



Examining Sleep Disturbance During the Menopausal Period

Allyssa L. Harris & Amari Harrison

ABSTRACT: Poor sleep is frequently reported by women during the menopausal transition period. Difficulties with sleep can affect women's physical and emotional health as well as their overall quality of life. Investigators have found that there is a correlation between a woman's menopausal history and poor sleep; however, there are differences within each menopausal stage. In this short review, we examine a recent secondary analysis study of quality of sleep and risk factors for poor sleep among women ages 45 to 54 years.

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Poor sleep, which broadly includes insomnia, sleep disturbances, and restless sleep, is a health problem affecting millions of adults annually and is frequently reported by women. Between 40% and 60% of women approaching menopause note some difficulties with sleep disturbance or insomnia (Joffe, Massler, & Sharkey, 2010).

As the population of baby boomers ages, the number of women entering the menopause transition period will continue

to rise, likely increasing the number of women reporting insomnia, sleep disturbances, and restless sleep. Poor sleep has been cited as one of the top health concerns of menopausal women (van Dijk, Kavousi, Troup, & Franco, 2015) and was recognized as a core menopausal symptom in a 2005 National Institutes of Health State of the Science Conference panel report on menopause-related symptoms (National Institutes of Health, 2005).

CLINICAL IMPLICATIONS

- All women in the menopausal transition period should be assessed for sleep disturbance.
- Having poor sleep during one menopausal stage does not necessarily predict poor sleep during subsequent stages.
- Poor sleep can influence a woman's health, activities of daily living, and quality of life
- Insomnia is associated with depression; women with poor sleep should be assessed for depression.
- Educating women about sleep and health is an important role for nurses who provide care for women.

Sleep and Health

Poor sleep can affect a woman's health and well-being, placing her at risk for chronic diseases including diabetes, heart disease, obesity, and depression ([Centers for Disease Control and Prevention, 2018](#)). Sleep disturbances are broadly characterized as changes in quality, quantity, and timing of sleep that effects daytime functioning and quality of life ([American Psychiatric Association, 2019](#)). Restless sleep includes generalized movements that occur throughout the night, including rolling over, leg movements, and brief nighttime awakening.

Among all sleep disorders, insomnia is the most prevalent condition, affecting approximately 30% of adults ([National Sleep Foundation, 2019](#)) and 1 in 4 women ([Office on Women's Health, 2018](#)). Insomnia is defined as the inability to fall asleep or stay asleep or feeling unrested after sleep ([American Academy of Sleep Medicine, 2018](#)). Insomnia can be further defined as an acute or short-term disorder lasting up to 3 months or as chronic insomnia, which occurs at least 3 nights per week for a minimum of 3 months ([American Academy of Sleep Medicine, 2018](#)). Symptoms of insomnia include fatigue, difficulty concentrating or memory impairment, moodiness or irritability, daytime sleepiness, lack of energy and concerns or frustration about sleep.

Although insomnia may be connected closely with menopausal symptoms such as night sweats and hot flashes, insomnia can occur independent of menopausal symptoms ([Hachul, Bittencourt, Soares, Tufik, & Baracat, 2009](#)). Insomnia has been found in studies of postmenopausal women even without other climacteric symptoms ([Hachul et al., 2011](#); [Okun et al., 2009](#)). In a study of 962 women, severe self-reported sleep difficulties were associated with a 3.5-fold increase (95% confidence interval [CI] [1.99, 6.04])

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among women in the menopausal transition group compared with the premenopause group ([Tom, Kuh, Guralnik, & Mishra, 2010](#)).

In this short review, we report on research conducted by [R. L. Smith, Flaws, and Mahoney \(2018\)](#) that described the dynamics of poor sleep among participants of the Midlife Women's Health Study and identified risk factors associated with poor sleep during the menopausal transition. Our aim is to provide nurses who care for women with an opportunity to stay current on the latest evidence on sleep disorders and insomnia while assisting women as they transition through the menopausal period. This study provides Grade A evidence (see [Table 1](#)).

The Study Reviewed

The Midlife Women's Health Study was a prospective, longitudinal, population-based study in which the authors sought to examine the risk factors associated with hot flashes among healthy women ages 45 to 54 years. It was funded specifically to test the hypothesis that obesity is associated with an increase in hot flashes, potentially through ovarian failure, altered hormonal milieu, and/or genetic polymorphisms ([Ziv-Gal et al., 2017](#)). Ultimately, results longitudinally showed no association between baseline body mass index (BMI), BMI change or weight change, and hot flashes ([Ziv-Gal et al., 2017](#)). However, other associations were identified between hot flashes and such risk factors such as older age, perimenopausal status, cigarette smoking, lower estradiol and/or progesterone levels, African American race, and symptoms of depression.

Study Design, Sample, and Data Analysis

In the original study, women from Baltimore, Maryland, and its surrounding counties were recruited to participate in the cohort study ([Ziv-Gal et al., 2017](#)). The study received institutional review board approval from the University of Illinois and John Hopkins University. Participants were recruited by mail, and written consent was obtained. To meet inclusion criteria, participants had to be pre- or perimenopausal women ages 45 to 56 years with intact ovaries and uteri. Exclusion criteria included the following: current pregnancy; history of cancer; use of exogenous female hormones or herbal/plant substances; and postmenopausal or amenorrhea for the past year ([R. L. Smith et al., 2018](#)). Researchers defined menopausal status as follows: (a) premenopausal women had menstruated within the last 3 months (b) perimenopausal women were amenorrheic for the past 3 months, and (c) postmenopausal women had no menses within the past 12 months ([R. L. Smith et al., 2018](#)).

Data were collected between 2006 and 2015. More than 1,000 women were contacted, and a total of 780 women were recruited and participated during the first year of the study. After the first year, 5.5% withdrew, and approximately 3% of participants withdrew each subsequent year; at Year 4, follow-up visits were discontinued for women who were determined



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to be postmenopausal. By year 7, 101 premenopausal or perimenopausal women were still active in the study. The majority of participants were followed for 4 to 7 years. Using data collected from the Midlife Women's Health Study (Ziv-Gal et al., 2017), R. L. Smith et al. (2018) conducted a secondary data analysis to examine aspects of poor sleep and the associated risk factors. This secondary analysis provides insight into women with insomnia and menopause and is the focus of this short review.

Participants had an initial baseline office visit, which included BMI measurements, serum estradiol level tests, and vaginal ultrasonography. These women also completed a 26-page baseline survey focused on menopausal symptoms and a wide variety of other subjects, such as sexuality, mood, and various lifestyle issues. Of note, the survey questions also included questions about sleep habits, disturbances, and insomnia over the previous year and included items such as *Please indicate how frequently you experienced sleep disturbance during the past year* and *Please indicate how frequently you experienced insomnia during the past year* (R. L. Smith et al., 2018). Responses were recorded on a 5-point Likert-type scale. The sleep questions and demographic and health status variables examined included race, income and education level, health status, hot flashes, depression, frequency of alcohol consumption, smoking status, and leisure activity levels. After the initial visit, participants completed annual follow-up surveys. Serum estradiol levels also were collected at 4-week intervals for a total of four visits during the first year. All data recruitment and data collection were completed in June 2015 (R. L. Smith et al., 2018).

Data from 776 women were included in this study, with 191 participants providing 1 year of data, 104 providing 2 years, 91 providing 3 years, 231 providing 4 years, and 159 providing between 5 and 7 years of data, for a total of 2,479 observations. Participants' ages ranged from 45 to 61 years old, with a median of 50 years old. The sample was composed primarily of women who were White ($n = 427$) followed by those who were African American ($n = 137$). The majority of participants reported their health status as *good to very good* ($n = 388$), and 127 reported their health as *excellent*. Sixty-five percent ($n = 501$) of participants reported their income as moderate to high. Estradiol levels ranged from 5.6 to 766.4 pg/ml, with a median of 50 pg/ml. During the study, 436 women transitioned from premenopausal to perimenopausal and 219 women transitioned from perimenopausal to postmenopausal (R. L. Smith et al., 2018).

Data analysis was conducted using the R statistical package (Version 3.4.1; R Foundation, n.d.). To understand the persistence of poor sleep, R. L. Smith and colleagues (2018) used a proportional odds logistic regression model to calculate the probability of sleep disturbance or insomnia throughout the premenopausal to postmenopausal period, where the outcome variable was the Likert value at a later menopausal stage and the predictor value was the Likert value at an earlier menopausal stage. Participants were assigned a menopause status for each year of the study, and results were based on these results (R. L. Smith et al., 2018).

To determine the degree of interaction between insomnia and sleep disturbance at baseline, Kendall's tau was calculated. Kendall's tau is a nonparametric test used to measure the strength and direction of the relationship among ranked variables (Field, 2016). Ordinal logistic regression models were fit to determine risk factors for the three poor sleep outcomes: sleep disturbance, insomnia, and restless sleep (R. L. Smith et al., 2018).

Results

A high degree of correlation was found among all three poor sleep variables (sleep disturbance, insomnia, restless sleep). Insomnia was correlated with sleep disturbance ($\tau = 0.636$) and restless sleep ($\tau = 0.591$), while sleep disturbance was correlated with restless sleep ($\tau = 0.614$; R. L. Smith et al., 2018). Because of this high degree of correlation in this analysis, results focused primarily on insomnia.

Perimenopausal women who reported insomnia more than five times per week were more likely to report greater levels of insomnia during the postmenopausal period (odds ratio [OR] = 3.6, 95% CI [1.29, 10.36], $p = .01$), or as ordinal variables (OR = 2.9, 95% CI [1.3, 6.57], $p = .00$). However, premenopausal insomnia was not predictive of insomnia in perimenopause (R. L. Smith et al., 2018). Frequency of insomnia during the peri- and postmenopausal periods was significantly increased by several risk factors, including hot flashes ($p < .001$); frequency of hot flashes ($p < .001$); frequency of hot flashes weekly ($p < .001$) or daily ($p < .001$);

TABLE 1 USPSTF LEVELS OF EVIDENCE GRADING SYSTEM

Grade	Definition	Suggestions for Practice
A	The USPSTF recommends the service. There is high certainty that the net benefit is substantial.	Offer/provide service
B	The USPSTF recommends this service. There is high certainty that the net benefit is moderate or moderate to substantial.	Offer/provide service
C	Clinicians may provide this service to patients depending on patient circumstances. However, the net benefit may be small to patients without signs or symptoms (statement undergoing revision).	Offer/provide service only if other patient considerations support offering/providing the service.
D	The USPSTF recommends against this service. There is high or moderate certainty there is no net benefit or that the harms outweigh the benefits.	Discourage use of this service.
I	The USPSTF concludes the current evidence is insufficient to assess the benefit/harms balance of the service. The evidence is lacking, of poor quality, or conflicting, and the benefits/harms cannot be determined.	Review the “Clinical Considerations” section of USPSTF Recommendation Statement. The patient should understand the uncertainty and the benefits/harms balance.

Note. USPSTF = U.S. Preventive Services Task Force. Source: U.S. Preventive Services Task Force (2018).

and increasing depression ($p < .001$). In a supplemental table provided by R. L. Smith et al. (2018), results also highlighted the fact that sleep disturbance and restless sleep, at baseline, were significantly increased in the peri- and postmenopausal period by hot flashes ($p < .001$), and increased frequency of depression ($p < .001$). Current report of smoking was also associated with sleep disturbances ($p < .001$; R. L. Smith et al., 2018).

Last, in multivariable models, depression, smoking, phase of menopause, and frequency of night sweats all predicted insomnia. Women who reported regular depression were 4.8 times more likely to report more frequent insomnia compared with those without depression (R. L. Smith et al., 2018). Peri- and postmenopausal women were 1.4 times more likely to report greater insomnia than premenopausal women, and women who reported greater frequency of night sweats were 1.3 times more likely to report greater frequency of insomnia (R. L. Smith et al., 2018). Women who smoked were 1.2 to 1.4 times more likely to report frequent insomnia compared with those who did not smoke.

Study Conclusion

Women's experiences of insomnia and sleep disturbance vary as they encounter each phase of menopause. The results from this study showed that women's experiences of poor sleep during a particular menopausal stage did not necessarily predict poor sleep in a subsequent stage (R. L. Smith et al., 2018). However, women who reported more frequent insomnia (i.e., greater than 5 times per week) during the

perimenopause stage were more likely to report greater levels of insomnia after menopause.

R. L. Smith et al. (2018) found a high correlation between sleep disturbance, insomnia, and restless sleep in the study sample. Women without sleep disturbance were unlikely to report insomnia or restless sleep, whereas women with greater sleep disturbance were more likely to report insomnia and/or restless sleep. The researchers reported that this correlation was expected because the underlying risk factors were shared.

Risk factors correlated with sleep disturbance among women in this sample included depression, vasomotor symptoms, and smoking, regardless of menopausal status (R. L. Smith et al., 2018). In this secondary analysis, R. L. Smith et al. (2018) found that depression was significantly and consistently correlated with women's reports of poor sleep across all study variables. Women who experienced vasomotor symptoms, night sweats, and hot flashes were also more likely to report sleep disturbance. Night sweats and hot flashes are likely to have a direct effect on sleep discomfort and disturbance, increasing the likelihood of reports of poor sleep quality, including restlessness and insomnia. In addition, smoking was correlated with sleep disturbance and insomnia in this population even after accounting for the impact of vasomotor symptoms. The study's authors suggested that there could be another underlying pathway by which smoking increases the risk of poor sleep (R. L. Smith et al., 2018). Additional research is needed to explore the links between smoking and sleep disturbance.

Comments

Strengths and Limitations

There are several strengths and limitations for the study by R. L. Smith and colleagues (2018). Strengths include the sample size of 776 age-appropriate participants, which increases confidence in the results and allows for greater generalization (Biau, Kerneis, & Porcher, 2008). In addition, the researchers followed participants for a number of years, allowing for the examination of changes in sleep during the menopausal transition period (Caruana, Roman, Hernandez-Sanchez, & Solli, 2015).

One significant limitation of this study is the use of inconsistent terminology by R. L. Smith et al. (2018) regarding sleep disturbance and poor sleep. The correct terminology and umbrella term is *sleep disorder*, which encompasses any disorder that affects, disrupts, or involves sleep including insomnia, sleep disturbance, and restless sleep (National Sleep Foundation, 2019). In addition, the American Academy of Sleep Medicine uses this lexicon in its manual, *International Classification of Sleep Disorders* (Sateia, 2014). Using correct and consistent terminology that is congruent with the literature is important for understanding research and supporting practice initiatives. These terms were used more interchangeably throughout the report by R. L. Smith et al.

Another limitation of this study was the use of self-report of sleep outcome measures, which included only a single question assessment about insomnia and depression (R. L. Smith et al., 2018). This question was used assessed for these disorders only and did not take into account the fact that women may not perceive themselves as having insomnia and instead may consider themselves as having a lesser sleep disorder. A broader question would be *Many women experience sleep difficulties as they approach the menopausal period; are you have problems sleeping?* Alternatively, a woman could be queried about how often her sleep is disturbed. Positive responses by women should prompt a more extensive assessment questioning about sleep, including depression screening.

A further limitation is the measurement of estradiol levels, which can fluctuate widely during the menopause transition period. Lower levels of estradiol are associated with insomnia; however, because of normal physiologic fluctuations, it is difficult to predict at what level of estradiol women will experience symptoms of insomnia or which women will experience symptoms of insomnia (Bacon, 2017; North American Menopause Society, 2019a).

The authors of this study reported the use of validated scales. However, it is suggested that future research use a standardized assessment tool, such as the Pittsburgh Sleep Quality Index (Buysse, Reynolds III, Monk, Berman, & Kupfer, 1989), to improve the rigor of the instrument.

A final limitation was the small number of postmenopausal women ($n = 219$) in the final analysis. The study design plan



Women should be counseled on strategies to improve sleep quality, including an emphasis on the benefits of smoking cessation

called for recruitment of pre- and perimenopausal women, and the cessation of data collection by year 4. This design may have limited the number of participants who had transitioned to postmenopause and reduced the amount of data collected among this group of participants.

Implications for Practice

Sleep disturbance among women during the menopausal transition is a common problem for which women seek care. This study highlights common risk factors associated with sleep disturbance and underscores the need for thorough assessment, treatment, and education of women during the menopausal transition period. This research suggests that women who report sleep disturbance should be assessed specifically for depression, vasomotor symptoms, and smoking.

All women who are approaching the menopausal transition period should be educated about menopause and its common signs and symptoms. Approximately 75% of American women experience hot flashes during the menopausal period (North American Menopause Society, 2019b). Therefore, it is important to assess each woman and provide anticipatory guidance on the management of such vasomotor symptoms through nonpharmacologic and pharmacologic therapies. Evidence-based nonpharmacologic measures for relief of hot flashes include cognitive behavioral therapy (CBT) and mind-body stress-reduction techniques. Current pharmacologic recommendations for women with menopausal symptoms include the option of estrogen therapy, especially for those with severe hot flashes (Martin & Barbieri, 2019; NAMS Hormone Therapy Position Statement Advisory Panel, 2017).

TABLE 2 ASSESSMENT AND MANAGEMENT OF SLEEP DISORDERS OF WOMEN

Sleep assessment	Assessment of a woman's sleep: <ul style="list-style-type: none"> ● Current/past sleep patterns ● Frequency/duration of sleep difficulties ● Impact on daytime functioning ● Timing in relation to menopausal symptoms ● Sleep diary 	Sleep assessment scales ^a : <ul style="list-style-type: none"> ● Pittsburgh Sleep Quality Index ● Insomnia Severity Index ● Epworth Sleepiness Scale ● Basic Nordic Sleep Questionnaire
Patient	<ul style="list-style-type: none"> ● Comprehensive history <ul style="list-style-type: none"> ○ Mental health ○ Review of current medications ● Comprehensive physical examination ● Assessment of vasomotor symptoms ● Laboratory testing if appropriate ● Referrals: <ul style="list-style-type: none"> ○ Sleep study ○ Behavioral health 	
Management ^b	Lifestyle and environment interventions: <ul style="list-style-type: none"> ● Reduce alcohol and caffeine consumption ● Smoking cessation ● Regular exercise ● Reduce life and/or situational stress ● Bedroom <ul style="list-style-type: none"> ○ Sleep with fan ○ Decrease room temperature ○ Reduce weight of bed linens ○ Wear lightweight bed clothing ○ Have consistent bedtime Pharmacologic management: <ul style="list-style-type: none"> ● Management of vasomotor symptoms with hormone therapy ● Antidepressants ● Anticonvulsants ● Sedatives and hypnotics—use with caution ● Nutritional and herbal supplements Nonpharmacologic management: <ul style="list-style-type: none"> ● Cognitive behavior therapy ● Yoga ● Massage 	Patient education: <ul style="list-style-type: none"> ● Sleep and sleep disorders ● Menopause

Note. Sources: American Academy of Sleep Medicine (2018); Talero-Gutiérrez et al. (2008).

For women with an intact uterus who elect to use menopausal hormone therapy, a combination of estrogen and progestin therapy is recommended to decrease the risk of endometrial cancer (North American Menopause Society, 2015).

For women who report depression, medication is often prescribed. However, current guidelines recommend psychological therapy be offered in conjunction with pharmacotherapy (Tal, Suh, Dowdle, & Nowakowski, 2015). Health education about the health consequences of smoking and strategies for smoking cessation should be offered to women. Previous research found smoking to be a risk factor for poor sleep during menopause (Moreno-Frias, Figueroa-Vega, &

Malacara, 2014; Xu & Lang, 2014). The current study lends support to previous studies, because R. L. Smith and colleagues (2018) also found smoking to be a risk factor for sleep disturbance, even after accounting for the impact of hot flashes.

Women ages 45 to 64 years account for approximately 27% of the population, and approximately 2 million women will transition through menopause each year in the United States (North American Menopause Society, 2010; U.S. Department of Health and Human Services, 2013). Based on these numbers, women's health nurses will increasingly encounter women who experience sleep disturbance during the

menopausal period and who will seek care. Restless sleep and sleep disorders can have an impact on women's quality of life, mood, productivity, and physical health (Baker, de Zambotti, Colrain, & Bei, 2018; van Dijk et al., 2015). Having a thorough understanding of the scope of the problem, along with current management recommendations, is important.

Current guidelines for the management of sleep disorders recommend that a thorough assessment of sleep be conducted by using validated tools such as the Pittsburgh Sleep Quality Index (Buysse et al., 1989). This 19-item self-report scale measures quality of sleep during a 4-week period by assessing defined components of quality of sleep, sleep onset latency, sleep duration and disturbances, medication, and daytime dysfunction. Items are scored from 0 to 21, with higher scores indicating poorer sleep quality. Several other sleep assessment tools have been psychometrically validated for use among menopausal women, including the Insomnia Severity Index, Epworth Sleepiness Scale, and the Basic Nordic Sleep Questionnaire (Monterrosa-Castro, Portela-Buevas, Salgado-Madrid, Mo-Carrascal, & Duran-Mendez Leidy, 2016).

A thorough history and physical examination with laboratory testing, if appropriate, should be conducted, and women should be assessed for vasomotor and depression symptoms, as well as for smoking. Health education about menopause and treatment options should be offered to women. Management of sleep disorders includes psychological, environmental, and pharmacologic approaches.

Women with sleep disorders should be offered CBT, which is considered the gold standard for the treatment of chronic insomnia (Hachul & Polesel, 2017). Several meta-analyses have shown the effectiveness of CBT for treatment of insomnia (Murtagh & Greenwood, 1995; M. T. Smith et al., 2002). Furthermore, women with sleep disturbance may often have concurrent depression, and CBT may be useful in the management of this disorder.

Several environmental and lifestyle changes have been suggested to reduce menopausal symptoms and improve sleep. Women should be counseled on strategies to improve sleep quality, including an emphasis on the benefits of smoking cessation (Polo-Kantola et al., 2014). Sleeping in a cool room, reducing the weight of bed linens, wearing light bed clothing, and sleeping with a fan may help reduce vasomotor symptoms, thereby improving sleep quality. However, more recent research has found that weighted bed linens may improve sleep quality by reducing the levels of sleep arousal (Ackerley, Badre, & Olausson, 2015). Researchers have associated an improvement in sleep quality with an increase in physical exercise (Rubio-Arias, Marín-Cascales, Ramos-Campo, Hernandez, & Pérez-López, 2017). Two randomized

controlled trials with 44 women in each examined the effectiveness of massage and yoga to improve sleep quality in menopausal women (Afonso et al., 2012; Oliveira, Hachul, Goto, Tufik, & Bittencourt, 2012). Both studies showed significant improvement in insomnia symptoms in women with yoga ($p = .00$; Afonso et al., 2012), and therapeutic massage ($p = .000$; Oliveira et al., 2012) as measured by the Insomnia Severity Index (Bastien, Vallières, & Morin, 2001).

In general, women should also be instructed on sleep hygiene, which includes using the bed for sleep and sexual activity only. If women are unable to fall asleep, they should get out of bed. A sleep diary may also be useful for the evaluation of sleep patterns and includes the timing of sleep, total amount of time spent in bed, and the duration of sleep for a 2-week period. Information should also be recorded on sleep cues. Additional education on reducing daytime napping, caffeinated beverages, and life and/or situational stress may improve overall sleep quality.

When pharmacologic interventions are indicated, management of insomnia may include treatment of vasomotor symptoms with hormone therapy, as well as antidepressants and anticonvulsants (Hachul & Polesel, 2017). Sedatives and hypnotics may be prescribed but should be administered with caution because women may experience difficulties with tolerance, withdrawal, and dependence, as well as rebound

insomnia with short-term use (Hall, Kline, & Nowakowski, 2015). Although the evidence on the use of herbal and nutritional supplements for the treatment of insomnia is scant and generally of poor quality, several studies have reported positive benefit for

insomnia and menopausal symptoms with the use of isoflavones, valerian root (Hachul et al., 2011; Hachul & Polesel, 2017; Kohama & Negami, 2013; Mucci et al., 2006; Sarris & Byrne, 2011; Taavoni, Ekbatani, Kashaniyan, & Haghani, 2011), and Phyto Female Complex (SupHerb, n.d.). Nutritional and herbal supplements may be beneficial to women in conjunction with conventional therapies.

Conclusion

Poor sleep, including insomnia, sleep disturbances, and restless sleep, during the menopausal period can have significant negative impact on women's physical and psychological well-being and their quality of life. As women progress through menopause, it is important that their health care providers conduct a thorough assessment of their menopausal symptoms, including vasomotor symptoms, depression, and sleep disturbance. Management of care of women through menopause and any associated sleep disturbance can include psychological, environmental, and pharmacologic measures. As more women begin to transition through the menopause period, it is important for women's health nurses

Women should also be instructed on sleep hygiene, which includes using the bed for sleep and sexual activity only

to appreciate the impact of sleep disturbance on women's health and quality of life and help them make informed decisions about the management options best for them.

Uncited References

Kaunitz and Manson, 2015, Meeta et al., 2013, Monterrosa-Castro et al., 2016, Insomnia, Foundation, 2010, SupHerb, 2010 NWH

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