

Time lost: Factors influencing advanced practice provider's prioritization of sleep

Beverly M. Hittle^{a,*}, Gordon L. Gillespie^a, Holly J. Jones^a and Amit Bhattacharya^b

^a*College of Nursing, University of Cincinnati, Cincinnati, OH, USA*

^b*College of Medicine, University of Cincinnati, Cincinnati, OH, USA*

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Abstract.

BACKGROUND: Prescribing patient care providers regularly experience insufficient sleep, putting them at increased risk of committing occupational injuries, accidents, and errors and developing chronic health conditions.

OBJECTIVE: Identify antecedents to short sleep (≤ 6 -hours sleep in 24-hour period) in the understudied population of hospital-based Advanced Practice Providers (APPs).

METHODS: Using an ethnographic research design, data included APP and key stakeholder interviews, hospital observations, and relevant documents. Interview data were analyzed using modified constant comparative method.

RESULTS: Nine APPs were interviewed, revealing four themes: Social/Family Obligations and Value of Connectivity, Community Value of Sleep, Organizational Value of Sleep, and Individual Biology and How the Body Values Sleep. APP decisions to prioritize sleep are based on an interplay of societal, professional, organizational, and personal values. Triangulated data verified results, except regarding how APP sleep deficit can lead to mood disturbances and the lack sleep consideration in patient care error reporting.

CONCLUSIONS: Findings demonstrate the importance of consistency in messaging, action, and policy when promoting occupational sleep health among healthcare workers. Implications include instituting worker sleep education, leadership modeling healthy sleep habits, and inclusion of sleep in root cause analyses. Additional consideration includes evaluating the influence of nursing culture on nurse practitioners' sleep habits.

Keywords: Sleep health, work culture, work organization, sleep education, patient safety

1. Introduction

Forty percent of prescribing patient care providers in the United States report less than 7 hours of sleep per night [1]. In addition to cognitive deficits, 6 or fewer hours of sleep in a 24-hour period has been associated with a multitude of provider chronic health conditions [2]. Because of these adverse health outcomes and concerns for patient safety, multiple

professional provider organizations have created position statements on the topic of provider sleep and the work hours which disrupt sleep [3–5]. Of the 401,000 Advanced Practice Providers (APPs) working in the United States, 12.3% are working in either adult inpatient settings or emergency services [6–8]. Working in the intensive care units, emergency departments (EDs), and other specialized units, these acute care APPs (which includes nurse practitioners and physician assistants) can be found working circadian disrupting schedules. These schedules include fixed shifts occurring beyond the hours of 7 am to 6 pm, as well as rotating shifts which requires

*Address for correspondence: Dr. Beverly Hittle, 3110 Vine Street, Cincinnati, OH, 45221, USA. Tel.: +1 513 558 5500; E-mail: Beverly.Hittle@UC.edu.

workers to have revolving start times [9]. As the role of the acute care APPs expands in the United States, understanding how their sleep is impacted by their advancing position on the healthcare team should be further evaluated.

Concerns about sleep and patient care has largely centered around medical residents and their training. With evidence supporting sleep deprived cognitive impairments [10] and patient care errors associated with medical resident training hours [11], Accreditation Council for Graduate Medical Education addressed the issue of medical residents' sleep and long work hours [12]. The most recent changes to these hours in 2011 dictated restrictions in medical residents' work hours, leading to a decrease in provider availability [13]. This gap in care, compounded by the shortage of experienced physicians, has resulted in more APPs being hired as providers in around-the-clock acute care patient settings [14], exposing APPs to increased shift work disrupting their circadian rhythms.

Research investigating APP sleep and work hours has been explored among specialty groups, such as certified registered nurse anesthetists, certified nurse midwives, and certified midwives. In a national survey of certified registered nurse anesthetists, Biddle and Aker [15] report 25% ($n = 1,284$) of respondents described experiencing fragmented sleep, waking prematurely (59%), or difficulty falling asleep (47%), with 68% reporting excessive sleepiness during the day. Almost 16% of respondents acknowledged personally having fallen asleep during a case and almost 50% reported having witnessed in-surgery sleeping among colleagues. In-surgery sleeping was attributed to long cases without breaks and afternoon or nighttime cases in dimly lit surgical suites. A large majority of certified registered nurse anesthetists reported attempting to mitigate these fatigue issues through fatigue prevention (i.e. pre-shift nap) and countermeasures (i.e. caffeine ingestion). Despite efforts, almost 30% ($n = 325$) reported committing a medical error as a result of long work days and multiple call shifts [16]. Similarly, certified nurse midwives and certified midwives are experiencing sleep loss, with reports of regularly sleeping less than the 7–9 hours of recommended sleep per 24-hour period [17, 18]. In a survey of 753 certified nurse midwives and certified midwives, 24% of the respondents reported committing a clinical error due to sleepiness and almost 37% committed a near-miss clinical error [19]. Additionally, lack of sleep puts midwives at risk for injury, with almost 1/3 reporting falling asleep while driving.

Much of the sleep issues for certified nurse anesthetists, certified nurse midwives, and certified midwives are associated with shifts longer than 12-hours and multiple on-call shifts [16, 19], shift lengths that APPs in an acute-care setting may not be regularly working [20]. In another comparable prescribing group, Smith-Coggins, Rosekind, Hurd, and Buccino [21] reported emergency medicine physicians ($n = 6$) working 8-hour night shifts demonstrated cognitive impairment and committed more errors when compared to working 8-hour dayshifts. Emergency medicine physicians in another study ($n = 36$) reported average sleep duration was 6.6 hours and when sleep dropped to 5.6 hours of sleep, there was 15-fold increase of errors [22]. Emergency medicine physicians ($n = 819$) working night shift have reported negative job satisfaction (58%); negative health implications (51%) such as fatigue, poor sleep quality, mood disturbances; and difficulty maintaining health, and have considered leaving the field (43%) or retiring (56%) [23]. Finally, Ferguson, Shoff, McGowan, and Huecker [24] found emergency medicine physicians and residents ($n = 32$) had difficulty prioritizing sleep, ranking it fourth in priority behind family, work, and leisure activities.

This compilation of evidence suggests working night and rotating shifts can present not only professional and patient safety issues for healthcare providers, but also personal health and social concerns for APPs. Because much is unknown about the sleep of APPs in the acute care hospital setting, an exploratory qualitative study is warranted. The purpose of this research study is to (1) identify the antecedents to short sleep (≤ 6 hours sleep in 24-hour period) in hospital-based APPs, including work and personal causes and (2) describe how short sleep impacts a provider's routine for delivering patient care.

In an attempt to provide a holistic view of the individual, social, and organizational factors influencing APP sleep, including how these causes interact, this study was guided by the Social Ecological Model [25]. The Social Ecological Model conceptual framework [25] theorizes health behaviors stem from five factors: intrapersonal, interpersonal, organizational, community, and public policy and has been used to frame other occupational hazards among the healthcare workforce [26]. By considering the interdependency of society and individual on behavior, the Social Ecological Model provides an opportunity for health promotion interventions to support individual behavioral changes, such as sleeping the requisite 7–9 hours in a 24-hour period.

2. Methods

2.1. Study design

This study used an ethnographic research design to describe the culture surrounding sleep for APPs working in an ED and adjacent short stay/observational unit. Ethnography is “the work of describing a culture” [27]. Culture can be defined as a group’s shared values, beliefs and societal rules [28]. The researcher spends time in the culture, observing, sometimes participating in activities, asking questions of participants, and collecting documents. To understand how APPs prioritize sleep, it is important to know their beliefs, attitudes, and societal rules toward the personal, family, work, and organizational antecedents which influence their sleep decisions and habits.

2.2. Human subjects’ protection

Approval for this study was obtained from the local Institutional Review Boards and the emergency medicine group overseeing the practice of the APPs where this study took place. A signed consent document was obtained from each participant before study activities started.

2.3. Setting

The study setting was the EDs and adjacent observational Clinical Decision Units (CDUs) at two large teaching hospitals in the Midwest United States. Both hospitals are within the same hospital organization. An urban acute care facility, hospital A’s ED has 45 patient beds where approximately 56,000 patients are treated annually. The CDU has 15 patient beds. In the CDU, patient stay is anticipated to be less than 24 hours. Hospital B is a suburban Level III trauma center. Hospital B’s ED has 54 patient beds where approximately 54,600 patients are treated annually. The CDU has a capacity for 15 patients.

2.4. Sampling and recruitment

The key informants for the study were APPs working in the ED and/or the CDU. At the time of the study, approximately 38 APPs worked for the emergency physician group, contracted to provide care in the study site EDs and CDUs. In addition to the APP population, key stakeholders were recruited for interviews to triangulate the APP data. Key stakeholders,

a study population of approximately 260 individuals, included ED and CDU nurses, nursing assistants, physicians, management, and hospital human resources staff and safety officers. APP and key stakeholder recruitment occurred via direct email and/or personal contact. APP study inclusion criteria included APPs working in the ED and/or CDU at one or both study sites for a minimum of six months. Inclusion criteria for key stakeholders was employment at the study site with the specified job titles, such as manager of the APPs, human resources officer, safety officer, and/or ED/CDU employees working with APPs. Additionally, all participants had to be a minimum of 18 years of age. Recruitment for both groups continued until information redundancy was achieved.

2.5. Data collection

This study was conducted in three phases, based on the naturalistic inquiry method of Lincoln and Guba [29]. Phase 1 involves initial interviews, observations, and preliminary analyses. Phase 1 of this study included interviews with APPs, hospital site observations, and analysis of interview data. In phase 2, the researcher sharpens the focus, based on the information obtained from phase 1. For this study, phase 2 included interviews with key stakeholders as well as document collection. Phase 3 establishes trustworthiness and credibility through member checking. In member checking the data analysis is shared with study participants. Study participants are asked to review the analysis for errors, or misrepresentation of their experiences.

2.5.1. Phase 1

2.5.1.1. Key informant (APP) interviews: Demographic information and data regarding sleep duration and chronotype was collected from APPs, followed by a semi-structured interview. Sleep duration data included self-reported averages of sleep in a 24-hour period when the participant works various shifts, as well as when the participant is off duty. Chronotype is a self-reported measurement of individual sleep timing preferences. The chronotype question indicates participant tendencies toward being an early chronotype (likes to go to bed early and rise early), intermediate chronotype (no strong sleep timing preference), or late chronotype (prefers to go to bed late and wake up late). Understanding individual sleep preferences helps to enlighten the research on shift work and personal sleep tolerance, as individuals

working shifts in opposition to their personal sleep preferences have shown evidence of shortened sleep duration and quality [30]. Chronotype was measured via one question from the Survey of Shiftworkers Instrument, a shortened version of the Standard Shift Work Index [31]. Semi-structured interview questions were guided by the Social Ecological Model framework [25]. Interviews were approximately one hour in length. Because patient health and wellness are dependent on the APPs' attention, interviews were not conducted on-site, but at locations convenient and comfortable for the interviewees. All interviews were audio recorded and transcribed using Microsoft Office Word 2011. Transcription verification occurred via reading the transcripts while listening to the audio recording.

2.5.1.1. Observations: Covert, non-participatory observations were conducted in the hospital settings over an eight-week period. Observations took place for 1–4 hours at a time. At some locations, space was limited for an observer to be onsite, therefore, observation lengths were limited. Since interviews and observations were occurring concurrently, the researcher's identity was not hidden from study participants during observations, but observation activities were covert. Because occupational research involves a worker's place of employment, potentially threatening their income, some consider them a vulnerable research population [32]. Therefore, covert observation activities were chosen to maintain participant confidentiality from employer and coworkers and to avoid Hawthorne effect. While conducting observations, the researcher collected and reviewed organizational policies and coded transcribed data.

In an attempt to observe APPs working various shifts, as well as being cognizant of their chronotype based personal tolerance for various shift timing, observations times took participant work schedules and chronotype into consideration. Therefore, an APP who is an early chronotype was observed during a day shift and an evening or night shift. Because some APPs rotate to sites not included in the study, not all APPs were able to be observed during every combination of shifts they were scheduled. Research participants were observed for actions indicating shift work tolerance (use of caffeine, cognitive deficits, yawning, etc.) and actions which speak to the value of sleep personally and/or within the organization (i.e. napping, scheduling support). Observations also were used to support or oppose participant interview responses. Observation notes were taken on a

semi-guided worksheet with additional reflexivity notes taken before and after.

2.5.2. Phase 2

Phase 2 included interviews with key stakeholders and document collection for triangulating with the phase 1 data. Key stakeholder interviews were semi-guided interviews based on the Social Ecological Model [25]. Interviews were less than one hour in length. Similar to APPs, the key stakeholder interviews took place outside the work environment, at a mutually agreed upon location. All interviews were audio recorded and transcribed. Transcriptions were verbatim using Microsoft Office Word 2011, with transcription verification occurring via reading the transcripts while listening to the audio recording. Documents collected and reviewed included schedules, and policies and procedures from the ED physician and hospital organizations.

2.5.3. Phase 3

Member checking is the third phase of qualitative inquiry. It is a vital method for establishing trustworthiness and credibility in research findings [29]. Member checking was conducted with the APPs after the completion of initial interview analysis and with the key stakeholders after the final research analysis was completed.

2.6. Data analysis

Descriptive statistics are reported to describe participant demographics and chronotype self-report results. Means were generated via SPSS 25 [33] for sleep duration.

Qualitative data were analyzed using a modified constant comparative analysis method [29]. Analysis began with the phase one interviews. Transcribed interviews were coded line-by-line for categories. Memos were written concurrently to help define the properties of the categories as they emerged. Phase two transcribed interview data were analyzed in the same format and categories compared to phase one analysis categories. This allowed for testing whether the categories were still defined by the properties, or whether new categories were emerging. To increase credibility, dependability, and confirmability (all dimensions of study trustworthiness), the coding was conducted by two separate researchers and an audit trail maintained. Data analysis was ongoing throughout the data collection process to allow for refinement of themes/categories.

2.6.1. Triangulation

Triangulation is a verification process to establish trustworthiness [28, 29]. By comparing the documents and observations with the interview data, the research participants' responses could be verified or refuted, thus providing increased credibility to the results. When interview analyses were complete, the key stakeholder, observations, and document content were used to corroborate the results from APP interviews [28]. Additional methods of trustworthiness incorporated into this study were the generation of reflexivity notes [29]. The reflexivity notes included the researcher's accounts of personal presuppositions noted before, during, and after the observations and interviews. A methodological notebook held research activities as well as the audit trail. All of these actions add to the credibility, dependability, and confirmability of the data collection and analysis. Lincoln and Guba [29] describe credibility, dependability, and confirmability as qualitative research equivalent of internal validity, reliability, and objectivity, adding to the trustworthiness of the study.

3. Results

3.1. Key informant interviews

Nine APPs participated in the study, with data saturation achieved. The mean age of participants was 41 years. All participants were female, and none reported Hispanic or Latino ethnicity. Five participants were NPs and four were PAs. The average length of time worked as an APP was 5.5 years, with an average of 2.7 years at the current job. The average hours worked per month was reported at 154.5 hours. Average hours of sleep when working during day shift and night shift were below the recommended average of 7–9 hours (see Table 1). Reported sleep duration ranges were 5–7.5 hours when working day shift, 6–9 hours when working evening shift, and 4.5–7.5 hours when working night shift. Five reported being

an early/probably early chronotype, one reported intermediate, and three reported late/probably late chronotype.

Four themes emerged as influencing how providers prioritize sleep: Social/Family Obligations and the Value of Connectivity, Community Value of Sleep, Organizational Value of Sleep, and Individual Biology and How the Body Values Sleep (see Table 2).

3.1.1. Social/Family obligations and the value of connectivity

This theme describes how APPs plan their sleep around an ever-changing work schedule, prioritizing sleep around irregular and long work hours, family, friends, and other social obligations. They want to feel connected to the daytime world and sometimes must sacrifice sleep as a trade-off. The subthemes include "Time lost trying to adjust your sleep schedule" and "Nobody else has the schedule I have" (see Table 2).

3.1.1.1. Time lost trying to adjust your sleep schedule: APP work schedules in the ED/CDU environment lack routine work days and extends beyond the five-day work week (see Table 2). If they are not working a straight nightshift schedule, they must rotate shifts, denying APPs the same predictable sleep schedule afforded in the "9–5" work world. To adjust to the changing schedule, APPs create predictability and carefully plan when they sleep. They have sleep routines for each of the various shifts they work which does not always guarantee they sleep well. APPs describe how day sleeping in preparation or recovery from night shift creates a perception of time lost. On days off, that time lost is precious. Quickly trying to flip back to a day schedule, they cut their day sleep duration short to re-join the rest of the world, resulting in feeling tired and exhausted the rest of the day.

When creating a sleep routine, APPs consider how much can be squeezed into a 24-hour period. APPs' long work hours (the majority of shifts are scheduled as 10–12 hours) leave little time for much else on work days. Adding anything to their day, results in shorting themselves on sleep. Often times, they do not see any other way to keep up with the dayshift world around them. Although the lack of predictability in the APP's schedule is challenging, many feel shift work provides a greater work-life balance. Because of the long work hours, they may have extra days off during the week. These days off provide a counterbalance of traveling, spending time with family and

Table 1

Advanced practice provider reports of sleep habits (N=9)

Sleep duration	Hours (S.D.)
Average sleep duration	
when working:	
Day shift	6.1 (.9)
Evening shift	7.1 (1.1)
Night shift	6.1 (.9)
Average sleep duration on	8.3 (.9)
days not worked	

Table 2
Theme, subthemes, and exemplars

Themes and subthemes	Exemplars
Social/Family Obligations and Value of Connectivity <ul style="list-style-type: none"> ● Time lost trying to adjust your schedule ● Nobody else has the schedule I have 	<p>“... just flipping between the days and nights can be challenging. Um, it’s hard to get on a set schedule or routine. Um, every week is different and the days I work every week are different, so there’s no consistency within that. Um, and I think, you know, when you are flipping from a, like, a night shift back to a dayshift there’s kind of that time lost there trying to adjust your sleep schedule...”</p> <p>“... the people that I care about, they all live on a day shift schedule, and it’s like when my family needs me for something... I get up, and I do what I have to do... you have to prioritize things and sometimes the priority has to be being with your friends and family or doing the things that they do on their schedule. And that means giving up the time that you would normally sleep to be at those events that they need you at.”</p> <p>“I think more mentally it’s been harder on me because I haven’t been able to have more of the social interactions that I was able to have the last time; like... nobody else has the schedule that I have. It’s harder to get out, like I don’t see my friends, I don’t see my family nearly as much because of the way that this schedule works.”</p>
Community Value of Sleep <ul style="list-style-type: none"> ● We’re expected to be reachable 24/7 ● They forget that I’m sleeping 	<p>“... I wanna go back to 50 years ago, I wanna go back to when we were allowed to go to work from 9:00 to 5:00, or whatever your shift was, and then you could go home. When you came in the next day for your shift, you got told about whatever you needed to know about for the update, whatever information you needed, that’s – they gave it to you then... it’s like you’re never separated from the job anymore...”</p> <p>“... sometimes they forget that I’m sleeping in the daytime... people calling. That’s another thing, when you are sleeping in the daytime in between calls, and phone calls, or anybody who wants to contact you... so then you have to wake up.”</p>
Organizational Value of Sleep <ul style="list-style-type: none"> ● Does my employer care if I sleep? 	<p>“[Medical residents] have to have a certain amount of time off between their – their shifts and stuff like that when they’re at the hospital for long periods of time. Um, but for us, no, because we always have at least 12 hours off between – maybe it’s ten. I think we have to have ten hours off between each shift. So if you don’t – if you choose not to sleep during that time, that’s, you know, that’s up to you...”</p> <p>“...[the request driven schedule] is to give you that flexibility in your schedule because they know how demanding our schedules are. It’s...to give you the ability to have some say in your schedule.”</p> <p>“I feel like it’s an insoluble problem. People have to work nights. And it’s really bad for you. We all know that. But then, there’s nothing to be done about it.”</p>
Individual Biology and How the Body Values Sleep <ul style="list-style-type: none"> ● My body still knows that it’s daytime ● It takes a toll on your health ● Your brain’s kind of foggy and not running on all gears 	<p>“your body gets confused. Your mind gets confused by it. It’s still just trying to make you a daytime being and not nocturnal...”</p> <p>“But whenever I work night shifts in particular, I feel like I really, like, gross and unhealthy when I get off because I’m like just trying to stay awake all night. So, I’m like just snacking all night... And then like I don’t get a whole lot of sleep, so then I just feel even more – like I feel very unhealthy the – the times I work night shift... I try to work out, which makes me feel better like mentally and emotionally and like physically... I just feel nasty. I don’t – I don’t know how to describe that... I don’t ever feel like that any other time.”</p> <p>“I feel it more physically in my body and my joints ache; like just feeling really run-down, kinda like you’re on the verge of getting sick all the time.”</p> <p>“I definitely feel like I’ve aged.”</p> <p>“You know, it’s like, after you work some night shifts, it’s like you have a hangover. You get all the punishment, but without the fun.”</p> <p>“... you feel like every time you walk into the room you have to remind yourself, like, recharge –you know, be present. This person, like, needs to feel like you’re – you’re with them and, you know, and you’re just, like, walking around like a zombie. I don’t know how much it contributes to mistakes. I’m sure I would make way more mistakes when I’m tired towards the end of my shift.”</p>

Table 2
(Continued)

Themes and subthemes	Exemplars
<ul style="list-style-type: none"> • My brain can't get away from being at work 	<p>"I think in medicine, you know, there's always, especially in the ER, like, there's always stressful situations and stressful patients and critical patients, and you know, there are times when you have a patient that's staying on your mind, um, that you are thinking about. I've definitely had dreams about patients that have kind of affected my quality of sleep a little bit, 'cause I'll have dreams about a patient encounter, or I will um, kind of wake up and like, have a dream that I was taking care of a patient and wake up and be like "Oh wait, I'm at, you know, home asleep, not at work."</p>

friends, and managing household business during the week without having to take time off of work.

3.1.1.2. Nobody else has the schedule I have: The night shift and long, irregular hours of hospital work cause APPs to miss holidays and family events. Missing events and time with family and friends can create feelings of social isolation (see Table 2). APPs report how friends and family avoid contacting them for fear of disrupting APP sleep. Holidays are celebrated outside the appointed day. Sometimes, the APPs cut sleep short to oblige family and social events (see Table 2). Managing irregular work hours while parenting was brought up by both APPs who have children and those who do not. Childless APPs empathize with their coworkers who have children, sensing there is increased schedule conflicts and more competition for those coworkers' time, which can make sleep prioritization a greater challenge. In reality, a strong support system at home, such as a spouse with flexible work hours, can make it more manageable. But, having this strong support system is rare.

3.1.2. Community value of sleep

APPs describe the way society expresses value of sleep, thus impacting APP sleep. Manifestations include the demand for 24/7 services, technological advances keeping workers connected to work demands, or the external noises in the community which interrupt sleep. Subthemes include "We're expected to be reachable 24/7" and "They forget that I'm sleeping" (See Table 2).

3.1.2.1. We're expected to be reachable 24/7: Society's value on sleep is demonstrated in the availability of around the clock services, including healthcare. Society expects hospitals to be open and healthcare workers to always be at the ready, which APPs see as part of the job. Society also expects many other services to be available 24/7, including food and retail. Corporations are eager to comply, creating a cyclical demand in society for more availability. There's a sense that night shift workers are undervalued, not

only by employers who offer a token differential, but by society who takes advantage of shopping and buying food whenever the need arises. Additionally, technology has enabled companies to always keep connected with employees through the use of email (see Table 2). Employees find it difficult to disconnect from work. Some APPs describe it as a manifestation of individual productivity (more hours awake equals more work is being completed) and not being able to turn their back on work emails. A few of the APPs describe their personal drive to "always to be going," preventing sleep from being a priority in their lives. Others describe unlearning these societal beliefs through a better understanding of the importance of sleep to health and work performance and/or due to personal experiences that spark a change in convictions.

3.1.2.2. They forget that I'm sleeping: APPs periodically have their sleep (particularly day sleep) interrupted by outside disturbances (see Table 2). These include phone calls, barking dogs, garbage trucks, school buses, and family members waking them to ask questions. After being woken by these noises, it is often times hard to get back to sleep.

3.1.3. Organizational value of sleep

Organizations convey to employees how sleep is valued when certain practices or policies are in place. Organizational culture should be congruent with these policies and procedures, but sometimes there is dissonance, causing values to seem insincere. Clustered cultures within hospital systems may not be aligned with organizational culture, significantly influencing employee attitudes and practices regarding the importance of sleep (see Table 2).

3.1.3.1. Does my employer care if i sleep?: APPs discuss how hospital organizations and employers demonstrate value of provider sleep through policies and procedures. The APP monthly schedule is request driven, meaning providers can request specific days off, or request scheduling preferences (e.g. the

maximum nights in a row scheduled) (see Table 2). While preferences are mostly accommodated, vacations, holiday coverage, and coworkers on medical leave sometimes create schedule needs, requiring providers to work beyond their stated preferences. Overall, the request driven schedule is an organizational policy viewed as supporting sleep. Rotating shifts does not support healthy sleeping habits, and some participants question why there cannot be straight shifts. Allowing providers to nap also is viewed as encouraging sleep, but it is not well supported. Finding a location and time (particularly for ED staff) is a major barrier. If APPs decide to lie down, they keep their phone close by, so they can be easily reached. The potential for a phone call can make falling asleep elusive. Sometimes APPs are the barriers to napping, as some express a personal discomfort with taking naps while on the job. Their sense of responsibility prevents them from allowing themselves to nap. APPs who are NPs comment how they were not allowed to nap when they worked as a nurse, reinforcing the mindset of needing to keep vigilant watch over patients.

Another policy described is the number of hours required to be off duty in between scheduled shift rotation (i.e. moving from a night shift to a day shift). Several of the APPs are not clear on the specific number of hours required by the policy. In fact, the APPs have a recollection of policies and procedures which may influence their sleep, but policy specifics may not be clear (see Table 2). APPs depict a lack of policy when describing how a few coworkers have opted to commit to working more than full-time hours. This is an acceptable practice, supported by the organization. Working these excessive hours is not the norm and more indicative of individual APP values. APPs do not view this practice as reflecting on the organizational values but rather the individual worker's values.

Outside of the current policies and procedures, APPs give few suggestions on how organizations can make changes to improve provider sleep. Because employers cannot dictate how workers spend their time away from work, the APPs are not certain much can be done about worker sleep (see Table 2). Some believe it will only change if there is change initiated from the top of the organization, either through modeling behavior or possibly through policy. But this is unlikely because healthcare is a business and change will require money. Outside of a vague recollection of rules for maximums on medical resident hours, the APPs are unaware of national organizational position

statements or clinical practice guidelines related to sleep and shiftwork.

3.1.4. *Individual biology and how the body values sleep*

Constructs from this theme are either the antecedent of sleep disturbances or the effect, thus sleep prioritization is contextual. There are four subthemes to this theme: "My body still knows that it's daytime," "It takes a toll on your health," "Your brain's kind of foggy, not running on all gears," and "My brain can't get away from being at work" (see Table 2).

3.1.4.1. My body still knows it's daytime: Even with careful sleep schedule planning, APPs cannot always fight against their biological circadian rhythms, resulting in less than optimal sleep duration and quality around work days (see Table 2). Personal sleep timing preferences and circadian rhythms adaptation can make sleep elusive when transitioning to another shift. Sleep difficulties can occur at night, when trying to fall asleep for an early morning shift, or during the day when trying to sleep after working night shift. When sleep aid techniques and routines, such as blackout curtains and eye-covers, fail some APPs resort to the use of pharmaceutical sleep aids (i.e. Benadryl, Melatonin, and muscle relaxers). Because sleep debt accumulates after multiple days of shortened sleep duration and/or poor sleep quality, APPs may experience sleep "catch up" days, where they surprisingly find they have slept for 10 to 12 hours.

3.1.4.2. It takes a toll on your health: APPs describe how their shift work and the resulting circadian disruption has impacted their physical and mental health (see Table 2). They discuss that when they are tired, they snack more. When they feel exhausted, they use caffeine to counteract the tiredness. Several commented they do not really like these caffeinated beverages, but feel they need them to stay alert. Being disciplined about healthy eating habits and regular exercise can offset some of the physical effects of the sleep insufficiencies. Regardless of physical fitness, APPs feel night and rotating shifts are not healthy.

3.1.4.3. Your brain's kind of foggy, not running on all gears: Working irregular work hours can leave APPs feeling cognitively foggy (see Table 2). They describe how a lack of sleep can slow down their thinking processes, occasionally slowing down their productivity, and potentially impacting their interactions with patients and coworkers. Some talk about feeling so tired they cannot keep their eyes open.

Although they do not report errors from poor cognition, they acknowledge it could happen.

3.1.4.4. My brain can't get away from being at work: Sometimes, the APPs' work stress and on-the-job experiences disrupt sleep (see Table 2). APPs need time to process the events that occur during their shifts and post-shift decompression time on evening and night shift can mean shortened sleep duration. Most days are uneventful, but when a trauma or emotional experience takes place, it weighs on their minds. They find it difficult to fall asleep because they are replaying the day's events in their heads. Sometimes the repetitive thoughts surrounding these events manifest in dreams about work, decreasing sleep quality.

3.2. Observations

Fifteen observation visits took place for a total of 28 hours. Observations occurred as early as 5 a.m. and concluded as late as 1 a.m. Six of the nine APPs were observed during various shifts and times. Three had self-identified during the interviews as early chronotypes and three as late chronotypes. Attempts were made to observe each of the six APPs during the beginning, middle, and end of various shifts scheduled (e.g. morning, evening, night). Because the APPs rotated to settings outside the study sites, only four of the APPs were able to be observed in this manner.

Observations largely confirmed APP interview data. Organizational factors, such as rotating shifts and locations were observed. Workload was dependent on the number of patients arriving to the ED, the acuity of patient condition, and the overturn of patients admitted and discharged to the CDU. Day-shift CDU APPs were observed staying later than the scheduled shift to complete charting as a result of the increased workload at the end of the shift. Consumption of caffeine products were noted. Noticeable signs of fatigue (i.e. dark circles, yawning, and irritability) were witnessed in two APPs at the completion of two shifts. One was a late chronotype working the second of two subsequent night shifts. The other APP was an early chronotype at the end of her third day shift.

3.3. Key stakeholder interviews

Key stakeholder participants included ten ED registered nurses and technicians, CDU registered nurses, ED physicians, and hospital safety personnel. Interview data mainly reflected the data from APP interviews, allowing the emerging subthemes to cluster under the same four APP themes. Key stakeholder

discussion around social and family obligations were focused mostly on APPs who have families, again reinforcing the challenges that are faced. Community values of sleep echoed APP insights regarding the growth of a 24/7 society, which lacks respect and understanding of the importance of sleep. ED physician key stakeholders described the same policies and procedures as in the APP interviews, outlining organizational value of sleep. Physician key stakeholders also shared origins of the policies and how the organization has taken circadian science into consideration when constructing the rules. Individual values and biological effects were reiterated through discussion of the impact of short sleep on physical health, how circadian rhythms can be disrupted by APP work, and the effect of intense patient encounters on sleep quality. Additionally, nurse key stakeholders, who work straight shifts, expressed empathy for APPs trying to establish sleep routines with shift rotations, feeling this factor was a major disruption to optimal sleep.

A few deviations from the APP interview data were noted, particularly with the subthemes of how sleep impacts APP mental health and quality patient care. Mood and mental health became a subtheme of its own, as key stakeholders stated they know when APPs are tired because they are "grumpy" towards nurses, nursing assistants, and sometimes patients. Difficulties dealing with workplace frustrations also surfaced. The mental and cognitive impacts of short sleep on quality care were noted by key stakeholders. Most of this was described as "slower" when writing orders or responding to patient requests. Sometimes items related to patient care were overlooked, but key stakeholders viewed this as human mistakes any healthcare team member could commit. They described an atmosphere of department team work where mistakes were caught by nurses, techs, and other support staff, providing a system of checks and balances to human cognitive missteps. Several key stakeholders have been involved in the patient care error review process. These key stakeholders acknowledged sleepiness is not specifically considered in root cause analyses, except for noting the time an error occurred. All felt the complicity of sleepiness could only be determined if a healthcare worker admitted to feeling sleepy when the error occurred, and all stated this would be unlikely.

3.4. Documents

Four APP monthly schedules, one scheduling policy from the ED physician group, and a hospital

organizational handbook with 81 policies were made available and reviewed. Hospital organizational policies did not make specific references to contracted employees, such as APPs. Of note, it is against hospital policy for hospital employees to sleep on the job, but contracted employees are not discussed. The scheduling policy does confirm the request off process described by APPs. Schedules did not designate which days off were requested. Review of the schedules does confirm policies are followed as written and described by APPs. APPs were never scheduled to return from a night shift before 10 hours off, as the policy states. The minimum time between shifts noted on the schedule was 11 hours. Although four of the nine study participants had one month where the number of scheduled shifts exceeded their reported contractual agreement, the average shifts worked over the four months was as reported in the interviews and surveys.

4. Discussion

Similar to other healthcare workers, APPs in this study reported experiencing less than recommended sleep duration when working day and night rotating shifts. APPs identified multiple factors as causes of short sleep. These include factors existing within the context of social and family relationships, the community supply and demand of services, organizational policies and procedures, and individual APP factors such as circadian rhythms, all of which are highly influential on each other. These antecedents of short sleep in APPs reflect evidence found in other shift workers, including nurses [34–36].

The interdependence of the factors can make effective policies and procedure writing difficult. Individual beliefs sometimes may be dictating behavior. In this study, APPs describe an organizational policy permitting napping during shifts. Several APPs found an inability to nap due to a personal sense of duty. Some reported this as a carryover from beliefs they held during their years working as registered nurses. These individual beliefs make the napping policy ineffective. Yet, if one considers how the organization presents and supports the policy, perhaps it can be influential on individual beliefs. As found in this study, locations were not always conducive to napping, creating a barrier. Additionally, hospital organizations present an inconsistent standard, one which considers napping a fireable offense for nursing and ancillary staff but allows it for contracted

workers. This, despite evidence supporting on-shift naps improve alertness in workers and napping being an accepted practice among medical residents and other medical professionals [37, 38]. Interestingly, APPs did not cast judgement on their coworkers who nap, so they are accepting of napping practices. This speaks to the potential for change of individual beliefs, one which could support better sleeping practices among acute care APPs.

Disruption to circadian rhythms is a factor which contributes to the insolubleness of the sleep and shift work issue for APPs. How does one successfully counter diurnal biological rhythms which exist within every living creature on earth [39]? Some strategies exist and can be implemented. Considering worker chronotype tendencies into shift scheduling has been effective at increasing sleep duration and quality [40]. Yet, this process cannot exist alone, as other scheduling practices can compound fatigue issues. Observations in this study demonstrated two workers exhibiting signs of tiredness while working shifts which were timed more closely to their reported chronotype. Although this matching of shift scheduling and chronotype would be ideal, these APPs were at the end of a multi-day run of 12-hour shifts. Twelve-hour shifts have been implicated in increased fatigue and patient care errors, yet research suggests management has faced opposition from staff when trying to institute change to shorter shifts [41, 42]. A case could be made for better education of APPs and other healthcare professionals on the effects of long work hours on sleep, homeostatic pressure drives, cognition, and health and wellness. By educating staff and outlining a team approach to fatigue management in organizations, workers may be more likely to surrender favorite practices, such as long work hours, in lieu of improved sleep and patient safety.

Further education also could reach APPs in some way professional organizations are not. Despite published support of fatigue management practices among many disciplines within the healthcare field, workers are unaware of these suggestions. In this study, a majority of APPs and key stakeholders were only vaguely aware of position statements and/or policies related to medical residents' hours of duty. This suggests the need for further outreach to all healthcare workers on the importance of sleep, a strategy which has been shown to be effective at improving health and safety outcomes [43].

Finally, when considering organizational policies and procedures, management needs to model the value of sleep. Change will not occur unless it comes

from the top of the organization [44–46]. APPs describe a culture where physicians in the ED group, come to work ill and/or fatigued. It is well understood by the APPs they should not call in unless they have found a replacement to cover their shift. This perpetuates an impractical model of invincibility, and permission to practice when an APP may not be fit for duty, putting APPs and patient safety at risk. Additionally, practitioners cannot be left to self-monitor their performance when sleep deprived. As reported in this study, APPs recognized the possibility of their own cognitive impairment, but did not report their on-the-job fatigue and cognitive symptoms to the level reported by key stakeholders. This suggests they may not recognize their need for sleep and the possible cognitive deficits, a phenomenon documented in the literature [47]. This highlights the need for policies to be instituted.

5. Limitations

This study was an ethnographic study with a small sample size. Therefore, generalization is limited. Observations were not as robust as planned due to limited space for an observer in the study site and study participants working shifts outside the study sites. Timing of observations may have prevented some activities, such as napping, from being observed. Individual and social/family interactions were only observed if exhibited in the workplace observational setting. Because of the sensitivity of self-report data in relation to patient care errors, it is possible APPs were not comfortable sharing information which they may believe would implicate them. Despite repeated attempts, recruitment efforts were unsuccessful at including scheduling and human resources staff as key stakeholders. Finally, documents were limited to what the ED physician group would allow. Individual APP contractual agreements were not shared. Nor was the contractual agreement between the hospital and the ED physician group. Therefore, policies and procedures were limited to those the researcher could access, as well as what was reported by study participants.

6. Conclusion

Similar to other shift workers, many factors influence APP sleep. To invite behavioral changes in healthcare workers' prioritization of sleep, all levels of influence can be addressed, as seen with the

SEM framework. An organizational shift in culture and policies, which incorporates APP education and organizational changes supporting sleep habits, may be beneficial. When workers and employers both understand and demonstrate the importance of sleep to worker health and patient safety, improvement to the workplace culture may ensue.

Conflict of interest

None to report.

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References

- [1] Shockey TM, Wheaton AGJMM, report mw. Short sleep duration by occupation group—29 states, 2013–2014. *2017*;66(8):207.
- [2] Luyster FS, Strollo PJ, Jr., Zee PC, Walsh JK. Sleep: a health imperative. *Sleep*. 2012;35(6):727–34.
- [3] American Association of Nurse Anesthetists. Patient Safety: Fatigue, Sleep, and Work Schedule Effects Practice and Policy Considerations. AANA.com 2015.
- [4] American College of Emergency Physicians. Emergency Physician Shift Work. *Annals of Emergency Medicine*. 2017;70(6):947–8.
- [5] American College of Nurse-Midwives. Fatigue, Sleep Deprivation, and Safety: American College of Nurse-Midwives; 2017 [Available from: <http://www.midwife.org/acnm/files/ACNMLibraryData/UPLOADFILENAME/00000000306/Sleep-Guidelines-04-07-17.pdf>.]
- [6] American Academy of Emergency Nurse Practitioners. Emergency nurse practitioner practice data: Executive summary: American Academy of Emergency Nurse Practitioners; 2018 [Available from: https://www.aenp-natl.org/assets/docs/enpractice_data_exec_summary_final.pdf.]
- [7] American Academy of Physician Assistants. What is a PA?: American Academy of Physician Assistants; 2019 [Available from: <https://www.aapa.org/wp-content/uploads/2018/03/What-is-a-PA-Infographic-Legal-Size.3.22.FINAL.pdf>]
- [8] American Association of Nurse Practitioners. NP Fact Sheet: American Association of Nurse Practitioners; 2019 [Available from: <https://www.aanp.org/about/all-about-nps/np-fact-sheet>.]

- [9] Drake CL, Wright K. Shift work, shift-work disorder, and jet lag. In: Kryger M RT, & Dement WC, editor. Principles and practice of sleep medicine. 6 ed. Philadelphia: Elsevier; 2017. pp. 714-25.
- [10] Williamson AM, Feyer A-M. Moderate sleep deprivation produces impairments in cognitive and motor performance equivalent to legally prescribed levels of alcohol intoxication. *Occupational and Environmental Medicine*. 2000;57(10):649-55.
- [11] Weinger MB, Ancoli-Israel S. Sleep deprivation and clinical performance. *Jama*. 2002;287(8):955-7.
- [12] Accreditation Council for Graduate Medical Education. History of duty hours Accreditation Council for Graduate Medical Education; [Available from: <https://www.acgme.org/What-We-Do/Accreditation/Clinical-Experience-and-Education-formerly-Duty-Hours/History-of-Duty-Hours>.]
- [13] Ward NS, Afessa B, Kleinpell R, Tisherman S, Ries M, Howell M, et al. Intensivist/patient ratios in closed ICUs: a statement from the Society of Critical Care Medicine Taskforce on ICU Staffing. *Critical Care Medicine*. 2013;41(2):638-45.
- [14] Johal J, Dodd A. Physician extenders on surgical services: a systematic review. *Canadian Journal of Surgery*. 2017;60(3):172.
- [15] Biddle C, Aker J. The national study of sleep-related behaviors of nurse anesthetists: personal and professional implications. *AANA Journal*. 2011;79(4):324.
- [16] Domen R, Connelly CD, Spence D. Call-Shift Fatigue and Use of Countermeasures and Avoidance Strategies by Certified Registered Nurse Anesthetists: A National Survey. *AANA Journal*. 2015;83(2):123-31.
- [17] Hirshkowitz M, Whitton K, Albert SM, Alessi C, Bruni O, DonCarlos L, et al. National Sleep Foundation's sleep time duration recommendations: methodology and results summary. *Sleep Health*. 2015;1(1):40-3.
- [18] Tremaine R, Dorrian J, Paterson J, Neall A, Piggott E, Grech C, et al. Actigraph Estimates of the Sleep of Australian Midwives: The Impact of Shift Work. *Biological Research for Nursing*. 2013;15(2):191-9.
- [19] Arbour M, Tanner T, Hensley J, Beardsley J, Wika J, Garvan C. Factors That Contribute to Excessive Sleepiness in Midwives Practicing in the United States. *Journal of Midwifery & Women's Health*. 2019;64(2):179-85.
- [20] Rejtar M, Ransstrom L, Allcox C. Development of the 24/7 nurse practitioner model on the inpatient pediatric general surgery service at a large tertiary care children's hospital and associated outcomes. *Journal of Pediatric Health Care*. 2017;31(1):131-40.
- [21] Smith-Coggins R, Rosekind MR, Hurd S, Buccino KR. Relationship of day versus night sleep to physician performance and mood. *Annals of Emergency Medicine*. 1994;24(5):928-34.
- [22] Westbrook JI, Raban MZ, Walter SR, Douglas H. Task errors by emergency physicians are associated with interruptions, multitasking, fatigue and working memory capacity: a prospective, direct observation study. *BMJ Quality & Safety*. 2018;27(8):655-63.
- [23] Smith-Coggins R, Broderick KB, Marco CA. Night shifts in emergency medicine: the american board of emergency medicine longitudinal study of emergency physicians. *The Journal of Emergency Medicine*. 2014;47(3):372-8.
- [24] Ferguson BA, Shoff HW, McGowan JE, Huecker MR. Remember the drive home? An assessment of emergency providers' sleep deficit. *Emergency Medicine International*. 2018;2018.
- [25] McLeroy KR, Bibeau D, Steckler A, Glanz K. An ecological perspective on health promotion programs. *Health Education Quarterly*. 1988;15(4):351-77.
- [26] Gillespie GL, Gates DM, Fisher BS. Individual, relationship, workplace, and Societal recommendations for addressing healthcare workplace violence. *Work*. 2015;51(1):67-71.
- [27] Spradley JP. *The ethnographic interview*. New York: Holt, Rinehart and Winston; 1979.
- [28] Hammersley M, Atkinson P. *Ethnography, principles in practice*. 3rd ed. London;New York,: Routledge; 2007.
- [29] Lincoln YS, Guba EG. *Naturalistic Inquiry*. Newbury Park: Sage Publications; 1985.
- [30] Lee C-Y, Chen H-C, Tseng M-CM, Lee H-C, Huang L-H. The relationships among sleep quality and chronotype, emotional disturbance, and insomnia vulnerability in shift nurses. *Journal of Nursing Research*. 2015;23(3):225-35.
- [31] Barton J, Spelten E, Totterdell P, Smith L, Folkard S, Costa G. The Standard Shiftwork Index: a battery of questionnaires for assessing shiftwork-related problems. *Work & Stress*. 1995;9(1):4-30.
- [32] Rothstein MA. Ethical guidelines for medical research on workers. *Journal of Occupational and Environmental Medicine*. 2000;42(12):1166-71.
- [33] IBM Corp. *IBM SPSS Statistics for Windows*. 26 ed. Armonk, NY: IBM Corp.; 2019.
- [34] Caruso CC. Negative Impacts of Shiftwork and Long Work Hours. *Rehabilitation Nursing*. 2014;39(1):16-25.
- [35] Estryn-Béhar M, Van Der Heijden BIJM. Effects of extended work shifts on employee fatigue, health, satisfaction, work/family balance, and patient safety. *Work*. 2012;41(SUPPL.1):4283-90.
- [36] Knauth P, Hornberger S. Preventive and compensatory measures for shift workers. *Occupational Medicine*. 2003;53(2):109-16.
- [37] Rogers AE. The effects of fatigue and sleepiness on nurse performance and patient safety. *Patient safety and quality: An evidence-based handbook for nurses*: Agency for Healthcare Research and Quality (US); 2008.
- [38] Ruggiero JS, Redeker NS. Effects of Napping on Sleepiness and Sleep-Related Performance Deficits in Night-Shift Workers: A Systematic Review. *Biological Research For Nursing*. 2014;16(2):134-42.
- [39] Hastings MH, Maywood ES, Brancaccio M. The Mammalian Circadian Timing System and the Suprachiasmatic Nucleus as Its Pacemaker. *BIOLOGY-BASEL*. 2019;8(1):13.
- [40] Vetter C, Fischer D, Matera Joana L, Roenneberg T. Aligning Work and Circadian Time in Shift Workers Improves Sleep and Reduces Circadian Disruption. *Current Biology*. 2015;25(7):907-11.
- [41] Geiger-Brown J, Trinkoff AM. Is It Time to Pull the Plug on 12-Hour Shifts?: Part 1. The Evidence. *JONA: The Journal of Nursing Administration*. 2010;40(3):100-2.
- [42] Montgomery KL, Geiger-Brown J. Is it time to pull the plug on 12-hour shifts?: Part 2. Barriers to change and executive leadership strategies. *Journal of Nursing Administration*. 2010;40(4):147-9.
- [43] Barger LK, Runyon MS, Renn ML, Moore CG, Weiss PM, Condlé JP, et al. Effect of Fatigue Training on Safety, Fatigue, and Sleep in Emergency Medical Services Personnel and Other Shift Workers: A Systematic Review and Meta-Analysis. *Prehospital Emergency Care*. 2018;22(sup1):58-68.

- [44] Horstmann D, Remdisch S. Drivers and barriers in the practice of health-specific leadership: A qualitative study in healthcare. *Work*. 2019;64(2):311-21.
- [45] Lerman SE, Eskin E, Flower DJ, George EC, Gerson B, Hartenbaum N, et al. Fatigue risk management in the workplace. *J Occup Environ Med*. 2012;54(2):231-58.
- [46] National Safety Council. *Managing Fatigue: Developing an effective fatigue risk management system*: National Safety Council; 2019 [Available from: <https://safety.nsc.org/managing-fatigue-report>.]
- [47] Van Dongen HPA, Belenky G. Individual Differences in Vulnerability to Sleep Loss in the Work Environment. *Industrial Health*. 2009;47(5):518-26.