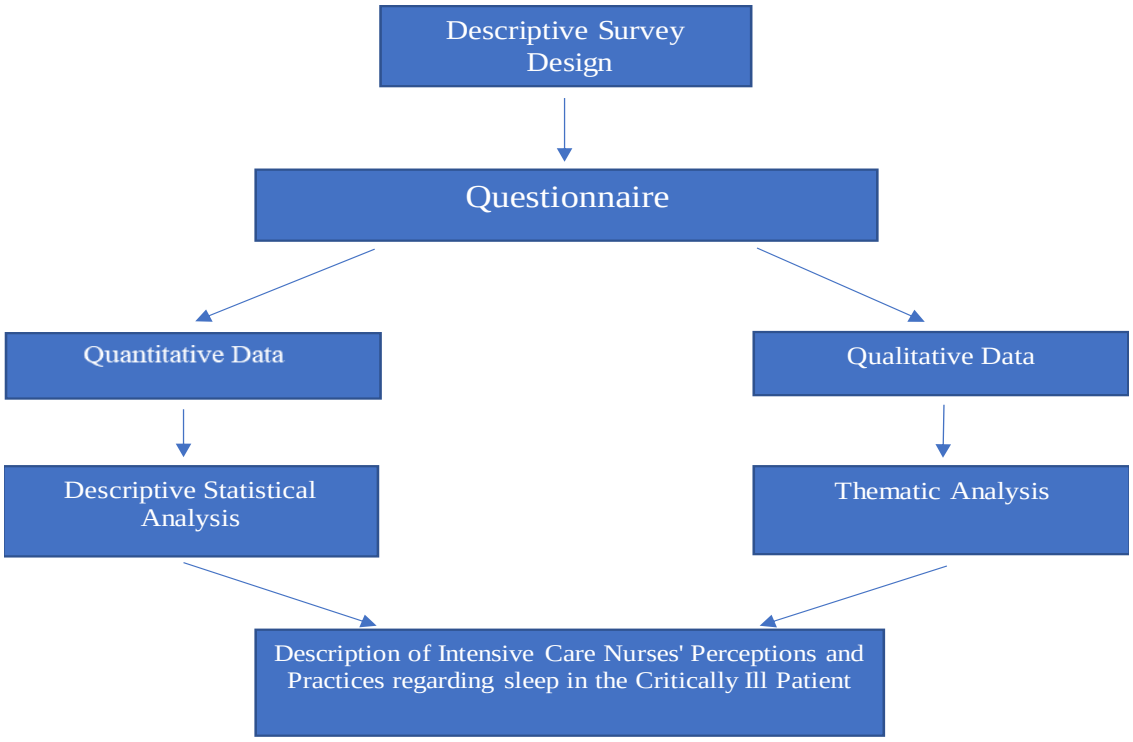

Figure 4. Research design.

3.2.2 Quantitative component. Quantitative research approaches are systematic logical processes used to answer questions about measurable concepts (Borbasi & Jackson, 2016, p. 103). The intent of quantitative research is to examine data using

numerical and statistical procedures to effectively measure concepts and variables objectively to describe, draw conclusions, investigate relationships and examine probable cause and effect (Creswell, 2015; Parahoo, 2014). Objectivity and clearly defined data that are easily interpreted are the hallmarks of this approach, with the benefit of robust quantitative research that can be generalised to the wider population. Borbasi and Jackson (2016) stated that, through the generalisability of robust quantitative research, there is potential for practice change, which is a goal of applied nursing research.

Surveys are a form of quantitative research, with measurement, accuracy, reproducibility and generalisability being highly important (Coates, 2004). Using a questionnaire as the survey instrument to collect quantitative information provides an efficient way to collect a large amount of data to effectively answer the research questions in this study (Schneider et al., 2003). Demographic data, along with five-point Likert rating scales, rank items and dichotomous and closed-ended questions, are used to illicit the quantitative data to describe the perceptions and practices of ICU nurses relating to patient sleep in the ICU.

3.2.3 Qualitative component. Qualitative research is a way of exploring and understanding the meaning that people or groups ascribe to a social or human problem (Creswell, 2013a). This approach is characterised by rich descriptive data that are non-statistical in nature (Borbasi & Jackson, 2016). The inductive nature of qualitative research seeks to understand the subjective human experience by attributing concepts with meaning in an attempt to contextualise the ‘whole’ of the phenomenon of interest (Borbasi & Jackson, 2016).

Qualitative description is designed to present comprehensive summaries of a phenomenon or event in everyday language (Polit & Beck, 2017). Simply, the rich data

provided by a qualitative approach are able to make sense of behaviour and to understand the behaviours within its wider context (De Vaus, 2002). In this study, the qualitative descriptive component of open-ended questions was employed to complement and enrich the quantitative survey data collected.

The disadvantages of the quantitative survey design—such as information being considered brief and superficial, with breadth rather than depth of data (Creswell, 2013b)—are mitigated by the used of open-ended questions to add scope and breadth to this study. Open-ended questions within the questionnaire were designed to allow the participants to express any views they had on sleep in the ICU patient, with the description dependent on the perceptions, inclinations, sensitivities and sensibilities of the describer (participant) (Sandelowski, 2000).

3.3 Site and Sample Selection

3.3.1 Site. The study was conducted in a 30-bed medical/surgical ICU in a 738-bed public tertiary teaching hospital in the metropolitan area of Perth, WA. The site was chosen for the study because of the researcher's employment and familiarity with the staff, environment and ICU procedures. The hospital in which the research was undertaken has only been in operation since October 2014, with the ICU accepting patients from November 2014. The ICU is a state-of-the-art unit operating with a paperless computer information system (MetaVision). Currently, there are three pods (self-contained units) in operation, with 10 beds in each pod. The beds are housed in single rooms with frosted glass sliding doors. Patients are nursed one-to-one or one-to-two, depending on their acuity.

3.3.2 Sample. The concept of sample is intrinsic to survey research and is a critical part of the design of quantitative research (Kelley, Clark, Brown, & Sitzia, 2003; Polit & Beck, 2017). The area of sampling in a small-scale survey, such as this one,

differs substantially from that of large surveys using randomisation. Probability sampling technique is often seen with larger populations, with fewer restrictions on time, resources and access to subjects (Punch, 2003). A convenience sample (non-probability) was used as the sampling method in this study. A convenience sample consists of subjects who meet the participation criteria and can be easily identified and recruited into the study (Macnee & McCabe, 2008). Subjects from the sampling frame are included because they can be easily accessed—either because they are more open to participation or are more readily available during the recruitment process. This infers that not everybody in the sample frame has an equal chance of being included in the study (Macnee & McCabe, 2008). Many nursing studies use convenience sampling, despite the lack of control of potential bias when using this method (Grove et al., 2013). This sampling method is frequently used because of the limited availability of subjects and the need to include any subjects willing to participate who meet the eligibility criteria (Grove et al., 2013). The use of a convenience sample (non-probability sampling) for this survey was preferable because of time, cost and availability of participants.

The target population of this study were ICU nurses who were employed in a single-site ICU. A convenience sample of the population was made up from a potential 180 registered nurses (RNs), clinical nurses (CNs) and graduate registered nurses (GRNs) (sampling frame). The inclusion and exclusion criteria were as follows:

- Inclusion criteria: employed as an RN or CN in the ICU.
- Exclusion criteria: agency staff and student nurses.

In collaboration with the university biostatistician, and using Yamane's (1967) equation for simplified formula for proportions, the sample size was determined to be 84. This included the population of 180, confidence interval determined at 95% and

degree of variability assumed maximum variation ($p = 0.5$). The sampling error determined for this sample size was 8%.

3.4 Data Collection

3.4.1 Questionnaire. As required by the descriptive survey design, the instrument used for data collection in this study was a self-administered electronic questionnaire using SurveyMonkey (www.surveymonkey.com). SurveyMonkey provides a customisable data collection and analysis tool.

The questionnaire (Appendix A) was used to elicit demographic data, as well as the attitudes, beliefs and behaviours reported by ICU nurses relating to sleep among the patients for whom they cared. An online questionnaire was chosen because it is low cost, respondents can complete it in their own time, a large amount of information can be gathered, and the anonymity of respondents can be assured (Gray, 2004). Lack of bias and standardisation of a data collection tool are further advantages of the self-administered questionnaire, with questions presented in exactly the same way to all subjects, with the same wording and in the same order (Wood & Ross-Kerr, 2006). The advantages of a self-administered questionnaire provided the rationale for its choice as the data collection tool.

Response rates to a questionnaire can be low (Gray, 2004). This can be resolved to a degree by ensuring that the questionnaire makes respondents feel that their answers are valuable and by ensuring that the questionnaire is easy to respond to, is not too lengthy and is well-presented and structured (Parahoo, 2014). The use of open-ended questions can be more demanding for respondents to answer; however, the freedom for the respondents to express their feelings, opinions and perceptions may provide depth of data that closed questioning may not, and for this reason was an important inclusion in this questionnaire (Sarantakos, 2013).

3.4.1.1 Development of the questionnaire. The development of the questionnaire was undertaken with the researcher understanding the current empirical research on the poor sleep experienced by ICU patients, and the lack of research on nurses' perceptions of this. A literature review was conducted to search for any existing scales or surveys related to the topic of this study. This assisted the researcher to source a valid and reliable questionnaire that could be used in part. It also provided the background for the creation of the newly developed questions in this questionnaire.

Punch (2003) stated that successful surveys often use questionnaires that are a mixture of existing instruments. An existing questionnaire, known as the SLEEPii survey, was adapted and used to form part of the current study's questionnaire (Kamdar et al., 2016). The author of the SLEEPii survey was contacted by email, and permission was granted to either use or adapt the questionnaire (Appendix B). The SLEEPii survey (Appendix C) was developed by a panel of members from the Sleep in ICU Taskforce to gather data on critical care providers' perceptions and practices regarding sleep in the ICU (Kamdar et al., 2016). The modified instrument used in the current study includes questions replicated and adapted from the SLEEPii survey. The SLEEPii survey has been deemed valid and reliable by independent experts in survey design (Kamdar et al., 2016).

The SLEEPii tool was unable to cover the current study's area of interest in its entirety; therefore, with assistance from an expert in the field of sleep in the ICU, the researcher adapted the existing questions and created new items to ensure their ability to answer the research questions. The questions formulated by the researcher included continuous, categorical, dichotomous, five-point Likert scale and text-entry questions. Open-ended questions were added to encourage participants to freely express their thoughts and opinions on sleep in the patients for whom they cared. Further refinement

of the closed- and open-ended questions was performed. Rewording, sequencing, scale measurement and terminology corrections were applied, with the assistance of the expert on sleep in the ICU and the researcher's faculty supervisors.

The SurveyMonkey questionnaire included the participant information sheet to adequately address the ethical principles of informed consent. This outlined the voluntary nature of the study and the subject matter under investigation, and was provided to the nurses. Completion of the survey implied that the nurse had consented to participate in the study. The questionnaire contained three sections, as follows.

3.4.1.1.1 Section A: Demographic data. This section contained 10 questions (Items 1 to 10) on the demographic details of the nurse, including age, gender, level of education, level of nursing experience and previous ICU experience. These questions were designed to ascertain the diversity and experience of the nursing staff in this specific ICU.

3.4.1.1.2 Section B: Closed-ended questions. This section contained 13 closed-ended questions (Items 11 to 23) related to nurses' attitudes, beliefs and practices. Items 11, 12, 15, 16 and 21—beliefs and attitudes (adapted items)—were as follows:

- Item 11: A continuous question on how much sleep nurses believe is achieved by patients.
- Item 12: A continuous question on how much sleep nurses believe patients require.
- Item 15: A five-point, single-item Likert scale asking for level of agreement on ensuring quality of sleep.
- Item16: A five-point, single-item Likert scale asking for level of agreement on ensuring quantity of sleep.

- Item 21: A five-point, multiple-item Likert scale with agreement rating on the negative effect of poor quality sleep in ICU patients.

Items 17, 18, 20 and 22—beliefs and attitudes (newly developed items)—were as follows:

- Item 17: A categorical question asking whether the nurses believe their colleagues are concerned about patient sleep.
- Item 18: A categorical question asking whether the nurses believe their patients are concerned about their own sleep.
- Item 20: A five-point, multiple-item Likert scale rating the overall quality of patient sleep in the ICU.
- Item 22: A five-point, multiple-item Likert scale question to ascertain the degree of importance placed on various sleep-promoting practices.

Items 13 and 14—factual awareness (newly developed items)—were as follows:

- Item 13: A categorical item with a yes/no response asking the nurses if they were aware of any tools available to help them to assess patient sleep.
- Item 14: A categorical item asking the nurses if they had ever received any education relating to sleep in the ICU.

The above questions were designed to ascertain awareness of the availability of resources on patient sleep. Items 19 and 23—behaviours and practices (newly developed items)—were as follows:

- Item 19: A five-point Likert scale question asking the nurses to rate their agreement with their ability to assess patient sleep. This included five items related to the level of sedation and ventilatory and airway support of the patient when trying to assess sleep.

- Item 23: A five-point Likert scale asking how often the nurses reported performing sleep-promoting practices for their patient. This question contained 10 sleep-promoting practices.

3.4.1.1.3 Section C: Open-ended questions. This section contained four open-ended questions (Items 24 to 27—newly created items) to allow the respondents to reflect on their assessment, opinions, perceived barriers and potential improvements to patient sleep in the ICU. These questions were designed to illicit information to gain insight into the thoughts, attitudes, beliefs and behaviours of the respondents through semi-structured questions, thereby allowing the respondents to freely express their views.

3.4.1.2 Questionnaire validity. The SLEEPii questionnaire was developed by the Sleep in ICU Taskforce, pilot-tested by 79 ICU providers, and deemed valid and reliable (Kamdar et al., 2016). The SLEEPii questionnaire was designed to collect the perceptions and practices of nurses and doctors from multiple ICU sites over 24 countries; however, for this study, the researcher modified a number of questions from the SLEEPii, in addition to adding newly developed questions. Modifications to the existing questions in the SLEEPii survey ensured that the questions were appropriate for use with the nursing cohort within a single ICU site. The newly developed questions specifically focused on the attitudes, beliefs and behaviours of the nurses within the single-site ICU using both closed- and open-ended questions.

When an existing instrument is modified and new questions are added, the original validity may not hold true for the new instrument; thus, it is important to re-establish validity (Creswell, 2013b). Validity is the property of a research instrument that measures its relevance, precision and accuracy (Sarantakos, 2013). A measure is considered valid if it measures correctly and accurately what it is intended to measure

(Macnee & McCabe, 2008). Face validity assesses the user friendliness of the questionnaire—whether 'on the face' it appears to measure the appropriate construct (Babbie, 2008; Polit & Beck, 2014). Content validity asks whether the items in the questionnaire are comprehensive and appropriately reflect that which they are supposed to measure (Macnee & McCabe, 2008). To establish the validity of the questionnaire in this study, face and content validity was assessed by an ICU sleep expert, a medical researcher and two faculty nursing supervisors.

3.4.1.3 Face and content validity testing. The questionnaire was tested from July to December 2017, prior to the proposed data collection period. Initially, testing was performed by a medical doctor (MD1) from the United States who was the principal researcher for 'Perceptions and Practices Regarding Sleep in the Intensive Care Unit'—the study that created and used the SLEEPii survey. Suggestions were provided by MD1 on how to improve the validity and clarity of the questionnaire (Appendix D) from the original SLEEPii survey. This was recommended by MD1 because problems were found with understanding some of the SLEEPii survey questions after data were collected for their research project.

Subsequent testing for face and content validity was performed by a medical doctor (MD2) employed in the study site research department, with experience in ICU sleep research and survey research. MD2 assisted with refining the adapted questions from the SLEEPii survey and creating new questions (Appendix E). This was undertaken to ensure that the questions in the newly created questionnaire would be able to measure the subject under investigation, and that the content represented the phenomenon being studied (Parahoo, 2014). Further testing was performed by two nurse researchers/faculty supervisors to ensure face validity. Minor changes were made to the wording of the open-ended questions to ensure clarity and transparency. The final

questionnaire was tested by MD2 and the faculty supervisors, and found to be sufficient for this study.

3.4.1.4 Recruitment strategy. Recruitment of ICU nurses occurred through a single-site tertiary hospital ICU in the metropolitan area of Perth. Permission to recruit nurses into the study was obtained from the nurse unit manager and director of the ICU. The researcher recognised that the initial communication with potential participants was important, especially because the researcher was a member of staff within the ICU department. An approach that was 'pleasant, positive, informative, culturally sensitive and non-aggressive' (Grove et al., 2013) was used to invite staff members to participate in the survey. All nursing staff in the ICU were sent an email invitation (Appendix F) that contained the participant information letter (Appendix G) and the link to the survey. Posters (Appendix H) were placed on information boards in the ICU tea room with information about the study and how to access the survey.

3.4.1.5 Questionnaire distribution. All nurse employees of the ICU have access to a global health email, which is monitored by employees for information relating to work matters. The email sent to potential participants consisted of the participant information sheet and the SurveyMonkey link to the questionnaire. Alongside the email distribution, some paper questionnaires and a secure box for the completed questionnaires were placed in the staff tea room for nurses who preferred to complete the survey in paper form.

Email surveys, while cost-effective and anonymous, also have their weaknesses, with decreased response rate being one of the most concerning (Grove et al., 2013). A cover letter or participant information sheet has been recognised as one of the factors that can influence response rates in emailed questionnaires (Sarantakos, 2013). As such, the letter was carefully composed to ensure that the information and tone was amenable.

The questionnaires could be completed using a bedside computer or any other computer located within the ICU department. Awareness around the importance of completing the survey was raised in the 'huddle' during the period of questionnaire dissemination. The huddle is a meeting attended by all ICU nurses who work in a clinical capacity, and occurs in each pod before the start of every shift. It is used to highlight issues and communicate important information to clinical nursing staff.

3.5 Methods of Data Analysis

3.5.1 Quantitative. The quantitative data included the demographic questions (Section A) and closed-ended questions (Section B). Prior to analysis of the quantitative data, the survey information underwent data cleaning. This involved tidying up the dataset by proofreading submitted questionnaires, highlighting unclear responses and noting any missing data (Punch, 2003). The data were then exported from SurveyMonkey into Microsoft Excel (2016) and IBM SPSS Statistics Version 25 (IBM Corp, 2017). The dataset was then checked for errors. Microsoft Excel (2016) and IBM SPSS Statistics Version 25 (IBM Corp, 2017) were both used for data consolidation and analysis.

Data analysis followed three steps, as outlined by Punch (2003):

- summarising and reducing data (defining the variables)
- descriptive level analysis (distribution of the variables)
- relationship analysis (relationship between the variables).

Simple descriptive statistics were used to synthesise and describe the quantitative data (Polit & Beck, 2014). Descriptive statistics summarise data in ways that render the data easier to interpret, and are built on descriptive statistical tests and analysis, with the core component being accurate summarisation of the collected data (Borbasi & Jackson, 2016; Jirojwong, Johnson, & Welch, 2014). This analysis was performed with the

categorical ordinal data being measured using frequencies and percentages, and the continuous data using measures of central tendency. Given that the dataset was not obviously skewed, the mean (*M*) was used as the measure of central tendency and standard deviation (*SD*) and to measure the dispersion (variation). Knowing the mean and standard deviation explains a great deal about the distribution of a set of scores and is also important to account for variance or differences (Punch, 2005).

Comparison of groups was performed using chi-squared to test comparisons of frequencies between categorical variables in the sample with distribution of variables of interest to ascertain independence (Kim, 2017). Given that the sample was small and chi-squared relies on approximation, a Fisher's exact test was used to more accurately test the independence of variables. Parametric statistics, such as the single-sample t-test, were used to compare normally distributed continuous data.

Correlational statistics were used to measure the strength and direction of association between ordinal variables in some of the Likert scales. The non-parametric Spearman's test was chosen because the Likert data were measured on an ordinal scale and there was a monotonic relationship between the variables being measured.

3.5.2 Qualitative. This descriptive survey contained both qualitative and quantitative questions within one questionnaire. The qualitative data were obtained from the open-ended questions (Section C) of the questionnaire. These data were analysed using simple thematic analysis, as described by Braun and Clarke (2006). Thematic analysis is a method for identifying, analysing and reporting patterns (themes) within data (Braun & Clarke, 2006). There were six phases to the analysis process that helped code, categorise and discover themes from the open-ended questions (Figure 5). Thematic analysis provided a highly flexible approach that produced a rich, detailed and complex account of the data. This method proved useful for examining the perspectives

of many different nurses in the study and was used to highlight the similarities and differences, and generate insights (Nowell, Norris, White, & Moules, 2017).

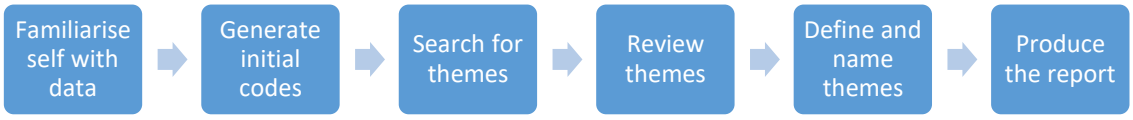

Figure 5. The six phases of thematic analysis (Braun & Clarke, 2006).

Thematic analysis was chosen partly for its accessibility, as it does not require the detailed theoretical and technical knowledge of approaches such as grounded theory (Braun & Clarke, 2006). NVivo 12 (QSR International, 2018) was used to assist with creating codes and categorising data. Initially, the data were read in their entirety numerous times to search for meaning and deeper understanding (Polit & Beck, 2014). Once familiarity with the data was achieved, the data were exported from SurveyMonkey into Microsoft Excel, and then into NVivo 12. The data were coded and categorised, and themes were created. The themes were discussed with the researcher's faculty supervisors to obtain an objective opinion. Some repetitive themes emerged from each of the four open-ended questions; thus, the data were merged to create one whole dataset. From this, a smaller set of themes and subthemes emerged, covering all concepts described by the nurses. This approach allowed the themes to capture and unify the nature of the nurses' perspectives into a meaningful whole (DeSantis & Ugarriza, 2000).

3.6 Ethical Considerations

This study demonstrates the principles of honesty, integrity, respect and ethical behaviour through safe and secure practices, as detailed in the *Australian Code for Responsible Conduct of Research* (National Health and Medical Research Council, Australian Research Council, & AVC Committee, 2007). Prior to commencing the

study, the research proposal gained low-risk ethical approval through the University of Notre Dame Human Research Ethics Committee (HREC #017157F) (Appendix I) and the hospital research ethics committee and governance office (Approval #RGS0000000681) (Appendices J and K). All participants were informed about the study verbally and in writing, and consent was implied if the questionnaire was completed and returned. The participants' right to anonymity and privacy was protected by ensuring that all data related to the questionnaire were anonymous with removal of any identifying information. Data storage has complied with the University of Notre Dame's policy and is secured with password-protected files on a laptop.

3.7 Summary

This chapter has described the survey research methodology used in this study. Quantitative and qualitative data were collected using a single questionnaire containing newly created and adapted questions from the SLEEPii survey. Data analysis was performed using appropriate quantitative and qualitative approaches to extract the nurses' perceptions and practices relating to patient sleep in a single-site tertiary hospital's ICU in the metropolitan area of Perth. This study upheld the ethical considerations of the nurses who participated and the tertiary hospital research site, and maintained data collection and storage considerations. The following chapter presents the findings from the qualitative and quantitative data analysis.

Chapter 4: Findings

4.1 Introduction

This chapter presents the analysis and discussion of the findings from the quantitative and qualitative data collection. The response rate and demographic data from the study population are discussed, followed by examination of the findings from the fixed items within the survey. Themes and concepts from the open-ended questions are reported in the qualitative findings.

4.2 Response Rate

The data collection occurred during a two-week period from 12 to 26 February 2018. A response rate of 47% (n = 84) was obtained within the allocated two-week period of data collection. This response rate was considered adequate to represent the population, with no requirement to revisit the site for further data collection.

4.3 Demographic Data

4.3.1 Age and level of nursing experience. The mean age of the respondents was 39 years. For the level of nursing experience, the RN Level 1.5 to 1.9 represented the majority of respondents, comprising 57% (n = 48). The CNs (Level 2) were the next largest group, comprising 23% (n = 19), followed by the RN Level 1.2 to 1.4, who accounted for 10% (n = 8) of the responses (Figure 6). The ‘other’ group included management, research, non-clinical nursing staff and senior RN Level 4, comprising 8% (n = 7). The junior members of the nursing staff (the GRNs) were in the minority, comprising 2% (n = 2) of the responses.

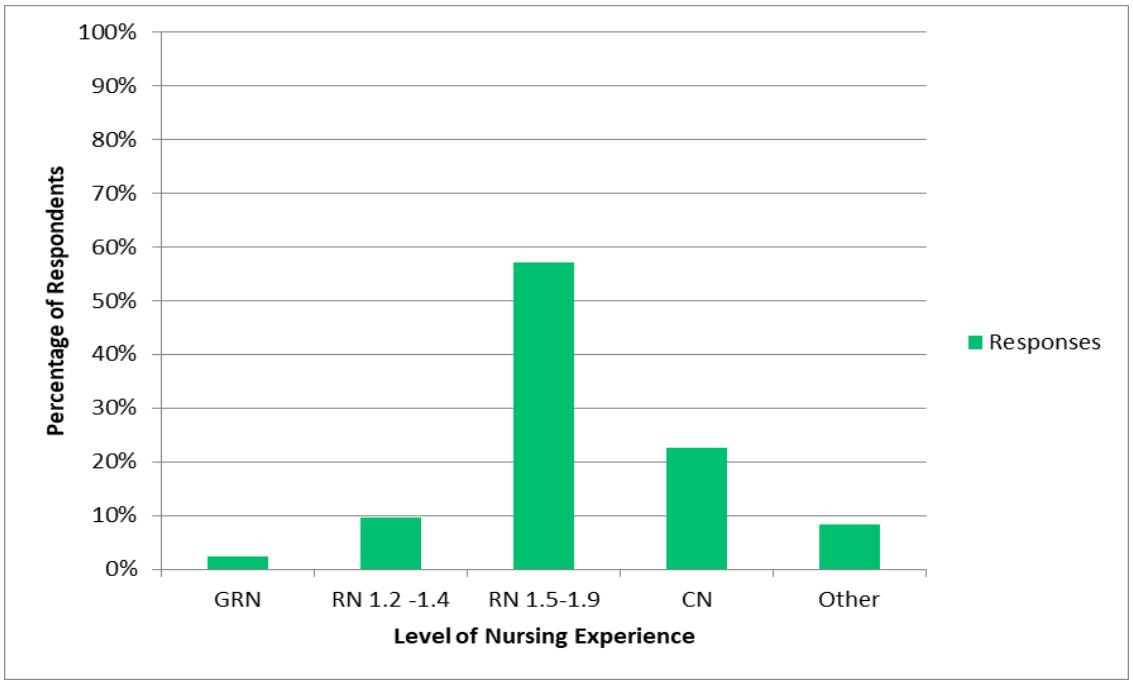

Figure 6. Respondents' level of nursing experience.

4.3.2 Highest level of education. The majority (65%, *n* = 55) of respondents reported completing postgraduate studies (Figure 7). The most frequent qualification reported was a postgraduate certificate or diploma (58%, *n* = 49), while the highest level of qualification (a master's degree) attained 7% (*n* = 6). Of the remaining 35% (*n* = 29), the highest level of education was an undergraduate degree or equivalent.

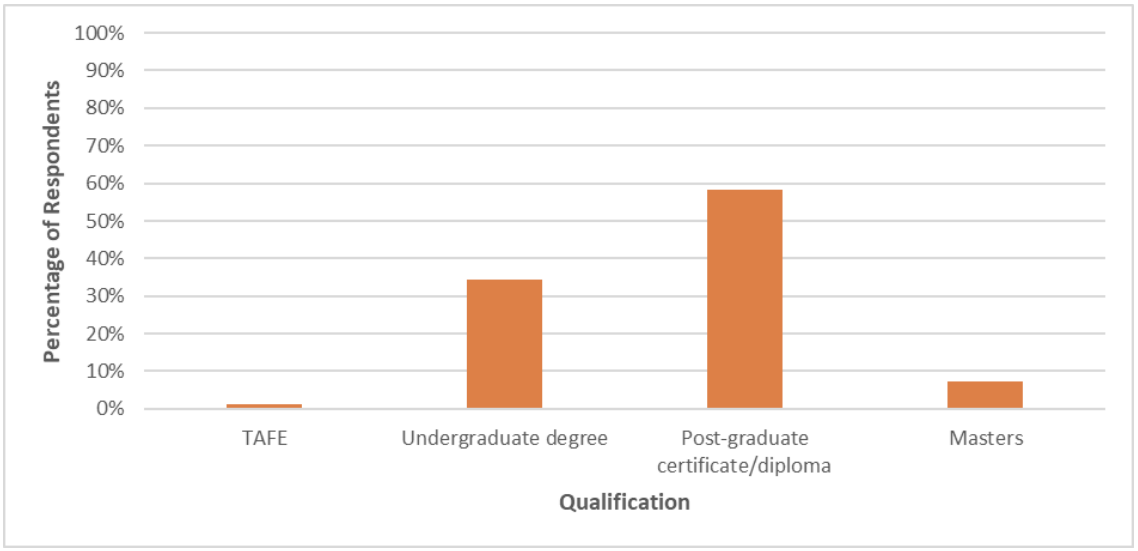

Figure 7. Respondents' level of education.

4.3.3 ICU nursing experience and rostered nightshift time. This question sought to identify the respondents' length of service specifically in the ICU clinical environment. The minimum time respondents had worked in the ICU environment was six months, while the maximum was 37 years, with a median of nine years. Of these respondents, 69% (*n* = 58) reported that all working hours in the past 12 months were spent in clinical practice in the ICU. Given that the ICU is a 24-hour service, the respondents were asked about the frequency of their rostered nightshift. Of the respondents surveyed, the average percentage of time spent working nightshift was 43%.

4.3.4 Previous ICU employment. Given that the study site was a new tertiary hospital, opening in 2014, the respondents may have had previous employment in other ICUs in the same state, other states or overseas. Of the respondents, 92% (*n* = 77) had previously worked in another ICU, while 59% (*n* = 50) had never worked in an ICU outside of WA.

4.3.5 Sleep promotion in other ICUs. Sleep-promotion protocols (SPPs) and CPGs were of interest to the researcher. The number of respondents who had worked in an ICU with a SPP or CPG was 29% (*n* = 24), while the majority of respondents (71%, *n* = 60) reported they had not (Figure 8). Of this larger cohort, only 7% (*n* = 6) had not worked in any other ICU.

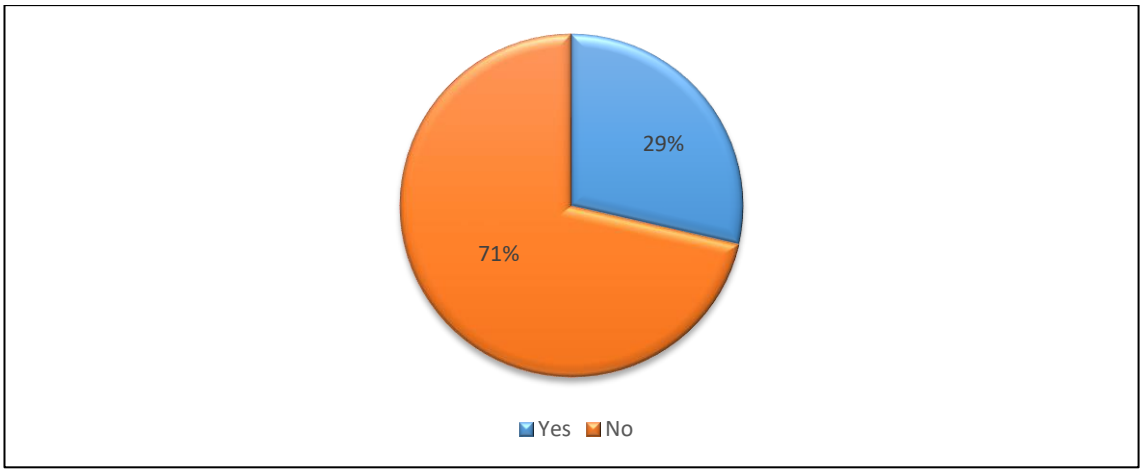

Figure 8. Respondents who had worked in an ICU with an SPP or CPG on sleep.

4.4 Quantitative Data Analysis and Findings

The quantitative questions covered the following sleep-related topics of interest: patient sleep in a 24-hour period, importance of adequate sleep, quality of sleep, perceived effects of poor quality sleep on patient outcomes, perceived importance of sleep-promoting interventions and importance of sleep to patients and colleagues.

4.4.1 Patient sleep in a 24-hour period. The respondents were asked to provide an estimate of how much sleep they believed their patients achieved while in the ICU. The results indicated that the respondents believed their patients slept, on average, 5.18 hours (*SD* = 1.82) in a 24-hour period (see Figure 9). The maximum amount of sleep was estimated as 14 hours, while the estimated minimum was two hours.

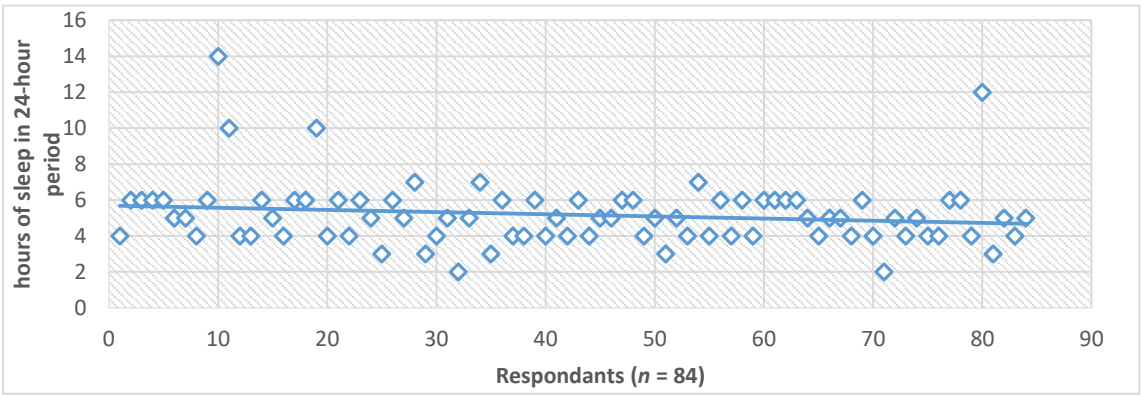

Figure 9. Time in a 24-hour period that respondents believed their patients sleep.

The question relating to how many hours patients are believed to sleep was followed by a question asking how many hours should be dedicated specifically to patient sleep in the ICU. A mean of 8.58 hours (*SD* = 1.88) was determined, highlighting a deficit of 3.4 hours between the amount of sleep respondents believed patients were attaining and the amount of sleep they believed patients should be achieving (see Figure 10).

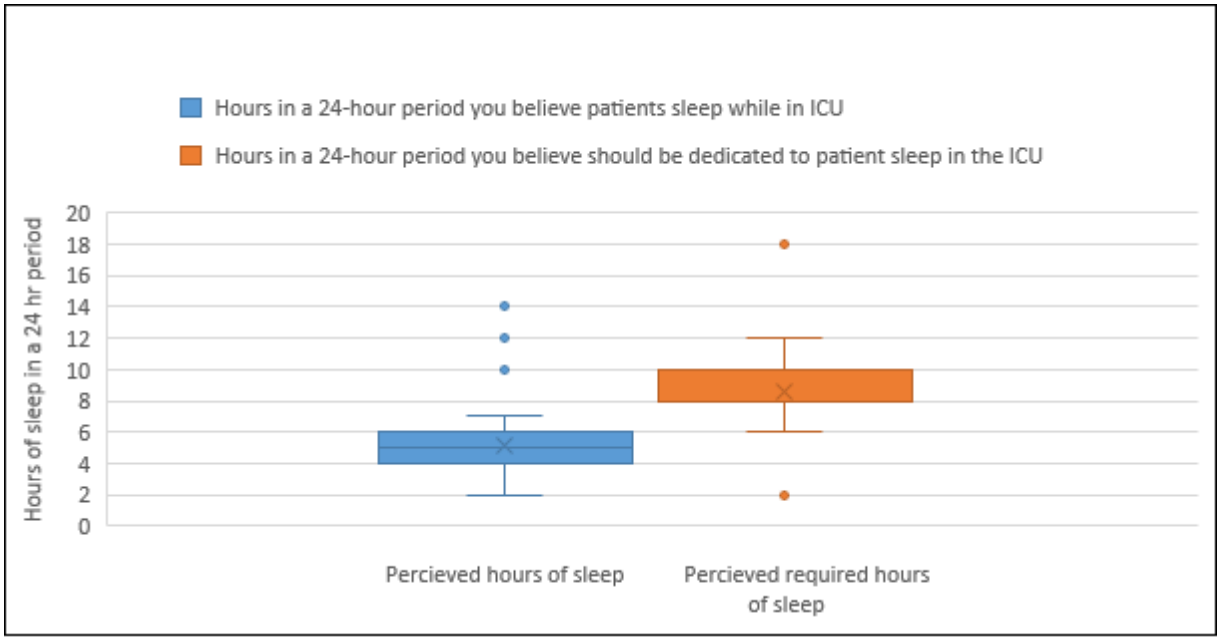

Figure 10. Respondents' beliefs about patients' hours of sleep while in ICU (*N* = 84).

A single-sample t-test was performed on the data to test the statistical difference between the actual mean difference and zero when examining the sleep that the respondents perceived their patients received and the hours they believed their patients required. The null hypothesis was that the perceived hours of sleep that patients received and the hours of sleep they required were equal. The null hypothesis was rejected as $p < 0.001$. This indicated a significant non-zero difference in hours of sleep perceived by respondents.

4.4.2 Importance of adequate sleep in ICU patients. To determine the respondents' attitudes regarding the importance of quality and quantity of patient sleep in the ICU, two agreement rating questions were presented. The respondents were decisive, with 100% (*n* = 84) agreeing (strongly agree/agree) that ensuring adequate quality sleep is an essential part of nursing an ICU patient. Ninety-seven per cent (*n* = 81) of respondents agreed that ensuring adequate quantity of sleep is important. The remaining 3% (*n* = 3) of respondents were unsure whether ensuring quantity sleep is an essential part of nursing an ICU patient (Table 1).

Table 1

Importance of Quality and Quantity Sleep for ICU Patients

Item	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
Ensuring adequate QUALITY sleep is an essential part of nursing an ICU patient	77% (65)	23% (19)	0% (0)	0% (0)	0% (0)
Ensuring adequate QUANTITY sleep is an essential part of nursing an ICU patient	67% (56)	30% (25)	3% (3)	0% (0)	0% (0)

4.4.3 Quality of sleep in ICU patients. To determine the respondents' beliefs about the quality of sleep experienced by their ICU patients, a five-point Likert scale with multiple items was used for respondents to rate the quality of sleep they believed patients received while in the ICU, with respect to varying levels of sedation determined by the RASS and airway management.

A total of 16% (*n* = 13) of respondents believed that patients who require mechanical ventilation via endotracheal tube (ETT) and are deeply sedated generally attain good quality sleep. This was also the case for patients requiring mechanical ventilation who were moderately sedated (16%, *n* = 13). Thirty per cent (*n* = 25) of the

respondents indicated that mechanically ventilated, deeply sedated patients attain acceptable quality of sleep. This was similar to moderately sedated patients, with 33% (*n* = 25) of respondents believing they experienced acceptable sleep quality. Despite these results, most respondents believed the quality of patient sleep to be poor (very poor/poor) for lightly sedated, mechanically ventilated patients (68%, *n* = 57); non-sedated, ventilated patients with a tracheostomy or ETT (81%, *n* = 68); and non-ventilated or sedated patients (75%, *n* = 63), as displayed in Figure 11.

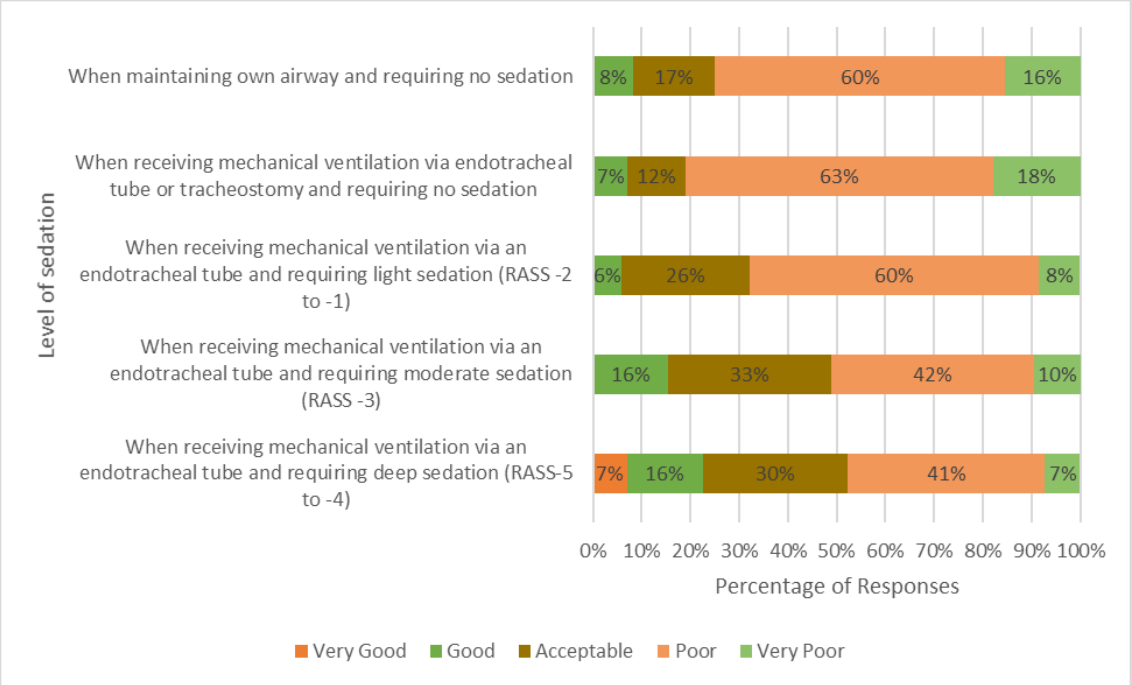

Figure 11. Quality of patient sleep as perceived by the respondents (*N* = 84).

4.4.4 Perceived effects of poor quality sleep on patients. The respondents were asked to rate their degree of agreement regarding whether poor quality sleep has the potential to negatively affect a number of patient outcomes. As shown in Figure 12, the respondents overwhelmingly agreed (strongly agree/agree) that poor quality sleep can negatively affect patients' ability to fight off infection (93%), ability to heal wounds (92%), ability to be extubated (86%), hospital length of stay (93%), ability to participate

in physical therapy (98%) and likelihood of developing depression (98%). The development or persistence of delirium elicited the highest number of 'strongly agree' responses, with 75% (*n* = 64). In total, 99% (*n* = 83) respondents agreed that lack of quality sleep has a negative effect on patients developing delirium.

Thirty per cent (*n* = 25) of respondents were unsure of the effects of lack of sleep on the survival of the ICU patient. This was the only item that elicited a significant 'unsure' response. However, overall, the results indicated that the respondents agreed that poor quality sleep negatively affects patient outcomes.

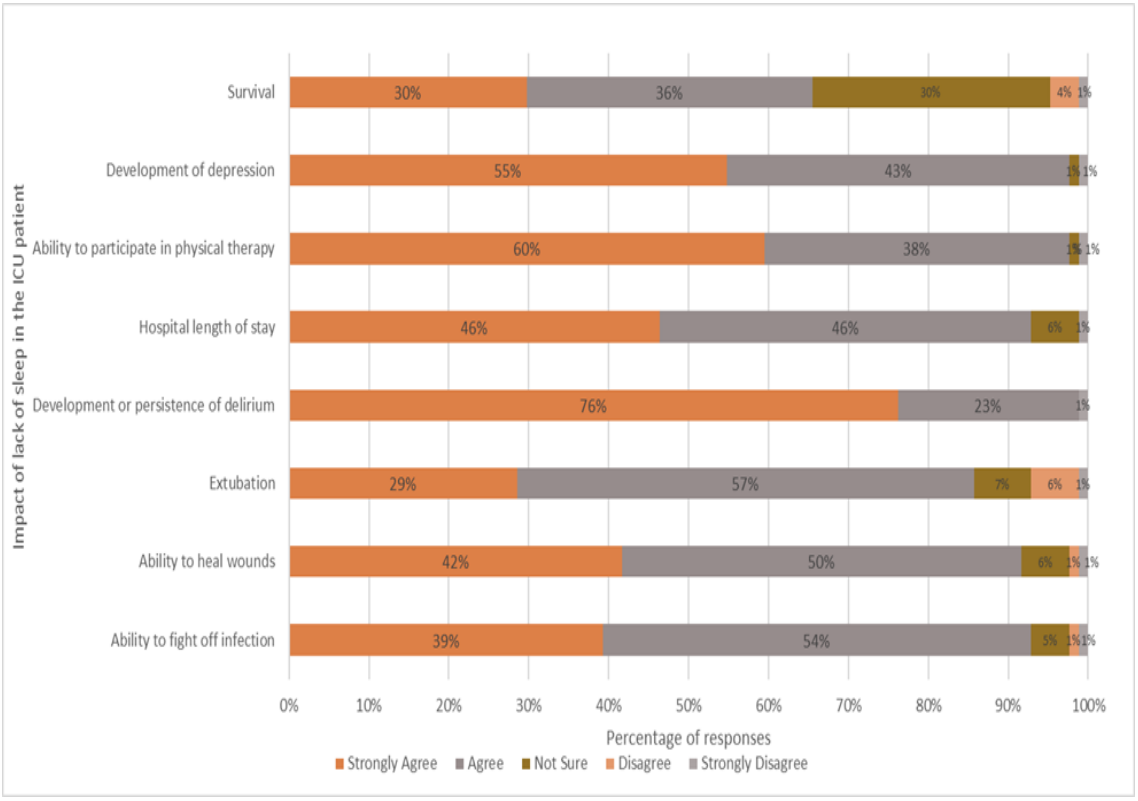

Figure 12. Negative effects of poor quality sleep on patients.

4.4.5 Perceived importance of sleep-promoting interventions. The respondents were asked to rate the level of importance they placed on specific sleep-promoting interventions. Talking quietly at night was recognised as the most important sleep-promoting intervention, with 83% (*n* = 70) of respondents classing this as very

important. Dimming or turning off lights was also recognised as very important, with a total response of 79% (*n* = 66). Both talking quietly and dimming lights had a 2% (*n* = 2) moderately important response, whereas 100% (*N* = 84) of respondents thought that clustering cares and day/night routine was either very important or important. In contrast, administration of benzodiazepines was highlighted as the least important intervention, with 56% (*n* = 47) of respondents rating it as moderately to slightly important. Providing ear plugs (19%, *n* = 16) and eye masks (16%, *n* = 13) elicited the second and third highest number of moderately important responses (see Figure 13).

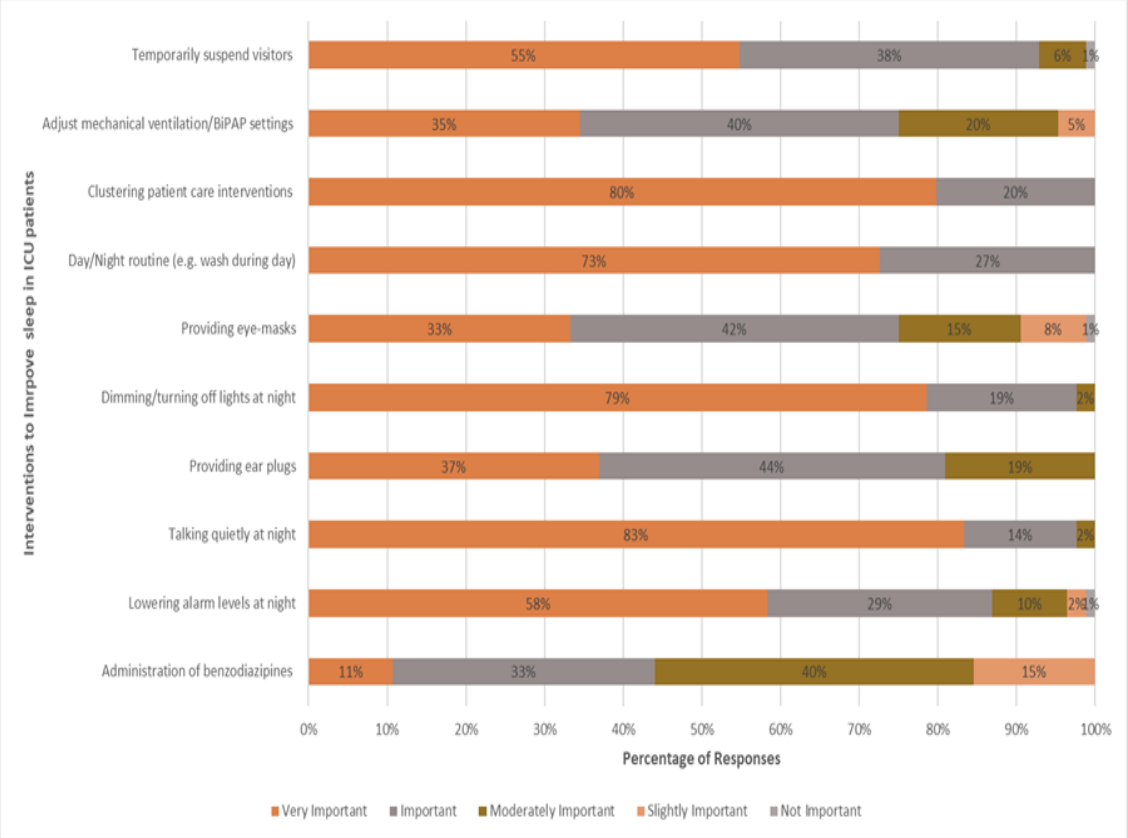

Figure 13. Importance of interventions to promote sleep (*N* = 84).

4.4.6 Importance of sleep to patients and nursing colleagues. The respondents were asked whether they thought patients in the ICU were concerned about

lack of sleep during their stay. Ninety per cent (*n* = 76) of respondents believed that patients were concerned about sleep disturbance while treated in the ICU (Figure 14).

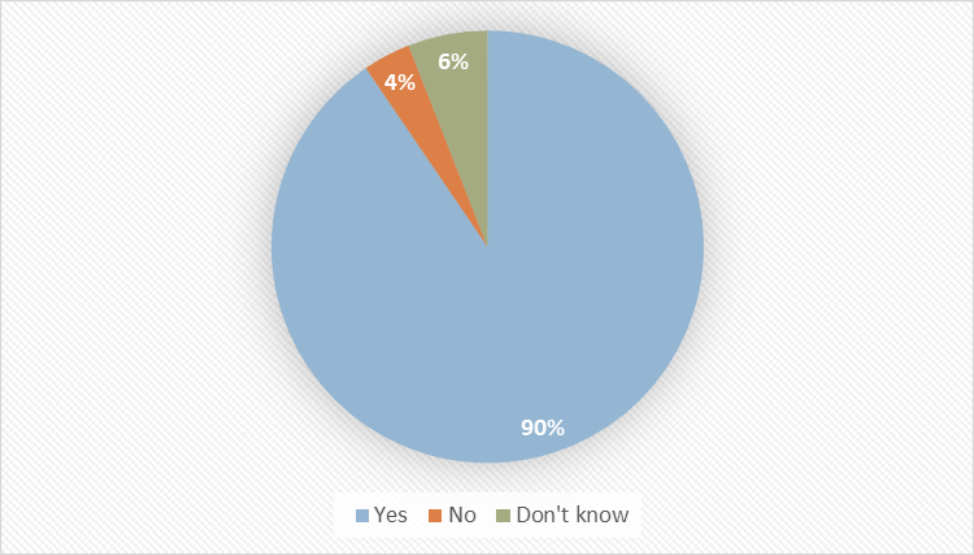

Figure 14. Respondents' beliefs regarding whether patients are concerned about lack of sleep while in ICU.

The respondents were asked if they believed their ICU colleagues were concerned about the sleep disturbance of patients in the ICU. Fifty-one per cent of the respondents (*n* = 43) reported that they believed their colleagues were concerned. Surprisingly, 43% (*n* = 36) indicated that they did not believe their colleagues were concerned about sleep disturbance among the patients being cared for in the ICU (Figure 15).

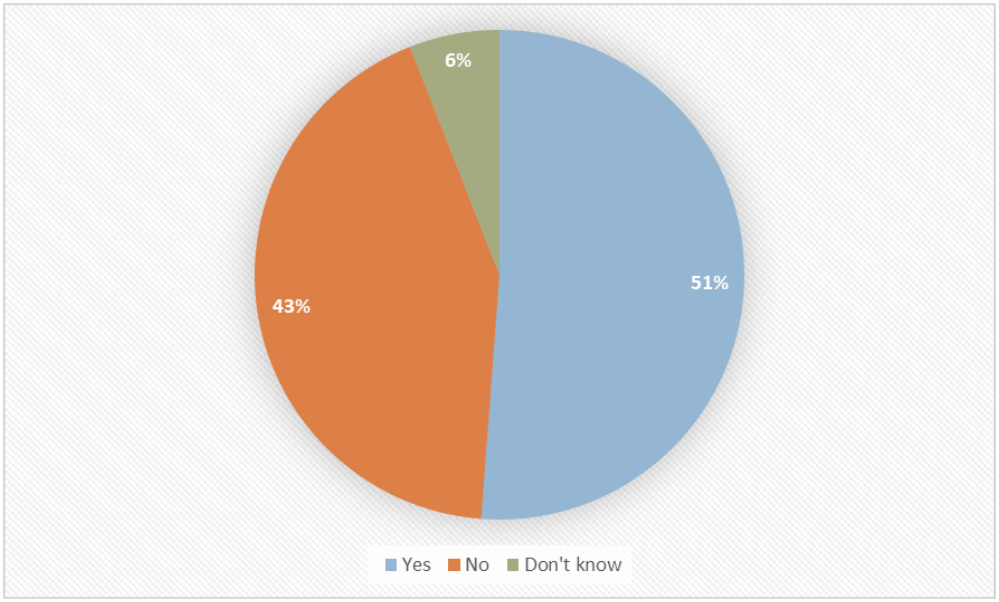

Figure 15. Respondents' beliefs regarding whether their colleagues are concerned about patient sleep disturbance.

Fisher's exact test was performed to examine the relationship between level of nursing experience and whether the respondents believed their colleagues were concerned about sleep disturbance among ICU patients. Level of nursing experience was divided into two groups: junior RNs (GRNs and RNs 1.2 to 1.4) and senior RNs (RNs 1.5 to 1.9, CNs and other). There was no significant relationship between level of nursing experience and the respondents' beliefs regarding whether their colleagues were concerned about patient sleep: X^2 (2, N = 84) = 5.31, p = 0.07. As a result of a count of lower than 5 in 50% of the cells, a Fisher's exact test was performed, which confirmed that there was no statistical significance: p = 0.08.

4.4.7 Education and sleep assessment tools. The respondents were asked if they had ever received any education on patient sleep in the ICU. A large percentage of respondents (79%, n = 66) reported that they had not received any education on patient sleep throughout their ICU career (Figure 16). Of these respondents, 83% (n = 5) of those who reported their highest level of education as a master's degree, and 69% (n =

34) of those who reported their highest level of education as a postgraduate certificate or diploma had not received any education on sleep in the ICU. Of the total 21% (*n* = 18) of respondents who had received education on patient sleep, 72% (*n* = 13) elaborated on the type of education they had received. These respondents detailed that conferences, preceptors, journal articles and audits were the primary sources of education.

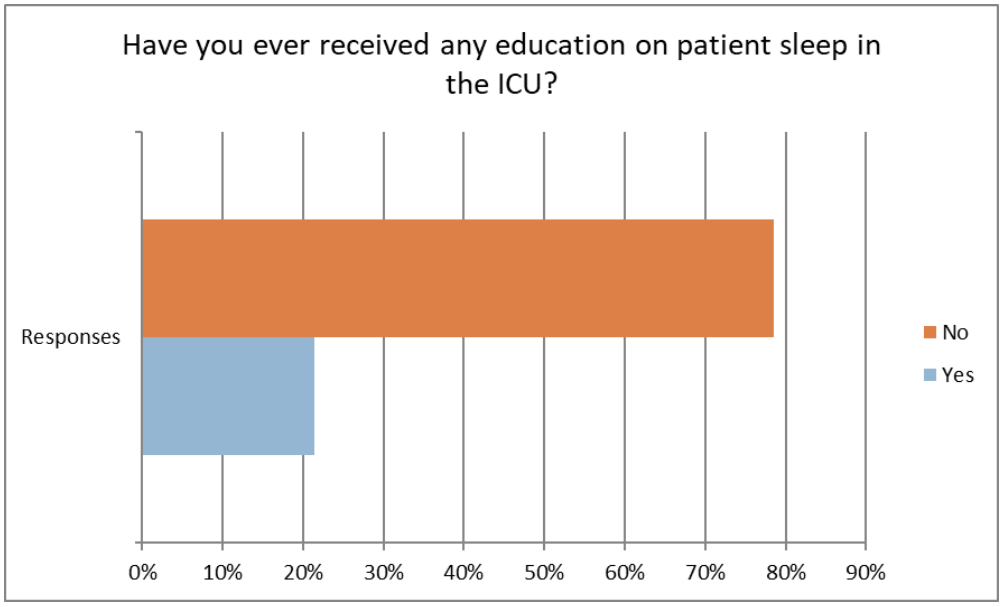

Figure 16. Respondents' education received on patient sleep.

When asked which tools, if any, the respondents were aware of to help them assess patient sleep (Figure 17), 79% (*n* = 66) stated that they were not aware of any tools available to help them assess the quality and quantity of patient sleep.

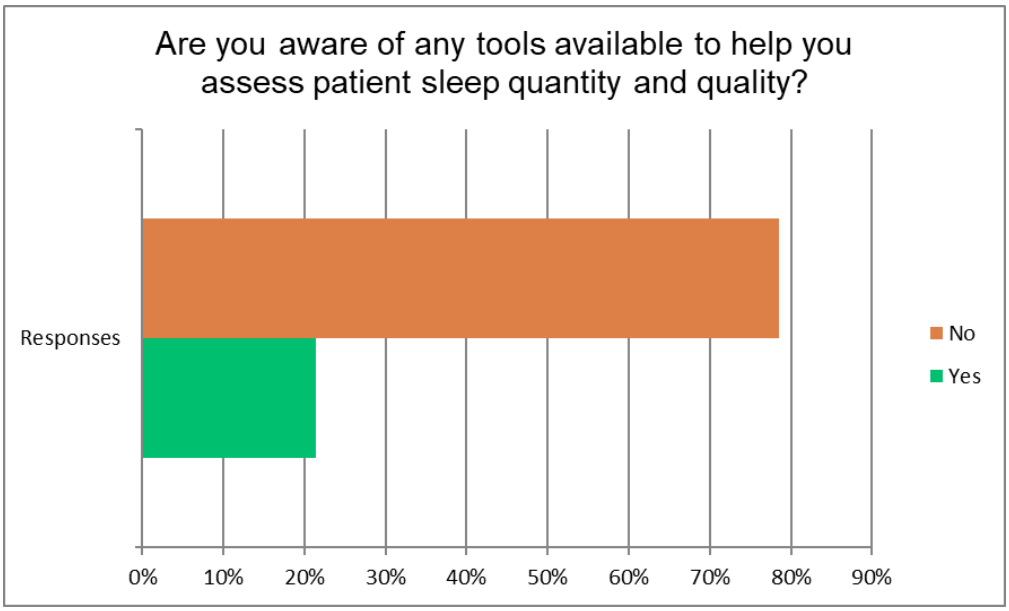

Figure 17. Respondents' knowledge of tools to assess patient sleep.

4.4.8 Sleep-promoting practices reported to be performed by respondents.

Two questions in the survey related to practices and behaviours. Both questions were multiple-item Likert scales that covered the respondents' ability to assess patient sleep and regularity of performing sleep-promoting practices.

Respondents were asked to rate their agreement of ability to assess whether the patient for whom they were caring was sleeping when under various levels of sedation and airway management. A patient who is deeply sedated and ventilated via ETT had the highest number of respondents who were unsure (29%, *n* = 24), disagreed (45%, *n* = 38) or strongly disagreed (10%, *n* = 8) that they were able to assess if their patient was sleeping (Figure 18). Seventeen per cent (*n* = 14) of respondents agreed (strongly agree/agree) that they were able to assess whether their patient was asleep when deeply sedated with RASS -5 to -4, and 35% (*n* = 29) for a patient moderately sedated with a RASS -3 and requiring mechanical ventilation.

The majority of respondents agreed (strongly agree/agree) that they were able to assess that their patient was sleeping when lightly sedated and receiving mechanical

ventilation via ETT (70%, *n* = 59), non-sedated and receiving mechanical ventilation via tracheostomy or ETT (94%, *n* = 79) and non-sedated and maintaining their own airway (97%, *n* = 82). The more heavily sedated the patient, the more unsure respondents were about their ability to assess sleep.

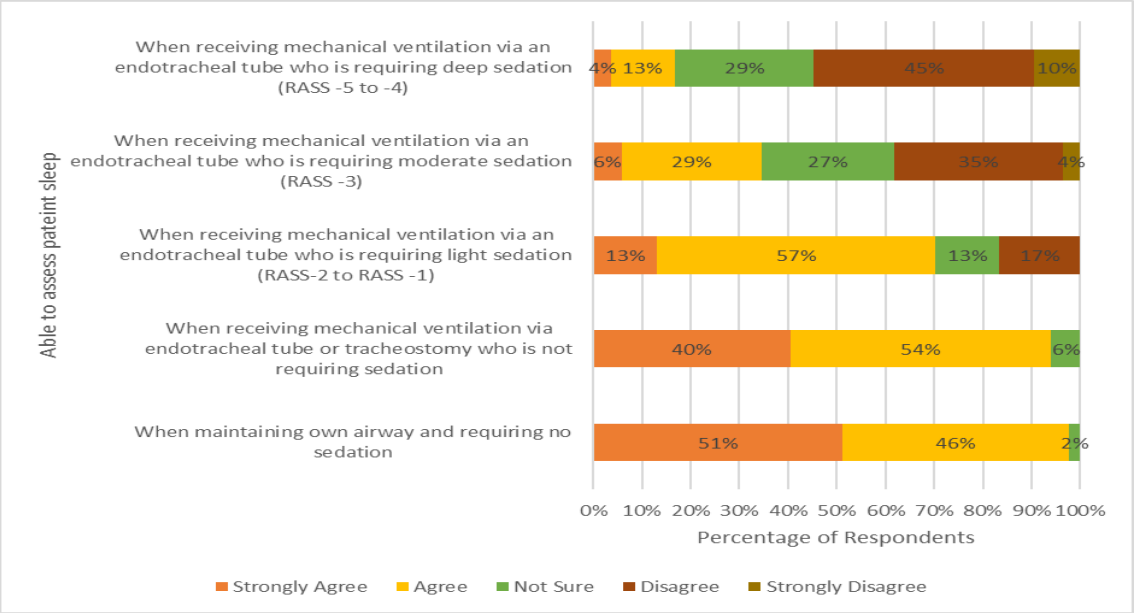

Figure 18. Respondents' agreement with ability to assess patient sleep.

To ascertain the regularity of sleep-promoting practices performed by respondents, a five-point Likert scale question with multiple items was created, asking respondents to specify how often sleep-promoting practices were performed.

The practices performed most frequently included dimming lights at night time (74%, *n* = 62) and ensuring a day/night routine (45%, *n* = 38), with the respondents indicating that they always performed these tasks. Lowering alarm levels (43%, *n* = 36), talking quietly at night (51%, *n* = 43) and clustering cares to minimise nocturnal interruption (54%, *n* = 45) were reported as being performed 'very often'. The least frequently performed tasks were adjusting ventilation settings and providing eye masks and ear plugs, as shown in Figure 19.

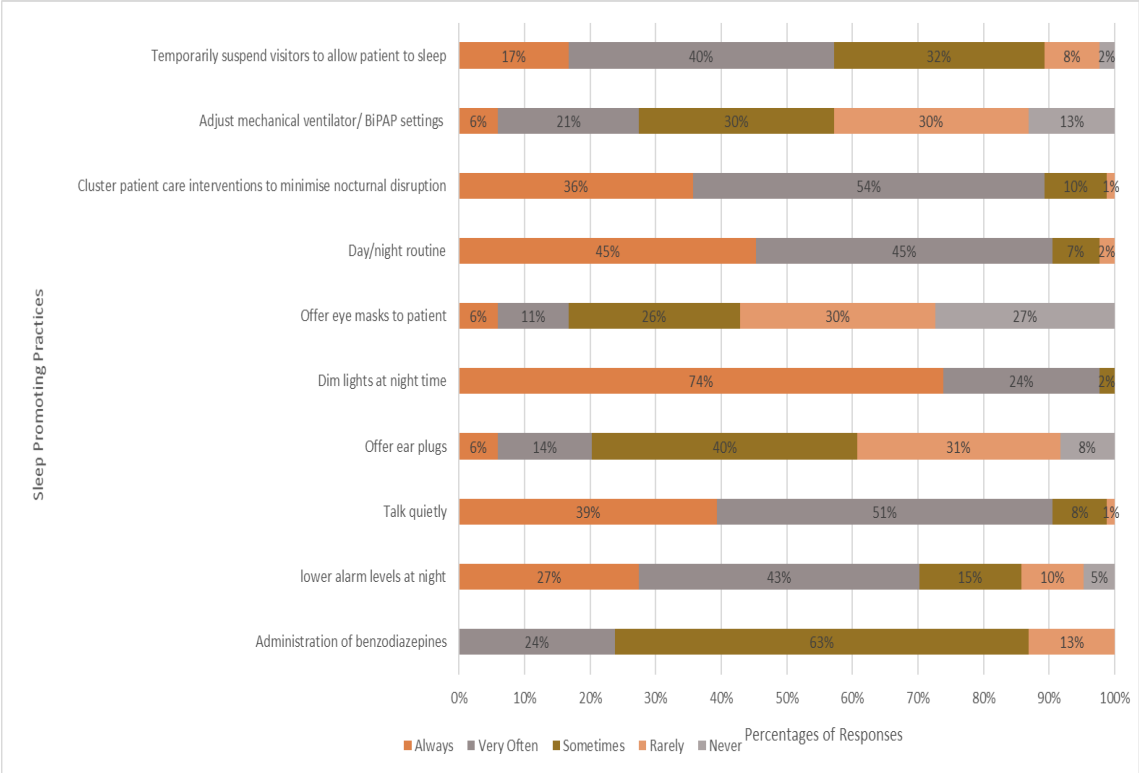

Figure 19. Frequency of performing sleep-promoting practices.

4.4.9 Importance and frequency of sleep-promoting practices. As outlined previously, the respondents were asked to rate the importance they placed on sleep-promoting practices, and how frequently they performed these practices, in two five-point Likert scale questions containing identical items. To measure the correlation between how often a sleep-promoting practice was performed and the importance placed on this practice, a non-parametric Spearman correlation test was performed between each pair of matching variables. A very strong positive correlation was found between how frequently the respondents performed the following practices, and how important they believed these practices to be:

- temporarily suspending visitors to allow patients to sleep (rs = .357, p < 0.001)

- adjusting mechanical ventilator/BiPAP settings to increase comfort for the patient (rs = .456, $p < 0.001$)
- clustering patient care interventions to minimise nocturnal disruption (rs = .334, $p < 0.001$)
- providing eye masks (rs = .440, $p < 0.001$)
- administering benzodiazepines (rs = .358, $p < 0.001$)
- lowering alarm levels at night (rs = .534, $p < 0.001$)
- offering ear plugs (rs = .349, $p < 0.001$).

A positive correlation was found between how frequently respondents dimmed lights at night time (rs = .267, $p < 0.05$) and ensured they talked quietly at night (rs = .274, $p < 0.05$) and how important they believed these practices to be. No correlation was found between how frequently day/night routine was performed and the level of importance place on this routine by the respondents (rs = .177, $p = 0.107$).

4.5 Qualitative Data Analysis

The qualitative data were collected from the four open-ended questions in Section C of the questionnaire. Of the 84 returned questionnaires, 92% (n = 77) of the respondents completed the open-ended questions. The questions focused on the respondents' observations and assessments of patient sleep, the respondents' opinions of sleep among ICU patients, the barriers encountered by the respondents, and what the respondents believed could be implemented to improve patients' sleep.

The first stage of analysis focused on familiarisation with the data, which involved reading over the questionnaire responses multiple times. Initial codes were then generated, and significant statements were highlighted and allocated to initial codes. An example of this is as follows:

- Statement: ‘Not all staff consider patient sleep while working night shift. While you try and promote good day/night routines, other staff/patients/environmental factors keep patients [sic] sleep disrupted’ (N33).
- Allocation of codes to text:
  - **Culture:** ‘Not all staff consider patient sleep while working night shift’.
  - **Barriers:** ‘other staff/patients/environmental factors keep patients [sic] sleep disrupted’.
  - **Sleep promotion:** ‘While you try and promote good day/night routines’.

The initial codes were continually refined until no new codes were necessary, and then the codes were used to form themes (Braun & Clarke, 2006). During this process, overlapping ideas emerged from the coding, which resulted in four overarching themes: the environment, sleep appraisal, the value of sleep and sleep solutions. These themes and subthemes are summarised in Figure 20.

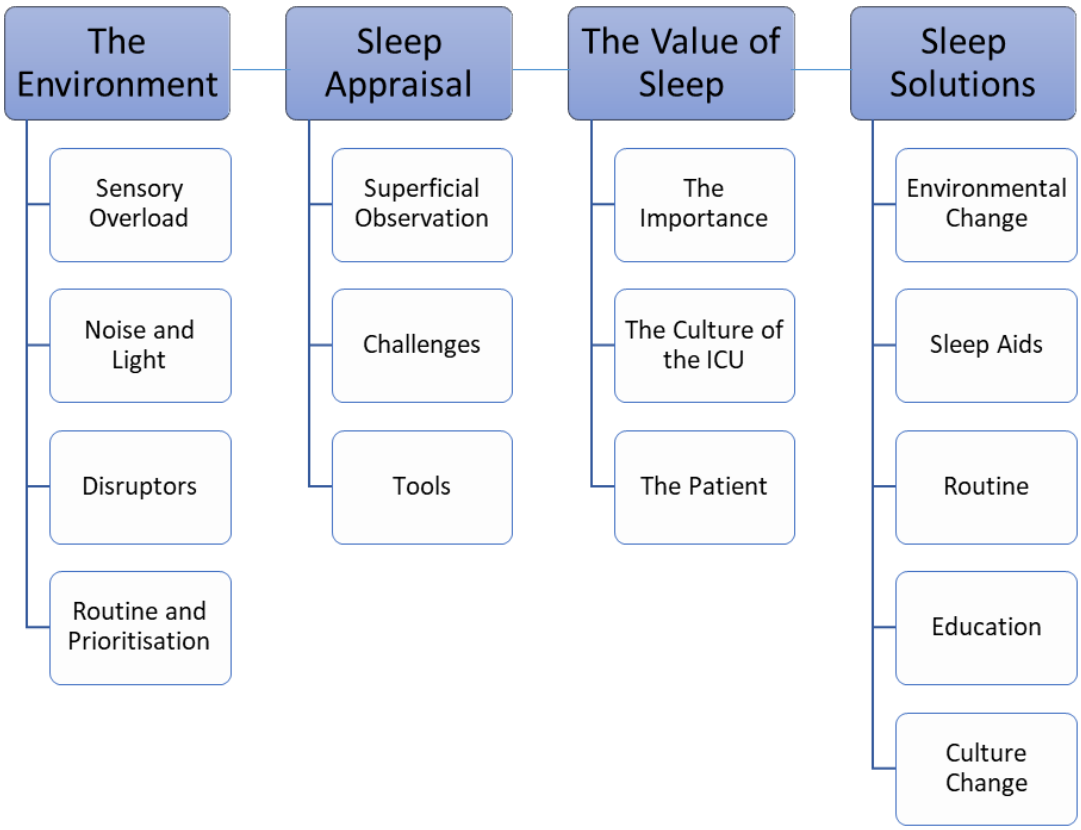

Figure 20. Qualitative themes.

4.5.1 The environment. The first theme identified was the ICU environment. The respondents documented multiple ways that the ICU environment influenced patient sleep. The ICU was described as a loud, bright and busy place to be, regardless of the time of day or night. One respondent reported this succinctly: ‘Nurses talking loudly, very often! Trolleys wheeling past, admission [of a patient] in the neighbouring bed space requiring a light which brightens about 3 rooms and call bells’ (N76). This first theme has three subthemes that highlight the effects of the ICU environment on patient sleep, as perceived by the respondents. The subthemes—sensory overload, disruptions, and routines and prioritisation—are explored in further detail below.

4.5.1.1 Sensory overload. The respondents reported on the disturbance of patient sleep as a result of the loud noise and bright lights, the architecture (layout of the ICU), the continual busyness of the unit, frequent interventions and routines, and the prioritisation of care. As a result of the intense sensory environment of the ICU, the respondents believed that ‘patients do not get enough essential deep sleep’ (N40) and that ‘patients tend to have inadequate sleep or poor quality sleep due to interventions or busy patient next door—lights, alarms are on, staff talking’ (N3). There appeared to be a difference in how the sensory environment was perceived by certain respondents. Some perceived the noise, light, disruption and routines to be unavoidable, while others viewed these as avoidable causes of sleep disturbance in ICU patients.

4.5.1.2 Noise and light. The majority of respondents identified noise as a barrier to and disruptor of patient sleep. Noise was described as coming from a multitude of different locations within the ICU, with some noises being perceived as uncontrollable and others more controllable. Statements were made by respondents regarding the uncontrollable noise factors: ‘Noise is sometimes unable to be controlled due to sick

patients and admissions in neighbouring rooms' (N11) and 'ICU by the nature of the work we do, is noisy' (N75). Statements such as 'Noise and light are always going to be a problem' (N71) appear to affirm a sense of powerlessness regarding noise control. Some respondents indicated that the environment itself is the cause of noise. N32 stated that 'Doors bang due to the material, floor carries sound easily'. Similarly, N28 stated that 'General noise, from opening plastic bags for dialysis, from cleaners changing bins, and from machines' creates the sound in the ICU environment.

In combination with the uncontrollable nature of noise in ICU, the controllable noise was created by nurses and other staff members talking loudly. This factor was noted as a disruptor of patient sleep. One respondent identified a lack of 'awareness of the loudness of talking and laughing' (N40) as one of the sources of controllable noise in the ICU. A respondent stated that 'some doctors and nurses speak as if it is the middle of the day outside, extremely loud[ly] and continue to do so even after being asked to be quiet' (N70). The following statements confirmed the oft-repeated account by respondents related to staff contribution to controllable noise: 'People talk too loudly, especially those that do not work nights often or think that they are sat in another room are okay when in actual fact they can be heard halfway down the unit' (N4) and 'Senior staff who hardly work with non-ventilated patients, who constantly talk loud in the corridors or laugh at the desk' (N56).

Other aspects of sensory stimulation, such as lights, were reported to be of concern. Specifically, the lights from neighbouring rooms, corridors, monitors and machines were termed as a source of disturbance for patients trying to sleep. The light from monitors and machines was described as difficult to control, as was the light from other sources: 'Lights from store rooms and work areas are not dimmable and very bright for sleeping patients' (N35). The respondents reported the inability to control the

light coming from areas other than the overhead lights in the patient's own bed space: 'Staff turning on lights in their patient's room to do a wash without thinking patient in the next bedspace will be disturbed' (N42). The concern with lights from other areas was attributed to the inadequate screening between bed spaces. A number of statements highlighted that 'The frosted windows block no light during night time admissions' (N61) and 'Frosted glass … when the light on in the next bedspace it shines straight through to the next room' (N67). N44 further explained: 'Whether it's the nurse or the environment—or even the patient, some factors are the room screening does not work—if a new patient in the next room has their lights on full'.

The respondents also discussed the architecture of the ICU as being a contributor to sleep disturbance. General comments regarding the layout of the ICU were common, as were more specific concerns about the design of patient rooms. The design of the ICU unit and patient rooms was believed to increase the problem of noise and light. N11 stated that 'The unit is badly designed for sleep, lights from neighbouring rooms, noise—sometimes unable to control due to sick patients and admission in neighbouring rooms'.

Thus, the busy nature of the ICU was highlighted as a significant barrier to sleep, with constant admissions occurring at any time of the night or day. The busyness, in conjunction with the architecture of the unit, were described as major causes of sleep disturbance, with comments such as 'Noise, lights, and admissions or a sick patient in the room next door' (N22) confirming the highly sensory environment that is not conducive to providing good quality patient sleep.

4.5.1.3 Disruption. The respondents identified the role of the ICU staff as causing or failing to prevent sleep disruptions. This was identified by some respondents as inevitable, and by others as a factor that requires change. The following statements

highlight these different perspectives: ‘Sometimes disruptions can be unavoidable if there is a sick patient next door needing their lights on and people in and out, there is little that can be done’ (N10) and ‘Not all staff consider patient sleep while working night shift. While you try and promote good day/night routines, other staff/patients/environmental factors keep patients [sic] sleep disrupted’ (N33).

Interventions were described as frequent disruptors to patient sleep. The respondents reported that any attempt to create an environment conducive to patient sleep was prohibitive because of the amount of interventions that ICU patients require: ‘Despite attempts to create an environment to support sleep, continued interventions prevent this’ (N16). The respondents discussed the requirement to fulfil their nursing duties as unavoidable, such as medication administration, assessment and frequent turning. One reason for interruptions was attributed to the existing policy and procedures in relation to observations and cares. N55 explained: ‘There are certain interventions that need to be done on a regular basis e.g. ongoing physical assessments of critical patients, regular mouth, eye, tracheostomy care, suctioning requirements and frequency of flap observations’.

The unavoidable nature of overnight nursing interventions was discussed frequently as inherent to the ICU patient. N45 stated: ‘Nursing tasks cannot always be clustered especially if the patient is requiring immediate attention and their condition is deteriorating’. Another nurse recorded: ‘Many of our higher acuity patients require ongoing interventions overnight making optimal day/night routines difficult’ (N55). In contrast, frequent excessive observations were considered a problem specific to this particular ICU. N41 was emphatic: ‘Patients [that] are ward listed or close to being ward listed still have one hourly blood pressures done, there appears to be no step-down of observations, it’s either all or nothing in WA’. Many respondents suggested that the

disruptions were caused by an apparent ‘lack of clustering cares’ (N71). The acuity of the ICU patient was viewed as a reason for not clustering cares overnight; however, many respondents highlighted that interventions were being performed constantly throughout the night, with little thought about clustering non-essential cares together. For example, N41 stated:

> a patient who is awake, if they are too cold or hot are going to wake up and ask for a blanket or throw one off, if they wake, do something … why do a temperature in the middle of their sleep?

As a solution to this, N38 suggested ‘encouraging grouping of cares so patients are disturbed less frequently’. The respondents expressed that policy and procedure requirements and a lack of step-down in cares when the patient condition improves are barriers to providing adequate quality and quantity of sleep in the ICU.

4.5.1.4 Routines and prioritisation. The respondents provided information about the routines of nurses and doctors as disruptors of and barriers to patient sleep. The night routines were described as being a cause of sleep disruption. One respondent elaborated on the routines:

> Dr rounds at night is frustrating, especially if very late. We then tend to wake them up so early, around 0500 for bloods, washes if in pod 2 and considering your day team, which I am not a fan of. I think if they are not awake don’t wash them, missing a wash is less detrimental than no sleep. (N76)

Nursing care routines were described as rigid in application and lacking in sleep prioritisation. N27 stated: ‘Nurses are focused on their care plan without assessing the real needs of the patient. A patient finally settles to sleep half an hour prior to mouth care and is woken by the nurse to do this’. An example of the day/night routine problem was the overnight patient wash routine. This was performed as a means of assisting the

day shift, with little regard for patient sleep. The respondents frequently commented that patients are required to be woken early to be washed: ‘Nursing staff stuck in a routine of washing their patients at 3:00am’ (N42) and ‘there is a culture that believes that patients have to be washed at 5am, intubated or not’ (N28). These comments reflect the respondents’ sense of obligation to perform overnight routine patient washes. Other respondents expressed dismay at this overnight wash routine: ‘Nursing staff are made to start washes on awake patients from 0500 hours so that the day staff do not have to wash their patients, which is rubbish’ (N68) and:

> HDU [High Dependency Unit] patients in the ICU are often doubled and it’s expected one of them is washed prior to the next team coming on at 7am to assist in timely transfers out of the department but these patients should be allowed to sleep in and recover. (N41)

Some respondents reflected on the ICU routine as counterintuitive to sleep prioritisation: ‘Staff [are] too interested in getting work done for day shift, a lot of ICU nurses don’t prioritise allowing patients to sleep well’ (N67). This was similar to their views on other medical staff, with doctors’ routines also identified as a barrier and disruptor to sleep. The respondents noted that ‘our doctors attend the patient for nocte shift assessments at all times of the night’ (N68) and ‘late night rounds go well into the night’ (N14). The respondents concurred that doctors woke patients without consideration of their sleep: ‘Doctors that wake patients once you have settled them for the night—just to listen to their chest’ (N44). One respondent stated: ‘Right now it is 3:22am and our doctor is reviewing the patient in the HDU [High Dependency Unit] area that should be asleep. They should have been reviewed at 2100hrs instead’ (N68).

4.5.2 Sleep appraisal. The theme of sleep appraisal explored the respondents’ assessments of patient sleep, including the challenges and tools to assist them in

accurately assessing sleep. The superficial nature of sleep assessment in the ICU can be summarised as follows: patients are asleep when their eyes are closed, their respiratory rate and blood pressure are lower, they are snoring and their movement is minimal. This topic is explored in the subtheme titled ‘superficial observation’. The barriers to sleep assessment and the tools the respondents reportedly used are detailed in the subthemes titled ‘challenges’ and ‘tools’.

4.5.2.1 Superficial observation. The majority of respondents included physically observing patients to make an assessment of their sleep. N28 identified the way that patient sleep was observed by noting physical signs: ‘I look at the patient to see if they have their eyes closed and if they appear relaxed. I also look to see if there is a drop-in heart rate and bp [blood pressure], depending on their condition’.

The respondents also identified specific signs of sleep through the observation and monitoring of vital signs, breathing patterns, movement of eyes and limbs, and level of patient comfort. N44 stated: ‘Observe monitor—pulse and BP drop slightly, resp [respiratory] rate is more fluid/even—position is more relaxed, and movement is less—at times you can move a hand’. The respondents highlighted using specific vital signs to assess patient sleep, such as heart rate and blood pressure observations—specifically, an observed decrease in either or both.

Many respondents reported patients’ respiratory rate, breathing pattern and presence of snoring as an indicator of sleep. N58 remarked that ‘Resp rate, depth of chest rising and falling, heavily breathing, snoring’ were indicators of a sleeping patient. Breathing and respiratory observations, such as ‘listen[ing] for breathing, whether RR [respiratory rate] was shallow, deep or rapid, and the presence of snoring’ (N41), were reported frequently by most respondents as the primary indicators of a sleeping patient. Further, in regard to patients’ breathing when assessing sleep, the respondents explained

that they observed the rate of breathing (decreases when asleep), quality of breathing (more relaxed when asleep) and deeper and slower breathing.

The respondents' observations of the level of restlessness or irritability expressed by the patient were juxtaposed with the appearance of comfort or level of relaxation. In identifying the state of wakefulness as restlessness, irritability, anxiousness and tiredness and observation of a sleeping patient was defined as looks comfortable, sense of calm, peace and looking relaxed.

The respondents also observed patient activity to assess if, and when, a patient was sleeping. This was summarised by N42 as 'face relaxed with eyes closed, body posture relaxed and looking comfortable'. The movement and position of the patient was discerned as being an observable feature of sleep or wakefulness. For example, N68 noted: 'The amount of physical movement in the bed (less movement more likely to be asleep)'. Similarly, the movement of the patient in reaction to being touched was considered an indicator: 'If you click in front of somebody's eyes or touch them on their cheek or moved their hand, if awake they will flinch and if in a deep sleep they will allow you to do so' (N41) and 'movement is less—at times you can move a hand … and they do not flinch' (N44). The respondents also detected eye movement, such as eyelid flickering and the open or closed appearance of eyes, as indicative of sleep activity. N48 commented, 'I observe the patient—are their eyes shut and do they appear to be sleeping and comfortable?'.

4.5.2.2 Challenges. The respondents described several barriers to knowing if their patient was asleep. They identified the difficulties inherent in a busy clinical environment where nursing care is prioritised over sleep: 'Sleep is always very poor, they are never comfortable. We wake them to give them pressure area care' (N76). Another barrier frequently mentioned was the difficulty associated with measuring the

quality and quantity of patient sleep: ‘Patients do not get enough sleep in ICU and it is difficult to gauge the quality of sleep they do get (if any)’ (N22). The variety of patients in the ICU on sedation provided a significant challenge to sleep assessment: ‘It is hard to differentiate between a sedated patient and one who is genuinely sleeping’ (N4) and ‘It is difficult to determine if a sedated patient is asleep’ (N55).

Several respondents recognised a lack of training, and required further education to assist with their assessment of patient sleep: ‘Nurses/heath care workers are not trained or offered the right information regarding sleep patterns’ (N69). There was consistent reporting of the need for learning: ‘More education on sleep assessment is required to help us do better’ (N23).

4.5.2.3 Tools. The use of a tool to support nurse assessment of sleep in the ICU was of interest. The respondents were asked if they were aware of any tools to help them assess the quality and quantity of patient sleep, and to specify which tools they were familiar with. As reported in Table 2, no formal sleep assessment tools were reported to be used by the respondents. Instead, documentation and patients’ perceptions of their own sleep were the most commonly reported ‘tools’ used. N57 noted: ‘a simple button on Meta-vision [Meta-vision—computer information system] to acknowledge patient sleeping and [within] handover from nurse to nurse’. The respondents also reported as assessment tools the practices of documenting and communicating the number of hours of sleep the patient appeared to attain overnight, the number of times the patient woke per hour and how easily the patient awakened.

Table 2

Assessment Tools for Sleep Reported by Respondents

What tools are you aware of to help you assess quality and quantity of patient sleep in the ICU?
1. Write it on the nurses' notes, put tick mark on the computer if the patient is sleeping.
2. Eye mask, dim lights, ear plugs, lower alarms.
3. Ear plugs, relaxation music, eye masks, day/night routine.
4. I am aware of them but don't know what they are.
5. ICU CAM, RASS and BP's to address level of consciousness. No tool specific for sleep.
6. Only tool I know of is a simple tick box on meta-vison in the neuro observations part, it simply is a yes or no to the patient sleeping.
7. Medications, dedicated afternoon sleep-time, lights down/off.
8. Earplugs, relaxation music.
9. Monitor watching – usually pulse and BP goes down slightly observing patient.
10. Earplugs, eye mask, music therapy, massage.
11. Day/night routine medications.
12. Having a day night routine planned.
13. BIS monitor close observation.
14. Day/night routines, drug regimes.
15. CAM survey. Reviewing previous shifts – hours documented when pt. asleep on Meta-vision.
16. Only implementing day/night routine for non-sedated patients whereby they are left from 0001 hours to 0500hrs without disturbing them (especially spinal patients). All nursing care is done during daylight hours for non-sedated patients.
17. Ear plugs, eye masks, dimming lights, clustering interventions to prevent disturbance of sleep.

The respondents also reported that assessment of patient sleep was reliant on communicating with the patient. This was highlighted by N44, who stated: 'Discuss with patient—how do they sleep at home, how many hours do they normally get, and about their sleep calculator—going to bed/wake up times'. Other respondents also reflected on their patients' perspectives of their own sleep. The respondents indicated that a tool to assess patient sleep included asking patients questions to assess their sleep, such as asking the patient 'how they felt—did they state they felt well rested [in] comparison to other days—is this their norm' (N73) and 'did you have a good night's sleep?'.

4.5.3 The value of sleep. The theme on the value of sleep focused on the importance that the respondents placed on patient sleep, the relationship to the respondents' perception of the culture of the ICU, and the patients' insights into their own sleep patterns. The subthemes of the importance of sleep, the culture of the ICU and the patient are further elaborated below.

4.5.3.1 The importance of sleep. The respondents clearly reported that sleep is very important, is essential for patient recovery and should always be a priority. In identifying the importance of sleep, the respondents also indicated that, in the ICU environment, patient sleep is poor to the point of inadequate, is severely underrated and is not well managed or monitored by staff.

The requirement for undisturbed sleep was viewed as more important for a critically ill patient than for a general hospital patient, with the healing nature of sleep described as integral to patient recovery in the ICU. The respondents asserted the necessity of sleep for healing, recovery and the ability of patients to participate in required daytime activities: 'Patients should have a good sleep at night, so that patient will feel comfortable the next morning' (N2) and 'We should be allowing adequate sleep for patients to heal and participate in rehabilitation' (N62). The reality of the suboptimal quantity and quality of sleep experienced by patients was also reported. N4 stated: '[It is] difficult for patients to get enough sleep and of poor quality when they do'.

4.5.3.2 The culture of the ICU. The respondents wrote extensively about how patient sleep was perceived and prioritised by their colleagues. They described an ICU where sleep was generally not prioritised, the importance of sleep was not recognised, and there was inconsistent management of sleep. One respondent highlighted that patient sleep was 'extremely poor in this ICU in WA' (N41). This may indicate that

some of the respondents believed that ICUs outside of WA better prioritise patient sleep.

The culture surrounding sleep in this ICU was regarded a barrier to the provision of a positive sleep environment. One respondent stated: 'Nurse mentality, a lack of understanding by policy makers as to need for sleep, lack of education and tick box nursing' (N27). Many respondents described the culture of patient sleep as poor: 'I don't think we do enough to help patients sleep, more education on sleep assessment is required to help us do better' (N23). This was echoed by other respondents, who stated that 'we underestimate the importance of sleep' (N17) and 'I think we are more often not good at minimising noise and disruptions where possible' (N10). Policy and procedure was described as creating a culture that did not prioritise sleep, with one respondent stating that the 'doors open, windows unfrosted policy' was a contributor to patient sleep disturbance (N61). N41 also reported: 'yes patients are critical sometimes but so many have pointless tasks done to them when no changes are going to be made as it is policy to do so'.

Doctors were also described as contributing to the poor sleep culture within the ICU. Specifically, the respondents highlighted the doctors' late-night rounds and reluctance to prescribe sedation. Some respondents described difficulty in communicating their concerns to the ICU doctors. Specifically, N45 explained: 'I don't always feel comfortable with certain doctors' approach to this subject'.

4.5.3.3 The patient. Patients' perceptions of sleep were noted as poor, with patients regularly complaining about their lack of sleep while in the ICU. The respondents stated: 'Patients complain often as it is noisy and uncomfortable' (N53) and 'Nearly all patients I have cared for reported being deprived of sleep' (N55). The result of the constant sleep disruptions experienced by patients was described as follows:

'Many [patients] are awake for days … then become delirious' and 'Lack of sleep leads to delirium, depression and chronic fatigue'.

4.5.4 Solutions. The final theme focused on the ways in which the respondents believed they could improve sleep in the ICU. The respondents made suggestions to better promote and prioritise sleep in the ICU. The subthemes of environmental change, sleep aids, routine, education and culture change emerged from the data.

4.5.4.1 Environmental change. Noise and light reduction were highlighted by many respondents as a requirement to improve patient sleep. Noise minimisation focused on keeping noise minimal at night and reminding staff to be quiet and lower their voices. One respondent stated:

> I wear non-audible shoes and expect others to do so too. Laughing, socialising and loud talking should be done in the tea room, not where patients can hear (and comment) on it all. Theatre staff, x-ray personnel who don't consider patients who wake up, bin cleaning that is being done at 0400—why? I would hate to be a patient, but then I am a known grump due to my constant nagging about noise. (N56)

Most suggestions for light reduction focused on turning lights off throughout the unit, in corridors and in work areas at specific times, in addition to dimming or turning down lights by 'placing dimming lights in certain areas so it is dark enough for patients to sleep' (N49). Alternative suggestions were provided for reducing light, which included: 'Giving each bedside nurse a torch, so they don't need to leave their examination lights on all night long' (N68). Another respondent suggested: 'Use only daylight as a lighting source on well-lighted days for patients so they can begin to see when sunrise/sunset is' (N6). Simple measures, such as closing the curtains, were suggested by others: 'Most nurses on nights never close the blinds at the back of the

room and allow the sunlight to stream in at 5am! Most people close curtains at night so they don't have this, why not in the unit?' (N41).

4.5.4.2 Sleep aids. The respondents suggested eye masks, earplugs and night sedation as a solution to sleep disturbance. N68 presented a suggestion to ensure more routine use of sleep aids to block out noise in the ICU: 'Charting earplugs topically every night at 2300hrs and encourage use of white noise music to allow patient to have a restful sleep whilst other noises may be going on around them'. Similarly, N58 suggested: 'Promoting earplugs and eye masks especially when an emergency is going on around them, maybe utilising sleep music, aromatherapy (lavender pillow spray) encourage them to bring their own pillow in from home'.

Medications to assist sleep were also considered important for improving patient sleep. N41 suggested: 'Offer sleeping tablets to patient who are able to have them to encourage and promote sleep'. Other respondents suggested that pharmacological standardisation for sleep and earlier prescription of antidepressants and night-time sedatives for long-term patients would help patients achieve better quantity and quality of sleep.

4.5.4.3 Routine. The respondents agreed that the day/night routine should be more strictly adhered to and this would improve sleep. N48 stated: 'More vigilance in day night routine—this is sometimes difficult depending on the patient condition but mostly could be improved'. Another suggested: 'Patient on a day night/routine unless actually awake themselves, should not be washed/showered until after 0700 hours, as this would be closer to the time they are usually up themselves' (N68). Likewise, the respondents frequently suggested changing the time for patient washes and having cares clustered together with minimisation of interventions. N42 spoke for many: 'Cluster cares, minimise interventions, all patients should have minimal interventions between

the hours of midnight and 0500. Ideally washes should be done by midnight (as with normal patients' daily routine)'.

The respondents frequently discussed a focus on settling into sleep routines and allowing time to fall asleep. Suggestions on preparing patients for the night ahead included: 'Attend hygiene needs before bedtime, if patient agrees, give warm wash, brush the teeth and make a comfortable position in bed, bed linen need to be changed if soiled and change the patients gown if sweaty' (N2). Similarly, N28 proposed:

> Organise with doctors what meds can be done earlier, so there is less beeping and waking of the patient. Try and set a new culture about washing patients, maybe consider 8–9pm or 5–6pm slot so the patient is more comfortable.

Alterations in the times of doctors' rounds were suggested to improve routines in the ICU, such as finishing the medical round before midnight and not waking sleeping patients: 'Awake patients should be seen first at night or first thing in the morning—not woken up' (N44). Visiting hours were also considered a sleep disruptor by many respondents, and suggestions for changes to visiting times included mandatory rest periods during the day and restricted visiting: 'Need to promote rest periods by limiting visiting times in ICU'. This was echoed by N72: 'I believe it is beneficial for patients to have visiting hours like every other hospital/ICU/Ward'.

4.5.4.4 Education. Further education was clearly identified as a prerequisite to improve sleep in the unit. Education of nurses, doctors, allied health and families was suggested: 'Greater knowledge of assessment and sleep deprivation' (N75) and 'education of staff and educating families about sleep promotion' (N74). Along with education, other suggestions for improved sleep included introduction of a useful sleep assessment tool or sleep protocol and implementation strategies, such as 'Having a patient sleep assessment chart to ensure all members of multidisciplinary team are on

the same page' (N7) and 'strategies implemented throughout unit and education provided to nursing and medical staff regarding those' (N33).

4.5.4.5 Culture change. The respondents noted the need to change staff perceptions of patients' sleep in this ICU. They suggested that 'serial offenders (noisy night staff) need to be pulled up' (N70) and that 'to improve patient sleep you will need to change some staff behaviour' (N20). Other respondents asserted that nurses' awareness of sleeping patients must be improved. N73 gave a comprehensive description of the culture change she believed to be required in the ICU:

> Consideration is a big thing I think, personally. Whilst the corridor lights go out people don't always consider others—for example pod leaders chatting and laughing at stations which isn't appropriate for patients trying to rest. It's harder in ICU, but not impossible. We aren't considerate enough and I feel many situations are medically managed as opposed to alternate methods—why consider a benzo for first line when an eye mask, peace and quiet could work just as well?

Another respondent referred to the experience of being a patient in an ICU, as well as being an ICU nurse, to paint a picture of the level of sleep disturbance inherent in the ICU. This nurse highlighted the importance of providing a positive sleep environment:

> After all most of us nurses live on a lack of sleep, however, having been a nurse and a patient in an ICU it is a very different story. That lack of sleep you function on at home is very different to being sick and having no sleep. (N41)

Increased communication with patients regarding their sleep preferences was a suggestion to improve sleep: 'Talking to the patient about their experience, Feedback from patients on the issues that prevented adequate sleep (what we think is the issue might not always be correct), involving the patient in planning their care' (N55). In

addition, the respondents stated that, to support the sleep of patients in the ICU, as an admission requirement to the ICU, they should ask patients what is normal for them in relation to bedtimes, as well as asking about the patients' usual length of sleep and any sleeping problems they may have experienced before admission to the ICU.

4.6 Summary of Quantitative and Qualitative Findings

This chapter has presented the findings from the quantitative and qualitative data collected from nurses within one tertiary hospital ICU in the metropolitan area of Perth, WA. The combination of demographic data, closed-ended questions analysed using descriptive and inferential quantitative methods, and open-ended questions analysed using qualitative thematic analysis provided a comprehensive overview of the attitudes, beliefs and reported practices of nurses regarding patient sleep in the ICU.

The respondents employed in this ICU were on average 39 years old, had a postgraduate qualification and had worked in the specialty of ICU for between six months and 37 years. Nearly all respondents had been employed in another ICU previously, while over half of respondents had never worked outside of WA. The majority of respondents had never received any education on patient sleep and had not worked in an ICU with an SPP or CPG on sleep. Ensuring quality and quantity of sleep for patients was considered important; however, the hours of sleep that the respondents believed the patients achieved while in the ICU was less than the amount the respondents believed they required. Assessment of patient sleep was believed to be difficult, especially for heavily sedated and ventilated patients. Sleep quality was also believed to be poor for all patients in the ICU. This poor quality sleep was believed to negatively affect patient outcomes, with sleep-promoting interventions—such as talking quietly at night and clustering cares—thought to be very important for improving patient sleep. These interventions were reported to be performed always or very often

by most respondents. The respondents believed that their patients were concerned about sleep disturbance; however, they were divided about whether their colleagues were concerned about sleep disturbance among the patients for whom they cared.

The qualitative data revealed that the respondents used superficial means to assess patient sleep, with physical observation of vital signs and patient movement as the primary means. The respondents presented detailed opinions about the poor sleep environment of the ICU as a result of noise, light, the environment, constant disruption and the culture. A multitude of barriers to patient sleep were highlighted and, in tandem, a solution-focused approach to improving patient sleep was provided.

The following chapter discusses the findings in detail and compares the results with the current literature and relevant theory.

Chapter 5: Discussion

5.1 Introduction

The previous chapter described the findings from the quantitative and qualitative data collected from the survey. These findings presented the respondents' perceptions and practices of patient sleep in the ICU using two different data analysis techniques. This chapter will combine both datasets and discuss the results, comparing the respondents' attitudes, beliefs and practices relating to patient sleep with the current literature and theory to elicit a deeper understanding.

In addition, this chapter will provide an exploration of the nurse respondents' demographics and relationship to the nursing workforce demographics Australia wide. This will be followed by a comparison of the overall research findings to the relevant literature and the TPB that underpins this research. A discussion of the new knowledge from this research will be presented and the research questions will be addressed, followed by a discussion of the strengths and limitations of the study.

5.2 Demographics

Chapter 4 outlined the demographic data statistics of the respondents. The researcher compared these data with the demographic statistics of the nursing workforce population in Australia and WA. Statistics regarding the demographic details of the Australian RN population were obtained from the Department of Health (2016). The average age of the study respondents was 39 years, which was younger than the average age of RNs in Australia (43.9 years). The percentage of female RNs was 91.7%, which was slightly higher than the Australian (88.6 %) and WA (90.7%) population (Australian Institute of Health and Welfare, 2017; Department of Health, 2016). Nearly all respondents had previously worked in another ICU, as the study site is a new hospital ICU that opened in 2014.

On average, respondents had nine years of experience in the ICU setting. A scarcity of research on the average years of experience reported by ICU nurses within Australia and globally renders it difficult to contextualise this finding. Nursing experience has been considered a factor that contributes to the level of quality nursing care provided to patients (Hill & Karen, 2010). However, the progression of novice to expert nurse (Benner, 2001) has not been allocated specifically by years of nursing experience (Conway, 1998; Uhrenfeldt & Hall, 2007).

Of the respondents, 65% held a postgraduate qualification. The College of Intensive Care Medicine of Australia and New Zealand (2011) *Minimum Standards for Intensive Care* state that the majority of nursing staff should hold a post-registration qualification in intensive care. As such, postgraduate intensive care nursing education is well established in Australia (Australian College of Critical Care Nurses, 2015). Currently, there are 30 official critical care postgraduate nursing courses offered in Australia (Western Australian Department of Health, 2018). The Australian and New Zealand critical care workforce standards recommend that 50% of nurses in the critical care setting hold a postgraduate critical care qualification. Current data on the number of Australian nurses with postgraduate qualifications working in critical care are unavailable. The last survey in 2001 reported that 55 to 78% of nurses in critical care held postgraduate qualifications; however, this may not reflect the current workforce (Gill, Leslie, Grech, & Latour, 2012).

5.2.1 Nightshift. The percentage of time nurses spend working nightshift—the traditional time for sleep—is an important demographic when exploring nurses' attitudes and beliefs regarding patient sleep. On average, the respondents reported that nightshift comprised half of their rostered clinical work time. The study site offers nurses the option of 12-hour shifts, with nurses working 12 hours rostered on for

approximately 50% of their shifts as nightshifts. This could be an explanation of the high overall percentage of time spent on nightshift at the study site. Statistics regarding the percentage of time the Australian population of RNs spend working nightshift are unavailable. However, 12-hour shifts are now viewed as the standard shift length for nurses in many ICUs around the world (Aveyard & David, 2016) and this may increase the overall percentage of night shifts worked, compared with eight-hour shifts.

5.3 Comparison of the Findings with the Literature

There is a dearth of studies specifically focused on the attitudes, beliefs and practices of ICU nurses. Kamdar et al. (2016) performed a multisite, global quantitative survey of nurses', physicians' and physician assistants' perceptions and practices regarding sleep in the ICU. This previous study had clear differences in method, site and sample to the current research, which focused solely on nurses and used quantitative and qualitative data in a single site. The SLEEPii survey from a study on the perceptions and practices of ICU providers was used as a guide to create the questionnaire for this research. However, the differences between these two studies and the instrument affected any direct comparison. The SLEEPii survey was designed to elicit responses from practitioners all over the world; thus, many of the questions it contained were too broad to use in a single-site study of nurses. The questions were adapted and newly created to focus specifically on nurses, and to generate detailed findings on their attitudes and beliefs.

Hopper et al. (2015) conducted a qualitative study on healthcare workers' attitudes and identified barriers to patient sleep. This was a single-site study consisting of interviews with seven nurses and 12 physicians in a medical ICU in the United States. Although differences in methodology and sample were evident, the results from the qualitative component of this study focus on nurses and the Hopper et al. (2015)

study contained similarities that require further exploration. More recently, a multinational survey of ICU nurse managers from 522 ICUs was conducted by Hofhuis et al. (2018). This quantitative survey used a self-administered questionnaire disseminated to nurse managers across 10 countries to investigate the sleep assessment and sleep-promotion strategies reported by ICU nurses. The structure and regularity of sleep-promoting practices reported by nurses in the multinational study were used to contextualise the reported sleep practices of the respondents from the current single-site study. The findings from previous research, including the above-mentioned studies, will be used to extrapolate the results from this study on nurses' attitudes, beliefs and reported practices.

5.3.1 Nurses' knowledge and perceptions.

5.3.1.1 Knowledge. The respondents' knowledge about patient sleep was investigated indirectly by eliciting their opinions on the assessment of and barriers to patient sleep, and improvements that could be made. Through the expression of opinions and perceived barriers, the respondents revealed their knowledge of the factors that affect patient sleep in the ICU (Bihari et al., 2012; Elliott et al., 2013; Elliott et al., 2014; Freedman, Kotzer, & Schwab, 1999). Noise, light and clinical interventions are recognised as some of the external factors that are the most disruptive to patient sleep (Delaney et al., 2015; Elliott et al., 2013; Honkus, 2003). The respondents clearly identified noise, light and nursing interventions as detrimental to good quality and quantity of sleep, despite not having received formal education on sleep in ICU patients. Similarly, Christensen (2005); Johansson, Knutsson, Bergbom, and Lindahl (2016); and McIntosh and MacMillan (2009) found that knowledge of the main causes of sleep disruption were expressed by nurses, regardless of the absence of formal education on the subject. In the current study, the respondents provided rich description of the extent

and nature of the nursing interventions, and, to a lesser degree, the light, which they believed disrupted patient sleep. However, there was a clear lack of description and in-depth knowledge regarding the characterisation and extent of noise. This correlates with previous research, which found a lack of theoretical knowledge on noise among nurses in the ICU (Christensen, 2005; Johansson et al., 2016).

5.3.1.2 Attitudes and beliefs on the importance of patient sleep. Ultimately, patient sleep was considered very important to the respondents, whereby ensuring adequate quality and quantity of sleep was declared an essential element of nursing an ICU patient. Kamdar et al. (2016) reported that 81% of ICU providers believe quality and quantity of sleep is very or extremely important. Individually and collectively, the current study respondents indicated that they highly valued patient sleep, yet were divided on how important patient sleep was to their colleagues. The respondents extensively reported the lack of awareness or consideration shown by other staff members when patients were trying to sleep. Specifically, talking loudly at night was considered behaviour consistent with demonstrating a lack of concern for patient sleep.

Hopper et al. (2015) found that less experienced ICU personnel who have not been taught to consider the importance of sleep for critically ill patients may be less mindful of the practices that promote an environment conducive to sleep. One of their respondents stated: ‘I think people tend to forget that people need to sleep’ (Hopper et al., 2015, p. 97). This view was replicated by the respondents in the current study, and indicated that the respondents perceived that their ICU colleagues did not feel that sleep was as important as they did. In contrast, the expectation that the respondents felt to fulfil nursing duties and comply with policy and procedure could manifest as a lack of concern about patient sleep. Hopper et al. (2015) suggested that lower prioritisation of sleep was a trade-off for current standard of care. This sentiment was alluded to by the

respondents in the current study, who described the requirement to complete nursing tasks as being prioritised over patient sleep. Another example of this was frequent overnight observations of patients, which may not be required by lower acuity patients, yet remained the policy requirement of the ICU.

Ninety per cent of respondents in this study believed that the patients were concerned about lack of sleep during their stay in the ICU. This corresponds with previous research on patient perceptions of sleep in the ICU, with inability to sleep being rated one of the most stressful experiences of staying in the ICU (Nelson, 2001; Novaes et al., 1999; Rotondi et al., 2002; Simini, 1999). The current study respondents appeared to understand that sleep was important to patients and that sleep deprivation resulting from reduced quantity and quality of sleep over the course of the patients' ICU admission was likely to cause distress during their stay.

5.3.1.3 Beliefs regarding the quantity and quality of patient sleep. The respondents believed that patients were not receiving the quantity of sleep they required for recovery. On average, the respondents considered that patients had less than six hours of sleep in a 24-hour period, and that they required more than eight hours of sleep. This finding corresponds with Kamdar et al. (2016), who found that 65% of ICU providers believe patients attain less than six hours of sleep, and 57% believe that eight hours or more is sufficient. The belief that patients gain less than six hours of sleep is supported by PSG data from previous studies (Aurell & Elmqvist, 1985; Beecroft, 2008; Elliott et al., 2013; Gabor et al., 2003). In contrast, Freedman et al. (2001) found that TST was of normal duration (8.8 hours) when measured by PSG; however, this study also indicated large individual variations of two to 19 hours of TST. Interestingly, despite the current study respondents' absence of knowledge about a formal sleep measurement tool, the belief that patients in the ICU sleep less than six hours within a

24-hour period correlates with many of the studies using a gold-standard objective sleep measurement. Beecroft (2008) performed a study comparing nurses' assessment of patient sleep with PSG, and found that the median TST assessed by nurses was just over five hours, compared with the PSG recording of three hours. The overestimation of sleep by nurses when compared with objective sleep measurement has been a consistent finding (Aurell & Elmqvist, 1985; Bourne et al., 2007; Fontaine, 1989). This indicates that, while the respondents in this study were correct in their assumption that patients achieve less than six hours of sleep, they could still be overestimating the TST achieved by patients.

Quality sleep is imperative to the recovery of body and mind in critically ill patients (Kamdar, Needham, et al., 2012; Krachman, D'Alonzo, & Criner, 1995; Matthews, 2011; McKinley et al., 2013; Parthasarathy & Tobin, 2004; Weinhouse & Schwab, 2006). The respondents demonstrated an appreciation of the need for quality patient sleep to enhance recovery in the ICU. The respondents' beliefs about the quality of sleep achieved by patients depended on the level of sedation and presence or absence of an artificial airway and mechanical ventilation. Patients who were not sedated were considered the most likely to have poor quality sleep. Further, non-sedated patients requiring airway support via ETT or tracheostomy were perceived by the respondents as subject to the poorest quality sleep in the ICU patient cohort. Just under half of the respondents believed that patient sleep is good or acceptable when patients are heavily sedated and mechanically ventilated, or moderately sedated and mechanically ventilated. Patients who maintained their own airway with no sedation were considered to experience poor quality of sleep by the respondents.

Historic and contemporary research on patient perceptions of sleep has found that sleep quality is affected among ICU patients who are not sedated or ventilated

(Freedman et al., 1999; Gabor et al., 2003; Stewart, Green, Stewart, & Tiruvoipati, 2017). When surveying patients upon discharge from the ICU, Freedman et al. (1999) found that patient perceptions of sleep in the ICU were significantly poorer than their perceptions of sleep at home. Stewart et al. (2017) reported similar findings when investigating the self-reported sleep of 56 non-ventilated ICU patients at a single ICU site. The patients rated their sleep quality at home before admission and upon discharge from the ICU. They reported that their quality of sleep was significantly worse in the ICU than at home, and identified noise, lighting, clinical intervention and pain as significant barriers to sleep in the ICU.

Reducing ventilation in the ICU with the aim of liberation from the ventilator and removal of airway support requires cessation of continuous sedation. The current study respondents' belief that non-sedated ventilated patients experience very poor quality sleep is supported by PSG recordings. Fanfulla, Ceriana, D'Artavilla Lupo, and Trentin (2011) performed a PSG study of 22 patients in an ICU step-down unit. Half the patients were not ventilated, and half were being weaned from the ventilator delivered via tracheostomy. All patients recorded abnormal sleep architecture and the researchers found that ventilatory requirements and the presence of a tracheostomy were not the main determinants of sleep quality. Similarly, patients with tracheostomies undergoing prolonged weaning from the ventilator were studied using PSG by Huttmann et al. (2017). All patients were fully conscious and not receiving continuous sedative medications. The researchers identified impaired sleep quality, with a decrease in REM, sleep efficiency and TST.

Thus, the assumption that sedated, ventilated patients achieve better sleep quality contradicts the literature. The reality is that these patients manifest abnormal sleep that is highly fragmented and lacking in slow-wave and REM sleep (Cooper,

Thornley, Young, & Slutsky, 2000; Elliott et al., 2014; Freedman et al., 2001; Gabor et al., 2003; Parthasarathy & Tobin, 2002). Compared with non-ventilated patients, those who are mechanically ventilated have more highly fragmented sleep with reduced efficiency and increased sleep during daylight hours, as measured by PSG (Cooper et al., 2000). Ventilator mode, dyssynchronous breathing, discomfort from the ETT and possible greater illness severity have been recognised as the contributing factors (Parthasarathy & Tobin, 2002, 2004; Weinhouse & Schwab, 2006). In addition, medications used to sedate intubated and ventilated patients are known to affect sleep quality, with the combination of benzodiazepines and opioids considered some of the most disruptive to slow-wave and REM sleep (Bourne & Mills, 2004). Parthasarathy and Tobin (2004) suggested that, while a sedated state may resemble sleep, it may not provide the physiological benefits of true sleep.

5.3.2 Sleep assessment and measurement. The current study respondents reported performing sleep assessment without the use of a formal tool and with minimal documentation of assessment results. The respondents reported various methods of observing and assessing patient sleep, and many believed they could assess sleep in sedated and ventilated patients, despite not using a formal sleep assessment tool. Observations such as patients' eyes being closed; an observed decrease in heart rate, blood pressure and respiratory rate; and reduced body movement were the primary measures reported by the respondents.

Similar findings were reported by Hofhuis et al. (2018), who performed a multicentre descriptive survey of nurses in 552 ICUs in 10 countries. 'Lying quietly with eyes closed' was reported as the best indicator of patient sleep. This was followed by an observed decrease in blood pressure and slow respiratory rate. The assessment method indicated by the respondents in this study and the corresponding literature

suggests that, for many ICU nurses, sleep assessment is not performed using a best-practice approach. However, the assessment of sleep by nurses using heart rate and blood pressure may be a valid means of assessing the initiation of sleep. According to Ritmala-Castren (2016), a drop in blood pressure and heart rate was observed by PSG in most patients when entering the N1 stage of sleep. Despite this, no correlation was found between nurses' observations of sleep, such as eye movement under closed eyelids and muscle twitching, and the PSG recordings of sleep latency, awakenings and patient movement (Ritmala-Castren, 2016). Therefore, it is difficult to assume that nurses know when a patient is sleeping by using these indicators as a form of sleep assessment.

The challenges in differentiating sleep from sedation have been recognised as a barrier to sleep assessment in ICU patients in previous research, and a factor that contributes to the complexity of sleep assessment in this setting (Ding, Redeker, Pisani, Yaggi, & Knauert, 2017; Hopper et al., 2015). Some respondents in the current study explicitly stated: 'It's hard to differentiate between a sedated patient and one who is genuinely sleeping, when a patient is heavily sedated' (N4) and 'It's very hard to assess whether a patient is asleep or deeply sedated' (N34). Litton et al. (2017) found that the number of hours that nurses observed patients to be awake overnight was less among mechanically ventilated patients, and attributed this to the possibility that nurses equate sleep with sedation. However, the tool used by nurses to assess patient sleep in Litton et al. (2017) was simply indicating 'awake', 'sleeping' or 'could not tell'; thus, a deficiency in detail of the assessment tool may have contributed to this finding. However, Edwards and Schuring (1993) found that nursing assessments of patient sleep and wake states using this method were correct 81% of the time when compared with the PSG data. The 15-minute intervals of sleep assessment using this tool were deemed

realistic for nurses to account for the sleep/wake state in both studies (Edwards & Schuring, 1993; Litton et al., 2017).

Bourne et al. (2007) suggested that the use of a sleep assessment tool, such as the RCSQ, by nurses may be a better indicator of sleep parameters than reliance on the approximation of sleep quantity. This tool has been tested in previous research and been found to be a reliable tool for nurses to assess patient sleep (Frisk & Nordström, 2003; Kamdar, Shah, et al., 2012; Richards, O'Sullivan, & Phillips, 2000). However, the overestimation of quantity of patient sleep by nurses when using this tool has been reported as a weakness (Kamdar, Shah, et al., 2012). This may be considered a reason for its lack of implementation across all ICUs as a standard sleep assessment tool.

Despite the availability of sleep assessment tools that can be used by nurses to assess patient sleep, nurses working clinically in the ICU may not have this knowledge. Hofhuis et al. (2018) found that only 1% of 552 ICUs surveyed used questionnaires to assess sleep, and McIntosh and MacMillan (2009) found that none of their student nurses had encountered a structured model of patient sleep assessment in the ICU. Thus, the inability of the current study respondents to name a tool to assess patient sleep is consistent with other ICU nursing populations.

5.3.3 Patient outcomes. Previous research suggests that sleep deprivation can contribute to cognitive impairment, immune dysfunction, cardiovascular disease and respiratory impairment (Krachman et al., 1995; Orzel-Gryglewska, 2010; Pisani, 2015; Weinhouse & Schwab, 2006). Ninety-five per cent of the current study respondents agreed that poor quality sleep has a negative effect on patient outcomes, including infection, wound healing, extubation, delirium, hospital length of stay, participation in physiotherapy, depression and survival. Delirium and development of depression were the outcomes deemed most likely to occur or persist as a result of poor sleep quality.

The belief that poor quality sleep affects the survival of patients was not definitive, which may be due to a paucity of research directly linking sleep deprivation to mortality in humans (Orzel-Gryglewska, 2010; Vassalli & Dijk, 2009).

The respondents overwhelmingly believed that the effects of poor sleep contributed to delirium onset or persistence. This result agrees with Kamdar et al. (2016), who found that 97% of respondents believed that poor sleep could contribute to the development or persistence of delirium. It is believed that up to 80% of mechanically ventilated ICU patients may be affected by delirium, which is associated with increased length of hospital stay and poor patient outcomes (Barr et al., 2013). The connection between sleep and delirium is not clearly understood, and there remains a significant gap in research outlining strategies to prevent delirium (Delaney et al., 2015; Stuck et al., 2011). The literature suggests that both phenomena share similar mechanisms, with similarities between the clinical and physiologic profiles of patients with delirium and sleep deprivation (Figueroa-Ramos, 2009; Trompeo et al., 2006; Weinhouse et al., 2009). A possible rationale for the belief that poor sleep contributes to delirium in ICU patients is nursing staff's clinical observation of patients in the ICU. As the patient advocate, nurses are well positioned to identify issues that prevent effective sleep and recognise the factors that may contribute to delirium in the ICU (Matthews, 2011).

The current study respondents were very uncertain about whether poor sleep adversely affects patient survival, with 30% giving an 'unsure' response to the question. In fact, there is very little evidence about the effect of poor sleep on survival in humans, and the mechanisms by which sleep affects survival are unknown. Previous experimental research on rats found that 11 to 32 days of total sleep deprivation caused death; however, this has not been translated in humans (Orzel-Gryglewska, 2010).

Research into the long-term effect of poor sleep among ICU patients is in its infancy; however, evidence on the effect of sleep disturbance in the ICU is becoming more apparent (Kamdar, Needham, et al., 2012).

5.3.4 Factors responsible for sleep disturbance. The respondents were asked to identify the factors that prevented or disturbed patient sleep. Loud noise and bright lights from multiple different sources within the ICU, as well as frequent nursing interventions, were highlighted by most nurses as the greatest barriers to sleep. These modifiable factors have been recognised as significant sleep disruptors to patient sleep by multiple historic and contemporary studies (Aurell & Elmqvist, 1985; Edell-Gustafsson et al., 1994; Elliott et al., 2014; Freedman et al., 1999; Gabor et al., 2003; McIntosh & MacMillan, 2009; Ritmala-Castren et al., 2015; Stewart et al., 2017). Along with the established sleep disruptors, the current study respondents identified patient acuity, workflow, policy and visiting hours as detrimental to sleep in the ICU. These factors were considered either controllable and avoidable or uncontrollable and unavoidable in nature.

5.3.4.1 Noise. Noise was identified as a significant contributor to disruption of patient sleep. Staff talking loudly, especially at night, was a major barrier and source of controllable noise reported by the respondents. This echoed nurses' and patients' reports of noise as one of the most significant sleep disruptors in previous research (Hopper et al., 2015; McIntosh & MacMillan, 2009; Stewart et al., 2017). Noises from other sources were recognised in this study, as with previous research, including the uncontrollable nature of noise from alarms, admissions of patients to the unit, doors slamming, and the acoustics of single rooms (Ding et al., 2017; Hopper et al., 2015; Johansson, Bergbom, Waye, Ryherd, & Lindahl, 2012; Johansson et al., 2016). These uncontrollable noises were described by the respondents as problematic. The

respondents did not describe the noise in any detail apart from the source, which may indicate that, while nursing staff view noise as a barrier, they may lack a deeper understanding of the effects of excessive continual noise exposure in the ICU.

Interestingly, current research highlights that single rooms, now prevalent in contemporary ICU architecture, do not protect patients from excessive noise. Litton et al. (2017) performed a cross-sectional, observational study in 39 ICUs across Australia and New Zealand (including the current study site), measuring the ambient sound in the ICU and the total time and number of awakenings of patients during the night (539 patients). The authors found no difference in sound levels between units with single rooms and open units. The study also found that sound levels were high, with a maximum of 78 decibels measured one metre from the patient bed, which exceeds the World Health Organization (WHO) recommendations of 35 decibels in patient areas (Berglund, 1999). This finding is consistent with other research measuring noise levels in the ICU (Darbyshire & Young, 2013; Elliott et al., 2013; Johansson et al., 2012). The difficulty in correlating noise to patient sleep disruption has been a complication of studies seeking to objectively ascertain the extent to which noise affects patient sleep (Aurell & Elmqvist, 1985; Elliott et al., 2013; Freedman et al., 2001; Gabor et al., 2003; Johansson et al., 2012; Litton et al., 2017).

In a comparative study of ICU patients and healthy subjects using PSG, Gabor et al. (2003) found a significant improvement in TST and night sleep among the healthy subjects when in the single ICU room, compared with the open ICU. However, sleep architecture and awakenings were not found to be significantly different for patients or healthy subjects in the single room. The noise from staff activities in single rooms were the predominant source of sound-induced sleep disruption in this study.

5.3.4.2 Light. The current study respondents described light emanating from monitors, corridors, storerooms and adjacent rooms—due to partitions that do not block out light—as uncontrollable and disturbing. The inability to dim lights was a cause of the bright ICU environment. Patients in single rooms with sliding frosted glass partitions were particularly vulnerable to artificial light. In addition, the artificial nocturnal light and lack of natural daylight may contribute to circadian rhythm disturbance in ICU patients (Korompeli et al., 2017). There is conflicting research on the influence of light on sleep among ICU patients. While objective studies have reported light to be one of the most disruptive factors to sleep (Elliott et al., 2014), some subjective studies have indicated that patients perceive light to be less disturbing to their sleep than noise and clinical interventions (Freedman et al., 1999; Stewart et al., 2017). However, an intervention that reduced patient exposure to light improved patient self-reported sleep (Engwall et al., 2015). This finding, combined with Elliott et al.'s (2014) PSG data, support the current study respondents' perception that light is a barrier to patient sleep.

5.3.4.3 Interventions and routines. Critically ill patients require nursing care interventions at frequent intervals during the day and night. For some patients, overnight interventions are essential for survival and recovery; however, for others, they may be performed because of routine, ICU guidelines and/or policy related to task-oriented nursing. The study respondents recognised that overnight nursing interventions, whether considered vital or not, were a significant contributor to sleep disturbances in the ICU. Le, Friese, Hsu, and Wynne (2012) performed a prospective observational study in five different ICUs, using nurses to collect data on nocturnal interventions. Their results indicated that patient care activities were a prime contributor to sleep disruption, with a large number of nocturnal nursing interventions during regular sleep

hours. The most common intervention was nursing assessment. Similarly, Giusti (2016) analysed the frequency, pattern and types of nocturnal care interactions. Administering medications, measuring vital signs, taking blood samples, nutrition and positioning of patients were the most frequent interventions, with over 18 care interactions occurring per night. The retrospective review of medical records performed by Tamburri et al. (2004) concurred with the higher frequency of interventions, citing a mean of over 42 care interactions per night. Gabor et al. (2003) also found a high number of overnight patient care interactions that disturbed patient sleep, such as dressing care, intravenous fluid management and medication administration.

The current study respondents frequently mentioned concerns about patient washes or baths in the early hours of the morning. Many of the nurses considered these washes—a strict routine requirement in this ICU—to be extremely disruptive to patient sleep. The timing of patient washes was considered modifiable by the respondents, yet they felt unable to drive the change themselves because of a perceived lack of control over entrenched night shift nursing routines. It is apparent that this nursing intervention is performed in many ICUs during night-time hours. Tamburri et al. (2004) described routine daily baths as performed 62% of the time between 9.00 pm and 6.00 am, with 61% occurring between 2.00 am and 5.00 am. Hopper et al. (2015) also reported similar sleep disruption behaviour caused by nursing routines, thereby denying recovery-oriented sleep requirements.

To further reiterate the significance of ongoing nocturnal nursing interventions, Ritmala-Castren et al. (2015) performed a PSG study to describe the quality of sleep related to night-time nursing care activities for non-intubated, non-sedated patients. The median time interval between care activities was 47 minutes, with patient position changes and drawing blood the two activities reported to be performed most often. The

authors found that a high number of care activities were significantly associated with less light N2 sleep and slow-wave sleep. From a different perspective, a survey of patients post-discharge from the ICU by Freedman et al. (1999) found that care interactions and diagnostic testing were considered as disruptive as noise. This evidence aligns with the current study respondents' identification of frequent overnight nursing interventions as a significant barrier to the quantity and quality of patient sleep.

5.3.4.4 Patient acuity. Patient acuity was noted by the current study respondents as a reason for sleep disturbance. The concept of patient acuity is complex and is considered to encompass illness severity, complexity and workload requirements in the critical care setting (Brennan, Caitlin, & Barbara, 2009). The severity of patient illness dictates nursing care needs and ultimately contributes to increased instances of external sleep disruptors. An escalation in the medical and nursing care that requires staff to attend to a patient urgently results in an unavoidable increase in noise, light and interventions (Hopper et al., 2015). Using PSG, Gabor et al. (2003) discovered that even healthy adults sleeping in an ICU have decreased nocturnal TST, with a reduced percentage of deep sleep and REM. Ritmala-Castren et al. (2015) also found that patients with reduced severity of illness had more awakenings than did those with a higher level of severity. The assumption was that the less acute patient may be more sensitive to external stimuli. In contrast, using a modified quality of sleep questionnaire, Bihari et al. (2012) conducted a cross-sectional study of 100 patients in a mixed ICU to ascertain patients' perceptions of the factors that affected their sleep, and the quality of sleep they experienced. Bihari et al. found that severity or type of illness, length of stay in the ICU, postoperative status and ICU interventions were not associated with patient perceptions of sleep quality. However, certain limitations could have influenced these results, such as the subjective assessment of sleep quality by patients and recall bias.

Examination of the intrinsic sleep disruptors caused by increased patient acuity or severity of illness was not within the remit of this research. However, sepsis, pain, anxiety, pre-existing conditions (including sleep disorders) and medications (such as inotropic agents) required by the critically ill are recognised as contributing to patient sleep disturbance (Kamdar, Needham, et al., 2012). The perception that patient acuity is a factor for sleep disturbance was not described in detail by the respondents in this study; however, the term 'patient acuity' was presented multiple times by nurses when highlighting barriers to patient sleep. Interestingly, the patients who were likely to have increased illness acuity—such as the heavily sedated, ventilated patients—were considered to have higher sleep quality than the other patients in the ICU. This contradiction could be related to the perceived influence of sedation on sleep by the respondents.

5.3.4.5 Workflow, policy and visiting hours. The respondents also discussed the local and wider health system policy barriers to sleep in the ICU. Specifically, the respondents stated that patient sleep was interrupted by policies relating to the frequency of observations, by staff leaving doors open to patient rooms, and by the timing of nursing cares. They provided examples of two-hourly mouth care, admissions and ward transfers during the night, and no set visiting hours.

ICU protocols, such as frequently monitoring vital signs, were perceived by the respondents to be detrimental to patient sleep. The lack of autonomy of nurses to step-down care and reduce the frequency of observations when the patient condition improves, or upon anticipation of transfer to the ward, was highlighted by the respondents as problematic. In support of this concern, previous studies have found that nurses recognised recurrent overnight observations for patients that are not high acuity as being a policy-based barrier to patient sleep (Hopper et al., 2015; Le et al., 2012).

The 24-hour ICU admission practice is an unavoidable reality when prioritising care for critically ill patients. The respondents noted the significant effect of overnight admissions and movement of patients in and out of the unit. In a ‘naptime’ clustered care initiative, Knauert, Redeker, Yaggi, Bennick, and Pisani (2018) also found that overnight admissions were frequent and disruptive to adjacent patients’ sleep. Similarly, Ding et al. (2017) found that unpredictable workflow contributed to sleep disturbance and highlighted the non-modifiable nature and effects of noise, light and other in-room interruptions. In contrast, the current study respondents discussed certain workflow issues as being potentially avoidable, such as cleaners emptying bins in the early hours of the morning and doctors completing rounds with lower acuity patients during late evening and night. It could be argued that, aside from patient admissions, there are many other workflow factors that are modifiable and that, by prioritising patient sleep, could be minimised overnight.

Many respondents reported that the lack of visiting hours and set times for visitors affected patient sleep, with family members present in the patient’s room throughout the day and night. The respondents frequently made recommendations to implement set visiting times to allow for patient sleep. Gabor et al. (2003) used PSG recordings to observe that family visits and medical care activities caused sleep disruptions that were of longer duration than other disrupting factors. The high acuity of some patients in the ICU means that families may need to be available to stay with a loved one who may be dying, be critically unwell or have a poor prognosis. However, the disruption to patient sleep, as recognised by nurses and by PSG, indicates that nurses may be justified in their concern that constant family presence in the patient room is a barrier to patients achieving good quality and quantity sleep (Berti, Ferdinande, & Moons, 2007).

The knowledge, attitudes and beliefs of the respondent nurses presented in this research indicate that they understand that patients in the ICU experience poor quantity and quality of sleep, and are aware of many of the external factors that are responsible for sleep disturbance. Many of their perceptions on sleep in the ICU are supported by the literature; however, the apparent lack of control in changing factors such as noise, light, clinical interventions, routines, patient acuity and policy influenced their attitudes. Ultimately, this lack of control affects their perceived ability to provide an environment that is conducive to good quantity and quality sleep.

5.3.5 Sleep promotion. Measuring the effectiveness of sleep-promoting interventions has long been identified as a research priority for critical care nurses (Edwards & Schuring, 1993). The respondents in this study considered lowering noise, reducing light, clustering cares and rearranging the day/night routine as the optimal ways to improve patient sleep. The respondents believed that sleep-promoting practices were necessary to improve patient sleep; however, they acknowledged the challenges that exist in implementing these practices with critically ill patients who require frequent interventions.

5.3.5.1 Noise and light reduction. Noise control and light reduction were considered the most important interventions for promoting patient sleep, and were reported to be the most frequently performed. Most of the respondents reported that they talked quietly at night and dimmed overhead lights. The practice of noise control and light reduction was also reported by Hofhuis et al. (2018). The authors found that reducing noise generated by staff and turning room lights off were performed more than 50% of the time in 80% of the ICUs surveyed. Hopper et al. (2015) also found that performing interventions that decreased noise and diminished light were considered important to ICU nurses and medical staff. In contrast, the survey on the perceptions

and practices of ICU providers performed by Kamdar et al. (2016) found that noise control and lighting changes were not considered as important as clustering patient cares. However, the respondents to Kamdar et al.'s survey were only able to choose one item that they believed would improve patient sleep.

The importance of reducing noise and light to assist sleep should be intuitive; however, the busy nature of the ICU and the high acuity of patients mean that the simplest sleep-promoting measures may be overlooked. The respondents in this study believed that noise and light are one of the most significant barriers to patient sleep, and noise and light reduction were reported as the most often performed sleep-promoting practice. Despite the respondents' attempts to consistently reduce noise and light at night, they still considered them a significant cause of sleep disruption in this ICU. This may indicate that a large proportion of the noise and light is perceived as uncontrollable.

5.3.5.2 Clustering cares and day/night routine. The majority of the respondents reported that they clustered patient care and implemented day/night routines to improve sleep. These actions were believed to be essential by all respondents. Similar findings were reported by Kamdar et al. (2016), where clustering patient care provided uninterrupted blocks of sleep and was the one practice the ICU providers believed had the potential to improve their patients' sleep. Ding et al. (2017) also identified the clustering and rescheduling aspects of care as the most commonly reported sleep-promoting practice. Although the respondents in the current study reported performing these practices frequently, many believed that clustering care was not necessarily prioritised by their colleagues and that this practice could be improved. The respondents also believed that clustering care could be implemented more consistently with the use of enforced guidelines. Tamburri et al. (2004), Hopper et al. (2015) and Le et al. (2012) all suggested that sleep-promotion efforts, such as clustering care, require assessment of

patient acuity. They asserted that, by identifying patients who are not critically ill or are in recovery from critical illness, cares and interventions can be stepped down and performed in blocks to better prioritise sleep. However, because of the complexity of intensive care patients, the need for uninterrupted sleep must be balanced against the need for frequent assessment and observation.

5.3.5.3 Earplugs and eye masks. The respondents considered it important to use sleep aids, such as earplugs and eye masks, yet viewed this as less important than other sleep-promoting practices. This was reflected by the respondents who reported use only on occasion, with some claiming to have never provided either sleep aid. Some respondents stated that most patients refused earplugs or eye masks when offered, and others stated that eye masks were not available in the unit. Previous studies have found that patients refused the use of earplugs and eye masks because of discomfort (Boyko et al., 2012; Jones, 2012), and that they are not widely promoted or used by ICU nurses (Hofhuis et al., 2018). The use of earplugs and eye masks can improve the subjective experience of sleep, with patients reporting longer sleep time (Hu, Jiang, Hegadoren, et al., 2015; Jones, 2012; Richardson, Allsop, Coghill, & Turnock, 2007; Scotto, McClusky, Spillan, & Kimmel, 2009). However, there remains the possibility that nurses are unaware of the benefits of using non-pharmacological sleep aids to promote sleep; therefore, they do not advocate them for patient use. Nurse education on the benefits of sleep aids, such as earplugs and eye masks, may increase patient compliance through nurses' endorsement of the practice to their patients.

5.3.5.4 Medications. Administration of benzodiazepines was reported by the majority of the respondents as an irregular practice. In contradiction, the respondents considered the use of benzodiazepines as reasonably important as an intervention to promote sleep. Interestingly, many of the respondents described the reluctance of

doctors to prescribe medications for sleep in this ICU. This is similar to the findings of Hopper et al. (2015), who discovered differing opinions between doctors and nurses regarding administration of medications to facilitate patient sleep, and a lack of consensus on whether medications to promote sleep are effective or have deleterious effects. Kamdar et al. (2016) asserted that half of the providers in the ICUs surveyed estimated that only one-quarter of patients received medications to assist sleep. A dearth of empirical evidence is available on the best medication to promote sleep with minimal side effects (Oto et al., 2012). The lack of high-level evidence regarding the positive sleep outcomes associated with the use of benzodiazepines in ICU patients is likely to contribute to the contradiction between the perceptions and practices of the respondents in this study.

5.3.5.5 Ventilation. The least often performed sleep-promoting practice was the adjustment of ventilation settings. Seventy-three per cent of respondents reported this as an infrequent practice, despite their general conviction of its importance for sleep promotion. Some of the respondents saw this primarily as the role of the doctor, and suggested they were actively discouraged from making ventilatory changes. Ventilation has been shown to have adverse effects on sleep architecture because of desynchrony, disruption of circadian rhythm and reduction of slow-wave and REM sleep, with some modes of ventilation affecting sleep more than others (Blissitt, 2016; Delisle, Ouellet, Bellemare, Tétrault, & Arsenault, 2011; Matthews, 2011). Parthasarathy and Tobin (2004) suggested that mechanically ventilated patients experience considerable sleep disruption, with greater sleep fragmentation during pressure support than with assisted controlled ventilation. Even with the knowledge that certain modes of ventilation cause sleep disturbance, a previous study found that nurses often lack the confidence to change ventilator settings to promote sleep (Blissitt, 2016). It is unknown if this is a

parallel for the respondents in the current study; however, the lack of nurse autonomy in regard to ventilation in this ICU appears to prohibit this practice.

5.3.5.6 Education. No formal education on sleep was reported by the respondents. Many reported holding a postgraduate qualification; however, the area of study was not asked or disclosed. Interestingly, the respondents with a master's degree reported no formal education on sleep in the ICU. Education was suggested by the respondents as a way to improve patient sleep. Similarly, Ding et al. (2017) found that nurses perceived education on sleep and sleep improvement as a means to promote sleep. A paucity of research on nurses' knowledge of sleep, sleep promotion and interventions was found. Thus, clinical practice appears to be the primary way for nurses to learn about sleep (McIntosh & MacMillan, 2009).

Curriculum recommendations for sleep education in undergraduate and postgraduate nursing programs have been developed by expert nurses in the field of sleep and circadian rhythm (Lee et al., 2004). The recommendations outline the need for research, education and training of healthcare professionals to improve patient sleep (Lee et al., 2004). A scan of the literature from the past 20 years found recommendations for education of nurses, specifically in regard to their important role in sleep promotion and to ensure awareness of the consequences of sleep deprivation in critically ill patients (Delaney et al., 2015; Krachman et al., 1995; Pisani, 2015). It appears that the majority respondents in the current study have not been recipients of these recommendations.

5.3.5.7 Sleep-promotion protocol and clinical practice guidelines. The majority of respondents had not worked in an ICU with a documented sleep-promotion policy, guideline or protocol. Of the 24 respondents who had worked in an ICU with either a SPP or CPG, half had never worked outside of WA. This indicates that the respondents'

previous ICU employment in WA operated a SPP or CPG. The presence of documented SPP and CPGs for promotion of sleep in the ICU environment is inconsistent. Of the studies that feature the use of an SPP and CPG, Hofhuis et al. (2018) found that 9% of the ICUs had a SPP or guideline for sleep, Kamdar et al. (2016) noted that 32% of ICUs had an SSP, and Litton et al. (2017) indicated that only 15% of the study sample in Australia and New Zealand reportedly used an SPP or sleep-promoting policy. Although the number of ICUs using a documented sleep policy is low, the respondents in this study suggested that the implementation of such a guideline or protocol would influence their practice and positively affect patient sleep.

The implementation of an SSP and CPG has led to positive outcomes relating to sleep promotion. Kamdar et al. (2016) found that practitioners with established sleep protocols believed their patients experienced better sleep quality, and they could assess their patient sleep, control light conditions and control environmental noise levels. Monsén and Edéll-Gustafsson (2005) implemented a change to doctors' and nurses' routines with uninterrupted periods for patients, and found a reduction in the sleep disturbance of patients. The authors suggested that their behaviour modification program increased staff awareness of the need for patient sleep and for periods of uninterrupted sleep. Elliott and McKinley (2014) developed a CPG to improve sleep in a single-site ICU, called 'Rest and Sleep for the ICU Patient'. The solution-focused approach developed a complex CPG to increase the sleep of ICU patients. At the time of report, the guideline had been adopted into the unit; however, it was not yet embedded in practice.

5.4 Theory of Planned Behaviour

In relation to the TPB, the current study respondents believed that sleep was important and the provision of undisturbed sleep to patients was a priority (behavioural

belief). The respondents were divided on whether their colleagues were concerned about their patients' sleep (normative belief) and indicated a perceived lack of control of the environmental factors that affect patients' quality and quantity of sleep (control belief). In accordance with the TPB, the behavioural belief was favourable; however, the normative and control beliefs were not, thereby indicating that the respondents' intention to perform sleep-promoting behaviours was hindered.

Jenner, Jenner, Watson, Miller, and Jones (2002) used the TPB to explore nurses' hand hygiene behaviour. They suggested that knowledge is insufficient to change behaviour and that coworkers and environmental barriers can negatively influence nursing practice. Enhancing nurses' sense of ownership and designing interventions to improve adherence to practice were recognised as significant motivators for improving intention and promoting the desired behaviour. Using the TPB as a theoretical framework to improve the intention of nurses to perform sleep-promoting behaviours within the ICU may be a valid approach, as the TPB has been recognised as useful in creating strategies to help increase the uptake of nursing guidelines (Francis et al., 2004).

5.5 Research Questions Addressed

Research Question 1: What attitudes and beliefs do nurses hold regarding the importance of quality and quantity of sleep in the ICU patient?

The respondents conclusively believed that sleep is important for ICU patients. Their knowledge of the environmental and modifiable barriers to sleep was consistent with the current evidence from sleep research. However, their understanding of the importance of sleep was not due to any formal education provided on sleep in the ICU, and is subsequently likely to have been gained through clinical experience and personal observation. The respondents felt they lacked control over certain systemic and

environmental barriers to patient sleep, which affected their sleep-promotion efforts. They commiserated with patients about sleep disturbance as a result of the ICU environment; however, they did not necessarily believe their colleagues were as understanding or concerned about the provision of an environment that promoted sleep. The respondents also believed they were able to make accurate assessments when patients were affected by various levels of sedation and airway support, notwithstanding a lack of knowledge of specific validated sleep assessment tools. They believed the patients for whom they cared did not receive the quality or quantity of sleep they required for recovery, and they felt this contributed to negative outcomes, such as the development and persistence of delirium. The respondents highlighted education, routines and practice changes as important to create a more sleep-friendly ICU.

Research Question 2: What therapeutic behaviours/sleep-promoting practices do ICU nurses report using to promote quality and quantity of sleep among the patients for whom they care?

The reported sleep-promoting practices performed by the respondents were not integrated with specific guidelines. The respondents indicated that their practices were not uniform and were inconsistent in application. The most common practices reported were dimming lights at night time, talking quietly, and clustering cares to minimise night-time disruption. A lack of control over other staff members talking loudly during night shift, mechanical ventilation changes to promote sleep, and visitation times was reported and considered to significantly affect patients' achievement of adequate quality sleep. The respondents did not consider sleep aids, such as earplugs and eye masks, as important, and they were used infrequently. The majority of the sleep-promoting practices were based around avoiding noise, light and frequent interventions, rather than actively providing aids to barricade sensory stimulation.

Research Question 3: Do nurses' attitudes and beliefs regarding sleep in the ICU patient reflect their reported practices?

The respondents believed that achieving adequate quality and quantity of sleep was important and should be prioritised to improve patient outcomes among the critically ill. However, they also identified environmental and systemic barriers that prohibited sleep-promoting practices that would provide patients with blocks of undisturbed sleep. Therefore, the attitudes and beliefs of the respondents were inconsistent with their reported practices. The respondents' reports indicated that there was a contradiction between policy designed to provide a high standard of care to critically ill patients, and the prioritisation of practices aimed at protecting patient sleep. The respondents recognised that sleep cannot be the number one priority for critically ill patients; however, the prioritisation of non-urgent nursing interventions (such as patient washes) over allowing patients to sleep is paramount to improving patient outcomes.

5.6 Significant Findings

This study was concerned specifically with intensive care nurses and their perceptions on a range of topical issues relating to patient sleep in the ICU. The responses allowed the researcher to comprehensively answer the research questions presented. However, three other significant findings also emerged from the research. These findings were as follows:

1. The respondents reported having received no formal institutional-based education on sleep for intensive care patients.
2. The respondents were unaware of any valid and reliable sleep assessment tool they could use to assess their patients' sleep in the ICU.
3. Despite being aware of the causes of the external disruptors to patient sleep, the respondents felt powerless to change them.

5.7 Limitations

The limitations of this study are identified as follows. This study relied on a small sample drawn from one public tertiary healthcare service in WA. Thus, the perceptions and practices of ICU nurses in public or private hospitals in other areas of WA, other states of Australia and other countries may vary, which could affect the generalisability of the results. A further limitation is potential recruitment bias, as the researcher was an employee in the study setting. This was addressed with the use of a voluntary, anonymous survey that was distributed via email using an online data collection tool. It is also important to note that the researcher did not hold a senior or management position in which the power differential could be considered to have limited recruitment or data collection. Additionally, the two-week period of time that the survey was open, is recognised as being brief, negatively affecting the response rate. Finally, response bias is a potential limitation of this study, as it is possible that the respondents felt pressure to answer questions positively when asked about the importance of sleep and application of sleep-promoting practices.

5.8 Summary

This chapter has described the quantitative and qualitative data and discussed the findings in relation to the current literature and the theory that underpinned this study. The findings from this descriptive survey method were used to address and answer the three research questions and highlight significant findings. The limitations of the research were also recognised and discussed. In summary, the findings from this descriptive survey contribute to a growing body of knowledge on nurses' current perceptions and practices regarding sleep promotion, and the effects these may have on sleep in the ICU patient. The implications and recommendations for future practice are discussed in the following chapter.

Chapter 6: Recommendations and Conclusion

6.1 Introduction

This study was conducted to provide an insight into nurses' perceptions and practices regarding sleep among critically ill patients. Nurses are the gatekeepers of the ICU; thus, these nurses' beliefs can impede or promote patient sleep, and understanding these beliefs is vital to elicit changes. These changes can be included in policy and practice to improve the prioritisation of patient sleep in a way that complements, rather than prohibits, the quality of care for critically unwell patients.

The findings of this study have offered an indication of what nurses believe is important for the practice and provision of an environment that supports patients to achieve sufficient quantity and quality of sleep. The respondents suggested that improvements could be made to routines, environment and policy to better accommodate the sleep of patients, and that these changes would be welcomed and encouraged in the ICU.

Awareness of the negative effects of noise, light and nursing interventions was evident; however, a lack of confidence and ability to control these issues was apparent. Contributing factors, such as other staff members, management, ICU policy and workflow, were described as the reasons for the powerlessness felt by the respondents. The respondents strongly believed that their patients were concerned about sleep when staying in the ICU, and provided insights into nurse–patient communications regarding the stress caused by sleep disruption.

A chasm exists between nurses' beliefs and attitudes regarding the importance of patients achieving uninterrupted sleep, and decision making and prioritisation of sleep-promoting practices. This study's findings suggest that formal education on patient sleep in the ICU is not provided within tertiary education or as professional

development in the ICU. The respondents believed that more education is a requirement to understand the complexity of sleep in ICU patients and to ensure that sleep-promoting practices are informed by evidence. This chapter will discuss the significant findings from this research and present recommendations for clinical practice, future research and education.

6.2 Recommendations for Education

A significant finding was the deficit of formal education on sleep in critically ill patients among the nursing cohort in this study. Respondents who had attained postgraduate qualifications comprised 65% of the sample, yet no nurses reported receiving education from university studies or formal education within the ICU. Increases in knowledge are associated with influencing attitudes and behaviour. This is evident in nursing practice, where nurses make clinical decisions based on education from empirical research, combined with policies, guidelines, experience and clinical judgement (Ervin, 2002; Penz & Bassendowski, 2006; Rycroft-Malone, Seers, Titchen, & Harvey, 2004). A scan of WA universities delivering undergraduate nursing degrees and postgraduate critical care courses determined that education on sleep in acute care settings is not a specific learning outcome or requirement.

This study's recommendations focus on a structured approach to education on patient sleep as part of the curriculum in both undergraduate and postgraduate nursing courses. More specifically, this study recommends:

- in undergraduate nursing degrees and postgraduate critical care courses, teaching should be provided on the topics of normal and abnormal sleep architecture, the sleep measurement tools available for nurses to assess sleep, the factors contributing to sleep disruption specific to the ICU, pharmacological interventions and sleep-promoting strategies

- in undergraduate nursing degrees and postgraduate critical care courses, learning and practice objectives should be implemented relating to sleep and sleep promotion in the ICU within the relevant critical care unit
- graduate and novice ICU nurses should receive education upon orientation to the ICU
- sleep-related competencies should be included in skills development and competency booklets within the ICU.

6.3 Recommendations for Clinical Practice

The results of this study have highlighted that systemic change is required to nursing education, nursing practice and the ICU environment to prioritise and promote patient sleep. The scarcity of empirical evidence on effective sleep-promotion practices that improve patient outcomes in the ICU has been identified as the primary reason for lack of consensus and implementation of standards of care focusing on sleep. Bridging the gap between theory, research and practice to improve patient outcomes relies on evidence-based nursing practice being more than just research, and instead incorporating all aspects of practice knowledge (Estabrooks, 1998; Penz & Bassendowski, 2006).

The recommendations for clinical practice resulting from this study include:

- developing a sleep-promotion protocol or CPG in consultation with ICU stakeholders
- developing a sleep policy, including assessment, documentation and handover guidelines
- designation of nursing ‘champions’ focused on patient sleep within the ICU
- standardisation of pharmacological sleep aids that are recommended by doctors and supported by nurses

- ensuring the availability of a ‘sleep first aid kit’ at each bedside, containing earplugs, eye masks and a sign that can be placed on the door of the patient’s room indicating that the patient is sleeping and should not be disturbed.

6.4 Recommendations for Future Research

The findings in this study are limited by the single-site ICU and small sample of ICU nurses. Thus, these findings are not generalisable to the WA or Australian ICU nursing population. As such, several recommendations for future research have emerged from this study to encourage education, promote the uptake of research findings to practice and help develop tools to assist nurses in their sleep assessment practice. The specific recommendations for further research include:

- using this research as a pilot study to conduct a nationwide survey of ICU nurses
- pre- and post-education intervention in the ICU—educating nurses and doctors on patient sleep to determine the effect of improved knowledge on patient self-reports of sleep experiences in ICU
- implementing research to promote the uptake of research findings related to practices that have been evidenced to promote patient sleep
- further development and testing of a valid and reliable sleep assessment tool that can be easily used by nurses
- further research on the effects of implementing multifaceted bundles of care to improve patient sleep.

6.5 Conclusion

This descriptive study has presented the attitudes, beliefs and reported practices of intensive care nurses regarding patient sleep in a single-site tertiary hospital in WA. Protecting the sleep of patients in the ICU was considered a priority by the nursing

cohort in this study. The barriers to patient sleep in the ICU were identified as being multifaceted, and the respondents identified that changes to ICU education, routine, policy and workflow are essential to support their practice in promoting patient sleep.

Current research definitively recognises the need to improve sleep among ICU patients. The lack of high-level research that provides evidence of sleep-promotion strategies to improve patient outcomes has affected the development of an evidence-based practice approach to patient sleep in the ICU. The inclusion of nurses in future research, evidence-based policy development and clinical practice changes concerning patient sleep is essential to ensure changes are supported, understood and embedded into nursing practice and ICU culture for the benefit of the recovery of patients.

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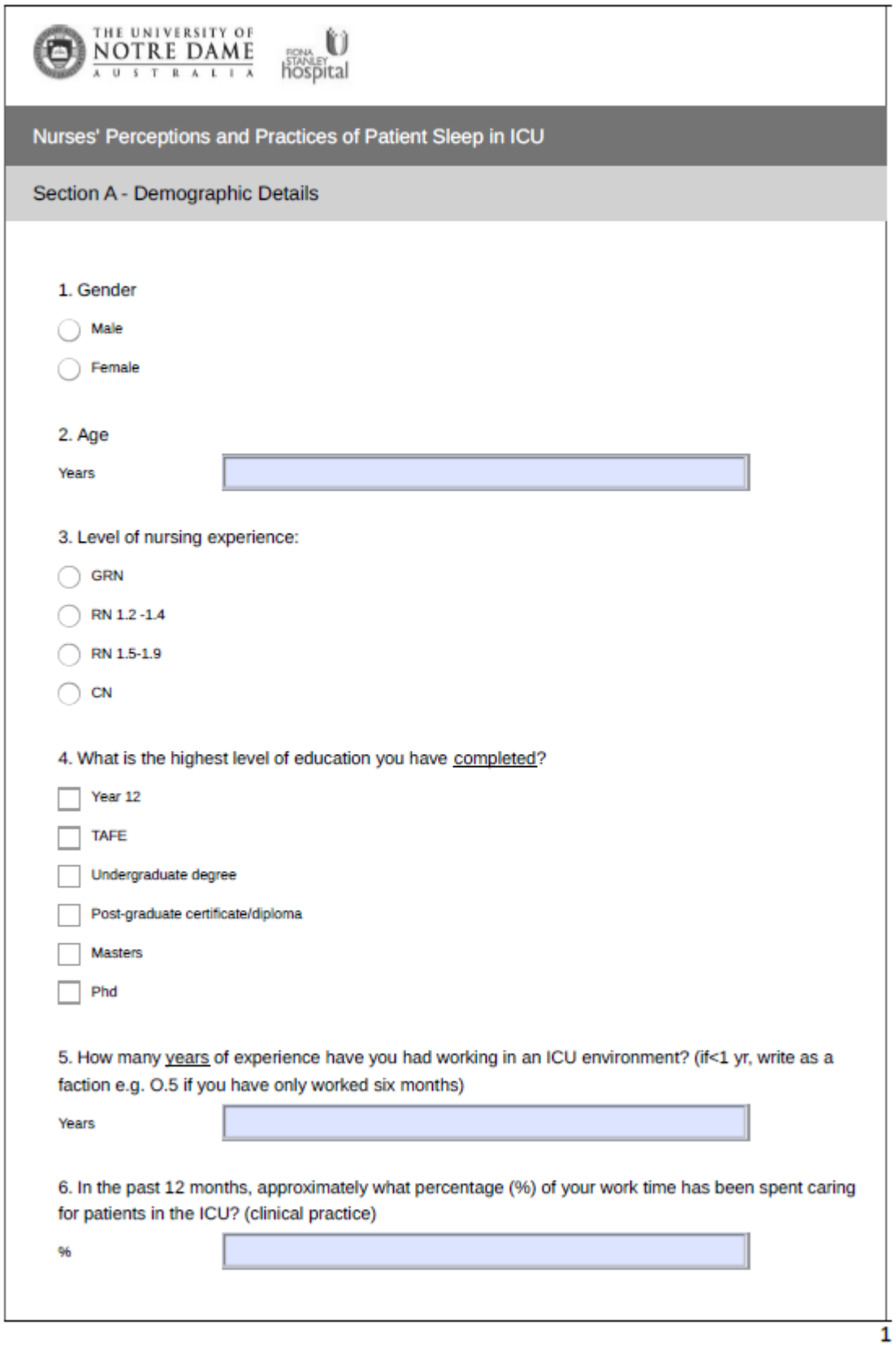
Appendix A: Questionnaire



THE UNIVERSITY OF NOTRE DAME AUSTRALIA

FIONA STANLEY hospital

Nurses' Perceptions and Practices of Patient Sleep in ICU

Section A - Demographic Details

1. Gender

- ○ Male
- ○ Female

2. Age

Years

3. Level of nursing experience:

- ○ GRN
- ○ RN 1.2 -1.4
- ○ RN 1.5-1.9
- ○ CN

4. What is the highest level of education you have completed?

- ☐ Year 12
- ☐ TAFE
- ☐ Undergraduate degree
- ☐ Post-graduate certificate/diploma
- ☐ Masters
- ☐ Phd

5. How many years of experience have you had working in an ICU environment? (if<1 yr, write as a faction e.g. O.5 if you have only worked six months)

Years

6. In the past 12 months, approximately what percentage (%) of your work time has been spent caring for patients in the ICU? (clinical practice)

%

1

7. How many intensive care units have you worked in OTHER than Fiona Stanley Hospital ICU?

Number

8. How many ICU departments have you worked in outside of Western Australia?

Number

9. Have you worked in an ICU with a sleep promotion protocol or clinical practice guideline on patient sleep?

- [ ] Yes
- [ ] No
- [ ] N/A - Have not worked in any other ICU

10. Approximately what percentage of your clinical practice do you spend working night-shift?

%

THE UNIVERSITY OF NOTRE DAME AUSTRALIA

FIONA STANLEY hospital

Nurses' Perceptions and Practices of Patient Sleep in ICU

SECTION B

11. On average, how many HOURS in a 24 hour period do you believe your patients sleep while in the ICU?

Hours

12. How many HOURS specifically dedicated for sleep, in a 24 hour period, do you believe ICU patients need?

Hours

13. Are you aware of any tools available to help you assess patient sleep quantity and quality?

- [ ] Yes
- [ ] No

If 'yes', please specify:

14. Have you ever received any education on patient sleep in the ICU?

- ( ) Yes
- ( ) No

If 'yes' please specify:

Please state your degree of agreement with the following:

15. Ensuring QUALITY sleep is an essential part of nursing an ICU patient

Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
( )	( )	( )	( )	( )

16. Ensuring adequate QUANTITY of sleep is an essential part of nursing an ICU patient

Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
○	○	○	○	○

17. Do you believe your ICU nursing collegues are concerned about sleep disturbance in their patients?

- ○ Yes
- ○ No
- ○ Don't know

18. Do you believe that patients are concerned about lack of sleep during their stay in the ICU

- ○ Yes
- ○ No
- ○ Don't know

19. I am **able to assess** whether my patient is asleep:

	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
a) When receiving mechanical ventilation via an endotracheal tube who is requiring deep sedation (RASS -5 to -4)	○	○	○	○	○
b) When receiving mechanical ventilation via an endotracheal tube who is requiring moderate sedation (RASS -3)	○	○	○	○	○
c) When receiving mechanical ventilation via an endotracheal tube who is requiring light sedation (RASS-2 to RASS -1)	○	○	○	○	○
d) When receiving mechanical ventilation via endotracheal tube or tracheostomy who is not requiring sedation	○	○	○	○	○
e) When maintaining own airway and requiring no sedation	○	○	○	○	○

20. Rate the overall QUALITY of your patient's sleep while they are in the ICU:

	Very Good	Good	Acceptable	Poor	Very Poor
a) When receiving mechanical ventilation via an endotracheal tube and requiring deep sedation (RASS-5 to -4)	○	○	○	○	○
b) When receiving mechanical ventilation via an endotracheal tube and requiring moderate sedation (RASS -3)	○	○	○	○	○
c) When receiving mechanical ventilation via an endotracheal tube and requiring light sedation (RASS -2 to -1)	○	○	○	○	○
d) When receiving mechanical ventilation via endotracheal tube or tracheostomy and requiring no sedation	○	○	○	○	○
e) When maintaining own airway and requiring no sedation	○	○	○	○	○

Please rate your degree of agreement with the following:

21. Poor QUALITY sleep in the ICU patient has the potential to negatively impact the following:

	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
a) Ability to fight off infection	○	○	○	○	○
b) Ability to heal wounds	○	○	○	○	○
c) Extubation	○	○	○	○	○
d) Development or persistence of delirium	○	○	○	○	○
e) Hospital length of stay	○	○	○	○	○
f) Ability to participate in physical therapy	○	○	○	○	○
g) Development of depression	○	○	○	○	○
h) Survival	○	○	○	○	○

5

22. Please rate the **degree of importance** you place on the following interventions to improve sleep in patients in the ICU:

	Very Important	Important	Moderately Important	Slightly Important	Not Important
a) Administration of benzodiazipines (temazepam, diazepam) prescribed for sleep	○	○	○	○	○
b) Lowering alarm levels to decrease noise at night time	○	○	○	○	○
c) Talking quietly at night	○	○	○	○	○
d) Providing ear plugs	○	○	○	○	○
e) Dimming/turning off lights at night	○	○	○	○	○
f) Providing eye-masks	○	○	○	○	○
g) Day/Night routine (e.g. wash during day)	○	○	○	○	○
h) Clustering patient care interventions to minimise nocturnal disruption	○	○	○	○	○
i)Adjust mechanical ventilation/BiPAP settings to make it more comfortable for your patient	○	○	○	○	○
j) Temporarily suspend visitors to allow patient to sleep	○	○	○	○	○

6

23. Please rate **how often you perform** the following sleep promoting practices for your patient

	Always	Very Often	Sometimes	Rarely	Never
a) Administration of benzodiazepines	○	○	○	○	○
b) lower alarm levels at night	○	○	○	○	○
c) Talk quietly	○	○	○	○	○
d) Offer ear plugs	○	○	○	○	○
e) Dim lights at night time	○	○	○	○	○
f) Offer eye masks to patient	○	○	○	○	○
g) Day/night routine	○	○	○	○	○
h) Cluster patient care interventions to minimise nocturnal disruption	○	○	○	○	○
i) Adjust mechanical ventilator/ BiPAP settings to make it more comfortable for your patient	○	○	○	○	○
j) Temporarily suspend visitors to allow patient to sleep	○	○	○	○	○

7

THE UNIVERSITY OF NOTRE DAME AUSTRALIA

RONA STANLEY hospital

Nurses' Perceptions and Practices of Patient Sleep in ICU

SECTION C - Open-ended questions

24. What do you observe when making an assessment about your patient's sleep?

25. What is YOUR personal opinion on the sleep of patients in ICU

26. Are their any barriers to improving patient sleep in the ICU you work in?

27. How do you think you/we could improve patient sleep in the ICU

END OF QUESTIONNAIRE
THANK YOU FOR PARTICIPATING
Please place survey in the labelled lock box in the tea room

Appendix B: Permission to Use and Adapt the SLEEPii Survey

From: Kamdar, Biren B. <BKamdar@mednet.ucla.edu>
Sent: Tuesday, July 11, 2017 2:40 PM
To: Rebecca Hahn
Subject: RE: Permissions to use and adapt questionnaire - Perceptions and Practices Regarding Sleep in the Intensive Care Unit

Hi Rebecca

Margaret has been swamped but she emailed me back – and she's OK with you using the SLEEPii survey!! She also was OK with me working with you to modify/update the questionnaire which I think would be super important to improve the quality of your study

I wonder whether it might help to have a phone meeting? I know you're in Australia so you're ~15 hours ahead of Los Angeles time .. I'm available Thursday and Friday afternoon (US Pacific Time) to chat

Before the meeting it might help to send me any updates/modifications to the survey instrument that you've made so far

Please let me know about the meeting

Thanks
Biren

Biren Kamdar, MD, MBA, MHS
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310-825-3763 (office), **310-206-8622** (Fax), **bkamdar@mednet.ucla.edu**

Appendix C: SLEEPii Survey

Online Data Supplement

Perceptions and Practices Regarding Sleep in the ICU: A Survey of 1,223 Critical Care Providers

Biren B. Kamdar, MD, MBA, MHS, Melissa P. Knauert, MD, PhD, Shirley F. Jones, MD, Elizabeth C. Parsons, MD, MSc, Sairam Parthasarathy, MD, Margaret A. Pisani, MD, MPH for the Sleep in the ICU (SLEEPii) Task Force

SLEEP IN THE INTENSIVE CARE UNIT SURVEY

1. Please document your role in providing care in the intensive care unit
   - ❍ Nurse
   - ❍ Nurse in training
   - ❍ Advanced Practice Nurse (Nurse practitioner, clinical nurse specialist, nurse anesthetist)
   - ❍ Physician's Assistant
   - ❍ Pulmonary-Critical Care Fellow
   - ❍ Surgical Critical Care Fellow
   - ❍ Attending Physician
   - ❍ Cardiology Fellow

2. How many years of experience have you had working in an intensive care unit environment?

3. What is your age in years?

4. What is your gender?
   - ❍ Male
   - ❍ Female

5. In what Country do you practice?
   - ❍ United States
   - ❍ Great Britain
   - ❍ France
   - ❍ Australia
   - ❍ New Zealand
   - ❍ Spain
   - ❍ Italy
   - ❍ China
   - ❍ India
   - ❍ Brazil
   - ❍ Korea
   - ❍ Canada
   - ❍ Other _____

6. What is the zip code where you practice in the intensive care unit?

7. Please check your primary area of expertise.
   - ❍ Internal Medicine-Pulmonary & Critical Care
   - ❍ Internal Medicine-Critical Care
   - ❍ Internal Medicine-General Internal Medicine
   - ❍ Internal Medicine-Cardiology
   - ❍ Surgery-Critical Care
   - ❍ Anesthesiology

E2

- ❍ Emergency Medicine
- ❍ Neurology-Neurocritical Care
- ❍ Family Medicine
- ❍ Other _____

8. What is your practice setting? Check all that apply.
   - ❍ Academic Medical Center
   - ❍ University Hospital
   - ❍ Private Hospital
   - ❍ Urban, Public Hospital
   - ❍ Veterans Affairs Hospital
   - ❍ Other _____

9. Are you the director of an intensive care unit?
   - ❍ Yes
   - ❍ No

10. When do you typically spend the majority of your hours working in the ICU?
    - ❍ Days
    - ❍ Nights
    - ❍ 50% Days and 50% Nights

11. How much of your clinical practice is spent caring for patients in the ICU?
    - ❍ 0-10%
    - ❍ 10-25%
    - ❍ 25-50%
    - ❍ 50-75%
    - ❍ 75-100%

12. How many ICU beds does the unit you work in have?

13. How many different ICU's does your hospital have? Check all that apply
- ❍ Medical
- ❍ Surgical
- ❍ Cardiac
- ❍ Medical-Surgical
- ❍ Neurosurgical
- ❍ Cardiothoracic Surgery
- ❍ Burn

14. How many beds does the hospital you practice in have?

15. On average how many hours in a 24-hour period do you think your patients sleep while in the ICU?

16. Rate the overall QUALITY of your patients sleep while they are in the ICU?

Very Poor (1)	Poor (2)	Fair (3)	Good (4)	Very Good (5)	Excellent (6)
❍	❍	❍	❍	❍	❍

17. Please indicate the level of importance that ICU patients sleep (both quantity and quality) while under your care?

Unimportant (1)	1 (2)	2 (3)	3 (4)	4 (5)	Extremely Important (6)
❍	❍	❍	❍	❍	❍

18. Do you believe that if your patients sleep poorly while critically ill it could affect their recovery?
- ❍ Yes
- ❍ No
- ❍ Maybe
- ❍ Don't know

19. Which aspects of a patient's recovery do you think could be adversely affected by poor sleep in the ICU? (Check ALL that apply)
- ❍ Ability to fight off infection
- ❍ Ability to heal wounds
- ❍ Liberation from mechanical ventilation
- ❍ Development or persistence of delirium
- ❍ Hospital length of stay
- ❍ Ability to participate in physical therapy
- ❍ Development of depression
- ❍ Survival
- ❍ Don't know

20. What is the ONE thing that you believe may improve your patients sleep in the ICU?
    - ❍ Medication prescribed for sleep
    - ❍ Noise control
    - ❍ Keep patients awake during the day so they are more tired for sleep at night
    - ❍ Keeping them physically active during the day so they are more tired for sleep at night
    - ❍ Keeping the ICU room dark at night and bright during the day
    - ❍ Allowing patients blocks of uninterrupted sleep time
    - ❍ None of the above
    - ❍ Don't know
    - ❍ Other _____

21. How many HOURS per DAY specifically dedicated for sleep do you believe is SUFFICIENT for your ICU patients?

22. How many hours of dedicated time for sleep do you believe can be REALISTICALLY ACHIEVED in your ICU patients?

23. What percentage of patients receive medication specifically to help them sleep while they are in your ICU?

24. Please rank the following items from MOST important to LEAST important as disturbances of patient sleep in your ICU. Rank 1 as being the MOST important and 12 being the LEAST important. (YOU CAN CLICK AND DRAG ITEMS IN ORDER OF YOUR PREFERENCE)
    - _____ Medication administration
    - _____ Measuring vital signs
    - _____ Performance of radiographic studies
    - _____ Suctioning of airway secretions/Ventilator adjustments
    - _____ Bathing
    - _____ Physical examination by providers
    - _____ Wound care
    - _____ Noise levels in the ICU
    - _____ Light levels in the ICU
    - _____ Visitation from family and friends
    - _____ Patient repositioning
    - _____ Other

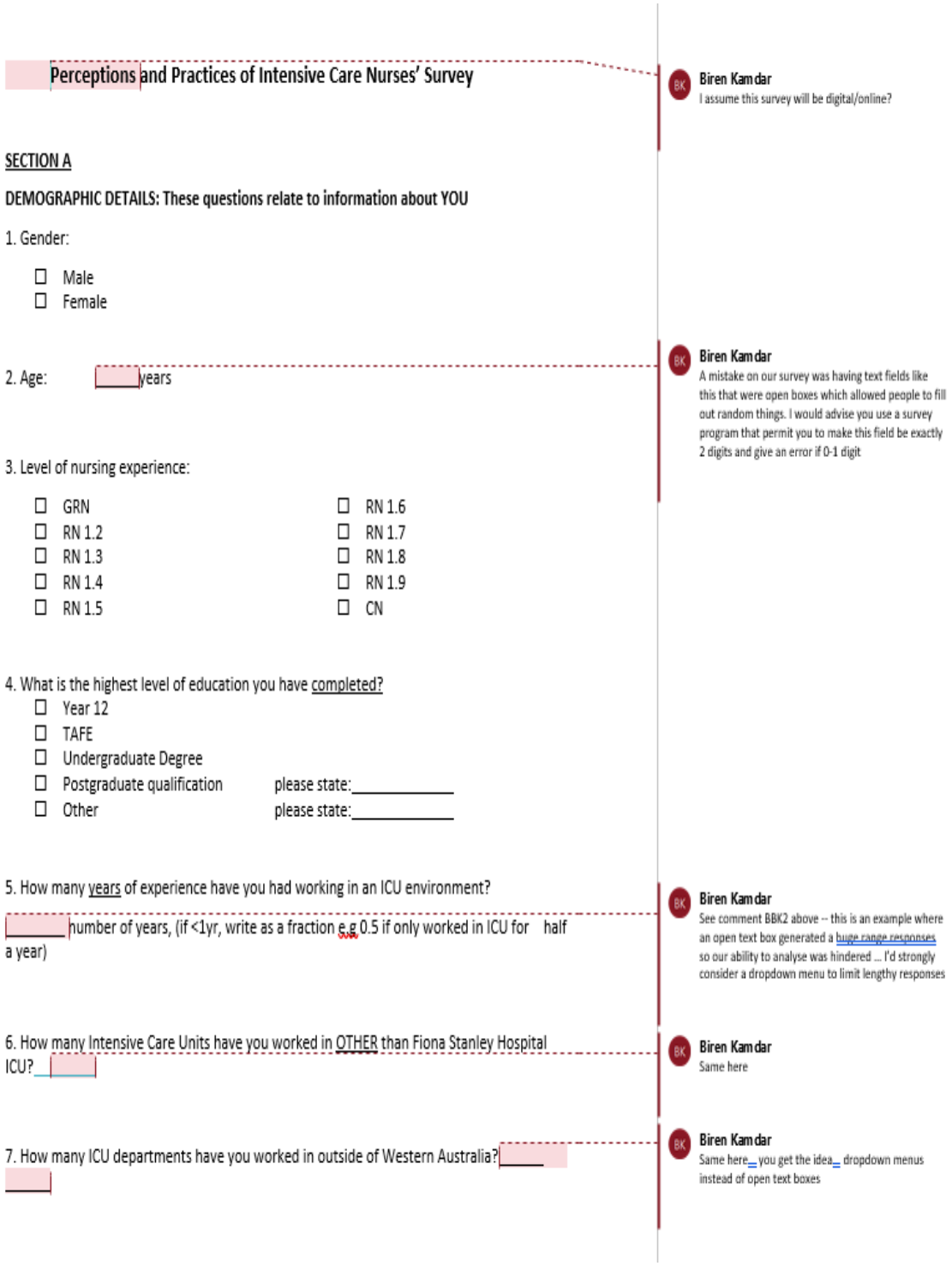
25. Does your ICU have a protocol aimed at PROMOTING SLEEP for your ICU patients?
    - ❍ Yes
    - ❍ No
    - ❍ Don't Know

26. How long have you had a protocol for sleep promotion in your ICU? Please respond in years.

27. Please rate how certain you are that you CAN PERFORM each of the following tasks described below

	You can absolutely never do this	2	3	4	5	6	7	8	9	You can do this absolutely every time
Assess whether your ICU patients are sleeping enough	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
Control the ICU environmental lighting conditions for your patients to allow them to sleep	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
Control the environmental noise levels for your ICU patients to allow them to sleep	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
Adjust the mechanical ventilator or BiPAP settings to make it more comfortable to allow your patients to sleep	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
Delay non-emergency disturbances of stable ICU patients in order to allow them time to sleep (e.g., administering medications, checking vitals signs, bathing, etc.)	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
Adhere to a sleep protocol designed for ICU patients that requires clustering of care	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
Temporarily suspend visitation from family and friends to allow your ICU patients time to sleep	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
Create conditions in your ICU to allow your stable patients dedicated time to sleep at night	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍

Appendix D: Example of the Development and Testing of Questionnaire by Dr Biren Kamdar



Perceptions and Practices of Intensive Care Nurses' Survey

Biren Kamdar
I assume this survey will be digital/online?

SECTION A

DEMOGRAPHIC DETAILS: These questions relate to information about YOU

1. Gender:

- ☐ Male
- ☐ Female

2. Age: _____years

Biren Kamdar
A mistake on our survey was having text fields like this that were open boxes which allowed people to fill out random things. I would advise you use a survey program that permit you to make this field be exactly 2 digits and give an error if 0-1 digit

3. Level of nursing experience:

- ☐ GRN
- ☐ RN 1.2
- ☐ RN 1.3
- ☐ RN 1.4
- ☐ RN 1.5
- ☐ RN 1.6
- ☐ RN 1.7
- ☐ RN 1.8
- ☐ RN 1.9
- ☐ CN

4. What is the highest level of education you have completed?

- ☐ Year 12
- ☐ TAFE
- ☐ Undergraduate Degree
- ☐ Postgraduate qualification please state:_____
- ☐ Other please state:_____

5. How many years of experience have you had working in an ICU environment?

_____number of years, (if <1yr, write as a fraction e.g 0.5 if only worked in ICU for half a year)

Biren Kamdar
See comment BBK2 above -- this is an example where an open text box generated a huge range responses so our ability to analyse was hindered ... I'd strongly consider a dropdown menu to limit lengthy responses

6. How many Intensive Care Units have you worked in OTHER than Fiona Stanley Hospital ICU?_____

Biren Kamdar
Same here

7. How many ICU departments have you worked in outside of Western Australia?_____

Biren Kamdar
Same here... you get the idea... dropdown menus instead of open text boxes

8. How many ICU departments have you worked in outside of Australia?_____

9. When do you typically spend the majority of your hours working in the ICU?
- ☐ Days (12hr, am or pm)
- ☐ Nights
- ☐ 50% days and 50% nights

Biren Kamdar
Awkward wording

Biren Kamdar
If this survey is for ICU nurses, isn't the answer 100%?

10. How much of your clinical practice is spent caring for patients in the ICU?
- ☐ 0-10%
- ☐ 10-25%
- ☐ 25-50%
- ☐ 50-75%
- ☐ 75-100%

Biren Kamdar
The ranges overlap – could you consider 0-10, 11-25, 26-50, etc. to avoid confusion

SECTION B

11. Ensuring quality sleep is an essential part of nursing an ICU patient

strongly agree	agree	not sure	disagree	strongly disagree
1	2	3	4	5

12. Ensuring adequate quantity of sleep is an essential part of nursing an ICU patient

strongly agree	agree	not sure	disagree	strongly disagree
1	2	3	4	5

13. On average how many hours in a 24-hour period do you believe your patients sleep while in the ICU?_____Hours

Biren Kamdar
Dropdown menu here

14. How many hours per day specifically dedicated for sleep do you believe can be realistically achieved in your ICU patient?_____Hours

Biren Kamdar
Dropdown menu

Please state your degree of agreement with the following:

Biren Kamdar
If this is deployed a paper survey, there are some formatting things that can improve the overall look including font, white space, bold/underline etc. ...

15. I believe I am able to assess whether my patient is asleep:

a) For a patient receiving mechanical ventilation via an endotracheal tube ~~that~~ who is requiring deep sedation (RASS-5~~4 or to~~ -3).

Biren Kamdar
What about RASS -5?

strongly agree	agree	not sure	disagree	strongly disagree
1	2	3	4	5

b) For a patient receiving mechanical ventilation via an endotracheal tube ~~that~~ ~~who is is~~ ~~requiring~~ requiring light sedation (RASS -2 to ~~-~~+1).

strongly agree	agree	not sure	disagree	strongly disagree
1	2	3	4	5

c) For a patient receiving mechanical ventilation via endotracheal tube ~~a~~ or tracheostomy ~~that~~ who is not requiring sedation

strongly agree	agree	not sure	disagree	strongly disagre
1	2	3	4	5

d) For an extubated patient requiring no sedation

strongly agree	agree	not sure	disagree	strongly disagree
1	2	3	4	5

e) I

16. Rate the overall quality of your patients sleep while they are in the ICU:

a) For a patient receiving mechanical ventilation via an endotracheal tube that is requiring deep sedation (RASS-4 or -3).

excellent	very good	Fair	Good	Poor
1	2	3	4	5

b) For a patient receiving mechanical ventilation via an endotracheal tube that is requiring light sedation (RASS -2-+1).

excellent	very good	Fair	Good	Poor
1	2	3	4	5

c) For a patient receiving mechanical ventilation via a tracheostomy that is not requiring sedation

excellent	very good	Fair	Good	Poor

Biren Kamdar
How about patient with ETT receiving NO sedation? I edited the next question to include ETT

Biren Kamdar
Is this a typo?

Biren Kamdar
Consider changing wording in these questions similar to above

1 2 3 4 5

d) For an extubated patient requiring no sedation

excellent very good Fair Good Poor

1 2 3 4 5

17. Is there a sleep promotion protocol in the ICU in which you currently work?

- ☐ Yes
- ☐ No
- ☐ Don't know

18. Have you worked in an ICU with a sleep promotion protocol?

- ☐ Yes
- ☐ No
- ☐ N/A – Have not worked in any other ICU

19. Are you aware of any tools available to help you assess patient sleep quantity and quality?

- ☐ Yes please state_____
- ☐ No
- ☐ Don't know

Please rate your degree of agreement with the following:

20. Poor quality sleep in the ICU patient -has the potential to negatively impact the following aspects:

a) Ability to fight off infection

Strongly agree agree neutral disagree strongly disagree

1 2 3 4 5

b) Ability to heal wounds

Strongly agree agree neutral disagree strongly disagree

1 2 3 4 5

Biren Kamdar
I'm not sure I would call this "protocol" but rather something about sleep prompting

Also, as I've learned from local ICUs in my area, many have "protocols" with elaborate posters, signs etc but literally NO champions to provide education and prompting...hence the intervention is totally useless. I would strongly encourage you to add some question around involvement of champions and "super users" etc, how often prompting is occurring and how (human, text message, etc), and whether formal education/inservice has been given to staff to highlight the importance of sleep/sleep-delirium/etc

I think the above topics are much more important than asking about the presence of a prompting list

Biren Kamdar
Same comment about the word "protocol"

Appendix E: Example of the Development and Testing of Questionnaire by Dr Edward Litton

Perceptions and Practices of Intensive Care Nurses' Survey

SECTION A

DEMOGRAPHIC DETAILS: These questions relate to information about YOU

1. Gender:
   - ☐ Male
   - ☐ Female

2. Age: _____years

3. Level of nursing experience:
   - ☐ GRN
   - ☐ RN 1.2
   - ☐ RN 1.3
   - ☐ RN 1.4
   - ☐ RN 1.5
   - ☐ RN 1.6
   - ☐ RN 1.7
   - ☐ RN 1.8
   - ☐ RN 1.9
   - ☐ CN

4. What is the highest level of education you have completed?
   - ☐ Year 12
   - ☐ TAFE
   - ☐ Undergraduate Degree
   - ☐ Postgraduate qualification please state:_____
   - ☐ Other please state:_____

5. How many years of experience have you had working in an ICU environment?
_____ number of years, (if <1yr, write as a fraction e.g. 0.5 if only worked in ICU for half a year)

6. How much of your clinical practice is spent caring for patients in the ICU?
   - ☐ 0-10%
   - ☐ 11-25%
   - ☐ 26-50%
   - ☐ 51-75%
   - ☐ 76-100%

7. How many Intensive Care Units have you worked in OTHER than Fiona Stanley Hospital ICU?_____

8. How many ICU departments have you worked in outside of Western Australia?____

9. What percentage of your clinical time do you spend working nightshift? _____%

Edward Litton
Suggest not giving people an 'other' option wherever possible. Hard to interpret.

Also suggest avoiding long hand answers wherever possible, including here. Does not add materially and asks more of respondents. You wont be able to interpret anyways.

Edward Litton
Better to jus ask what percentage as a continuous variable.

(like Q9)

also best to standardise how the answers to the same types of questions are formatted

SECTION B

10. On average how many hours in a 24-hour period do you believe your patients sleep while in the ICU?_____Hours

Edward Litton
you might need to be more specific about what type of patient

11. How many hours per day specifically dedicated for sleep do you believe ICU patients need?_____Hours

Edward Litton
general comment: should be refered to as patients admitted to the ICU, not ICU patients

Please state your degree of agreement with the following:

12. Ensuring quality sleep is an essential part of nursing an ICU patient

strongly agree	agree	not sure	disagree	strongly disagree
1	2	3	4	5

13. Ensuring adequate quantity of sleep is an essential part of nursing an ICU patient

strongly agree	agree	not sure	disagree	strongly disagree
1	2	3	4	5

14. Do you believe your ICU nursing colleagues prioritise sleep in their patients?

- ☐ Yes
- ☐ No
- ☐ Don't know

Edward Litton
not sure I understand this. Prioritise compared to what?

Should the question be framed to mirror 15?

15. Do you believe that patients are concerned about lack of sleep during their stay in the ICU?

- ☐ Yes
- ☐ No
- ☐ Don't know

16. ~~I believe~~ I am **able to assess** whether my patient is asleep:

a) ~~For a patient~~When receiving mechanical ventilation via an endotracheal tube and ~~t~~with a requirement for~~ho is requiring~~ deep sedation (RASS-5 or -3).

strongly agree	agree	not sure	disagree	strongly disagree
1	2	3	4	5

b) ~~For a patient~~When receiving mechanical ventilation via an endotracheal tube and with a ~~who is~~ requirement for~~ing~~ light sedation (RASS -2-+1).

strongly agree	agree	not sure	disagree	strongly disagree
1	2	3	4	5

c) For a patient receiving mechanical ventilation via endotracheal tube or tracheostomy who is not requiring sedation.

strongly agree	agree	not sure	disagree	strongly disagree
1	2	3	4	5

Edward Litton
copy wording for other stems

d) For an extubated patient requiring no sedation

strongly agree	agree	not sure	disagree	strongly disagree
1	2	3	4	5

18. Rate the overall **quality** of your patients' sleep while they are in the ICU:

a) For a patient receiving mechanical ventilation via an endotracheal tube who is requiring deep sedation (RASS-5 to -3)

Eexcellent	Vvery good	Fair	Good	Poor
1	2	3	4	5

b) For a patient receiving mechanical ventilation via an endotracheal tube who is requiring light sedation (RASS -2 to +1).

excellent	very good	Fair	Good	Poor
1	2	3	4	5

c) For a patient receiving mechanical ventilation via endotracheal tube or tracheostomy who is not requiring sedation

excellent	very good	Fair	Good	Poor
1	2	3	4	5

d) For an extubated patient requiring no sedation

excellent	very good	Fair	Good	Poor
1	2	3	4	5

19. Have you worked in an ICU with a sleep promotion protocol or clinical practice guideline?

- ☐ Yes
- ☐ No
- ☐ N/A – Have not worked in any other ICU

20. Are you aware of any tools available to help you assess patient sleep quantity and quality?

- ☐ Yes please state_____
- ☐ No
- ☐ Don't know

21. Have you ever received any education on patient sleep in the ICU?

- ☐ Yes please state_____
- ☐ No

Edward Litton
this should be at the start where you ask about individual practice.

You could just ask this and not ask about other icus and other icus outside of WA

Would be helpful to decrease total question number

Edward Litton
Not big enough if you really want this.

Edward Litton
remove

Please rate your degree of agreement with the following:

Edward Litton
much better

22. Poor **quality** sleep in the ICU patient has the potential to negatively impact the following aspects:

	Strongly Agree	Agree	Neutral	Disagree	Strongly Agree
a) ~~Ability to fight off~~Susceptibility to infection	o	o	o	o	o
b) ~~Ability to heal wounds~~Wound healing	o	o	o	o	o
c) ~~Extubation~~Weaning from mechanical ventilation	o	o	o	o	o
d) Development or persistence of delirium	o	o	o	o	o
e) Hospital length of stay	o	o	o	o	o
f) ~~Ability to participate~~Participation in physical therapy	o	o	o	o	o
g) Development of Depression	o	o	o	o	o
h) Survival	o	o	o	o	o

Edward Litton
much better

23. Please rate the **degree of importance** you place on the following interventions to improve sleep in patients in the ICU:

	Very Important	Important	Moderately Important	Slightly Important	Not Important
a) ~~Administration of B~~benzodiazepine administration (e.g. temazepam)~~s such as temazepam prescribed for sleep~~	o	o	o	o	o
b) Decreasing noise~~-~~ (e.g. by lowering alarm levels at night)~~ at night~~	o	o	o	o	o
c) Talking quietly at night	o	o	o	o	o
d) Ear plugs	o	o	o	o	o
e) Dimming lights at night	o	o	o	o	o
f) Eye-masks	o	o	o	o	o

Appendix F: Email to Staff

Dear ICU Nurse,

My name is Rebecca Hahn and I am a postgraduate student at Notre Dame University and a Registered Nurse working in Fiona Stanley Hospital Intensive Care Unit. As part of my Master of Philosophy in Nursing Research, I am conducting a survey on nurses' perceptions and practices relating to patient sleep in the ICU.

I am inviting you to participate in this study by completing an online survey.

Participation is completely voluntary and all information gathered from the survey is anonymous, no one will be able to identify you or your answers. All data collected will be held securely.

Please find attached the participant information sheet explaining the research project including confidentiality and ethical information in further detail.

To complete the survey please click on the link below and you will be directed to the SurveyMonkey questionnaire. The survey will take approximately 10 minutes to complete.

www.surveymonkey.com (example)

If you have any queries regarding this study please do not hesitate to contact me on 0439975860 or Rebecca.hahn@health.gov.wa.au

Thank you in advance for your time and insights.

Kind regards,

Rebecca Hahn

Appendix G: Participant Information Letter

Dear Participant,

You are invited to participate in the research project described below:

Nurses' perceptions and practices relating to patient sleep in the intensive care unit: A descriptive study.

What is the project about?

The aim of my project is to investigate the perceptions and practices of ICU nursing staff regarding sleep in intensive care patients at Fiona Stanley Hospital (FSH). Nursing routines and associated clinical interventions have been reported to be one of the most disruptive factors to patient sleep in the ICU. However, there is a current lack of empirical research specifically focusing on the role of nurses' attitudes, beliefs and behaviours relating to sleep in the ICU patient.

Who is undertaking the project?

This project is being conducted by Rebecca Hahn and will form the basis for the degree of Master of Philosophy in Nursing at The University of Notre Dame Australia, under the supervision of Dr Tracey Coventry and Adjunct Associate Professor Elaine Bennett.

What will I be asked to do?

This project will take place in the ICU at FSH. It requires the completion of a questionnaire containing closed- and open-ended questions relating to your attitudes, beliefs and practices regarding sleep in the critically ill patients that you care for. The questionnaire will take approximately 10 minutes to complete and you can either complete it online via the link provided, or by hand on a paper copy that can be placed in the box provided in the tea room.

Please make sure that you ask any questions you may have, and that all your questions have been answered to your satisfaction before you agree to participate.

Are there any risks associated with participating in this project?

There are no specific risks anticipated with participation in this study. However, if you find that this study brings up any concerns for you, you can seek professional, confidential and free counselling through the Employee Assistance Program.

What are the benefits of the research project?

Your involvement in this study is an opportunity to share your beliefs and opinions on sleep in the patients you care for at Fiona Stanley Hospital ICU. You will also help to increase understanding of how important sleep in critically ill patients is to ICU nurses, which may inform education and practice guidelines relating to sleep in the ICU.

What if I change my mind?

Participation in this study is completely voluntary. Even if you agree to participate, you can withdraw from the study at any time before submission of the completed questionnaire, without discrimination or prejudice. Withdrawal after submission of the completed questionnaire will not be possible, as this questionnaire is non-identifiable.

Will anyone else know the results of the project?

All information collected in this study is anonymous and will be stored securely with access restricted to authorised persons, such as the researcher, supervisors and an independent reviewer. Once the study is completed, the data collected from you will be stored securely in the School of Nursing and Midwifery at The University of Notre Dame Australia for at least a period of five years. The data may be used in future research, but you will not be able to be identified.

The results of this project may be published in peer-reviewed journals. The journal articles and any conference papers can be made available to participants when they become available.

Will I be able to find out the results of the project?

Once we have analysed the information from this study, we will display a summary of our findings on the education board in Pod 3 of the ICU. This is expected to be available by September 2018.

Who do I contact if I have questions about the project?

If you have any questions about this project, please feel free to contact either Rebecca Hahn on 0439975860 or rebecca.hahn1@my.nd.edu.au, or my supervisor, Tracey Coventry, on 9433 0627. My supervisor and I are happy to discuss with you any concerns you may have about this study.

What if I have a concern or complaint?

The study has been approved by the Human Research Ethics Committee of the South Metropolitan Health Service (approval number RGS 681) and The University of Notre Dame Australia (approval number 017157F). If you have a concern or complaint regarding the ethical conduct of this research project and would like to speak to an independent person, please contact the South Metropolitan Health Service Research Ethics and Governance Unit on (08) 6152 2064 or SMHS.HREC@health.wa.gov.au. Alternatively, you may contact Notre Dame's Ethics Officer at (08) 9433 0943 or research@nd.edu.au. Any complaint or concern will be treated in confidence and fully investigated. You will be informed of the outcome.

How do I sign up to participate?

If you are happy to participate, please click on the following link to the survey or complete the attached survey and submit it in the box provided.

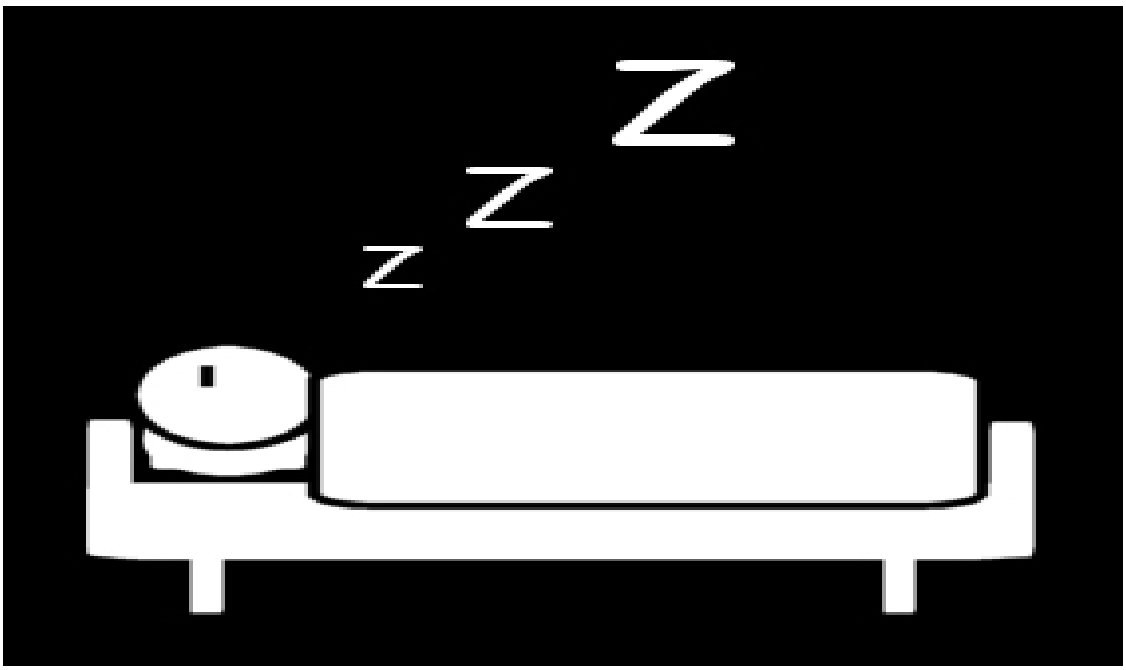
Thank you for your time. This sheet is for you to keep.

Yours sincerely,

Rebecca Hahn

Appendix H: Poster

IS YOUR PATIENT SLEEPING?



We would love to know what you think about

patient sleep in the ICU!

If you are a nurse employed in FSH ICU you will receive an email to your global email address with a link to a SURVEY:

'Nurses' perceptions and practices relating to patient sleep in the intensive care unit'

Alternatively, you can fill in a paper survey located in the tea room and place it in the secure box.

All responses are voluntary, anonymous and very much appreciated!

Rebecca Hahn 0439975860/Rebecca.hahn@health.gov.wa.au

Appendix I: University of Notre Dame Australia Ethics Approval Letter

THE UNIVERSITY OF NOTRE DAME AUSTRALIA

19 Mouat Street (PO Box 1225) Fremantle WA 6959
+61 8 9433 0555 | enquiries@nd.edu.au

10 October 2017

Dr Tracey Coventry & Ms Rebecca Hahn
School of Nursing & Midwifery
The University of Notre Dame Australia
Fremantle Campus

Dear Tracey and Rebecca,

Reference Number: 017157F

Project Title: "Nurses' perceptions and practices relating to patient sleep in the intensive care unit: A descriptive study."

Your response to the conditions imposed by a sub-committee of the university's Human Research Ethics Committee, has been reviewed and assessed as meeting all the requirements as outlined in the *National Statement on Ethical Conduct in Human Research* (2007, updated May 2015). I am pleased to advise that ethical clearance has been granted for this proposed study.

Other researchers identified as working on this project are:

Name	School/Centre	Role
Dr Elaine Bennett	School of Nursing & Midwifery	Co-Supervisor

All research projects are approved subject to standard conditions of approval. Please read the attached document for details of these conditions.

On behalf of the Human Research Ethics Committee, I wish you well with your study.

Yours sincerely,

Dr Natalie Giles
Research Ethics Officer
Research Office

cc: A/Prof Caroline Bulsara, SRC Chair, School of Nursing & Midwifery

Appendix J: Fiona Stanley Hospital Ethics Approval Letter

Government of **Western Australia**
Department of **Health**

SMHS Low Risk Panel
Level 2, Education Building, Fiona Stanley Hospital
11 Robin Warren Drive
MURDOCH WA 6150

07 December 2017

Mrs Rebecca Hahn
ICU, Fiona Stanley Hospital
11 Robin Warren Drive
MURDOCH WA 6150

Dear Mrs Hahn

PRN: RGS0000000681
Project Title: Nurses' perceptions and practices relating to patient sleep in the intensive care unit: A descriptive study

Thank you for submitting the above research project for ethical review. I am pleased to advise you that the above research project meets the requirements of the *National Statement on Ethical Conduct in Human Research (2007)* and was approved under the Alternative Review process in accordance with the Committee's Terms of Reference and Standard Operating Procedures. The South Metropolitan Health Service Human Research Ethics Committee at its meeting to be held on 12 December 2017 will be notified that this project was approved on their behalf. To find the original letter and any possible attachments, click here when logged into RGS.

The nominated participating site in this project is: Fiona Stanley Hospital

[Note: If additional sites are recruited prior to the commencement of, or during the research project, the Coordinating Principal Investigator is required to notify the Human Research Ethics Committee (HREC). Notification of withdrawn sites should also be provided to the HREC in a timely fashion.]

The approved documents include:

Document	Version	Version Date
Participant Information Sheet	2.0	30/11/2017
Questionnaire	2.0	30/11/2017
Research Proposal	2.0	30/11/2017
Email to staff	1.0	30/11/2017
Poster	1.0	30/11/2017

Ethical approval of this project from SMHS Low Risk Panel is valid from 04 December 2017 to 04 December 2022 subject to compliance with the 'Conditions of Ethics Approval for a Research Project' (Appendix A).

A copy of this ethical approval letter must be submitted to the Research Governance Office or equivalent body or individual at the participating institution in a timely manner to enable the institution to authorise the commencement of the project at its site.

This letter constitutes ethical approval only. This project cannot proceed at any site until separate site authorisation has been obtained from the Chief Executive or Delegate of the site under whose auspices the research will be conducted at that site.

Should you have any queries about the SMHS Low Risk Panel's consideration of your project, please contact the Ethics Office at SMHS.HREC@health.wa.gov.au or on 08 6152 2064. The HREC's Terms of Reference, Standard Operating Procedures and membership are available from the Ethics Office or from http://ww2.health.wa.gov.au/About-us/SouthMetropolitan-Health-Service/About/Human-Research-Ethics-and-Governance.

The HREC wishes you every success in your research.

Yours sincerely

Wendy Khoo
Delegate of the Chair
South Metropolitan Health Service HREC

Appendix K: Fiona Stanley Hospital Governance Approval Letter

08/12/2017 RGS - Edit Project Letter

Government of Western Australia
Department of Health

Mrs Melanie Wright
Level 2, Administration Building, 14 Barry Marshall Parade
MURDOCH WA 6150

08 December 2017

Mrs Rebecca Hahn
ICU, 11 Robin Warren Drive
MURDOCH WA 6150

Dear Mrs Hahn

PRN: RGS0000000681
Project Title: Nurses' perceptions and practices relating to patient sleep in the intensive care unit: A descriptive study
Protocol Number: N/A

Thank you for submitting the above research project for governance review. I am pleased to advise you that South Metropolitan Health Service Executive has granted authorisation for this research project to be conducted at the following participating site(s):

Fiona Stanley Hospital

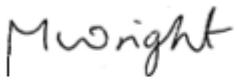
Site authorisation of this project is valid from 07 December 2017 subject to continued ethical approval from the South Metropolitan Health Service Human Research Ethics Committee and compliance with the 'Conditions of Site Authorisation for a Research Project' (Appendix A). To find the original letter and any possible attachments, click here when logged into RGS.

This is a student project from Notre Dame. Uses descriptive analysis to describe the attitudes, beliefs and behaviours of ICU nurses'. The results of this study will contribute to the growing body of knowledge on the modifiable factors that contribute to sleep disturbance in the ICU patient, further informing the development of clinical practice guidelines and education on the importance of patient sleep. Questionnaire based.

Should you have any queries about South Metropolitan Health Service Executive's consideration of your project, please contact the Research Governance Office at SMHS.RGO@health.wa.gov.au or on 08 6152 2646. The Research Governance Office's Standard Operating Procedures are available from the Research Governance Office.

I wish you every success in your research.
Yours sincerely

://rgs.health.wa.gov.au/pages/Project-Letters-Edit.aspx?pid=683&lid=1115&isEdit=1&isDlg=1&isPrint=1&isEdit=0



Melanie Wright
A/Manager Research Ethics and Governance Unit
As Delegated by the Executive Director
Fiona Stanley and Freamantle Hospital Group

Appendix L: Presentation of Research

Australian and New Zealand Intensive Care Society Clinical Trials Group

6 to 8 March 2018, Sofitel Noosa Pacific Resort

20th Annual Meeting on Clinical Trials in Intensive Care

Oral Presentation Title: Quality & Quantity of Sleep Experienced by Patients in the ICU