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Sleep Characteristics in Hospitalized Antepartum Patients

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Abstract

Objective—To describe sleep characteristics in high-risk antepartum inpatients.

Design—Prospective descriptive design.

Setting—Tertiary hospital in southern California.

Participants—A convenience sample of 39 antepartum women.

Methods—Data were collected from participants' medical records, questionnaires (General Sleep Disturbance Scale [GSDS]), actigraphy on days 3-4 after admission, and a sleep diary that included reasons for awakening and morning and evening fatigue ratings.

Results—Weeks gestation ranged from 24-35 weeks. Sleep time varied from 310-492 minutes and averaged 6.7 hours/night. The women were awakened 9-32 times/night and averaged 18 awakenings. They napped an average of 124 minutes throughout the day. Women averaged 3.9 on the GSDS when retrospectively considering 7 days prior to hospitalization and scored 4.1 when considering the current 3 days of hospitalization. In the diary, most rated their sleep quality as Fairly Good or Very Good (62-71%), but 29% said Very Bad on night 2, and 38% said Very Bad on night 3.

Conclusion—Frequent interruptions during the night do not allow for mothers to receive the restorative sleep they need.

Keywords

Sleep; Antepartum; Hospitalized

Callouts

1. Sleep disturbances are common during pregnancy as a result of physiologic, hormonal, emotional, and physical/anatomical changes.
2. With antepartum patients experiencing long-term hospitalization, it is crucial to assess quality and quantity of sleep of antepartum inpatients.

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3. The average of 18 arousals and awakenings documented during the night may not allow for mothers to obtain much-needed rest.

Sleep is necessary for the maintenance of good health and well-being, especially during pregnancy. Nevertheless, sleep disturbances are common during pregnancy as the result of physiologic, hormonal, and anatomical/physical changes. Characteristics of sleep in pregnancy differ according to gestation. Women are encouraged during pregnancy to rest often and achieve the maximum hours of sleep. Sleep loss in late pregnancy has been associated with longer labor and increased risk of cesarean delivery, and researchers recommend that obstetric patients be advised to be in bed for 8 hours in order to obtain a minimum of 7 hours sleep during the third trimester (Lee & Gay, 2004). However, much of what is known about sleep in pregnancy is the result of research on healthy pregnant women. High-risk women are being hospitalized at earlier gestations and for longer hospitalizations. Sleep disturbance in hospitals is also a common occurrence, but most studies have focused on patients in intensive care and medical surgical units. These studies have shown that sleep disturbance is universal in acute care settings, yet studies have not been conducted with a focus on antepartum hospitalized women. With the already existing sleep disturbance due to physiologic, hormonal, and emotional changes associated with pregnancy, what additional impact does inpatient hospitalization have on the antepartum patient and her sleep and well-being? The specific purpose of this pilot study was to examine sleep characteristics of high-risk inpatient antepartum patients.

CALLOUT 1

Background and Significance

Normal Sleep in Pregnancy—Sleep disturbances include initiation insomnia, nocturnal awakenings, restless legs syndrome, sleep-disordered breathing (snoring, sleep apnea), and excessive sleepiness and fatigue (Beebe & Lee, 2007; Lee, Zaffke, & McEnany, 2000; Lopes, Carvalho, Seguro, Mattar, Silva, Prado, et al. 2004). Characteristics of sleep differ according to the stage of pregnancy (Santiago, Nollado, Kinzler, & Santiago, 2001; Lee, et al.). During the first trimester, subjective symptoms include increased fatigue and sleepiness as well as less total sleep time at night. In cases of anxiety associated with pregnancy, there may also be initiation insomnia or trouble falling asleep. By the last trimester, awakenings are such that total sleep time has gradually decreased by about an hour even though bed time and final awakening time has stayed the same. Women are encouraged to rest often and achieve the maximum sleep possible during their pregnancy. In a study by Lee and Gay (2004), fragmented sleep during the night and less total sleep time in late pregnancy was associated with the duration of labor as well as type of delivery. When assessed at about three weeks before delivery, women in their study who slept less than 6 hours at night had 10 hours longer labor time and were 4.5 times more likely to have a cesarean delivery compared to those who slept more than 7 hours. However, much of what is known regarding sleep in pregnancy is the result of research in normal healthy pregnancy in the home environment or laboratory setting (Santiago et al., 2001; Sharma & Franco, 2004). Very little is known about sleep in pregnancy, particularly in women with high-risk pregnancy during hospitalization.

Sleep Quality in the Hospitalized Patient—Over the last 30 years, sleep studies have included patients in: intensive care units (Celik, Oztekin, Akyolcu, & Issever, 2005; Fontaine, 2005; Tamburri, DiBrienza, Zozula, & Redeker, 2004); medical surgical units (Tranmer, Minard, Fox & Rebelo, 2003); pediatric intensive care (Bennett, 2003); burn units (Raymond, Ancoli-Israelb, & Choiniere, 2004); and rehabilitation hospitals (Freter & Becker, 1999). Study samples are often comprised of either pediatric patients (Bennett,

2003) or the elderly (Ersser, Wiles, Taylor, Wade, Walsh, & Bentley, 1999). Sleep research studies on acute hospitalized patients have focused on quality and duration of sleep using subjective (i.e., surveys and sleep diaries) and objective (i.e., polysomnography) assessments. Measures have included perception of sleep by the patient or the nursing personnel, frequency of sleep disturbance, and personnel interactions. Research has shown that sleep disturbance is universal in the acute care setting and is seen as physiologically, psychologically, and environmentally induced.

Many studies have focused on the topic of sleep in the hospitalized patient; however, studies have not been conducted on obstetrical units or, more specifically, with the antepartum population as a focus. As previously discussed, not only do obstetrical patients have hormonal, emotional, and physical/anatomical changes that affect sleep, but these sleep disturbances may be worsened in the hospital - and the effect on a pregnant patient may differ from patients in other units. Although patients' sleep characteristics in the hospital setting have been reported, sleep in the antepartum population remains unknown. With the importance of sleep for obstetrical patients, and with the increasing number of antepartum patients experiencing long-term hospitalization, more information is needed to ascertain sleep characteristics in this population. Therefore, the research question was: What are the sleep characteristics (total sleep time, number of arousals/awakenings, and daytime sleep time) in hospitalized antepartum patients?

Research Design and Methods

This was a prospective descriptive study with a convenience sample of 39 antepartum women. The study was conducted in a tertiary women's hospital in southern California that delivers approximately 7,000 babies a year and has a 23-bed Perinatal Special Care Unit (PSCU). Institutional Review Board approval was obtained prior to data collection. Inclusion criteria consisted of women admitted to PSCU for the first time, hospitalized for >3 days, at least 18 years of age, and able to read and write English or Spanish. Patients diagnosed with previous sleep disorders or who worked night shift or irregular work schedules were excluded. Those with allergies to metal were also excluded due to the metal on the wrist actigraph monitor.

Instruments—To explore both subjective and objective measures of sleep parameters in the antepartum patient, the General Sleep Disturbance Scale (GSDS), wrist actigraphy, and a 48-hour sleep diary were used. The General Sleep Disturbance Scale (Lee, 1992) was designed to measure aspects of sleep disturbance in healthy adults. This tool contains 21 items that rate the frequency of specific sleep problems during the past week from 0 (not at all) to 7 (every day). Subcategories addressed by the GSDS include: sleep quality, sleep latency, sleep quantity, sleep maintenance, early awakening, use of medication to promote sleep, and the impact of sleepiness on daytime function. The total score ranges from 0 to 147, with the higher scores indicating greater frequency of sleep disturbance. A mean of 3 on any one subscale differentiates good sleepers from poor sleepers based on established DSM-IV criteria for insomnia. Validity and reliability have been tested in multiple studies of childbearing women (Lee & Gay, 2004) with a Cronbach alpha coefficient of .82 for the 3-item sleep quality subscale and alpha coefficient of .80 for the total scale.

To objectively record sleep/wake patterns, participants were asked to wear a wrist actigraph (Ambulatory Monitoring, Inc, Ardsley, NY) for 48 hours (days 3-4 of hospitalization). The actigraph is a small portable device that senses physical motion and stores the data in 30-second intervals. After 48 hours, the data are downloaded and analyzed with an automatic sleep scoring software program to minimize bias inherent in manual scoring (Action4, Ambulatory Monitoring, Inc, Ardsley, NY) for sleep and wake time. The actigraph has been

widely used in research studies for the evaluation of rest-activity cycles (Littner, Kushida, McDowell Anderson, Bailey, Berry, Davila, et al., 2003). While wearing the actigraph, each participant was also asked to keep a sleep diary and record bed times, wake times, and ratings of sleep quality and fatigue.

Procedure—The Perinatal Special Care Unit (PSCU) admission logs were reviewed with the trained clinical nurse research assistant to identify potential participants. Participants were approached during their first day of admission and asked to participate in the study. Once informed consent was obtained, demographic data were collected on age, ethnicity, years of education, occupation, and marital status. Medical information included gravity, parity, diagnosis, weeks of gestation, treatment orders (i.e., frequency of electronic fetal monitoring), activity (i.e., bed rest, bathroom privileges), and medications. The women were asked to complete the GSDS (0-7 day version) on admission and then again on day 4 after hospital admission (0-4 day version). Both the 48-hour sleep diary and wrist actigraphy were used during days 3 and 4 after admission.

Data Analysis—Measures were completed twice during the 48-hour assessment (actigraphy, diary bed times and wake times, ratings of sleep quality, and ratings of morning and evening fatigue). The averaged 2-day data were used and presented as means and standard errors of the mean. GSDS scores were calculated and reported as means with standard deviations. The data were analyzed using SPSS. A 2-tailed alpha level of .05 was used for all statistical tests. Frequency and descriptive statistics were calculated for the demographic and medical information.

Results

A total of 39 women were enrolled; 30% were primigravida and gestation ranged from 24 to 35 weeks. Other sample characteristics are listed in Table 1. Fetal monitoring consisted of tocodynamometer every 4-6 hours (73%); 44% had ultrasound every 4-6 hours (38% every 8-12 hours and 9% every 24 hours). Activity levels included strict bed rest (2%), bed rest with bathroom privileges (23%), and shower privileges (75%). Medications consisted of Terbutaline (33%), Magnesium Sulfate (46%), and Zolpidem (22%). Sleep time varied from 5 to 8 hours and averaged 6.7 hours per night. The women were aroused or awakened between 9 and 32 times/night on average for the two nights, with a mean of 18 times. They napped an average of 124 minutes throughout the day. Women scored 3.9 on the GSDS when asked to retrospectively consider the 7 days prior to hospitalization, and they scored 4.1 when asked to consider the 3 days of hospitalization when they were wearing the actigraph monitor and recording information in their sleep diary. On night 3, sleep quality was similar to night 2: Very Good (10%), Fairly Good (52%), and Very Bad (38%) (Table 2).

Self-reported sleep quality on night 3 was unrelated to age or pregnancy factors, but was correlated with actigraphy recorded number of awakenings ($r = .534$, $p = .013$) and GSDS for the 7 days before hospitalization ($r = .495$, $p = .027$) and current 3 days ($r = .519$, $p = .019$). Only 7 women were taking Zolpidem for sleep and they had a trend for more awakenings compared to the other 32 women; however, the sample was too small for statistical analysis. There were no differences on sleep variables for those on Terbutaline. The 15 women on Magnesium Sulfate did not differ on diary self-report, GSDS scores, or total sleep time by actigraphy, but had significantly more awakenings (23.7 ± 6.1) than the other 24 women (15.9 ± 7.4) in the sample ($t = 2.45$, $p = .021$) (Table 3).

CALLOUT 2

Discussion

The main purpose of the study was to describe sleep characteristics in high-risk antepartum hospitalized patients. Although rated retrospectively, their GSDS scores indicated existing sleep disturbances prior to hospitalization that continued and slightly increased during the three days of hospitalization. This was highly correlated with their current diary report of sleep quality and number of awakenings recorded by wrist actigraphy rather than total minutes of sleep at night. Sleep disturbance in pregnancy is well-documented in the literature (Gay, Lee, & Lee, 2004; Mindell & Jacobson, 2000; Sahota, Jainb & Dhandb, 2003), especially toward the end of the pregnancy and in hospitalized antepartum patients with multiple gestations (Maloni, Margevicius & Damato, 2006). The results of this study indicate that hospitalized antepartum women exhibit similar disruptive patterns. The women were able to initiate sleep but not necessarily maintain sleep. The sleep deprivation that results from difficulty maintaining sleep during the night is often manifested as falling asleep quickly whenever the opportunity presents itself. Common factors associated with sleep disruption are noted in the literature to include physiologic, hormonal, and anatomical/physical changes (Beebe & Lee, 2007; Edwards, Middleton, Blyton & Sullivan, 2002; Lee, Zaffke, & McEnany, 2000; Mindell & Jacobson, 2000). Other possible factors seen specifically in this antepartum population included around-the-clock treatments (electronic fetal monitoring), restricted activity levels, and medications. As result of the high-risk condition, most women were frequently and intermittently monitored either late at night or early morning, not allowing for uninterrupted or extended sleep. Continuous monitoring may be less disruptive to sleep than the on-again, off-again disruptions from intermittent monitoring. The majority of the women were monitored every 4 to 6 hours, making it difficult to obtain uninterrupted sleep cycles or the recommended 7-8 hours of sleep.

The body is not meant to be inactive or restricted. However, bed rest is often prescribed for high-risk pregnancies between 20-36 weeks gestation. Although bed rest can be beneficial in regulating uterus perfusion and fetal circulation and reducing pressure on the cervix, the restrictive activity results in some physiologic and psychosocial side effects (Hediye & Korkmaz, 2005). Studies have shown that exercise improves sleep (particularly deep sleep) and is recommended as part of a healthy sleep hygiene regimen (Lee, 2001; Lee, 2006). In this sample, 97% of the women were on bed rest but were allowed bathroom privileges. Although these women had only been on bed rest for three full days prior to starting the study, sleep may have been affected by their physical restriction.

Questions also exist whether disease processes of pregnancy-induced hypertension, gestational diabetes, or preterm labor are additive to the disrupted sleep experienced during a healthy pregnancy (Edward et al., 2002; Wolfson & Lee, 2005). Understandably, the women were hospitalized as a result of complications that could not be adequately managed at home. Additionally, side effects from medications used as treatment for these diagnoses may also contribute to sleep disruption. Most women in this study were given Magnesium Sulfate or Terbutaline, and Magnesium Sulfate was significantly more disruptive of sleep than Terbutaline. Surprisingly, pharmacologic therapies for sleep (such as Zolpidem) were already being provided to some (7) participants by day three of hospitalization. Although the use of sleep aids in pregnancy is increasing - and they are considered safe - the effects of these medications on mother and fetus need more research (Lee, 2006; Wolfson & Lee).

As noted by Fontaine (2005), the patient's own report of sleep quality is the best measure of sleep. Wrist actigraph monitors worn by the women documented their sleep disruption, and the amount of sleep fell short of the recommended amount. Nevertheless, the women overall reported fairly good sleep despite the many awakenings. As a result of their restricted

activity level, these women also averaged two hours of sleep during the day. Daytime naps can assist to provide an overall necessary quantity of sleep; however, excessive sleep during the day can adversely prolong the ability to fall asleep at night and reduce nighttime sleep quality.

CALLOUT 3

Limitation of Study

Several study limitations need to be noted. First, the sample size of 39 women limits generalizability to the population of antepartum women hospitalized on bed rest. Although the sample size was small, results provide a direction for further research. A larger sample would strengthen the findings, particularly for the effects of medication therapies on sleep quality and quantity. Second, the study was conducted in a tertiary women's hospital in a dedicated unit specific to antepartum care. In the United States, most antepartum patients are included in labor and delivery, postpartum, or gynecology units. Third, the length of sleep monitoring was only two nights and may not reflect typical sleep in the hospital setting. Fourth, some of the women were given sleep medication, which may have affected their perceived quality of sleep or objective measure of sleep time. Lastly, the study did not differentiate the awakening which occurred spontaneously by the patient or which awakenings were attributed to nursing personnel disturbances. Future studies should address causes for the frequent disruptions and awakenings, sleep patterns in longer durations of hospitalization, and polysomnographic studies to better inform health care providers and researchers interested in changes in sleep architecture in this population.

Implications

As a result of the increasing age of childbearing and advances in genetic and prenatal diagnosis, the volume of high-risk antepartum patients will also continue to rise (Posmontier, 2002). Undoubtedly, these patients will experience longer hospitalizations at early gestational ages. Nurses need to be aware of the role that sleep plays in the well-being of mother and fetus. Every effort needs to be made to assist women to achieve the best sleep possible during hospitalization. Pregnant women already experience sleep disruption as a result of the pregnancy, and these disruptions continue during hospitalization. As a result, focus should be placed on assessing the quantity and quality of sleep antepartum women receive while hospitalized. Nursing care should include not only a daily assessment about the previous night's sleep, but also nursing care and treatment that can be altered to foster longer periods of sleep at night.

Conclusion

Sleep characteristics in antepartum patients were explored. With the importance of sleep for the obstetric population, and with the increased number of women experiencing long-term hospitalization, it is important to ascertain this type of baseline information. Frequent interruptions during the night do not allow for mothers to receive the necessary restorative sleep they need during their antepartum stay. Understanding normal changes in sleep patterns in pregnancy can help nurses identify sleep disturbances that worsen as a result of antepartum hospitalization.

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Table 1

Sample Demographic Characteristic (N=39)

	M (SD)	Median	Range
Variable			
Age (yrs)	28.9 (6.6)	28.5	17 - 45
Pregnancies (#)	2.0 (1.2)	2	1 - 9
Live Births (#)	1.2 (1.2)	1	0 - 5
N (%)			
Education			
College grads or higher		14 (36%)	
High school or less		13 (33%)	
Unreported		12 (31%)	
Income			
Less than 15,000		11 (28%)	
More than 70,000		4 (10%)	
Unreported		24 (62%)	
Marital Status			
Married		20 (67%)	
Unreported		19 (33%)	
Ethnicity			
Black		2 (5%)	
Asian		5 (13%)	
White		16 (41%)	
Hispanic		15 (38.5%)	
Other -- Kurdish		1 (2.5%)	
Admitting Diagnosis *			
Preterm Labor		22 (58%)	
Diabetes		6 (16%)	
Pregnancy Induce Hypertension		4 (11%)	
Placenta Abnormalities		7 (19%)	
Incompetent Cervix		6 (17%)	
Number of Fetuses			
Singleton Gestation		30 (76%)	
Multiple Gestation		9 (24%)	

* May have been admitted with multiple diagnoses

Table 2

Sleep Characteristics (N = 39)

	M (SD)	Median	Range
Variable			
Daytime Sleep (minutes)	124 (107)	98.5	4 - 437
Nighttime Sleep (minutes)	405 (59)	420	310 - 492
Nighttime Awakenings (#)	18.8 (7.65)	16.5	9 - 32
General Sleep Disturbance 7 days before hospitalization	3.88 (1.16)	4.0	1.6 - 5.7
General Sleep Disturbance 3 days during hospitalization	4.07 (1.12)	4.1	1.8 - 6.3

	Sleep Quality Night 2	Sleep Quality Night 3
	N (%)	N (%)
Very Good	5 (13%)	3 (8%)
Fairly Good	20 (51%)	15 (39%)
Fairly Poor	0	0
Very Poor	10 (26%)	11 (28%)
Unreported	4 (10%)	10 (25%)

Table 3

Sleep Outcomes by Admitting Diagnosis and Type of Medication

		Sleep (minutes)	Awakenings (#)	General Sleep (past 3 days)	Sleep Quality
Pre-term Labor	No (n=20)	428 ± 57.1	17 ± 8.8	4.0 ± 1.1	2.07 ± 0.70
	Yes (n=19)	379 ± 52.3*	21 ± 5.9	4.2 ± 1.2	2.21 ± 0.63
Pregnancy Induced Hypertension	No (n=36)	404 ± 56.3	17 ± 7.1	4.0 ± 1.1	2.10 ± 0.66
	Yes (n=3)	409 ± 88.1	28 ± 4.0*	5.3 ± 0.2*	2.67 ± 0.58
Terbutaline	No (n=28)	404 ± 58.5	18 ± 8.1	4.1 ± 1.1	2.05 ± 0.50
	Yes (n=11)	394 ± 62.9	21 ± 7.1	4.2 ± 1.2	2.36 ± 0.81
Magnesium Sulfate	No (n=24)	401 ± 65.2	16 ± 7.4	3.8 ± 1.8	1.94 ± 0.64
	Yes (n=15)	402 ± 50.6	24 ± 6.1*	4.4 ± 1.2	2.40 ± 0.51*
Indocin	No (n=32)	409 ± 58.4	17 ± 7.4	4.2 ± 1.2	2.08 ± 0.64
	Yes (n=7)	368 ± 52.4	26 ± 6.4*	3.9 ± 1.0	2.43 ± 0.54

* t ≥ 2.0, p ≤ .05