

**INSOMNIA EXPERIENCE, MANAGEMENT
STRATEGIES, AND OUTCOMES IN ESRD PATIENTS
UNDERGOING HEMODIALYSIS**

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Thesis
Entitled

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HEMODIALYSIS**

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INSOMNIA EXPERIENCE, MANAGEMENT STRATEGIES, AND OUTCOMES IN ESRD PATIENTS UNDERGOING HEMODIALYSIS

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ABSTRACT

The purpose of this descriptive research was to examine the experience, management strategies, and outcomes of insomnia in ESRD patients undergoing hemodialysis. The predictive power of gender, age, education level, monthly income, duration of hemodialysis, and frequency of hemodialysis upon insomnia outcome were also examined. The Symptom Management Model of Dodd and colleagues (2001) was adopted as a conceptual framework for the research. 100 hemodialysis patients, who received hemodialysis treatment at Hemodialysis Unit of The Kidney Foundation of Thailand at Galyanivadhna Building, The Priest's Hospital, were recruited for this study. The data was collected by questionnaires on demographic characteristics, the Pittsburgh Sleep Quality Index (PSQI), insomnia management strategies and insomnia outcome. The data were analyzed using percentage, standard deviation and multiple regression.

The results revealed that the mean age of the sample was 44.76 and 54% of them were male. The sample perceived insomnia as feeling less rested in the morning or fatigue (97%) and awakening with sleepiness (96%), respectively. The sample evaluated their insomnia as moderately severe. The causes of insomnia were most commonly demonstrated by samples as stress and anxiety, followed by shortness of breath and hot or cold bedrooms. The strategies that most of the patients reported as effective at insomnia relief were meditation and praying before sleep. The insomnia outcomes were at the moderate level. The results of the multiple regression analysis indicated that gender, age, education level, monthly income, duration of hemodialysis, and frequency of hemodialysis were able to predict the insomnia outcome for approximately 18.7% of the ESRD patients undergoing hemodialysis ($R^2 = .187$, $p < .01$).

This study suggests that nurses taking care of hemodialysis patients should assess insomnia and consider factors that contribute to impaired sleep in order to establish the prevention and management of insomnia symptoms in hemodialysis patients. It also demonstrates the need for nursing interventions based on a symptom management model to facilitate effective insomnia management for this group of patients.

**KEY WORDS: INSOMNIA EXPERIENCE / INSOMNIA MANAGEMENT / CKD /
END STAGE RENAL DISEASE / HEMODIALYSIS**

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ประสบการณ์ การจัดการ และผลลัพธ์ ของการนอนหลับไม่เพียงพอในผู้ป่วยไตวายเรื้อรังระยะสุดท้ายที่ฟอกเลือดด้วยเครื่องไตเทียม (INSOMNIA EXPERIENCE, MANAGEMENT STRATEGIES, AND OUTCOMES IN ESRD PATIENTS UNDERGOING HEMODIALYSIS)

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บทคัดย่อ

การศึกษานี้เป็นการวิจัยเชิงบรรยาย มีวัตถุประสงค์เพื่อศึกษาประสบการณ์ การจัดการและผลลัพธ์ของการมีอาการนอนหลับไม่เพียงพอในผู้ป่วยไตวายเรื้อรังระยะสุดท้ายที่ฟอกเลือดด้วยเครื่องไตเทียม รวมถึงอำนาจการทำนายของ เพศ อายุ ระดับการศึกษา รายได้ ระยะเวลา และจำนวนครั้งในการฟอกเลือดด้วยเครื่องไตเทียมต่อผลลัพธ์ของการมีอาการนอนหลับไม่เพียงพอของผู้ป่วยไตวายเรื้อรังระยะสุดท้ายที่ฟอกเลือดด้วยเครื่องไตเทียม โดยใช้กรอบแนวคิดการจัดการกับอาการของดอดด์และคณะ (Dodd, et al., 2001) เป็นกรอบแนวคิดในการศึกษา กลุ่มตัวอย่างเป็นผู้ป่วยที่มารับการฟอกเลือดด้วยเครื่องไตเทียมในหน่วยไตเทียม มูลนิธิโรคไตแห่งประเทศไทย ณ ตึกกัลยาณีวัฒนา โรงพยาบาลสงฆ์ จำนวน 100 ราย เก็บรวบรวมข้อมูลโดยใช้แบบสัมภาษณ์ ประกอบด้วย ข้อมูลส่วนบุคคล ประสบการณ์การมีอาการนอนหลับไม่เพียงพอ (PSQI) วิธีการจัดการกับอาการนอนหลับไม่เพียงพอ และ แบบสัมภาษณ์ผลลัพธ์ของการมีอาการนอนหลับไม่เพียงพอ วิเคราะห์ข้อมูลโดยการหาค่าร้อยละ ค่าเฉลี่ย ส่วนเบี่ยงเบนมาตรฐาน และการวิเคราะห์ถดถอยพหุคูณ

ผลการวิจัยพบว่า กลุ่มตัวอย่างส่วนใหญ่เป็นเพศชายร้อยละ 54 มีอายุเฉลี่ย 44.76 ปี มีการรับรู้ถึงอาการนอนหลับไม่เพียงพอในลักษณะตื่นนอนแล้วรู้สึกง่วงนอนไม่เพียงพอ อ่อนเพลียและง่วงนอนช่วงกลางวันมากที่สุด (97% และ 96% ตามลำดับ) ประเมินระดับความรุนแรงและผลกระทบต่อการดำเนินชีวิตในระดับปานกลาง สาเหตุซึ่งรบกวนทำให้เกิดอาการมากที่สุดคือภาวะเครียดและวิตกกังวล รองลงมาคือ หายใจเหนื่อยและอุณหภูมิห้องร้อนหรือเย็นเกินไป วิธีการจัดการที่กลุ่มตัวอย่างปฏิบัติและได้ผลมากที่สุด คือการทำสมาธิหรือสวดมนต์ก่อนนอน สำหรับผลลัพธ์ของการมีอาการส่วนใหญ่อารมณ์นอนหลับไม่เพียงพออยู่ในระดับปานกลาง เมื่อวิเคราะห์ถดถอยพหุคูณ พบว่า เพศ อายุ ระดับการศึกษา รายได้ ระยะเวลา และจำนวนครั้งในการฟอกเลือดด้วยเครื่องไตเทียม สามารถทำนายผลลัพธ์ของการมีอาการนอนหลับไม่เพียงพอในผู้ป่วยไตวายเรื้อรังระยะสุดท้ายที่ฟอกเลือดด้วยเครื่องไตเทียม ได้ร้อยละ 18.7 ($R^2 = .187, p < .01$)

จากผลการวิจัยครั้งนี้ ผู้วิจัยมีข้อเสนอแนะให้พยาบาลผู้ดูแลผู้ป่วยที่ฟอกเลือดด้วยเครื่องไตเทียมประเมินอาการนอนหลับไม่เพียงพอและปัจจัยต่างๆ ซึ่งรบกวนการนอนหลับ เพื่อป้องกันและจัดการกับอาการนอนหลับไม่เพียงพอ และการศึกษาต่อไปควรเป็นการศึกษาถึงวิธีปฏิบัติตามแนวคิดของการจัดการกับอาการ เพื่อจัดการกับอาการนอนหลับไม่เพียงพอได้อย่างมีประสิทธิภาพ

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CHAPTER I

INTRODUCTION

Background and significance of the study

Chronic Kidney Disease (CKD) is a significant and increasingly severe public health problem. When patients have Stage 5 CKD or End Stage Renal Disease (ESRD), renal function is completely lost. Treatment can extend the patient's life for only a short period (Calvin, 2004; Luweera, 1999; Tangsanga & Suwamethsakul, 2005). Currently, ERS D treatment can be either conservative, which focuses on medication and nutrition, water, mineral (potassium, sodium, and phosphate) control, or by renal function replacement such as hemodialysis (HD), continuous ambulatory peritoneal dialysis (CAPD), and renal transplantation (Luweera, 1999; Vanichakarn, 1993). Hemodialysis therapy is an effective and widely used method which is able to decrease the mortality rate of ESRD patients. Hemodialysis, however, requires a high level of cooperation from patients since they have to visit their healthcare institute to undergo hemodialysis therapy 2 -3 times per week for the rest of their lives, or until they are able to have renal transplantation (Jittinan, 2002; Luweera, 1999; Pochnukul, 1988). According to the report of the United States Renal Data System (USRDS), the figures of ERS D patients in the United States at the end of the year 2001 came to a total of 378,862 wherein 64.50% of this figure underwent HD therapy (Molzahn, 2005). In Thailand, the numbers of patients registered for renal function replacement were 10.4 per 1 million according to the Nephrology Society of Thailand Statistics (Jittinan, 2001). In addition, the numbers of CKD patients undergoing hemodialysis treatment were 1,096 in the year 1997, 3,589 in the year 1998, and 7,323 in the year 1999 wherein most of the patients were aged 40-70 years old (Vanichakarn, 2003), and the numbers of ESRD patients undergoing hemodialysis in the year 2004 increasing to 8,640 (TRT Registry Subcommittee Nephrology Society of Thailand, 2004).

Hemodialysis therapy is widely used because ESRD patients can prolong their lives with good quality in confronting the effects of ESRD and complications from

hemodialysis, and other treatments. These complications can have physical, psychological, emotional and socioeconomic dimensions. Physical complications may include heart failure, cardiovascular disease, chest pain, hypotension, chilling during hemodialysis, muscle cramps, anemia, pruritus, arthritis, infection and malnutrition. In addition, frequently encountered complications from hemodialysis in ESRD patients include insomnia and fatigue (McCann & Boore, 2000). According to Hanly and colleagues (2003), 50% of CKD patients suffered from insomnia. Psychological complications from hemodialysis in ESRD patients occur due to long hemodialysis durations, i.e., 4-5 hours per time and 2-3 times per week, therefore, patients had presented the conflict, stress, anxiety, and depression (Orprasert, 1994; Sacks, Peterson, & Kimmel, 1990). Patients had to spend most of the time with hemodialysis so their social recreation time as well as family time decreased. Thus social and family role deficiency resulted (Limamnuaylarp, 1996). Moreover, patients have to pay 2,000-2,500 baht per dialysis treatment or 20,000-30,000 baht per month for the rest of their lives, or until they have renal transplantation.

CKD patients have a number of obvious complications from both the disease and therapy. One dominant physical complication is insomnia, which is an indicator of inadequate sleep, late bed time before sleep, frequent or long-term mid-sleep awakening, or inability to return to sleep after mid-sleep awakenings (Walsh, Hartman & Kowall, 1994). One major cause of insomnia is muscle cramps which may occur during hemodialysis or after. Muscle cramps occur as a result of rapid decreases in interstitial cell plasma levels and rapid decreases in serum osmolarity. In addition, muscle cramps might occur due to hemodialysis function in which urea nitrogen, creatinin and water are rapidly eliminated from the patient's body (Junthawanit, 1994). Restless leg syndrome (RLS) is a complication due to uremia from accumulation of waste in the human body. Uremia disturbs nervous system functionality and causes RLS (Goshorn, 2000). And, pruritus which is due to dry skin with urea salt from deficient sweat glands causes skin itchiness which could result in sleep disturbance, adversely impacted ADL and quality of life (Parfrey, Vavasour, Henry, Bullock & Gault, 1988). Other sleep disturbances include fever, pain, stress, anxiety associated with social situations, environment and personal factors e.g. roommates, light, noise, room temperature, coffee and tea consumption and cigarette

smoking (Unruh, Hartunian, Chapman & Jaber, 2003; Walker, Fine & Kryger, 1995). According to DeWit (1998), found that one-third of ESRD patients undergoing hemodialysis have sleep disturbances with more than 1 mid-sleep awakening, and most of them have less than 5 hours sleeping time per night in which insomnia can persist for more than a month. According to Walker and colleagues (1995) who studied 64 patients undergoing hemodialysis, 83.3% of the patients in the study had sleep disturbance, 66.7% had daytime drowsiness and 46.3% had difficulty falling asleep, all of which led to insomnia. In cases of chronic insomnia which is left untreated, the consequences can be severe e.g. discomfort, frequent mid-sleep awakening, getting up too early, sleepy in the morning and day time, soar-eyes and myalgia, frequent napping, loss of functionality, excessive fatigue that inhibits activity, decreased metabolism and energy storage, decreased immunity function, proneness to illness, difficulty concentrating, decrease in stress tolerance and possible association with psychotic symptoms such as delusion, paranoia, illusion, hallucination and disorganized behavior (Evan & French, 1995; cited in Laempet, 2001).

Adequate and good quality sleep is vital for human life. Adequate and good quality sleep can promote good physical health and mental health which thus promotes effective immune function. Therefore, promoting sleep management to attain adequate and good quality in ESRD patients undergoing hemodialysis is of the utmost importance. Nurses also play dominant roles in facilitating patients to apply their insomnia experience and knowledge in choosing correct methods of sleep management strategy according to personal factors, health status, illness condition and environment. In addition, regular and continuous self-assessment of sleep management can also alleviate both the short and long-term sleep problems of patients. Patients might choose one or more sleep management strategies under nursing consultation, especially if certain previous strategies had not been effective and when certain medical strategies have to be integrated with contributions from family members or relatives in applying any strategies required. According to the literature review, studies on sleep management for ESRD patients undergoing hemodialysis in Thai society context are rare. In addition, from the experiences of ESRD patients undergoing hemodialysis care, it has been found that patients often

experience insomnia, fatigue, daytime sleepiness, and nap during hemodialysis. These patients, therefore, were interested in studying the symptom experiences, management strategies and outcomes of insomnia in ESRD patients undergoing hemodialysis using the symptom management model of Dodd, et al. (2001). The expected benefits from this study are to promote health care personnel understanding in patient symptoms, and thus enable them to provide care and correct problem solving to the point that patient's needs are fulfilled in terms of controlling the severity of the disease and stem the progress of the disease by promoting factors in to enhance the quality of life for patients and their families. In addition, the research data can be used as study guidelines to adjust the strategies for nursing intervention recommendations or planning for this group of patients.

Research Questions

1. What are the insomnia experiences of ESRD patients undergoing hemodialysis?
2. What are the insomnia management strategies used by ESRD patients undergoing hemodialysis, and how are they effective?
3. What are the insomnia outcomes for ESRD patients undergoing hemodialysis?
4. What is the predictive power of gender, age, educational level, monthly income, duration of hemodialysis, and frequency of hemodialysis on the insomnia outcomes of ESRD patients undergoing hemodialysis?

Purposes of the study

1. To study insomnia experience in ESRD patients undergoing hemodialysis.
2. To study insomnia management strategies used by ESRD patients undergoing hemodialysis and their effectiveness on insomnia.
3. To demonstrate the insomnia outcomes including symptom status, emotional status, self-care ability and functional status in ESRD patients undergoing hemodialysis.

4. To study the predictability of gender, age, educational level, monthly income, duration of hemodialysis, and frequency of hemodialysis on insomnia outcomes.

Research Hypothesis

Gender, age, education level, monthly income, duration of hemodialysis and frequency of hemodialysis are the predictive factors of insomnia outcomes in ESRD patients undergoing hemodialysis.

Conceptual Framework

In this study, the model of symptom management proposed by Dodd, et al. (2001), which had been modified from the model symptom management of Larson, et al., was adopted. The symptom experiences, management strategies and outcomes were three dimensionally related as shown in Figure 1.

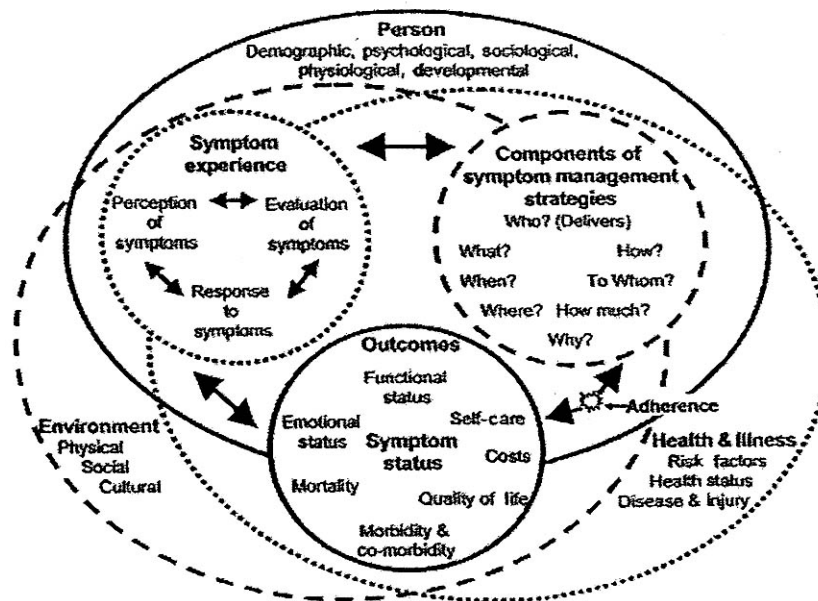


Figure 1 The revised symptom management conceptual model (Dodd, et al., 2001)

This model provided systematic guidelines for developing symptom management strategies to manage and alleviate the impact of symptoms on patients. When patients realized the symptom situations from their point of view together with their symptom perception, their symptom appraisal and response to symptom then

followed. The response of patients to symptoms may be exhibited in action to alleviate and cure the symptoms by many methods carried out by patients or the cooperation of relatives or healthcare personnel dependence. These actions were aimed at symptom management to achieve the desired outcome including pharmacological methods or other controls as appropriate with situations. The symptom management model included the specific characteristics of the strategy using the inquiries of who, what, where, why, how many (the size of method), for whom and how was the strategy. The symptom outcomes include characteristics in symptoms status, functionality, self care ability, economical status, quality of life, morbidity/co-morbidity, mortality, and emotional status. Dodd, et al. (2001) model also stated factors related to three dimensions of the model, i.e., symptom experiences, management/strategy, and outcome, which were personal factors, i.e. physical, psychological, social and developmental and personal characteristics; environmental factors, i.e. physical, social and cultural environment; and health & illness factors, i.e. risk factors, health status, disease and injury.

The symptom management model of Dodd, et al., (2001) was applied to describe the insomnia symptoms of ESRD patients undergoing hemodialysis. The symptom experience triggered by the interaction between the perception of deviation-from normal symptoms using feelings and interpretation of patients toward insomnia and deviated sleep patterns, i.e., sleep disturbance, inadequate rest, difficulty falling asleep after going to bed and day-time drowsiness. According to a study on the quality of sleep of 71 ESRD patients undergoing hemodialysis by Unruh, et al. (2003), most patients had insomnia, i.e. sleep disturbance, morning sleepiness, less-than-normal sleeping hours, daytime drowsiness, and frequent daytime napping even though individual patients might have different interpretations of insomnia in terms of physical, psychological, emotional and behavioral aspects. Then patients made appraisals of and decisions on symptoms concerning cause, frequency and severity of symptoms. Frequent insomnia can deteriorate patient health and daily functionality causing fatigue, distress, emotional variance, poor adaptability and decreased working efficiency (Walsh, et al., 1994). Subsequently, patients sought for symptom management strategies aimed at control and alleviation of outcome from insomnia comprising experience appraisal, objective identification, strategy practice, practice

frequency and effectiveness of such strategies which could be adjusted to meet the patients' acceptance. These strategies may come from self learning or from other sources such as family, healthcare system staff or others. However, patients' acceptance depends on decision-making by individual ESRD patients undergoing hemodialysis and with symptom outcomes which were the situations that resulted from the symptom management strategies regarding the symptom experiences and those that assisted the assessment of the symptom outcomes i.e. symptom status, functionality, self care ability, economical status, quality of life, morbidity and co-morbidity, mortality, and emotional status, all of which are interrelated. In this research, the symptom outcomes of ESRD patients undergoing hemodialysis were the appraisals in terms of symptom status, functional status, self care ability and emotional status while the appraisal of four aspects of outcome covered the physical psychological, emotional and social dimensions of patient.

The symptom experiences, management and outcomes also depended upon three dimensions, i.e. personal dimensions comprising basic human characteristics such as physical, psychological and social development; environmental dimensions comprising physical, social and cultural environments; and health & illness dimensions comprising risk factors, disease and injury (Dodd, et al., 2001). In this research, the personal dimensions, i.e., gender, age, education, and income and health & illness dimensions, i.e., duration of hemodialysis and frequency of hemodialysis were taken into account as these factors might have been related to insomnia experience and sleep quality.

Gender: gender is a potential factor related to sleep and some studies have found that females have better sleep quality than males (Unruh, et al., 2003). On the contrary, Hayter (1983) found that females had more sleep disturbances than males. This finding was similar to Mendelson and colleagues (1990), who found that male and female sleep disturbance problems were indifferent.

Age: age has been shown to be an important risk factor for insomnia in many studies. Increased age is correlated with increased severe sleep disorders, decreased deep sleep periods and increased daytime napping. Most ESRD patients are age 40-70 years old (Vanichakarn, 2003), therefore, they are at high risk for sleep problems

directly related to age. Han, et al. (2002) found that ESRD patients who also get diabetes with insomnia were older than the patient groups who had no insomnia.

Educational level: educational level is a socio-cultural factor. Education enables people to analyze and synthesize data to get reasonable information to attain an appropriate understanding about the person's interaction and environment. According to the study of Petchrung (2004) about experience, management strategies and outcomes of fatigue in hemodialysis patients reported that education level had a positive correlation with fatigue management strategies and fatigue outcomes.

Monthly income: monthly income is a powerful variable that explains health status. Higher incomes also facilitates access to care. People with higher incomes possess more opportunity for education, accessing beneficial resources and access to services. According to Nokes and Kendrew (2001) who studied the factors related to quality of sleep in HIV patients using the model of Larson, et al., personal income or economical status were related to quality of sleep perception. However, there had been no direct study on ESRD patients.

Duration of hemodialysis: ESRD patients undergoing hemodialysis need long periods and continuous therapy which create many complications which affecting their quality of life. Han, et al., (2002) studied insomnia in diabetic hemodialysis patients and found that duration of hemodialysis was not related to insomnia in this group. However, the patients and their families were financially burdened as a result of the hemodialysis for a long period of time (Jittinan, 2002; Napatorn, 1999). This leads to higher incidence of stress and anxiety which are major causes of insomnia (Srisurapanon, 1999).

Frequency of hemodialysis: hemodialysis was aimed at minimizing uremic symptoms which can decrease both short and long-term morbidity and mortality rates. According to Gotch, et al. (1997), who reported about 15,000 patients in order to maintain adequate and appropriate hemodialysis to treat the uremic symptoms, patients need at least 3 treatments of hemodialysis per week. Most Thai ESRD patients, however, have hemodialysis 2 times per week (Buranaosod, et al., 2002; cited in Petchrung, 2004).

According to the above conceptual framework, the relationships between all variables are shown in the following figure:

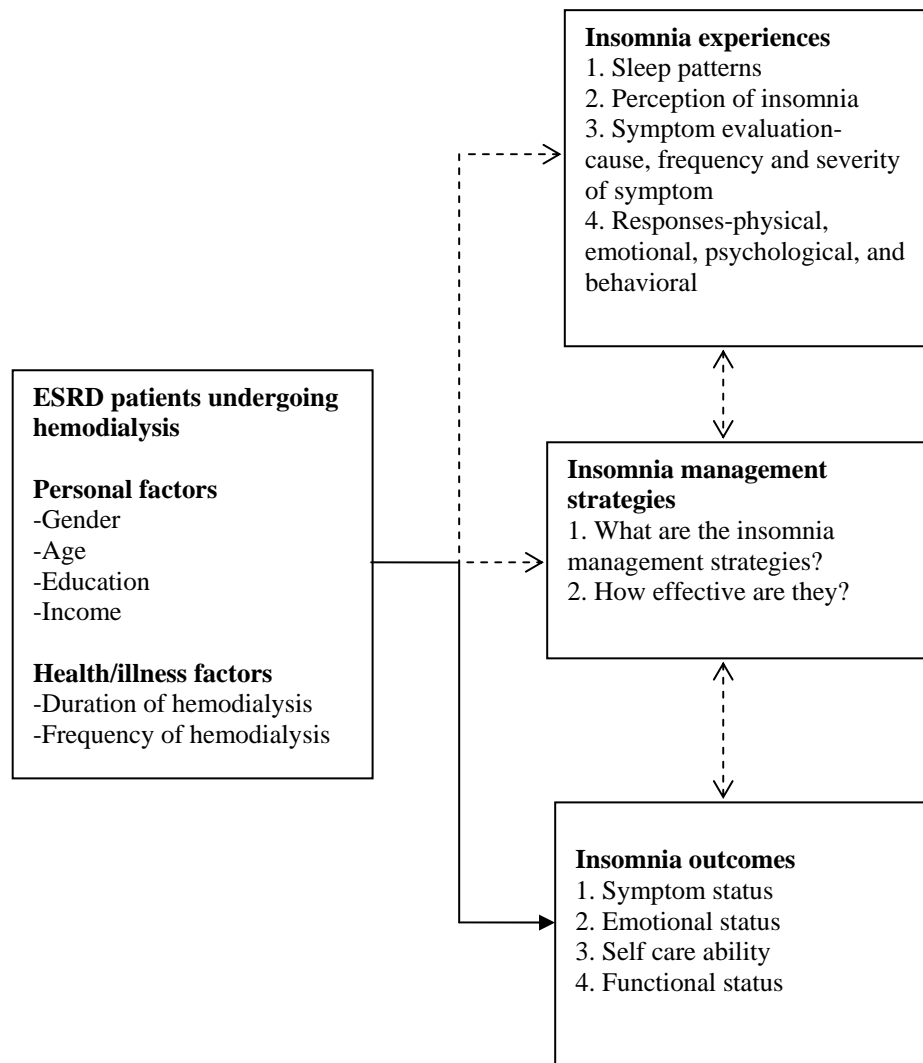


Figure 2 Conceptual framework applied from the symptom management model by Dodd, et al., (2001)

Scope of the study

This research studied insomnia experiences, management strategies, and outcomes of ESRD patients undergoing hemodialysis at the Hemodialysis Unit of the Kidney Foundation of Thailand at Galyanivadhna Building, The Priest's Hospital, Bangkok. Data were collected from July to August 2007.

Definition of terms

1. Insomnia experience refers to the individual perceptions of the ESRD patients undergoing hemodialysis and faced with insomnia by covering the topics of sleep patterns, insomnia perception, insomnia evaluation and insomnia response. The data was gathered by the Pittsburgh Sleep Quality Index: PSQI (Smyth, 1999) and the scale was translated into Thai by Waran Tanchaisawat and Tawanchai Jirapramukpitak (1997). The questionnaires was established by the researcher covered four elements as follows:

1.1 Sleep patterns refer to the perceptions of patients about characteristics of quantity and quality of sleep including bedtime, awakening, sleep latency, sleep duration and subjective sleep quality.

1.2 Insomnia perception refers the changes of perception from the prevailing feeling or practice concerning insomnia in certain environments or situations.

1.3 Insomnia evaluation refers to the consideration and decision-making of patients concerning the severity of insomnia, frequency of insomnia, cause of insomnia, and life threat due to insomnia.

1.4 Insomnia response refers to reactions to insomnia according to patient perceptions comprising physical, psychological, and behavioral responses.

2. Insomnia management strategy refers to the behaviors that ESRD patients undergoing hemodialysis utilize for self care, the frequency of practicing those strategies and the effectiveness of practicing the strategies which was evaluated by an interview questionnaire of insomnia management strategies that was developed from the literature review by the researcher. The questions concerning insomnia management strategies comprised the following:

2.1 Sleep promoting behaviors such as regular bedtime and awakening time, not drinking tea/coffee before bedtime, regular exercise.

2.2 Relaxation techniques such as meditation, reading books and listening to music.

2.3 Environmental management such as arranging bedroom environments and clean bed accessories.

3. Insomnia outcome refers to the results of insomnia occurring with the ESRD patients undergoing hemodialysis and applied insomnia management strategies that are evaluated in terms of 8 factors i.e. symptom status, ability of self-care, emotional status, economic status, quality of life, morbidity, co-morbidity, and mortality rate which were evaluated by an interview questionnaire of insomnia outcome that was developed from literature review by researcher. In this study, the insomnia outcome comprised of the following aspects;

3.1 Symptom status that was insomnia status.

3.2 Self-care abilities such as self-care activities, exercise, playing sports.

3.3 Functional status such as can work with another, and participation in family activities.

3.4 Emotional status such as cheerfulness, freshness, relaxation, and calm.

4. Age refers to the number of years of the ESRD patients undergoing hemodialysis in terms of each patient's date of birth and the date of the interview by the researcher. Any period of time more than 6 months was considered as 1 year.

5. Gender refers to either male or female ESRD patients undergoing hemodialysis.

6. Education refers to the number of years of formal study from primary school until the highest education or current studies of the ESRD patients undergoing hemodialysis.

7. Income refers to the amount of money per month in Thai currency that the ESRD patients undergoing hemodialysis earned from their jobs or other sources.

8. Hemodialysis duration refers to the period of hemodialysis since the initiation of the treatment until the time of study counted in months.

9. Frequency of hemodialysis refers to number of hemodialysis treatments per week.

Expected outcomes and benefits

1. To obtain a guideline for nursing intervention planning for insomnia management as appropriate for each individual patient.
2. To obtain a guideline for constructing insomnia management instructions and counseling format for ESRD patients undergoing hemodialysis to enable continuous self care.
3. To provide basic information for further research concerning insomnia management strategy development and the effectiveness of each strategy in ESRD patients or other groups of patients.

CHAPTER II

LITERATURE REVIEW

This research was conducted to study the insomnia experiences, management strategies, and outcomes in End Stage Renal Disease (ESRD) patients undergoing hemodialysis. The relevant literature has been reviewed in this chapter as follows:

1. Chronic Kidney Disease (CKD)
 - 1.1 Definition and cause of CKD
 - 1.2 Pathophysiology and prognosis
 - 1.3 Signs and symptoms
 - 1.4 Hemodialysis treatment
 - 1.4.1 Indications for hemodialysis therapy in CKD patients
 - 1.4.2 Effects of hemodialysis
2. Sleep
 - 2.1 Definition of sleep
 - 2.2 Phases of sleep
 - 2.3 Sleep cycles
 - 2.4 Importance of sleep
3. The symptom management model of Dodd (Dodd, et al., 2001)
 - 3.1 Symptom experiences
 - 3.2 Symptom management strategies
 - 3.3 Symptom outcomes
4. Insomnia experience in ESRD patients undergoing hemodialysis
5. Insomnia management strategies in ESRD patients undergoing hemodialysis
6. Insomnia outcomes in ESRD patients undergoing hemodialysis; symptom status, self-care abilities, functional status, and emotional status
7. Factors related insomnia outcomes in ESRD patients undergoing hemodialysis

1. Chronic kidney disease

1.1 Definition and causes of chronic kidney disease (CKD)

Chronic kidney disease (CKD) is a world-wide public health problem accompanied by rising incidence and prevalence of kidney failure, poor outcomes, high costs and an even higher prevalence of earlier stages of CKD. In 2000, the National Kidney Foundation (NKF) Kidney Outcome Quality Initiative (K/DOQI) Advisor Board approved of clinical practice guidelines to define and classify stages in the progression of CKD. CKD was thus defined as the presence of kidney damage or decreased level of kidney function for three months or more, irrespective of diagnosis (NKF K/DOQI Guideline, 2000).

Definition of chronic kidney disease criteria:

1.1.1 Kidney damage for 3 months or more, as defined by structural or functional abnormalities of the kidney, with or without decreased GFR, as manifested by either.

- Pathological abnormalities; or
- Markers of kidney damage, including abnormalities in the composition of the blood or urine, or abnormalities in imaging tests.

1.1.2 $GFR < 60 \text{ mL/min/1.73m}^2$ for 3 months or more, with or without kidney damage.

The classification of stages of CKD developed by the Work Group, including the population at increased risk of developing CKD, as well as the prevention of the development of CKD and improved outcomes at each stage, as shown in Table 1.

Table 1 Classification of chronic kidney disease

Stage	Description	GFR (mL/min/1.73m ²)	Action
1	Kidney damage with normal or ↑ GFR	≥ 90	Diagnosis and treatment, Treatment of co-morbid conditions, slowing prognosis CVD risk reduction
2	Kidney damage with mild ↓ GFR	60-89	Estimation of progression
3	Moderate ↓ GFR	30-59	Evaluation and treatment of complications
4	Severe ↓ GFR	15-29	Preparation for kidney replacement therapy
5	Kidney Failure	< 15 (or dialysis)	Replacement (if uremia present)

Abbreviations; GFR, glomerular filtration rate; CVD, cardiovascular disease (NKF K/DOQI Guideline, 2002).

In summary, chronic kidney disease refers to prolonged kidney dysfunction in which kidney function cannot be recovered, even if the cause of the kidney damage is solved because the degenerative kidney will persist to the point of chronic kidney disease.

Causes of CKD

There are many causes of CKD which can be divided based on kidney anatomy comprising glomeruli, tubular, renal vascular, and renal interstitium components. Therefore, renal biopsy has to be done in order to know the cause of kidney dysfunction and determine whether or not the cause is prerenal, interrenal or post renal.

The following review of CKD causes was discussed based on kidney anatomy incorporated with the disease-affected kidney which can be detailed as follows (Crandal, 1989; Limamnuaylarp, 1986):

1. Glomerular disease: the cause of 50% of end stage CKD. Glomeruli are damaged due to immunity system dysfunction as, for instance, in Goodpasture's

Syndrome. As the glomeruli are damaged, the dominant symptoms are traces of blood and protein in the urine and low levels of blood albumin. In addition, patients experience the abnormalities of the rennin angiotensin-aldosterone system, which leads to hypertension and uremia.

2. Tubular disease: the abnormality occurs in the tubular region, especially the proximal tubular, thus deteriorating electrolyte balance which causes kidney dysfunction.

3. Vascular disease: causes vascular constriction and atherosclerosis which, consecutively, causes insufficient blood supply to the kidney. Kidney filtration rates gradually decrease and, thus, the kidney becomes gradually dysfunctional.

4. Interstitial disease: renal interstitium infection causes capillary obstruction and damaged renal vascular function. One of the most frequently found types of this disorder is pyelonephritis, which is often caused by chronic urinary tract infection.

5. Obstruction: the obstruction of the urinary system from the renal area to the urethra due to calyces, tumors or congenital obstructions. Obstructions in the urinary tract also cause infection which may spread to the renal pelvis and lead to reverse pressure on the renal interstitium which can be diagnosed by the evidence of hydronephrosis, decrease in renal arteries and decrease renal filtration rate. Finally, the kidney loses its function.

6. Collagen-related disease such as SLE, polyarthritis, and systemic sclerosis; these diseases not only affect kidney function, but they also affect the cardio-vascular, musculo-skeleton and the nervous system. The mechanism of renal dysfunction is the production of antigen-antibody complex which consecutively causes vasculitis, a fatal disease.

7 Metabolic diseases: metabolic disorders can cause renal structural abnormality and finally lead to dysfunction. The most frequently found cause of metabolic disease is diabetes which causes renal vascular and renal tubule dysfunction as well as amyloidosis, which causes thickening of the basement membrane due to calcium deposits.

8. Congenital disorders i.e. renal agenesis or renal aplasia which is a cause of sudden death. Other causes of chronic kidney disease from congenital disorders are polycystic kidneys and medullary cystic disease.

9. Nephrotoxin – induced disorder: patients may consume nephrotoxic substances or chemical substances such as insecticide, toxic mushrooms or long-term consumption of analgesics containing phenacetin. The other nephrotoxic substances or drugs which can be prevented are radiation or drugs such as aminoglycosiders, amphotericin B, Cephalosporin, penicillins, tetracyclines and antineoplastic agents. These nephrotoxin substances damage all renal parenchyma i.e. glomerular, renal tubular and renal interstitium.

The most frequently found cause of CKD is diabetes (approximate 30%) followed by hypertension (around 25%), chronic glomerulonephritis (around 20%) and polycystic kidney disease (around 4%). The remaining 10 percent are other urinary tract diseases.

1.2 Pathophysiology and prognosis

Kidneys play an essential role in the maintenance of normal homeostasis.

A variety of diseases may affect the kidney and lead to progressive nephron loss. As kidney function deteriorates, loss of excretory, regulatory and endocrine function takes place, and complications develop in virtually every organ system. Despite the diversity of causes, the pathophysiology and clinical manifestations of progressive kidney disease are quite similar across the spectrum (Holecheck, 2004).

Stages of chronic kidney disease (NKF K/DOQI Guideline, 2002)

Glomerular filtration rate (GFR) is accepted as the best index of overall kidney function in health and disease. Several stages of CKD, defined as structural abnormalities of the kidney that can lead to decreased GFR, are recognized.

- Stage 1: Kidney damage. This stage is defined as the presence of structural or functional abnormalities of the kidney, initially without decreased GFR, which can lead to decreased GFR over time.

- Stage 2: Mild reduction in GFR (60 to 89 mL/min/1.73m²). At this stage, patients usually have hypertension and may have laboratory abnormalities indicative of dysfunction in other organ systems, but most are asymptomatic. If the serum creatinine level is elevated, it may be no more than borderline and of equivocal significance.

- Stage 3: Moderate reduction in GFR (30 to 59 mL/min/1.73m²). This stage is characterized primarily by the presence of azotemia, defined as the accumulation of

the end products of nitrogen metabolism in the blood and expressed by an elevation in serum creatinine and serum urea nitrogen concentrations. Erythropoietin production decreases, and laboratory abnormalities reflecting dysfunction in other organ systems are usually present. Although patients may have symptoms, they often remain remarkably asymptomatic even though their kidney function may be reduced by as much as 70%.

- Stage 4: Severe reduction in GFR (15 to 29 mL/min/1.73m²). In this extremely tenuous stage of CKD, the worsening of azotemia, anemia, and other laboratory abnormalities reflect dysfunction in several organ systems. However, patients usually have mild symptoms.

- Stage 5: Kidney failure (GFR < 15 mL/min/1.73m²). This stage is comparable to End Stage Renal Disease (ESRD) in chronic renal failure. In most cases, this level of kidney function is accompanied by a constellation of symptoms and laboratory abnormalities in several organ systems, which are collectively referred to as uremia. This is usually a progressive process that results in end stage renal disease. Initiation of kidney replacement therapy (dialysis or transplantation) is typically required for treatment of co-morbid conditions or complications of decreased GFR, which would otherwise increase the risk of morbidity and mortality.

1.3 Signs and symptoms of chronic kidney disease

When chronic kidney disease occurs, waste product elimination, electrolyte balance and vitamin and hormone synthesis efficiency decrease. In early stages, the signs and symptoms are not very obvious until the functionality of the kidney is only 20-40% of normal kidneys. Patients have headaches and fatigue. When kidney function decreases to 5-10% of normal kidney functionality, patients have nocturia and polyuria. As the chronic renal disease progresses, severely decreased urine volume from the normal amount is obvious and accompanied by oliguria, or when patients urinate less than 400 milliliters of urine in 24 hours, and finally anuria – less than 50 milliliters in 24 hours (deWit, 1998), and in which the signs and symptoms of various physiological systems are as follows:

1. Skin: the skin symptoms cause patients' physical and psychological discomfort such as pale skin with urochrome pigmentation. Dryness and crustiness is evident because of lipid gland atrophy, which consecutively causes perspiration

dysfunction and, thus causes uremic frost formation on the skin. The dry and frosty skin is very itchy (pruritus) so that patients may scratch until they wound themselves. In addition, the skin ecchymosis can easily occur due to the breakage of capillaries. In addition, nails and hair are cracked and dry. The nails are brittle and easily broken. The color of the nail contains 2 color i.e. white in the upper area and brown in the lower part of the nail.

2. Cardiovascular system: hypertension is accompanied by arm, foot and coccyx edema due to water and sodium retention. This is an effect of chronic kidney disease in which the blood flow to the kidney decreases in rate. Thus, the juxtaglomerular apparatus is activated to produce rennin enzymes which further stimulates angiotensin I and II and affects peripheral vasoconstriction. Furthermore, angiotensin II activates aldosterone production from the adrenal cortex. Aldosterone increases sodium re-absorption in the kidney and thus increases water content in the interstitial cells and sodium levels in the blood. In addition to hypertension, pericarditis from pericardial effusion can be found (Limamnuaylarp, 1996).

3. Respiratory system: the frequently found symptoms are pulmonary edema, pneumonia which is often adjuvant with heart failure due to high levels of water retention or inappropriate water and salt control. Other symptoms are Kussmaul's breathing and uremic-smelling breath.

4. Digestive system: often starts with anorexia, followed by nausea and vomiting, periodontal disease and inflammatory ulcers all along the digestive tract. Bleeding in the digestive tract follows and becomes is more severe in patients with blood clotting dysfunction. Patients may perceive tastes as either bitter or harsh, and tend to hiccup (Limamnuaylarp, 1996; Napatorn, 1999). For patients who can eat little, the essential amino acids in plasma decreases to the point that malnutrition and negative protein balance occurs (Tangsanga, 1994).

5. Circulatory and immune system: CKD patients have anemia and low levels of less than 6 gm % of hemoglobin (Limamnuaylarp, 1996) or hematocrit less than 25-30%. For CKD patients undergoing hemodialysis, the hematocrit level ranges between 39-45%. Red blood cells, however, remain normally sized and yield normal staining tests. The causes of anemia are decreases in red blood cell production and higher rates of red blood cell destruction accompanied by bleeding. Anemia from

decreased red blood cell production occurs due to the decreased erythropoietin hormone synthesis from the kidney as this hormone control red blood cell production at bone marrow. In addition, decreased red blood cell production also occurs due to insufficiency of some nutrients such as iron, folic acid, and Vitamin B12 or loss of nutrients during hemodialysis. This red blood cell destruction is said to occur from uremic toxins which suppress red blood cell production at the bone marrow. Thus, the produced red blood cell life becomes shorter (Goshorn, 2000). Coagulation deficiency from abnormalities of the coagulation process involves factor III production. ESRD patients are also susceptible to infection due to immunoglobulin deficiency.

6. Nervous system: waste product retention in the blood and electrolyte imbalance decrease neurotransmission capability in various organs which can lead to peripheral nervous system disorders causing burning pain, restless leg syndrome, muscle spasms and cramps. In addition, the central nervous system may be suppressed, leading to fatigue from sleep disturbance and leg numbness which also causes insomnia. Thus, patients have daytime sleepiness.

7. Reproduction system: changes in estrogen, progesterone and testosterone levels causes irregular or absent menstruation. Impotency is found in males from psychological and physiological changes which may cause reproduction organ atrophy and loss of sexual desire.

8. Musculoskeletal system: CKD patients can have renal osteodystrophy due to decreased glomerulus filtration rates resulting in decreased phosphate elimination; thus, phosphate and calcium combine together in the blood. As Calcium decreases, the parathyroid secretes additional hormones whilst the kidney is unable to change Vitamin D into its active form. Thus, calcium absorption in the intestines decreases. As a result, parathyroid hormone activates calcium removal from the bones.

9. Visibility: CKD patients experience eye irritation or red eye syndrome since calcium is deposited at the conjunctiva which can lead to blindness. The conjunctiva can also suffer edema due to low albumin.

10. Sleep disturbance: The last stage of CKD patients often have uremia from waste product deposition. Uremia disturbs nervous system functionality and leads to restless leg syndrome (Goshorn, 2000), which is one cause of sleep disturbance

(Wechapat, 1997). In addition, one-third of ESRD patients undergoing hemodialysis have sleep disturbance with more than 1 mid-sleep awakening, and most of them have less than 5 hours of sleep during the night (deWit, 1998). Long-term insomnia can cause decreased levels of consciousness and awareness, loss of concentration, ineffective work performance, irritability and distress. Insomnia therapy, therefore, can increase ability in ADL and quality of life for patients (deWit, 1998).

11. Endocrine gland: CKD patients often have hypothyroidism while the thyroxin level is normal or slightly less than normal. The exact mechanism and cause of this disorder is currently unknown. Hyperparathyroidism, however, is the result of high levels of blood phosphate and low levels of blood calcium (Goshorn, 2000). In CKD patients, the kidneys can eliminate fewer phosphates via urine. Thus, blood phosphate levels are high and calcithyrol production decreases as calcium absorption in the kidneys and digestive tract also decrease. As a result, the calcium levels in the blood are much lower, which then activates the parathyroid gland to produce more parathyroid until the patient has hyperparathyroidism. If this situation is sustained for a long period of time, patients can have osteomalacia (Napatorn, 1999; Tangsanga, 1994).

There are 2 kinds of treatments as follows (Goshorn, 2000; Pisitkul, & Tangsanga, 2000):

1. Supportive treatment
2. Replacement therapy
 - 2.1 Dialysis
 - 2.1.1 Peritoneal dialysis
 - 2.1.2 Hemodialysis
 - 2.2 Renal transplantation

1.4 Hemodialysis

Hemodialysis is a one method of effective renal replacement therapy, which is the best evolution that has been implemented to maintain life in ESRD patients as it gives ESRD patients an opportunity to prolong survival and prepares them to receive kidney transplantation. Hemodialysis is usually to keep the patients alive until a suitable donor kidney is found. The survival rate of dialysis patients, at one year after

dialysis begins is approximately 79%. After 5 years, however, this rate decreases to 33% (Luveera, 2000; Molzahn, 2005; Vanichakarn, 1993).

The objective of hemodialysis is to take heparinized blood from the body and send it to a dialyzer chamber in which a dialysate solution flows in the opposite chamber separated by a semi-permeable membrane. The substance flows between both fluids based on its concentration, so the substance from blood may diffuse to the dialysate or from the dialysate to the blood. This operation is called diffusion in which the waste products are eliminated from the blood. In the meantime, water diffuses from less concentrated fluid to higher concentrates in a process called osmosis. If more water elimination is required, an ultra-filtration method is needed in which the pressure difference between the blood and dialysate is very high.

Hemodialysis is prohibited for the following patients:

1. Patients with coagulation disorders.
2. Patients with unstable blood circulation.
3. Patients with cardiovascular disease.

1.4.1 Indications for hemodialysis therapy in CKD patients are as follows:

1. CKD patients who have been diagnosed as end stage renal disease, i.e., obvious smaller kidney size, abnormalities such as dehydration, acidosis, infection, and heart failure can be cured, but patients still have nausea and vomiting while being unable to work or perform ADL. These patients should undergo hemodialysis to return comfort and enable them to return to work.

2. Irregularities found in laboratory results: generally speaking, hemodialysis begins when creatinine clearance is less than 5 ml/min, BUN > 150 mg % and Cr > 12 mg%. If this situation is prolonged, the physiological changes in the patients can be severe in the form of acute hypertension, heart failure or hand and foot numbness, which, for the most part, are difficult to recover from. Therefore, long term prognosis cannot be provided.

At the first hemodialysis, only 2-3 hours is recommended to prevent dysequilibrium syndrome from rapid changes in waste products and water content in body. After that, the hemodialysis time can be increased to 4-5 hours, 2-3 times per

week. This schedule, however, varies with the size of the patients, the type of dialyzer used, the rate of the blood flow, the personal preferences of the patients and other factors (Limamnuaylarp, 1993; Molzahn, 2005; Smeltzer & Bare, 2004). For both physical and psychological preparation and including treatment, patients require close and attentive care from healthcare personnel to encourage them to undergo therapy and continue their lives.

1.4.2 Effects from hemodialysis

ESRD patients undergoing hemodialysis are susceptible to physical psychological, emotional, social, and economic impact as follows:

Physical impact: Hemodialysis in end stage CKD patients or ESRD patients causes the following physical changes:

1. **Fatigue and cramps:** End state CKD patients often become easily tired due to hypoxia caused by pulmonary edema. Pulmonary edema may occur from excessively high levels of blood water or sodium. In addition, hypoxia may occur due to uremic pneumonitis or uremic pleuritis (deWit, 1998). Pneumonia from uremic immunity suppression can also occur (Tantayothai & Intarasombat, 2000). The fatigue perceptions of patient depend upon duration and cannot be alleviated by sleep. Exhaustion and fatigue greatly impact daily work and the activities of daily living or highly concentrated work. If these symptoms are alleviated, however, the quality of life improves (Parfrey, et al., 1988, cited in Parungsakul, 2002). Fatigue and cramps can be encountered both during and after hemodialysis. Muscle cramps occur due to rapid decreases in plasma levels or interstitial cell water and rapid decreases in serum osmolarity. Muscle cramps can also occur due to rapid elimination of urea nitrogen, creatinin and water from the body (Jantawanich, 1994). Muscle cramps can exist for more than one month. In addition, fatigue and muscle cramps can cause sleep disturbance in patients. Sleep disorders cause sympathetic arousal, so increased neurotransmissions to the skeletal muscles cause more muscle tension, elevated blood pressure and increased heart rate. Thus, high amounts energy are consumed.

2. **Sleep disturbance:** ESRD patients undergoing hemodialysis often have uremia retention which disturbs peripheral nervous function and causes restless leg syndrome (RLS) (Goshorn, 2000), which is one important sleep disturbance factor (Wetchapat, 1997). In addition, one-third of ESRD patients undergoing hemodialysis

experience sleep disturbance with more than 1 mid-sleep awakening and less than 5 hours of sleep at night. Sleep disturbance can persist for more than 1 month (deWit, 1998) and long-term insomnia can cause decreased levels of consciousness and awareness, loss of concentration, inefficient work performance, irritability, blurred vision, stuttered speech, and hallucinations (Wetchapaet, 1997). Sleep disturbance induces inadequate sleep or insomnia in quantitative and qualitative ways, both of which impact daily living activity. Insomnia alleviation, however, can increase a patient's quality of life (deWit, 1998).

3. Pruritus: ESRD patients undergoing hemodialysis have dry skin with uremic frost on the skin and deficient sweat glands. As a result, pruritus occurs and persists for more than 1 month during hemodialysis. The severity of CKD is related to frequency of pruritus and affects sleep quality, ADL, and quality of life.

4. Fatigue: ESRD patients undergoing hemodialysis have nervous system dysfunction due to uremia in combination with mental problems, emotional problems, and fatigue (Tantayothai & Intarasombat, 2000). ESRD patients undergoing hemodialysis are, therefore, frequently subjected to fatigue (McCanne & Boore, 2000). Fatigue and lack of energy is one important problem which threatens the quality of life of ESRD patients undergoing hemodialysis. Brunier and Graydon (1996) found that 41% of ESRD patients undergoing hemodialysis had fatigue.

5. Headache: ESRD patients have decrease glomerula filtration rates, protein malnutrition and loss of albumin in the urine. As a result, interstitial cell water pressure decreases, which causes water flow from the cells to the interstitial cell area. Thus, fluid overload hyponatremia occurs. If fluid overload occurs, water from the interstitial cell moves into the cell until osmolarity on both sides of the cell wall is equal. As a result, cerebral edema occurs which causes headaches (Rattanasuwan, 1998; Thongcharoen, 1997). In addition, headache is a symptom in dialysis dysequilibrium syndrome which occurs during hemodialysis in which the removal of urea and nitrogen are removed from the blood causes lower osmolarity of plasma. Thus, more water moves into the neuron and causes cerebral edema. Headache normally occurs during hemodialysis and within one month after hemodialysis.

6. Arthritic joints: arthritis occurs due to renal osteodystrophy (Goshorn, 2000) from blood calcium and phosphorus level abnormalities. Joint pain occurs due

to calciumphosphate precipitation in various organs. Calciumphosphate is formed by combination phosphorus and calcium in the blood (Limamnuaylarp, 1996). In addition, as calcium combines with phosphorus, the blood calcium level decreases while renal dysfunction decreases Vitamin D synthesis. Thus, calcium absorption from the digestive tract also decreases. Decreased blood calcium levels activate parathormone production which increases bone calcium degeneration rates. Thus, patients may suffer from osteoporosis (Tantayothai & Intarasombat, 2000). According to Parfrey and colleagues (1988) who studied the clinical characteristics and severity of symptoms in 97 patients with hemodialysis, the arthritic joints were encountered during hemodialysis and more than one month after hemodialysis in which 1 to 3 arthritis joints were encountered. Knee arthritis was most frequently discovered, followed by hip joint, shoulder, wrists, and ankle arthritis. Joint arthritis severity perception, however, was not related to frequency of joint arthritis, sleep patterns, ADL or quality of life.

7. Anemia: ESRD patients frequently have anemia since the renal function on erythropoietin production is lost. Furthermore, the red blood cell production control in the bone marrow is also dysfunctional. In addition, uremic toxin retention interrupts red blood cell production which cause anemia in ESRD patients (Gallagher-Lepak, 1998). Anemia also occurs due to the short life red blood cells, gastrointestinal bleeding, coagulation dysfunction, and other bleeding disorders (Lemone & Burke, 2000). The coagulation process dysfunction can occurs when the CKD becomes more severe as Factor III production is inhibited and causes decreases in blood platelet and fibrin covering the vessel wall leading to hemostasis disorder (Rattanasuwan, 1998).

8. Malnutrition: CKD patients often have anorexia, nausea and vomiting, periodontal disease, and depression. Some nutrient control e.g. sodium control results in loss of taste. Therefore, patients generally lose appetite. These are the causes of malnutrition, especially in terms of protein and energy (Rattanakul, 2000). ESRD patients undergoing hemodialysis have tissue damage and loss of essential amino acids during the hemodialysis procedure which results in malnutrition. According to dietary control and nutrition loss during hemodialysis, 60% of ESRD patients undergoing hemodialysis suffered malnutrition (Thirawitayakon, et al., cited in Luweera, 1997).

Psychological and emotional impact: ESRD patients face changes in physical image such as dry blistered skin and hair breakage (Limamnuaylarp, 1996). In addition, some studies have reported that undergoing hemodialysis 2-3 times a week, 4-5 hours a time continuously for a long period of time made patients confused, stressed, anxious, and depressed (Orprasert, 1994; Sacks, Peterson & Kimmel, 1990). The confusion occurs due to the feeling that a patient's life solely depends on hemodialysis and healthcare personnel. However, if patients were able to cope with this fact effectively, they continued to live their lives without anxiety, depression and stress (Trakarnvanich, 1999). Patients also suffer stress from inability to work due to physical weakness (Orprasert, 1994). Dietary control, inadequate income, changes in life style, stress and anxiety activate the physiological response in the parasympathetic nerve, frontal pituitary gland and inner adrenal cortex, which results in excitement, rapid heart beat and sleep difficulty. Moreover, stressful patients were found to require long periods of sleep and longer periods of 1st and 2nd phase NREM sleep. Patients with depression have higher levels of monoamine oxidase which has an effect on adrenaline and serotonin destruction. As a result, patients also have sleep difficulties and frequent mid-sleep awakening.

Social impact: ESRD patients undergoing hemodialysis have to change their lifestyles and spend a lot of their time on hemodialysis. Their social interaction time diminishes as they are able to participate in fewer recreational activities with friends or relatives and immediate family. Thus, their roles and duties in family and society become deficient. Moreover, adverse changes in physical image make them reluctant to have social activity.

Economic impact: It has been estimated that the expense for hemodialysis 2 times per week is 20,000-30,000 baht per month and has to be continued for the rest of the patient's lives (Luweera, 1999). Some patients, however cannot afford such high expenses since they have to quit their jobs due to the fact that their illness and hemodialysis therapy took considerable amounts of time. As a result, patients lost their income (Orprasert, 1994).

It is obvious that ESRD patients undergoing hemodialysis suffer effects both illness and therapy in terms of physical, mental, emotional, social, and economic

aspects. The physical effects are indicated by changes in symptoms such as fatigue, cramps, pruritus, headaches, joint arthritis, and sleep disturbances causing insomnia.

2. Sleep

2.1 Definition of sleep

Human beings experience interactions and adaptations to environment while performing activities with appropriate and balanced behavior. Thus, the body and mind are always functioning and inadequate rest can lead to deteriorated health. Sleeping is, therefore, an essential activity which enhances physical and psychological function, especially with regard to the nervous system which requires rest in order to restore energy depleted by daily living in order for the body to retain its healthy function.

Sleep has received wide interest from numerous fields in general science and health science. Several authors have provided definitions for sleep as follows:

Sleep is a complex circadian rhythm involving the balance between the circadian rhythm and other physiological functionality (Hayter, 1983).

Sleep is a state of decreased physiological responses to external stimuli of the human body. On the other hand, it is a change in level of consciousness which can be awakened by appropriate stimuli. While sleeping, the brain waves have specific characteristics and the basal metabolic rate decreases (Fordham, 1991)

Sleep is a state of a decreased level of consciousness and cognition marked by physiological changes in a relaxation state wherein the function of all organs decreases. Sleeping, therefore, is the best way for a human being to rest (Tanpalachewa, 1991).

Sleep is the periodical and temporary rest of the human body accompanied by lying down, silence, closed eyes, snoring, or other signs that signify sleep (Hatterat, 1991).

Sleep is a basic physiological process which works in synchrony with other physiological rhythms of the human body in which physiological changes lead to relaxation. The characteristics of sleep are decreased and unstable levels of consciousness wherein responses to stimuli and mobility are rare or non-existent. The

behavior of sleep by lying down and closing the eyes is a temporary state which can be awakened by appropriate stimuli (Anusasanan, 1993).

Sleep is a state of decreased level of consciousness. The response to stimuli and body mobility are either rare or non-existent. The behavior of sleep is to stay calm with eyes closed in a temporary state that is easy to change when awakened by appropriate stimuli. Sleep requirement varies individually depending on a variety of factors i.e. physical, psychological, emotional, social, lifestyle, adaptation and self-esteem aspects (Potaros, 1995).

In summary of the aforementioned definitions, sleep is a complex physiological process which is synchronized with circadian rhythm and physiological functionality. Sleep is a state of decreased level of consciousness, decreased response to stimuli and no intent for movement. Sleeping behavior is natural and comprises lying down in quietude with eyes closed and may be combined with other behavior such as sleep walking, sleep talking, teeth clenching and snoring. The brain waves have specific characteristics during sleep wherein both body and mind are restored and rejuvenated. Sleep can return to an awakened state by appropriate and adequate stimuli.

2.2 Sleep phases

The phases of sleep can be divided by recording the numbers of physiological changes during sleep via electroencephalogram (EEG); electromyogram (EMG) electrooculogram (EOG); respiratory air flow measurement in the nose and mouth; chest and abdominal movement measurements during breathing, body movements, blood gas levels, hormone levels, basal temperature, and blood pressure which is inclusively called Polysomnographic recording (Guyton & Hall, 1996; Sudsuang, 1996).

Sleep can be divided into 2 phases based on eye movement as follows:

2.2.1 Non rapid eye movement sleep (NREM) or what can be called as slow wave sleep (SWS), Orthodox sleep or synchronized sleep (S-Sleep), which can be sub-divided into 4 stages as follows:

Stage 1 NREM or light sleep: this is the stage of light sleep in which muscles begin to relax, respiratory rate decreases and sometimes becomes unstable as

people are easily awakened and in which the sleeper feels that he did not fall asleep. The brain wave changes from alpha waves to beta and theta waves with mixed frequencies of 1-6 cycles per minute and low amplitude (Beck, 1992). Normally, this stage takes 1-7 minutes (Morton, 1993).

Stage 2 NREM: at this stage the body is more relaxed. The brain waves are characterized by 2 types of theta waves i.e. spindle, which has 12-14 cycles per minute frequency, and k-complex. These 2 waves indicate true sleep and the entering of Stage 2 REM. At this stage, eye movement is rare as basal metabolic rate and basal temperature decrease. Sleepers can be woken up with strong stimuli. This stage of sleep takes 10-15 minutes (Littrel & Schumann, 1990).

Stage 3 NREM: the beginning of deep sleep, which begins at approximately 30-45 minutes after Stage 1. At this stage, it is difficult to be woken up and brain waves are low in frequency, but high in amplitude i.e. delta waves or slow wave sleep has a frequency of 1-4 cycles per minute, but very high amplitudes which are found in 20-50% of brain waves. In Stage 3 NREM, the muscles are more relaxed and parasympathetic dominant causes decreased respiratory rate, blood pressure, and basal metabolic rate. This stage takes 10-20% of total sleeping time (Morton, 1993).

Stage 4 NREM: this is the deepest sleep and occurs approximately 40 minutes after Stage 1 NREM. This stage takes 10-20% of the total sleeping time (Morton, 1993), and more than 50% of brain waves are delta waves with electrical voltage no less than 75 mV wherein the frequency is approximately 0.5-2 cycles per minute. Heart rate and respiratory rate decrease to 20-50% of the normal awake states. At this stage, growth hormone is released in addition to other hormones activating protein, fat and carbohydrate synthesis which promotes muscle and bone growth, rejuvenates degenerated tissues and organs, increases the number and size of cells and restores energy (Ebersoles & Hess, 1998). Bed urination, snoring and bed ejection may be also found. If a sleeper is woken up, he will remember 20% of his dreams. This stage of sleep indicates the sleep quality all night.

A healthy adult utilizes 50-60% of sleeping time at Stages 1 and 2, then 20% at Stages 3 and 4 of the total sleep time.

2.2.2 Rapid eye movement or REM or desynchronized sleep, D-sleep or paradoxical sleep, since some parts of the brain are activated and some parts of the

brain are inhibited during a deep sleep (Fontaine, 1993). This stage starts at 90-100 minutes after the first stage. Sleepers are more difficult to awaken at this stage than at any other stages. The brain waves change rapidly and are characterized as low voltage (Black & Jacobs, 1993). The muscles are fully relaxed with no response to stimuli except in the eye muscles. The physiological changes at this stage comprise parasympathetic dominates which are triggered to release 2 times the normal adrenaline secretion, so that the body requires more oxygen. Thus, respiratory rates increase as well as heart rate, blood pressure and basal temperature. Consecutively, blood brain flow increases, perspiration and rapid eye movement occurs in addition to meaningful and obvious dreams as well as facial expressions such as laughing and crying which also occur at this stage. When sleepers are awakened at this stage, they can remember 80% of their dreams. This stage of sleep promotes thought memory and perception (Hodgeson, 1991).

2.3 Sleep cycles

Sleep-wake cycles are a part of the circadian rhythm of the human body in a 24-hour cycle. The sleep-wake cycles are related to light intensity and basal temperature which is controlled by suprachiasmatic nuclei in the hypothalamus. The sleep-wake control is centered at the reticular activating system situated in the brain stem area. When activated, RAS autonomously responds. It has been found that RAS function is related to various chemical levels in the body. Therefore, during different stages of sleep, the chemical balance of the human body remains stable i.e. during NREM, serotonin, norepinephrine, acetylcholine increases, but during early REM, acetylcholine increases but serotonin and norepinephrine decrease. However, as REM continues, serotonin and norepinephrine increase until the end of REM (Blacks & Jacobs, 1993).

NREM and REM sleep occur in many cycles in one night. The first stage of NREM occurs after sleeping for 1-7 minutes, then entering the 2nd, 3rd, and 4th stages of NREM. Upon completion of the 4th NREM stage, sleep goes back to 3rd and 2nd stage NREM and then enters REM sleep, after which the cycle is repeated at 2nd stage NREM without returning to 1st stage NREM. However, every time a sleeper wakes up he has to return to sleep at 1st stage NREM (Fontaine, 1993). In the early sessions of

sleep, the 3rd and 4th stages of NREM sleep were found in majority. However, in the last session of sleep 2nd NREM and REM were found in majority and 4th stage NREM sometimes did not exist (Foreman & Wykle, 1995). The duration of sleep during each cycle is approximately 60-120 minutes with an average 90 of minutes. There are approximately 4-6 sleep cycles in one normal sleeping night (Edward & Schuring). The total sleep time in each night also differs with age. Newborns sleeps 20 hours per day at one month of age and gradually decrease to 10-12 hours by the age of 4 years, once again decreasing to 9-10 hours at the age of 10, then 8.5 hours during adolescence at approximately 16 years of and decreasing to 7.5 hours at the age of 25-45 years old with a gradual decrease to 6.5 hours per night for the elderly (Morton, 1993). Generally speaking, however, the sleep time of adults and the elderly is not significantly different.

2.4 Importance of sleep

Sleep is a complex physiological process which synchronizes with the circadian rhythm of the human body to cause decreased levels of consciousness but with the ability to be woken up by appropriate stimuli. Sleep is a regular occurrence in human living expressed by means of quiet and rare responses to stimuli as compared to awakened states (Guyton, 2001). This is a relaxation state of the body and mind since level of consciousness and functionality decrease. Human beings utilize one third of their lifetimes in sleep to maintain their physical and psychological well-being. During sleep, energy utilization decreases so more energy is stored in high-level cells in the form of adenosine tri-phosphate incorporated with growth hormone secretion during 3rd, 4th NREM, and REM from the pituitary gland in high amounts, or 70% of total secretions per 24 hours. During the first 90 minutes of sleep, growth hormone facilitates migration of amino acids into cells and increases free fatty acids which are the energy sources of the cells. As a result, amino acid destruction in the cells is prevented and protein & ribonucleic acid synthesis efficiency increases. In addition, growth hormone facilitates somatomedins production, which plays important roles in bone marrow formation causing high regeneration rates for bone marrow during sleep. Thus, bone marrow is stronger. In the meantime, metabolism-related hormones such as corticosteroid, cortisol, glucagons, and catecholamine decrease and

the basal metabolic rate decreases for increased energy storage, support of the growth process, and restored organ efficacy. These processes occur during the sleep at a rate of three times greater than awakening periods. In addition, they can promote immune system efficacy due to the decrease of cortisol hormones which suppress lymphocyte and granulocyte function causing deficiency of infection prevention. During REM sleep, brain tissues are repaired and restored as the parasympathetic dominates in this phase causes higher blood flow to the brain, thus increasing central nervous system activity in review and collecting the information gathered all day, which is very beneficial for learning, memory and adaptation. REM is also the period of imaginative dreaming which creates happiness. As a result, adequate sleep is necessary for the health and happiness of humans, both in physical and psychological dimensions. On the contrary, people with sleep deprivation suffer from decreased energy storage, suppressed immune system functionality, more susceptibility to illness, loss of concentration, volatile tendencies for anxiety and excitement, decreased adaptation endurance and ability. Continuous sleep deprivation or insomnia can cause psychiatric disorders such as schizophrenia, paranoia, delusions, hallucinations or behavioral disorder (Evan & French, 1995, cited in Laempet, 2001). Sleep is, therefore, vital for human beings to maintain physical and psychological well-being.

Insomnia management in ESRD patients undergoing hemodialysis is, therefore, necessary in order to eliminate inhibited or negative factors related to sleep quality. Nurses play important roles in insomnia management strategy as healthcare personnel who take responsibility for symptom management which comprises holistic patient care and promoting a better quality of life, both physically and psychologically, which is the main target of healthcare institutes and patients. Finally, nurses who perceive the value added by this important task are also promoting their professional development.

3. The Symptom management model

Symptoms refer to a statement of experience reflecting changes in bio-psycho-social functionality in addition to the feelings or cognitive abilities of individuals. On the other hand, signs refer to abnormalities indicating illness which can be diagnosed

by individuals or other people. Both signs and symptoms are important by means of their indication of health problems to which patients and healthcare personnel should pay particular attention. The symptom management model was developed by Larson et al. (1994) and the modification comprising interrelated conceptual dimensions; symptom experience, symptom management strategies, and symptom outcome was carried out by Dodd, et al. (2001).

Relationships within the model

The dimensions of the symptom management model have conceptualized relationships to one another depicted in both the original and revised model as shown with bi-directional arrows (Figure 3). The relationships among these dimensions were revised based on research and experimental findings and on further conceptualizations by the faculty of graduate students of the University of California, San Francisco (UCSF) (Dodd, et. al., 2001).

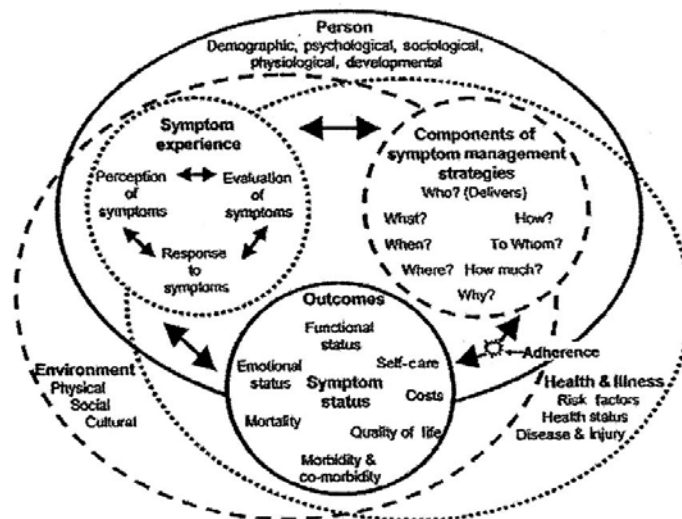


Figure 3 Revised Symptom Management Conceptual Model (Dodd, et. al., 2001)

Model assumptions

The symptom management model is based on the following five assumptions:

1. That the gold standard for the study of symptoms is based on the perception of the individual experiencing the symptoms and his/her self-report.
2. Individuals gained the opportunity of symptom severity because of the influence of various variables e.g. violent job. Hence, symptom management had to be provided before the occurrence of symptoms.

3. That nonverbal patients (infants, post stroke aphasic persons) may experience symptoms and the interpretation by the parent or caregiver is assumed to be accurate for purposes of intervening. That all trouble some symptoms need to be managed.

4. Symptom management strategy may be targeted on individuals, groups, families, or environments.

5. Symptom management is a dynamic process that is flexible for individuals. The scope of nursing influence emphasizes individuals, health status and sickness condition or environment.

As for the symptom management model of Dodd, et al. (2001), the following three factors influenced those 3 dimensions of the model: symptom experience, symptom management strategy and symptom outcomes as follows:

1. The individual variable e.g. personal data in physical, bio-psychosocial aspects were innate host factors reacting to individual symptom experience. Developmental variables include the level of development or maturity of the individual. In terms of application, the symptom management model can be extended or flexible based on the symptoms or the population of application.

2. Health/illness knowledge comprises factors of health status and illness including risk factors, injury and disability. In some groups of patients, the environmental risk factors can be related to symptoms such as high risk occupations or side effects from disease treatment or indications of other symptoms which are the consequences from the initial symptoms. These symptoms can be predicted, prevented or eliminated by means of various methods.

3. The environment may be the outcome of indications or inner context which causes symptoms i.e. physical, social, cultural environmental variables. The physical environment comprises home, workplace and hospital; social environment comprises a social support network and interpersonal relationships; cultural environment comprises the beliefs, values and practices of specific ethnic groups or religions.

As mentioned, symptom management involves 3 related dimensions for effective management of symptoms i.e. symptom experience, management strategies and outcomes.

3.1 Symptom experience

Symptom experience is the combination of the symptom perception, evaluation and response of individuals. Symptom perception signifies that a person perceives a change in feeling and behavior. Individuals evaluate symptoms by making decisions about the cause, severity, frequency, life threat, and effects on daily living with symptoms. Responses to symptoms comprise physical responses such as palpitation, changes in heart rate, menstruation, and sleep patterns. The psychological response is the response to cognitive or perceptual changes such as alterations in emotions, decreased adaptability or changes in personal capability. Behavioral responses are the expressions of feeling toward such symptoms involving both linguistic and social communication such as crying, conflict and changes in sleep patterns. Changes in social functions such as changes in terms of roles or responsibilities. Each symptom involves one or more of the abovementioned responses. Acute chest pain, for example, would elicit many responses such as increased heart rate, weeping and anxiety.

Understanding the correlation among the symptom experiences enables appropriate and effective symptom management. The interaction among symptom experience components were in a two-way direction. For instance, evaluation and response can promote perception. If the individual believes that the symptom are malicious and hazardous, a higher level of severity will be perceived.

3.2 Symptom management strategies

The target of symptom management is to prevent or reduce negative outcomes for symptoms by using medical, professional expert and self care strategies. The symptom management begins with the evaluation of the symptom experiences according to individual perception. This evaluation focuses on experience data classification in order to select appropriate symptom management strategy. The symptom management strategy may be aimed at more than one symptom experience component in order to yield more than one required symptom outcome. Symptom management, therefore, is a dynamic process which requires strategic changes with respect to time progress or the responses of individuals in terms of accepting or rejecting the strategy.

The revised model includes the specifications of the nature of the strategy with regard to what, when, where, why, how much intervention does, who the recipient of the intervention will be and how it will be delivered. Researchers and clinicians consider these questions as they design, develop and prescribe symptom management strategies. The specifications should greatly aid in replications of intervention studies. The nature of the intervention depends on the state of the science for the particular symptom. In the evolution of research on symptom management strategies, developers of the model have moved from targeting only the individual “who” in the model to including family members and experienced former patients as recipients of the intervention.

3.3 Symptom outcomes

Symptom outcome is the status of symptoms as a result of symptom management by individuals using symptom experience for evaluating self care ability, morbidity and co-morbidity, mortality, quality of life, expenses (in terms of health insurance and healthcare service accessibility), emotional status, and functionality, all of which are interrelated. The duration of symptom outcome evaluation is based on frequency and requires continuing practice of symptom management strategy and response to strategy. When the symptoms completely disappear, the strategy has to be changed to prevent future relapse or exacerbation of the symptoms. Thus, the strategy has to be adjusted in combination with continuous outcome evaluation, which must be carried out.

Obviously, the symptom management model can be used as a guideline to appropriately manage various symptoms. Successful symptom management also requires contribution from patients who give complete, accurate and appropriate symptom experience information, from patient’s families who provide additional data while facilitating the strategy implementation in cases where patients cannot provide data by themselves, and from healthcare personnel who will organize the collected data, summarize various appropriate strategies and facilitate strategy implementation to achieve the desired symptom outcome.

4. Insomnia experience in ESRD patients undergoing hemodialysis

Insomnia perception

Is the meaning given to changes of feeling and behavior toward sleeping.

Definition

Insomnia is indicated by feelings of inadequacy or deprivation of sleep. It is the experience concerning difficulty falling asleep (sleep latency), frequent or lengthy awakenings in the night (prolonged sleep disturbance or half-sleep) or inability to return to sleep after awakening (Walsh, et al., 1994).

Insomnia symptoms comprise complaints about sleep quality, duration and efficacy deprivation. These symptoms express sleep difficulty and problems with sleep maintenance ability i.e. frequency or duration of mid-sleep awakenings or early awakening, complaints of sleep deprivation compared with before admission to hospital, morning drowsiness, and daytime fatigue. The patterns of insomnia are ever changing (Morin, et. al.,1999).

Insomnia is not a disease and possesses a broad definition i.e. having sleep difficulty or difficulty maintaining sleep as well as feelings of fatigue in the morning (Hohagen, et al., 1994).

Insomnia is the quantitative and qualitative deprivation of sleep which is caused by sleeping difficulty, discontinuous sleep, or premature awakening (Intarapoka, 1999).

Insomnia is the disturbance or perception of disturbance of normal sleep causing numbers of health problem such as daytime fatigue, distress, anxiety, depression, and discomfort. Sleep disturbance problems can be divided into the following categories: inability to sleep, inability to maintain sleeping state and premature awakening (NIH technology Assessment Panel, 1996).

Insomnia is the experience of sleep deprivation or poor sleep quality which can be characterized as difficulty falling asleep, difficulty maintaining sleep, premature awakening, and fatigue upon awakening resulting in low energy and exhaustion, difficult adaptation, and daytime distress (National Center on Sleep Disorder research, 1999).

In summary, insomnia is a symptom of a sleep-wake disorder which is characterized as quantitative and qualitative deprivation of sleep. The experience

perceived from insomnia is long time sleep latency, difficulty falling back to sleep after awakening, sleep interruption and fatigue upon awakening.

Sleep Requirements

Each individual has their own activity of daily living patterns according to habits, duties, and lifestyles, and normally require approximately 6-8 hours of sleep. This requirement, however, varies and cannot be clearly identified in terms of numbers. Individual sleep requirements differ depending on health and condition i.e. while some people naturally require only 2-3 hours of deep sleep with better sleep quality than using sedatives (Leigh & Reimer, 1985) while other happy and healthy individuals may require less than 6-8 hours of sleep in which most of them are happy, self-contented, socially well-adjusted, effective workers, and well-disciplined. Many adults require only 4 hours of sleep. In addition, people who can relax and rest while awake need fewer hours of sleep (Taylor, et al., 1993). Some people, however, require at least 9 hours of sleep; otherwise, they will experience fatigue. Most of these people have high levels of anxiety and conflict as well as ill-structured patterns of living. Finally, ill or postoperative patients also require longer periods of sleep (Blare & Myers, 1994).

Quantitative sleep evaluation can identify the duration of sleep as per the following details (Buysse, et al., 1980, cited in Ramsiri, 2000):

1. Sleep latency or duration from going to bed till falling asleep. A person with good sleep quality utilizes less than 15 minutes since he can enter the next stage of sleep completely and quickly, whereas more than 20 minutes signify some level of insomnia as the person has difficulty entering the next stage of sleep.

2. Sleep duration is counted from the time a person falls asleep until morning awakening without mentioning mid-sleep awakenings. With regard to age-related total time of sleep, children require longer sleep durations which gradually decrease in adulthood and old age. Adults who can sleep more than 7 hours per night can be said to have good sleep quality.

3. Habitual sleep efficiency is the percentage ratio between the total amount of sleep hours divided by total hours spent in bed. A person is said to have good sleep quality if his habitual sleep efficiency is more than 85%.

Sleep quality

Sleep quality refers to sleep patterns which are not disturbed by any disturbance, or that which is perceived by a person as regular sleep patterns comprising ease in falling asleep, sleep latency duration of 20-30 minutes, continuous deep sleep with complete cycles of NREM and REM and at least 90 minutes' duration per cycle, few mid-sleep awakenings and prompt return to sleep until the actual morning awakening, waking up refreshed, ability to perform ADL and effective occupational performance. In consideration of the duration in bed and the time of sleep, sleep time is compared with time awake in bed. Sleep quality is a subjective behavior and feelings concerning sleep are derived from going to bed and awakening. The sleep quality is said to be good or bad by subjective individual evaluations (Snyder-Halpern & Verran, 1987).

The qualitative evaluation of sleep quality is as follows (Buysse, et al., 1989; cited in Ramsiri, 2000)

1. Subjective sleep quality evaluation is a summarized evaluation of sleep by an individual as to whether sleep is excellent or very poor.
2. Sleep disturbance refers to discontinuity in sleep in which the sleep-wake patterns change from habitual format, thus causing quantitative and qualitative deprivation of sleep.
3. Sedative usage indicates sleep problems. According to the study, drugs have effect on sleep disturbance for REM sleep. Therefore, after taking sedatives, a person may face difficulty getting to sleep on their own accompanied by frequent mid-sleep awakenings and difficulty returning to sleep, all of which adversely affect sleep quality.
4. Daytime activity, poor sleep quality resulting in sleepy, lack of enthusiasm, napping during day time, fatigue, depression, easily distressed, and decreased activity ability.

The characteristics of changed sleep patterns

Insomnia symptoms can be divided into the following groups:

Onset time of symptoms (Piemmongkol, 1993; Srisurapanon, 1999)

1. At sleep onset or initial insomnia, patients will find it difficult to fall asleep for more than 30 minutes, but have sleep patterns that become normal after asleep.

This group of symptoms frequently encountered in patients with high levels of anxiety, sleeplessness phobia, high levels of arousal, drug usage, unhealthy sleep habits, and environmental disturbances.

2. In sleep interruption, middle insomnia or sleep maintenance insomnia, patients are able to fall asleep normally but awaken in the middle of the night i.e. inability to return to sleep anymore after 1 a.m. - 2 a.m. or difficulty returning to sleep. These symptoms were related to sleep apnea syndromes, discomfort such as pain, coughing, breathlessness, dyspnea, nocturia, migraine, nocturnal asthma, peptic ulcers, seizures, drug usage, and environment.

3. In early morning awakening or terminal insomnia, patients are able to fall asleep and maintain sleep normally, but wake up 1-2 hours earlier e.g. a patient used to wake up at 6 a.m., but now wake up at 4-5 a.m. This symptom was found to be related to elderly, depression, drug, and environment.

Some patients had more than one symptom or some had all 3 symptoms.

The duration of symptoms (Walsh, et al., 1994)

1. Transient insomnia occurs from instantaneous stress or traveling across different time zones (jet lag) and usually occurs for 2-3 nights.

2. Short-term insomnia occurs from stress-induced situations such as changing career, illness or environmental factors. The duration ranged from 2-3 nights up to 1 month.

3. Persistent insomnia occurs from severe effect such as psychiatric disorder from drug, sleep disorder, including chronic effect of short term insomnia. The duration of insomnia may be over than 1 month.

Insomnia perception of ESRD patients undergoing hemodialysis

Perceptions of insomnia in ESRD patients undergoing hemodialysis are often expressed in complaints and changes in sleep patterns. According to Walker and colleagues (1995) who evaluated sleep and investigated sleep disturbance factors in 54 hemodialysis patients, the patients had initial insomnia and middle insomnia from many disturbance factors, and daytime drowsiness. Holley and colleagues (1992) studied 48 hemodialysis patients and found that they had initial insomnia, frequent middle insomnia, and terminal insomnia. This finding was in accordance with

Mendelson, et al. (1990) who found that patients had initial insomnia, middle insomnia or frequent awakening during sleep and daytime drowsiness in which some patients had 3 symptoms. The study of sleep quality in 71 hemodialysis patients of Unruh and colleagues (2003) revealed that patients had both quantitative and qualitative sleep problems in which most patients suffered initial insomnia (took more than 1 hour from going to bed till falling asleep), inability to maintain sleep, fatigue in the morning, sleep time deprivation, daytime sleepiness and frequent napping. According to the patients' perceptions, it can be summarized that ESRD patients undergoing hemodialysis suffered sleep problems comprising long-time sleep latency, decreased duration of sleep, decreased sleep efficiency and increased mid-sleep awakening duration, all of which were significant symptoms of insomnia.

Frequency and severity of insomnia

Insomnia is an indicator of sleep inadequacy or deprived sleep. In general, healthy persons can perceive some degree of occasional insomnia due to acute stress and anxiety. Occasional insomnia, however, does not have adverse consequences. On the contrary, frequent or regular insomnia can deteriorate human health. A person with chronic insomnia may complain about poor ADL ability, fatigue, distress, emotional variance, poor adaptability, and decreased working efficiency together with daytime sleepiness (Walsh, et al., 1994).

Insomnia severity can be decided by numbers of components i.e. frequency, severity and duration of insomnia including ADL, emotions, and quality of life impacts. The study of insomnia outcomes often evaluates the duration of sleep onset and mid-sleep awakenings longer than 30 minutes as an indication of insomnia in combination with less than 85% habitual sleep efficiency (ratio between net sleep duration and total duration in bed multiplied by 100) and sleep disturbances of more than 3 night per week (Morin, et al., 1999). According to Unruh, et al. (2003) who studied sleep quality in 71 hemodialysis patients, 40% of them had more than 30 minutes sleep latency and 62% had durations of sleep less than 6 hours per night. According to Mendelson, et al. (1990) who studied sleep quality in 11 hemodialysis patients, it was found that all 11 patients had sleep efficiency of less than 85% and 86% had sleep disturbance more than 3 times per week. In summary, end-stage CKD patients undergoing hemodialysis suffered severe insomnia. In addition, the severity

of insomnia depended largely on individual perceptions of sleep quality, sense of relaxation and feelings in the morning or awakening throughout the day. According to Walker, et. al. (1995) who studied sleep in 54 hemodialysis patients and found that 83% (45 patients) suffered sleep-wake cycle disorder while 67% (36 patients) suffered daytime sleepiness, and 60% had moderate feelings of inadequate rest.

Responses to insomnia

Physical responses

Consequences of REM sleep deprivation

The duration of sleep decreased and premature awakening caused REM sleep deprivation. If REM sleep deprivation accumulated for 24-48 hours, the steroid hormone production decreased. Steroid hormone is the transmitting agent in the synthesis of other hormones. In addition, the physiological response to hypoxemia and hypercapnea decreased which cause prolonged sleep apnea. The severity level of these consequences depends on the duration of sleep deprivation (Evans & French, 1995).

The Consequences of NREM-sleep deprivation

NREM-sleep deprivation occurs due to frequent sleep disturbance. The consequences are the suppression of immunity system functionality due to increased production of cortisol which suppresses the function of lymphocyte, granulocyte, and T-cells resulting in slow recovery and increasing complication risks. In addition, tissue restoration decreases since NREM3 and NREM4 are the stages when high amounts of growth hormone are released and NREM4 is the period of highest secretion of growth hormone. Growth hormone is involved in the growth of the human body as well as in tissue restoration and organ. NREM-sleep deprivation causes tissue restoration deficiency and fatigue. In addition, NREM-sleep deprivation is related to decreased body weight due to higher metabolism rate. More than 4 hours of NREM4-sleep deprivation causes nausea, diarrhea or constipation, headache, loss of muscle coordination, neck muscle weakness, and loss of muscle strength (Evans & French, 1995).

According to the physical examinations of insomniacs, it was found that the body temperature decreases as there are changes in the cardiovascular system accompanied by fatigue, palpitations, hand tremors, diminished reflexes, slow

cognition and decision-making, changes in eye movement, and including higher amplitude of brain waves, fatigue, headache, neck pain and muscle pain which is presumably due to muscle tension and deficiency of motor neurotransmissions in which the muscles are found to be contracted at all times which causes waste product retention (Potter & Perry, 1993), nausea, dark skin around eyes, swollen eye lids, red eyes and sore eyes (Kozeir, 1989).

Behavioral and psychological responses

Psychological responses vary with each individual. Insomnia causes changes in the function of the central nervous system (CNS). Thus mental, emotional and behavioral variance can be encountered as sluggishness, slow cognition, discouragement, insensitivity to the environment, unstable emotions and behavior, easily triggered anger, aggressiveness, lack of motivation, depression or paranoia and isolation which can be encountered if sleep deprivation lasts for 24-48 hours (Potter & Perry, 1993).

5. Insomnia management strategies for ESRD patients undergoing hemodialysis

Patients seeking to improve sleep quality and adequacy, or prevent acute sleep disorders should behave as follows:

Sleep-promoting behaviors

1. Identify the cause of the sleep disorder and make corrections at the root cause e.g. change sleeping place or change bed time. When the patient is able to adapt with the situation, sleep becomes a normal activity.

2. Stay in bed only for sleep. Do not stay in bed and read books, watch TV or have meals, or any other activities except for sexual relations. This practice is aimed at sleep.

3. Go to bed and get up at regular times; set the alarm clock to wake up in the morning at the same time everyday in order to maintain stable sleep-wake cycles.

4. Go to bed when tired or heavily drowsy, which can help decrease sleep latency. Avoid daytime napping or taking naps of over half an hour.

5. Select sedate pre-sleep activities such as reading books, watching TV or other activities that have a calming effect, then go to bed. After spending 10-15 minutes in bed without falling asleep, return to the activity until sleepy. Overly

entertaining or exciting activities should not be a part of this routine as they may have an arousing effect that leaves the person far from sleep. All activities should be calm and relaxing.

6. Drink warm milk, warm water or have a light supper before going to bed. Milk contains L-tryptophan which is an amino acid that acts as a natural sedative. L-tryptophan increases the level of serotonin and carries it to the brain, inducing drowsiness and making it easy to sleep. CKD patients, however, should exercise caution in drinking milk as it contains high levels of phosphorus, calcium, sodium, and cholesterol. Patients can drink approximately one half glass of low fat milk per day.

7. Nuts, fresh vegetables and preserved food should be avoided before going to bed since these foods induce high amounts of gas in the stomach which causes discomfort. High fat foods also cause the gastrointestinal tract to work harder, which may also lead to insomnia.

8. Although each person has a different level of caffeine tolerance, all people should avoid having nervous system-stimulating food such as food and beverages containing caffeine e.g. tea, coffee, chocolate and carbonated drinks 4-6 hours before going to bed since caffeine stimulates the nervous system and causes sleep disorders, especially when consumed in amounts more than 500 milligrams within a 24-hour period, or the equivalent of 3 cups of coffee. In addition to caffeine, smoking cigarettes which contain nicotine also stimulates the nervous system. Smoking cigarettes in combination with drinking coffee can, therefore, amplify these stimulating effects and increase the severity of sleep disturbance. Alcoholic drinks should also be avoided.

9. Perform regular exercise, which can reduce stress and emotional variance while promoting happiness, which consecutively facilitates good sleep and, in turn, reduces stress. Exercise, however, should be performed at least 3 hours before going to bed.

10. Record sleep patterns within a 24-hour period including bed time, wake-up times, duration of sleep, movement of the body during sleep and napping. It is important for all people to maintain habitual sleep patterns.

Environmental management for sleep

The environment of the bedroom should be arranged to promote good sleep quality by providing clean bed accessories, no insect disturbance, good ventilation, proper room temperature, sufficient light and no noise disturbance.

Relaxation techniques for sleep

1. Muscle relaxation 10 minutes before bed time should be performed to reduce stress. Other relaxing activities include a warm bath, back massage, reading, listening to light music, prayer and meditation. Choosing a comfortable position in bed is also essential.

2. Relax and maintain a tranquil state by counting 1-100 and reverse until sleep. Repetitious actions can create relaxation, good concentration thus facilitates good sleep.

3. If the above solutions for sleep problem do not work, special techniques such as self-hypnosis and imagery training may be necessary.

Pharmacological methods for sleep

1. Taking medication such as analgesics, fever relievers and cough suppressants can induce sleep. Usage, however, should be under the diagnosis and prescription of a physician.

2. Consult a physician to diagnose and provide appropriate treatment or consider using sleeping pills. Taking sedatives without a physician's prescription is dangerous. Therefore, although sedatives can be beneficial for acute insomnia, they may also produce side effects if used over long periods of time.

6. Insomnia outcomes in ESRD patients undergoing hemodialysis.

Although insomnia occurs only during the night, it affects the functionality of people for 24 hours. Long-term insomnia can affect lifestyles and emotions of individuals as a whole. In addition, it also affects health status, interpersonal relationships, working capability, feelings of low performance and incompetence due to loss of life-control and feelings of despair when waking up alone in the night and feeling that good sleep quality will never be achieved. Moreover, it is difficult to help others understand insomnia problems as people who have normal sleep cannot perceive the existence and severity of insomnia. Thus, other people tend to offer plain

advice such as to go to bed earlier or not think so much, neither of which are of any assistance to the insomniac (Goldstein, Krasner & Garfield, 1987).

In the case of daytime sleepiness, a person may be able to maintain thought or remain awake, but may sleep or feel heavily drowsy while performing activities. Furthermore, insomnia causes patients to be aggressive, distressed, powerless and depressed. The consequences are that personal interaction and family interactions are defied. Moreover, reports tell us that patients with insomnia often have discomforts and a number of health problems while any existing chronic diseases are exacerbated. Insomniacs are more frequently hospitalized with longer durations of hospitalization than person without insomnia experience. Often the insomniac's area of responsibility at work is limited and some people are compelled to change jobs due to health problems. Many insomniacs have reported tremendous effort in getting work done during the day after insomnia attacks as insomniacs have a lot of problems performing jobs which require high motivation, especially in cases of hard, highly technical, urgent, intellectual work, or work that requires auditing the correctness of language and numbers (Goldstein, Krasner & Garfield, 1987)

For ESRD patients undergoing hemodialysis, insomnia management that results in good sleep quality as expected can eliminate the insomnia outcomes discussed above as new sleep experiences reflect good sleep quality that differs from insomnia.

7. Factors related to insomnia outcomes in ESRD patients undergoing hemodialysis

According to the literature review, the factors related to insomnia outcomes in ESRD patients undergoing hemodialysis which were taken into account in this study were gender, age, educational level, monthly income, duration of hemodialysis, and frequency of hemodialysis. These factors are discussed as follows:

1. Gender

Gender is a factor representing the biological differences of people and consequently causes different sleep patterns. The documents related to the comparison of sleep according to developmental stages between males and females have presented differences in sleep characteristics wherein men had more variance and

rapidly occurring sleep disturbances than women from approximately 10 to 20 years (Kozier, et al., 1989; cited in Opanurak, 2002). At the onset of adulthood, men begin to decrease in REM sleep, frequently awakening because there is a congestion of semen in their penises which disturbs their sleep cycle during REM sleep (Closs, 1988). In addition, gender also affects the cognition and perception of individuals. According to Unruh et al. (2003) who studied the sleep quality in 71 ESRD patients undergoing hemodialysis, females had better sleep quality than males. However, the surveys of sleep in female patients with various age ranges and races indicated that women slept less than men (Hagnell, et al., 1993). These surveys were consistent with a survey done in the United States involving 1,000 women whose ages ranged from 30 to 60 years and wherein 48% of the women had problems whereas only 38% of the men had them. According to the study of Hayter (1983), the frequency of mid sleep awakening, duration of mid sleep awakening, and sleep quality of female samples were worse than male samples. Similarly, the study of Coren (1994) found that women had more opportunity for nightmares, difficulty sleeping and frequent awakening than men did. However, Mendelson and colleagues (1993) reported that the sleep quality of males and females differed. However, the information was not sufficient for definite conclusion that sleep difference was related to different genders. The current study related insomnia to the outcomes of ESRD patients undergoing hemodialysis wherein gender was a variable that would be determined as a predictor variable of the insomnia outcomes in this patient group.

2. Age

Sleep patterns normally start to change at the age 35 years due to reduction of neuron-influencing delta waves in the 3rd and 4th NREM or deficits of the central nervous system which controls the circadian rhythm related to sleep control (Lankford, 1994, cited in Ramsiri, 2000). As a result, the circadian rhythm and sleep patterns change adversely. Older ages would have insomnia, often awakening, and long sleep latency after awakening because higher stimulation index cause of the increased physical alertness when the ages were older (Snyder-Halpern & Verran, 1987). Older ages generated more degenerative central nervous system causing the limit of reaction to extrinsic alarm and dysfunction of biorhythm and the release of melatonin substance. Decrease of melatonin caused more severe insomnia along with

greater age (Blackman, 2000). According to a study by Han and colleagues (2002), reported that ESRD patients with diabetes and insomnia were of a higher age group than the group without insomnia. Similarly, the study of Merlino and colleagues (2006) found that age was confirmed as a significant and independent predictor of sleep disorders in patients with end-stage renal disease undergoing dialysis therapy. This finding was in contradiction with Holly, Nesper and Rault (1992) who studied sleep problems in ESRD patients undergoing hemodialysis, finding that there were no significant differences in sleep problems among groups of different ages. In this study, age was chosen as a predictive variable for insomnia outcomes in ESRD patients undergoing hemodialysis.

3. Educational level

Educational level is a socio-cultural factor which influences insomnia outcomes and higher educational levels enable people to access and understand health-related information (Pender, et. al., 2002). Moreover, higher educational level provides more knowledge and alternatives for selecting management strategies. Higher educational levels are associated with socio-economic status and can also increase opportunities for better jobs. The study of Petchrung (2004) reported that educational level had a positive correlation with fatigue management strategies and fatigue outcomes. Therefore, educational level is a variable that has been chosen to predict the insomnia outcomes in ESRD patients undergoing hemodialysis.

4. Monthly Income

Monthly income is a beneficial source of material support for people, as it enables them to develop knowledge and skills. Pender (1982) stated that persons with lower economic status also have lower levels of education since low income persons have to work longer periods of time to earn their living whereas higher income persons possess more opportunity for education as well as access to beneficial resources and services (Panpattanakul, 1994). According to Nokes and Kendrew (2001), who studied the factors related to sleep quality in HIV patients using the model of Larson et al., it was found that personal income or economical status were related to sleep quality perception. This finding was similar to the study of Habkonglek (2000) who found that income was positively related to health promoting behaviors and perceived self efficacy in addition to being able to predict 29.10% of

the variance in the health promoting behaviors of CAPD patients. Finally, the study of Petchrung (2004) on hemodialysis patients with higher incomes identified additional successful fatigue management strategies. In this study, monthly income was one of the predictive variables of insomnia outcomes in ESRD patients undergoing hemodialysis.

5. Duration of hemodialysis

For ESRD patients, undergoing hemodialysis therapy means long-term continuous therapy necessary for a chronic illness and creating many complications which affect the patients' quality of life. Han and colleagues (2002) studied insomnia in diabetic hemodialysis patients and found that the duration of hemodialysis was not related to insomnia in this group. Furthermore, patients may have to face the suffering of continuing symptoms of ESRD and dialysis, limitations resulting from integrating dialysis into their lifestyles and unending uncertainty of life on dialysis in addition to altering interrelationships between autonomy and dependence inherent in living on dialysis (Polascheck, 2003). Moreover, the patients and their families have to bear the financial burden of long-term hemodialysis (Jittinan, 2002; Napatorn, 1999), which leads to a higher incidence of stress and anxiety (Orprasert, 1994), both of which are major causes of insomnia (Srisurapanon, 1999). Therefore, the duration of hemodialysis is a variable chosen to predict the insomnia outcomes in ESRD patients undergoing hemodialysis.

6. Frequency of hemodialysis

Hemodialysis is aimed at minimizing uremic symptoms which can decrease both short and long term morbidity and mortality rates. According to Gotch and colleagues (1997) who reported from 15,000 patients in order to maintain adequate and appropriate hemodialysis to treat uremia symptoms, patients require at least 3 times of hemodialysis per week wherein a typical schedule is 3 to 5 hours of treatment 2 or 3 times per week. This schedule varies with the size of the patients, the type of dialyzer used, the rate of blood flow, the personal preference of the patients, and other factors (Limpannoylarp, 1993; Molzahn, 2005; Smeltzer & Bare, 2000). Most Thai ESRD patients, however, have hemodialysis 2 times per week. Frequency of hemodialysis, therefore, is one of the predictive variables on insomnia outcomes in ESRD patients undergoing hemodialysis.

In conclusion, based on the review of literature and existing related research, it can be concluded that ESRD patients undergoing hemodialysis are confronted with complications and many problems from the disease and treatments. Insomnia, expressed as long sleep latency; awakening during the night; difficulty going back to sleep; cheerless feeling after awakening and excessive daytime sleepiness, is a common symptom of ESRD patients undergoing hemodialysis. The causes of insomnia are physical, psychological, emotional behavioral and environmental disturbances. Moreover, insomnia affects routine life and decreases the performance of activities. Insomnia management strategies to eliminate insomnia are mixed strategies that promote sufficient sleep. In this study, the researcher was interested in examining the predictive power among gender, age, educational level, monthly income, duration of hemodialysis, and frequency of hemodialysis, on insomnia outcomes ESRD patients undergoing hemodialysis.

CHAPTER III

METHODOLOGY

This descriptive research was conducted to study the insomnia experience, management strategies and outcomes of hemodialysis patients. In addition, it was aimed at determining the predictive factors such as gender, age, education level, monthly income, duration of hemodialysis, and frequency of hemodialysis on the insomnia outcomes of ESRD patients undergoing hemodialysis. The details of the methodology are as follows:

Population and Sampling

The population in this study comprised patients aged over 20 years who had been diagnosed with end-stage renal disease (ESRD) and treated by hemodialysis at the Hemodialysis Unit of The Kidney Foundation of Thailand at Galyanivadhna Building, The Priest's Hospital.

Inclusion criteria

The eligibility criteria for participants to be included in this study were as follows:

1. Patients who have been regularly treated by hemodialysis at least twice weekly for more than 3 months.
2. Patients who had fairly bad or very bad subjective sleep quality according to the 5th question in the insomnia experience questionnaires, which meant they had insomnia experience.
3. No symptoms or disease that could be an obstacle to communication.
4. Patients with willingness to participate.

Sample size

A sample size of at least 88 participants was required based on power analysis for multiple regression to provide a power of 0.80 and $\alpha = .05$ to estimate multiple

regression for a medium effect size (0.30) (Polit & Beck, 2003). In this study, the calculation yielded a sample size of 100.

Setting

The data collection was provided at the Hemodialysis Unit of The Kidney Foundation of Thailand at Galyanivadhna Building, The Priest's Hospital. The setting provided hemodialysis for patients with chronic kidney disease by means of large modern hemodialysis machines and personnel who were expert in hemodialysis with hemodialysis machines. According to the statistics of chronic kidney disease from The Kidney Foundation of Thailand in 2003, 423 patients with chronic kidney disease were treated by hemodialysis. There were two groups of patients in which 226 patients received hemodialysis treatment for four hours twice a week and 197 patients received hemodialysis treatment for five hours three times a week. The specialists were the persons who treated and discussed proper methods of treatment and then provided appropriate recommendations for the patients and families. The nurses were registered nurses who had specific expert training in hemodialysis. Thus, the hemodialysis patients had a better chance of receiving treatment and advice from a healthcare specialist while they were waiting for receiving hemodialysis.

Research Instruments

The instruments utilized to measure the study variables are described as the follows:

Part 1: Demographic and clinical characteristics.

This part contained questions on information regarding the demographic characteristics of the hemodialysis patients including gender, age, marital status, educational level, occupation, monthly income, sufficiency of income and source of hospital financial support for hemodialysis. The clinical characteristics involved sickness and health status e.g. hemodialysis duration, frequency of treatment per week and adequacy (kt/v), Hb/Hct levels, other laboratory results, history of drug usage, and other co-morbidity diseases.

Part 2: Insomnia experience questionnaires as associated with sleep patterns, sleep quality, and insomnia experience were developed by modifying the Pittsburgh Sleep Quality Index (PSQI) (Smyth, 1999), which was translated into Thai by Tanchaiswad and Jirapramukpitak (1997) combined with the literature review. A rating scale was applied to this questionnaire and separated into 4 sections.

Section 1: Sleep patterns and sleep quality (Smyth, 1999), consisting of 5 items:

1. Frequent bedtimes and awakenings were in the 1st and 2nd items of the questionnaire. Habitual sleep efficiency was applied by computing (number of hours of sleep duration) / (number of hours of staying in bed times) x 100. The rating scores were as follows: 0 = >85%, 1 = 75-85%, 2 = 65-74.99% and 3 = <65%.

2. Sleep latency was in the 3rd item of the questionnaire and involved time in minutes from bedtime until sleep. The scores were rated as follows: 0 = < 15 minutes, 1 = 15-30 minutes, 2 = 31-60 minutes and 3 = > 60 minutes.

3. Sleep duration was in the 4th item of the questionnaire and inquired about the actual number of hours slept in a night (used with the calculation of habitual sleep efficiency). The scores were rated as follows: 0 = > 7 hours, 1 = 6-7 hours, 2 = 5-6 hours and 3 = < 5 hours.

4. Subjective sleep quality is the 5th item in the questionnaire, and is related to the patients' opinions about their sleeping. The scores were rated as follows: 0 = very good, 1 = fairly good, 2 = fairly bad and 3 = very bad.

The meaning of the scores in each item of the sleep pattern and sleep quality of this study were defined as follows:

0 score meant that patients had no insomnia

1 score meant that patients had little insomnia

2 score meant that patients had moderate insomnia

3 score meant that patients had much insomnia

Section 2: Insomnia perception, comprising 5 items.

Questions on expressing characteristics of insomnia regarding the patients perception and data from the literature review were provided e.g. difficulty falling asleep, feelings of having had no deep sleep, having a cheerless feeling in the morning, having nocturnal awakenings, difficulty going back to sleep and so forth.

The frequency of insomnia was targeted in this section, and the answers were rated in terms of occurrence as follows: never, 1-2 times/week, 3-4 times/week and more than 5 times/week.

Section 3: Evaluation of Severity, life threatening, and cause of insomnia (Smyth, 1999).

3.1 The evaluation of insomnia severity and level of life threat comprised 5 questions involving severity, life threat, working impact, and interpersonal relationship impact. The answers were rated at the levels of: little or none, moderate, much and very much.

3.2 The evaluation of the frequently disturbing causes of insomnia included 15 possible origins. This assessment was used to verify the sleep disturbances creating insomnia in most patients and comprised the following physical symptoms in Items 1-5: fever, cough, dyspnea, muscle cramps; psychological discomforts in Items 6-10: stress, anxiety, nightmares and environmental disturbances in Items 11-15: light, noise, high/low temperatures. The questions asked patients about the frequency of those disturbances, and the answers were rated as never, 1-2 times/week, 3-4 times/week, 5 times or more/week.

Section 4: The insomnia response questionnaire comprised 10 items on the physical, psychological and emotional responses to insomnia according to the literature review and categorized as physical responses in Items 1-4; psychological/emotional responses in Items 5-7; and behavioral responses in Items 8-10. This section inquired about the frequency of responses, and the answers were rated as never, 1-2 times/week, 3-4 times/week, 5 times or more/week.

Part 3: Insomnia management strategies questionnaire

The instrument was established by the researcher based on the literature review and related to all activities of self-care that patients took part in to manage insomnia by categorizing behavioral adjustments, psychological/relaxation techniques and environmental management to promote good sleep. The answers were categorized as yes = practice activity: If the patients have many activities when experiencing and no= never practice. It composed of 15 items of possible strategies.

6 items (Items 1-6) about promoting sleep behavior e.g. regular bedtime, no caffeine drinks, etc.

4 items (Items 7-10) about psychological techniques e.g. meditation, reading books, listening to light music, etc.

5 items (Items 11-15) about environmental management e.g. clean bed accessories, proper light arrangement, etc.

This part asked effective of each activity to insomnia, the answer related to an activity contain 4 levels: mostly effective, moderately effective, mildly effective and ineffective to management insomnia. All questions applied a four-level scale as follows:

Ineffective = 0 score meant that no difference in the insomnia after practice management strategy.

Mildly effective = 1 score meant that after patients practice management strategy, it was mildly effective to insomnia.

Moderately effective = 2 score meant that after patients practice management strategy, it was moderately effective to insomnia.

Mostly effective = 3 score meant that after patients practice management strategy, it was mostly effective to insomnia.

Part 4: Insomnia outcomes questionnaire

This instrument was established by the researcher based on the literature review. The questionnaire composed of 10 items involved with perception and evaluation of patients regarding post management of insomnia. Question 1 was about insomnia status. Questions 2-4 were related to self-care ability. Questions 5-7 and Questions 8-10 were about functional status and emotional status, respectively. All questions applied a four-level scale as follows:

Disagree = 0 score meant that the statement does not coincides with the cognition/feeling.

Less agree = 1 score meant that the statement rarely coincides with the cognition/feeling.

Partially agree = 2 score meant that the statement partially coincides with the cognition/feeling.

Fully agree = 3 score meant that the statement coincides with the cognition/feeling very much.

The total insomnia outcomes were calculated by summing all of the 10 items. The potential range of scores was from a minimum of 0 to a maximum of 30. The mean score and standard deviation could be interpreted into 4 levels of insomnia outcomes as follows:

Mean	Interpretation of insomnia outcomes
0	No difference in the insomnia/status
0.01 – 1.49	Minimally decrease of the insomnia/status
1.50 – 2.49	Moderately decrease of the insomnia/status
2.50 – 3.00	Mostly decrease of the insomnia/status

Validity and Reliability of the Instruments

Validity

The assessment of the instruments for gathering data, particularly the questionnaires, were initially submitted to 5 experts comprising one nephrologist, two expert nurses with more than 5 years' experience working with hemodialysis patients, and two nursing instructors who examined them for content validity. The suggestions from these five experts were incorporated into the final revisions of the questionnaires.

Reliability

The revised questionnaires were initially tried out on 30 hemodialysis patients who had similar characteristics to the sample and tested for their reliabilities by using Cronbach's alpha Coefficient.

Results of the reliability of the questionnaires on insomnia outcomes = 0.74

Data collection

All data were collected by the researcher by the following procedures:

1. Prior to the data collection, permission for collecting data was obtained from the Ethical Clearance Committee on Human Rights Related to Human Experimentation of Mahidol University. After permission was granted, letters were

sent to the head nurses of the Hemodialysis Unit of the Kidney Foundation of Thailand by Faculty of Graduate Studies, Mahidol University.

2. The research objectives and details of the data collection were presented to the head nurses of the hemodialysis unit in order to obtain cooperation in data collection. After obtaining approval, data collection was conducted daily from 6:00 a.m. - 6:00 p.m., except on Wednesdays.

3. The patients were approached and assessed in order to gain their agreement to participate in the study while they were either awaiting or receiving hemodialysis, which offered a good opportunity to talk with the patients. The researcher introduced herself, provided an explanation about consent for participation, including the purpose of the study, assurance of confidentiality and freedom to withdraw from the study at any time without affecting the treatments that they received in any way whatsoever.

4. The patients who participated were interviewed to complete the questionnaires for about 20-30 minutes, respectively.

5. After finishing the interview, the researcher thanked the subjects for their participation.

6. The researcher then prepared all the completed questionnaires for data analysis.

Protection of Human Subjects

This research was approved by the Ethical Committee on Human Rights Related to Human Experimentation of Mahidol University. Before collecting the data, potential participants were informed about the purposes of the study and their right to refuse to participate or to withdraw from the study at any time. They were ensured that their names would not be attached to the data, but a code number would be used instead. All participants were informed that data would be kept confidential and that the results of this study would be presented in group form, not individually. There was no negative effect of the study on the subjects other than inconvenience because they were asked to take approximately 20-30 minutes of their time to answer questionnaires. If the potential participants decided to be in the study, they were asked to sign an informed consent form (Appendix D).

Data Analysis

Data were analyzed by using statistical software as follows:

1. Frequency distribution percentage, and range were used to analyze the demographics, clinical characteristics, insomnia experience and management strategies of hemodialysis patients.

2. Mean and standard deviation were used to analyze the data from the insomnia experience questionnaire and the insomnia outcomes questionnaire.

3. Multiple regression analysis by enter equation was used to determine the predictive power of gender, age, education level, monthly income, duration of hemodialysis and frequency of hemodialysis on the insomnia outcomes of CKD patients undergoing hemodialysis.

Multiple regression analysis was used to test the effects of two or more independent variables on the dependent variable in levels of an interval scale. The independent variables in the nominal scale had to change to dummy variables before the analyses of this study could be performed (Polit & Hunger, 1999). Thus, gender was dummy that by male as 0 and female as 1.

CHAPTER IV

RESULTS

The descriptive research was conducted to study the insomnia experience, insomnia management strategies, and insomnia outcomes. It also explained the predictive power between demographic factors including gender, age, education level, monthly income, duration of hemodialysis, and frequency of hemodialysis on insomnia outcomes. The subjects were 100 ESRD patients undergoing hemodialysis at the Hemodialysis Unit of The Kidney Foundation of Thailand at Galyanivadhana Building, The Priest's Hospital. The data were analyzed and presented in this chapter as follows:

Part I : Demographic data.

1. Personal data of the participants (Table 2 - 3)
2. Clinical data of the participants (Table 4 - 5)

Part II : Insomnia experiences.

1. Sleep pattern (Table 6)
2. Insomnia perception (Table 7)
3. Insomnia evaluation (Table 8 - 9)
4. Insomnia response (Table 10)

Part III : Insomnia management strategies and effectiveness. (Table 11)

Part IV : Insomnia outcomes. (Table 12)

Part V : The Pearson Product's Moment Correlation Coefficients among the study variables. (Table 13)

Part VI : Predictors influencing insomnia in ESRD patients undergoing hemodialysis. (Table 14)

Part I : Demographic data**Table 2** Number and percentage of the participants classified by personal data; gender, age, religion, marital status, education level, and living status (n = 100).

Personal Data	Frequency	Percentage
Gender		
Male	54	54
Female	46	46
Age (years) Range 20-70 years, Mean = 44.76, S.D. = 11.76		
20-39	30	30
40-59	58	58
60-70	12	12
Religion		
Buddhism	96	96
Islam	3	3
Christianity	1	1
Marital status		
Married	50	50
Single	31	31
Widowed/Divorced/Separated	19	19
Educational level		
Uneducated	2	2
Primary school	36	36
Secondary school	16	16
High school/occupational school	25	25
Diploma/Certificate	8	8
Bachelor degree and above	13	13
Living Status		
With family	87	87
With relatives	8	8
Living alone	5	5

According to Table 2, the participants were male 54% and female 46%. More than half of them (58%) were between 40-59 years old. The majority of the participants (96%) were Buddhist and half of them (50%) were married. The educational level of the participants was primary school 36%. Most of the participants (87%) lived with their family.

Table 3 Number and percentage of the participants classified by personal data; occupation, monthly income, sufficiency of income, and source of hospital financial support for hemodialysis (n = 100).

Personal Data	Frequency	Percentage
Occupation		
Unemployed	25	25
Employee	55	55
Agriculturist	2	2
Trader	18	18
Monthly Income(Baht/month)		
0 – 5,000	27	27
5,001 – 10,000	42	42
10,001 – 15,000	20	20
More than15,000	11	11
Sufficiency of Income		
Insufficient	70	70
Sufficient with no savings	29	29
Sufficient with savings	1	1
Source of hospital financial support for hemodialysis		
Own expense	74	74
Social Security	23	23
Reimbursement from the government	3	3

According to Table 3, it was illustrated that more than half of the participants (55%) were employee. Almost half of the subjects (42%) had monthly income ranged from 5,001 to 10,000 baht. Most of them (70%) believed they had insufficient income and own expense for hemodialysis (74%).

Table 4 Number and percentage of the participants classified by clinical data; duration of hemodialysis, frequency of hemodialysis, adequacy of hemodialysis (Kt/v), and complication of hemodialysis. (n=100)

Clinical Data	Frequency	Percentage
Duration of hemodialysis (years)		
3 months - 1 year	3	3
1 – 5	31	31
6 – 10	45	45
11 – 15	17	17
> 15	4	4
Frequency of hemodialysis		
2 times per week	50	50
3 times per week	50	50
Adequacy of Hemodialysis (Kt/v)		
1.2 – 1.8	44	44
More than 1.8	56	56
Complication of hemodialysis (some subjects had more than one complication)		
Muscle cramp	77	77
Restless leg syndrome	6	6
Pruritus	51	51
Nausea/Vomiting	52	52
Hypotension	50	50

According to Table 4, the participants had received hemodialysis treatment from 6 to 10 years (45%) with 2 times or 3 times of hemodialysis per week (50% equally). All of the them had adequacy of hemodialysis Kt/v range from 1.2-1.8 and more than 1.8 (100%). In this sample, muscle cramp was the most frequency complication of hemodialysis (77%).

Table 5 Number and percentage of the participants classified by clinical data; hematocrit, hemoglobin level, and comorbid disease. (n=100)

Clinical Data	Frequency	Percentage
Hematocrit		
Man		
0.0 - 41.9% (Low)	49	90.7
42.0 - 52.0% (Normal)	5	9.3
Woman		
0.0 - 36.9% (Low)	44	95.7
37.0 - 47.0% (Normal)	2	4.3
Hemoglobin		
Man		
0.0 - 13.4 g/dL (Low)	48	88.9
13.5 - 18.0 g/dL (Normal)	6	11.1
Woman		
0.0 - 12.4 g/dL (Low)	44	95.7
12.5 - 16.0 g/dL (Normal)	2	4.3
Comorbid disease		
No	6	6
Yes	94	94
HT	70	70
DM	1	1
HT&DM	14	14
Other	9	9

According to Table 5, most of the participants presented the hematocrit in low levels (man 90.7%, woman 95.7%) and hemoglobin in low levels (man 88.9%, woman 95.7%). In addition, most of them had comorbid diseases (94%) such as DM and HT.

Part II : Insomnia experience**1. Sleep pattern**

According to Table 6, almost half of the participants (49%) had the bedtime at 8.00 p.m. – 10.59 p.m.. Most of them (64%) started the awakening time at 05.00 a.m.- 07.59 a.m.. Nearly half of the participants (44%) had sleep latency of 15-30 minutes, presented they had little insomnia. The participants (46%) claimed to have 5-6 hours of sleep duration a night, that indicated they had moderate insomnia. Most of the participants (63%) had habitual sleep efficiency or percentage of sleep duration hours toward time in bed between 65-74.99%. 80% of the participants had fairly bad sleep quality. This interpreted insomnia in the participants of this study as moderate level.

Table 6 Number and percentage of the participants classified by sleep pattern involved with bedtime, waking-time, sleep latency, sleep duration, habitual sleep efficiency and subjective sleep quality (n=100).

Sleep Pattern	Percentage	Interpretation of insomnia
Bedtime		
05.00 – 07.59 p.m.	7	-
08.00 – 10.59 p.m.	49	-
11.00 p.m. or later	44	-
Waking-time		
12.00 p.m. – 04.59a.m.	29	-
05.00 - 07.59a.m.	64	-
08.00a.m. or later	7	-
Sleep latency		
Less than 15 minutes	0	No
15 – 30 minutes	44	Little
31 – 60 minutes	34	Moderate
More than 60 minutes	22	Much
Sleep Duration		
More than 7 hours	0	No
6 hours – 7 hours	33	Little
5 - 6 hours	46	Moderate
Less than 5 hours	21	Much
Habituals sleep efficiency		
More than 85 %	0	No
75 – 85 %	6	Little
65 – 74.99 %	63	Moderate
Less than 65 %	31	Much
Subjective sleep quality		
Very good	0	No
Fairly good	0	Little
Fairly bad	80	Moderate
Very bad	20	Much

2. Insomnia perception.

Table 7 Percentage and frequency of ESRD patients undergoing hemodialysis according to perception of insomnia (n=100).

Statement	% of patients	Frequency times per week		
		1-2 times	3-4 times	5 times/over
Perception of insomnia (some subjects had more than one perception)				
1. Difficulty falling asleep/long time of sleep latency	78	33	29	16
2. Feeling of no deep sleep	77	38	34	5
3. Nocturnal awakening and difficulty falling asleep	81	34	33	14
4. Cheerless in the morning	96	45	42	9
5. Feeling of inadequate sleep / fatigue	97	27	59	11

According to Table 7, it was illustrated that the perception of insomnia most frequently found in the participants was inadequate sleep or fatigue (97%) and occurred 3-4 times per week (59%). The second was cheerless in the morning, awakening during the night and difficult to go back to sleep, difficulty falling asleep and no deep sleep at 96%, 91%, 78% and 77%, respectively.

3. Insomnia evaluation

3.1 Evaluation of severity

Table 8 Percentage and level of severity and impact of insomnia evaluated by ESRD patients undergoing hemodialysis (n=100).

Statement	% of patients	% of level of evaluation			
		little	moderate	much	very much
Severity and impact of insomnia					
1. Severity	100	15	64	19	2
2. Suffering	100	14	62	24	0
3. Daily living impact	100	11	57	32	0
4. Working impact	100	21	44	35	0
5. Interpersonal relationship impact	100	16	65	19	0

According to Table 8, it was found that 2% of the participants evaluated the severity in the very much level and they also reported that the working impact and daily living impact from insomnia in much level at 35% and 32%, respectively. However, most of the participants evaluated severity, suffering from insomnia and life daily living impact, working impact, and interpersonal relationship impact in the moderate level as 64%, 62%, 57%, 44% and 65%, respectively.

3.2 Evaluation causes of insomnia

Table 9 Percentage and frequency of ESRD patients undergoing hemodialysis who evaluated causes of insomnia classified by physical symptom, psychological and environmental causes of insomnia (n=100).

Causes of insomnia	% of patients	Frequency times per week		
		1-2 times	3-4 times	5 times/over
Physical symptom				
Fever	12	12	0	0
Cough	19	17	2	0
Shortness of breath/dyspnea	55	48	7	0
Restless Legs/ muscle cramp	22	19	3	0
Drinking tea/coffee	20	16	3	1
Psychological				
Stress	90	45	31	14
Anxiety	93	31	40	22
Discouragement	84	46	33	5
Nightmare	39	36	2	1
Feeling family burden	81	33	26	22
Environment				
Hot or cold bedroom	53	21	32	0
Noise	16	10	6	0
Light	36	26	10	0
Bad smell	6	6	0	0
Insects	42	35	7	0

According to Table 9, it was illustrated that more than half of the participants (55%) evaluated that physical causes of insomnia was shortness of breath and/or dyspnea and occurred 1-2 times per week (48%). For the psychological causes of insomnia was anxiety (93%) and occurred 3-4 times per week (40%), followed by stress (90%) and occurred 1-2 times per week (45%). The environment causes of insomnia was hot or cold bedroom (53%) and occurred 3-4 times per week (32%).

4. Insomnia responses

Table 10 Percentage and frequency of the ESRD patients undergoing hemodialysis classified by physical, psychological/emotional and behavioral response toward the insomnia (n=100).

Insomnia response	% patients of response	Frequency times per week		
		1-2 times	3-4 times	5 times/over
Physical				
Headache/dizziness	69	45	19	5
Nausea	26	23	3	0
Exhausted	84	44	40	3
Sleepiness/yawning and naps	96	41	49	6
Psychological / Emotion				
Irritation/frustration	82	45	35	2
Discouragement	53	34	16	3
Stress and/or anxiety	93	42	41	16
Behavioral				
Less endurance and more boredom	76	51	23	2
Inert, no enthusiasm	85	58	27	0
Decrease ability to work	85	63	21	1

According to Table 10, it was illustrated that the participants reported that physical, psychological/emotion and behavioral response toward the insomnia were mostly sleepiness, yawning and naps at 96%. The following was stress or anxiety, inert or less enthusiasm, and decrease ability to work at 93%, 85%, and 85%, respectively. Almost of these occurred in 1-2 times per week.

Part III : Insomnia management strategies and effectiveness.**Table 11** Percent of ESRD patients undergoing hemodialysis who practiced insomnia management strategies and % of patients rate effectiveness to insomnia by strategies.

Management strategies	% of patients	Effectiveness of each strategy			
		Most	Moderate	Mild	Not at all
Sleep promoting behavior					
1. Regular bedtime and waking up time	47	2	4	38	3
2. No daytime naps	34	2	11	19	2
3. If unable to fall asleep, go to do something until drowsy	27	0	1	24	2
4. Avoid caffeine drink	45	0	3	29	13
5. Drinking warm drink before bedtime	4	0	0	2	2
6. Regular physical exercise	42	1	22	19	0
Relaxing technique					
1. Meditation/praying before sleep	58	3	39	15	1
2. Reading a book before sleep	36	5	16	15	0
3. Body massage	24	0	12	11	1
4. Listening to soft music before sleep	27	0	12	15	0
Environmental management					
1. Clean bed accessories	94	0	10	84	0
2. Proper bedroom noise	11	0	2	9	0
3. Proper bedroom ventilation	68	0	5	62	1
4. Proper bedroom temperature	55	0	4	51	0
Using medication	17	1	10	6	0

According to Table 11, it was illustrated that the participants reported the sleep promoting behavior strategy was having regular bedtime and wake up time (47%) in which they reported the effectiveness to insomnia at mild level (38%). The relaxing technique strategy was meditation or praying before sleep (58%) in which they reported the effectiveness to insomnia at moderate level (39%). The environmental management strategy of cleaning bed accessories was the most (94%) in which they reported the effectiveness to insomnia at mild level (84%).

Part IV : Insomnia outcomes**Table 12** Mean, standard deviation and interpretation of insomnia outcomes of ESRD patients undergoing hemodialysis (n = 100).

Insomnia outcomes	Mean	S.D.	Result
Insomnia status			
Morning awakening energetic/freshness	2.17	0.55	Moderate
Self-care ability			
Self-care activities	2.91	0.28	Most
Housework	2.24	0.69	Moderate
Exercise/playing sport	1.51	0.73	Moderate
Functional status			
Work with another	1.97	0.59	Moderate
Participation in family activities	2.06	0.63	Moderate
Concentration to talk	2.16	0.50	Moderate
Emotional status			
Cheerful/fresh	1.89	0.61	Moderate
Relaxing/ not tense	1.88	0.53	Moderate
Concious/ calm	2.08	0.39	Moderate
Overall	2.08	0.30	Moderate

According to Table 12, it was demonstrated that the mean of the overall insomnia outcomes was at the moderate level (Mean = 2.08, S.D. = 0.30). The mean of self-care activities was the highest score, which was in the most level (Mean = 2.91, S.D. = 0.28). The means of other outcomes, including insomnia status, functional status, and emotional status were at the moderate level.

Part V : The Pearson Product' s Moment Correlation Coefficients among the study variables.

Table 13 Minimum, maximum, mean, standard deviation, and Pearson's Product Moment Correlation Coefficient of the study variables (n=100)

Factors	1	2	3	4	5	6	7
1. Gender	-						
2. Age	-.170 ^{ns}	-					
3. Education	.189 ^{ns}	-.427**	-				
4. Income	.211*	.148 ^{ns}	.067 ^{ns}	-			
5. Duration of HD	.044 ^{ns}	.209*	-.086 ^{ns}	.061 ^{ns}	-		
6. Frequency of HD	.040 ^{ns}	.385**	-.028 ^{ns}	.138 ^{ns}	.250*	-	
7. Insomnia outcome	.142 ^{ns}	-.201*	.305**	.170 ^{ns}	-.005 ^{ns}	.191 ^{ns}	-
Minimum	-	20	0	0	8	2	1.4
Maximum	-	70	16	25,000	210	3	2.7
Mean	-	44.76	9.21	8,876	87.44	-	2.08
Standard deviation	-	11.74	4.328	5765.47	48.04	-	0.30

*p < .05, **p < .01, ^{ns} p > .05

According to Table 13, it was demonstrated that age of the subjects ranged from 20 to 70 years (Mean = 44.76, S.D. = 11.74). The subjects education was 0 to 16 years (Mean = 9.21, S.D. = 4.328), monthly income was between 0 to 25,000 baht per month (Mean = 8,876, S.D. = 5765.47). Duration of hemodialysis was 8 to 210 months (Mean = 87.44, S.D. = 48.04) and scores of insomnia outcomes ranged from 1.4 to 2.7 (Mean = 2.08, S.D. = 0.30).

This table showed the relationship of education level and insomnia outcome was significantly positive (r = 0.305, p < 0.01) and age was significantly negative (r = -0.201, p < 0.05) with insomnia outcome.

In addition, age and education level were significantly negative ($r = -0.427$, $p < 0.01$) and gender was significantly positive ($r = 0.211$, $p < 0.05$) with income. Duration of hemodialysis was significantly positive ($r = 0.209$, $p < 0.05$) with age. Age and duration of hemodialysis were significantly positive ($r = 0.385$, $p < 0.01$ and $r = 0.250$, $p < 0.05$) with frequency of hemodialysis.

Part VI : Predictors influencing insomnia in ESRD patient undergoing hemodialysis

Table 14 Multiple Regression Analysis by enter equation among independent variables (predictors) gender, age, education level, monthly income, duration of hemodialysis, and frequency of hemodialysis on insomnia outcomes (n=100).

Factors	R	R²	F Change	b	Beta	t
Gender				.013	.023	.236 ^{ns}
Age				-.107	-.235	-2.010*
Education level				.039	.196	1.846 ^{ns}
Monthly income				.045	.150	1.532 ^{ns}
Duration of HD				-.004	-.017	-.176 ^{ns}
Frequency of HD				.153	.270	2.566*
Total	.433	.187	3.575**			

* $p < .05$, ** $p < .01$, ^{ns} $p > .05$

According to Table 14, it was found that gender, age, education level, monthly income, duration of hemodialysis, and frequency of hemodialysis predicted for 18.7% of the variance of insomnia outcomes of ESRD patients undergoing hemodialysis ($p < 0.01$). However, the variables that have influencing on insomnia outcomes were age and frequency of hemodialysis.

CHAPTER V

DISCUSSION

The descriptive study was conducted to document descriptions of insomnia experience, management strategies, and insomnia outcomes in ESRD patients undergoing hemodialysis. It also explained the predictive power between demographic factors including gender, age, education level, monthly income, duration of hemodialysis, and frequency of hemodialysis on insomnia outcomes. In this chapter, the interpretation of the study findings are presented and discussed as follows:

Part 1: Insomnia experience of ESRD patients undergoing hemodialysis

In this study, it was found that the ESRD patients undergoing hemodialysis had moderate to much insomnia (Table 6). In normal adult sleep patterns, sleep latency takes 5-10 minutes (should have less than 30 minutes) from going to bed (turn off the light, lay down and close the eyes) to falling asleep and the total amount of sleep required per night is approximately 7-8 hours per night and habitual sleep efficiency should be over 85% (Backhaus, et al., 2002; Buysse, et al., 1989). Furthermore considering the physiology of sleep associated with the circadian rhythm of sleep and wakefulness, the proper time of melatonin production of human adult that motivated the sleep mechanism was 9:00 p.m.-10:00 p.m. (Kowittarapong, 2002). In this study, 49% of the patients reported that they went to bed around 08:00-10:59 p.m., 44% of them went to bed around 11:00 p.m. or later, and 64% woke up around 05:00-07:59 a.m. Almost half of the patients (44%) had the sleep latency 15-30 minutes, 34% of the samples had the sleep latency 31-60 minutes and 22% of them had the sleep latency more than 60 minutes. Forty-six percent of the patients reported that they had actual sleep duration of 5-6 hours a night. Sixty-three percent of them had habitual sleep efficiency or percentage of sleep duration compared with time in bed at 65-74.99%. Almost of them (75%) had employment, they worked during the day and rested at night, their daily life was to finish work in the evening. Some of

patients went to hemodialysis in the evening and finished around 10:00 to 10:30 p.m., they spent time to travelling. This could be a reason for they went to bed too late and had sleep duration of 5-6 hours a night. This finding was consistent with the finding reported by Iliescu, Yeastes and Holland (2004). They reported that most CKD patients had the sleep latency between 31-60 minutes and sleep duration of 5-6 hours a night. In addition, most sleep quality by the self-assessment of patients in this study was a fairly bad level (80%) and was very bad level (20%). This demonstrated that most patients had fairly bad sleep quantity and very bad sleep quality. Poor sleep quality and quantity generated insomnia (Reimer, 2000).

In table 7, the ESRD patients undergoing hemodialysis had the perception of insomnia in all characteristics. The insomnia in the perception of most samples (97%) was inadequate sleep after morning awakening and fatigue, occurred in 3-4 times per week. The other perceptions of insomnia included feeling of being cheerless in the morning, awakening during the night and taking a long time to go back to sleep, difficulty falling asleep and no deep sleep with the percentage of 96, 81, 78, and 77, respectively. Other studies associated with sleep problems in the CKD patients declared that most subjects reported insomnia. Sleep difficulty was the most. The next were no deep sleep, awakening with difficulty in falling asleep once again, early morning wakefulness, and excessive daytime sleepiness (Iliescu, Yeates & Holland, 2004; Merlino, et. al., 2006; Noda, et. al., 2006). The perception of insomnia of the sample in this study can be defined by individual perception on sleep quality as proper sleep was the sleep that made those people feel fresh after awakening, sufficient sleep and full energy to work all day. Following physiological explanation, the sleep cycle would begin with the 1st, 2nd, 3rd and 4th continuous phases of NREM sleep followed by the 3rd and 2nd of NREM sleep and REM sleep and then the phase 2, 3 and 4 of NREM sleep were constantly followed as well as a cycle if no awakening interrupted (Landis, 2002). The mean of sleep duration should be 7-8 hours or 4-5 sleep cycles a night. The patients who had long sleep latency might be late at the beginning of stage of sleep and have an incomplete sleep cycle when awakening (Spiegel, et. al., 1999). Particularly the final period of sleep (4th or 5th sleep cycle) was the period of longer REM sleep than NREM sleep that had the effects on emotions, learning, memory and adaptation, and made the patients feel dizzy and inert with unstable emotions and

behavior (Closs, 1999; Taylor, et. al., 2001). Awakening in the middle of the night or at the beginning of the sleep or at NREM sleep made people need to always start with the 1st phase of NREM sleep of sleep cycle (Shneerson, 2000). Hence, many times of awakening during the night and difficulty to go back to sleep were the guards of deep sleep so the feeling after morning awakening would seem like having no sleep at night (Berger & Williams, 1999), fatigue, cheerless and having decreased ability of daytime performance (Kupfer, 1999).

Insomnia evaluation, the samples evaluated insomnia severity at the moderate level score as 64% (Table8). It could explain that most of the patients reported that sleep latency over 31 minutes, their prolonged awakening time at night, and torture of difficult to sleep leading to have duration of sleep less than 6 hours a night. According to the study of Nepor and Rault (1992), on the hemodialysis patients reported that the patients had severe insomnia and had sleep duration 5.5 hours a night. They also reported that the suffering from insomnia, daily living impact, working impact and interpersonal relationship impact were in moderate level at 62%, 57%, 44%, and 65%, respectively. It can be explained that a cheerless feeling after awakening and feeling inadequate sleep made them unable to do effective performance (Intaraphoka, 1999). The limitations resulting from illness made them decrease in social life. Some patients stated that after they received hemodialysis therapy, they often have financial problem. They mostly spent time with hemodialysis and had no time to socialize with their friends.

According to the evaluation of the causes of insomnia, the population of this study indicated causes of insomnia (Table 9). In physical aspects; shortness of breath or dyspnea was found in 55% of the samples and occurred 1-2 times per week (48%). According to the study of Mendelson and colleagues (1990) on the hemodialysis patients, the results showed that episodes of insomnia had a correlation with sleep dyspnea. Similarly to the study of Merlino and colleagues (2006) who stated that dyspnea was a cause of insomnia in ESRD patients undergoing dialysis therapy at 24.9%. Besides insomnia from dyspnea, the sample might have fear and anxiety. According to the psychological aspects, stress and anxiety were the most common disturbance of sleep at 90% and 93%, respectively. In this study, the patients said that they had at least one cause of stress or anxiety. The causes included disease, financial,

family and social interaction. Consistently, Peterson and Kimmel (1990) found that the ESRD patients undergoing hemodialysis mostly spent time with the hemodialysis, they had no time to socialized with their friends or relatives. The patients and their family had burdened a financial matter for hemodialysis, approximately 20,000-30,000 baht per month for a long time (Jittinan, 2002; Napatorn, 1999). The ESRD patients felt dependent, afraid of death, and had less control their life (Orprasert, 1994). The stress or anxiety aroused the function of sympathetic nervous system to release catecholamine, glucagons, and cortisol-steroid hormones influencing the central nervous system leading to restless, frustration, rapid breathing, hypertension and high muscular tension (Greene, 1997). Those also stimulated the function of reticular activating system (RAS) that guarded all phases of sleep cycle, increased sleep latency and decreased sleep efficiency including raised numbers of awakening during the night (Robbins, et al., 2004). According to the environment aspects, the sample reported that the environment disturbance as hot or cold bedroom (53%). Too high or too low temperature affects sleep because circadian rhythm is associated with temperature. A slight change in temperature may disturb sleep cycles (Morgan & Jose Closs, 1999). An increase temperature during sleep causes rising body temperature, leading to decreased amounts of sleep in the NREM stage 3 and the REM stage, resulting in early awakening.

In insomnia responses, insomnia typically generated physical aspects of sleepiness, yawning, and naps (96%) and exhaustion (84%) in this sample (Table 10). Psychological aspects of more stress and anxiety, irritability, and behavioral aspects of inertness, no enthusiasm, and decrease ability to work at 93%, 82%, 85% and 85%, respectively. The studies of the sign and symptoms of older adults and maintenance dialysis patients of insomnia (Alapin, et al., 2000; Stepanski, et al., 2000; Unruh, et al., 2003) showed that the patients mostly complained of fatigue, decreased alertness, daytime drowsiness, frequent naps, irritability, tension, hyperarousal, depressed mood, impaired memory functioning, decreased ability to concentrate, social aversion, and disabilities in work and social life. Excessive daytime sleepiness was the initial response toward insomnia (Parker, et al., 2003) because substitute sleep was required when people had insufficient sleep. One hour of insomnia every night would accumulate and caused multiple excessive daytime sleepiness (Intaraphokha, 1999).

The causes of psychological and emotional response in the sample were prolonged sleep latency and short sleep duration at night or deficiency of REM sleep. There are psychological and neurological repair, the release of growth hormone and the decrease of metabolism and oxygenation during the REM sleep (Purves, et.al., 1997). Deficiency of REM sleep over 24-48 hours was reflected in changes of CNS functions, biochemistry changes, decrease of epinephrine, and acetylcholine (Closs, 1999) and this altered psychological and emotional aspects. The sample in this study showed the least physical aspects of nausea, headache, or dizziness response, because they woke up during the night and difficulty falling asleep or had less insufficient NREM sleep. The defect of NREM sleep led to the decrease of growth hormone, less physical repairing process, and higher metabolism. Deficiency of NREM sleep over 24 hours caused nausea, headache, fatigue and muscular weakness (Evan & French, 1995). Therefore, the sympathetic nervous system and other systems worked less during the sleep but more work of parasympathetic nervous system was the energy saving for activities during the day. Prolonged awakening referring to daytime plus night time was found in higher release of cortisol, glucagon and catecholamine that acted to convert nutrient to energy in cells (Purves, et.al., 1997). Insomnia in any NREM or REM sleep, and over production or over energy saving affected the samples feel fatigue, energy loss, and have ineffective performance.

Part 2: Insomnia management strategies

Management begins with assessment of the symptom experience from the individual's perspective. According to the findings of this study, ESRD patients undergoing hemodialysis integrated several strategies to alleviate insomnia symptoms including sleep promoting behavior, relaxing techniques, and environmental management strategies (Table 11).

In the area of sleep promoting behavior strategies, the strategies frequently used to promote the sleep included regular bedtime and waking up time (47%), avoidance of drinking tea or coffee (45%), and had regular exercise (42%) (Table 11). However, they indicated the effectiveness of these strategies to insomnia as mild to moderate level. According to the studies of Kahawong (1995) and Ramsiri (2000) on elderly peoples, the results showed that most sleep promoting behaviors in elderly

was the avoidance of alcohol drinking after dinner, and tea or coffee, sedatives, and no smoking. The patients had the regular physical exercise at 42%, which they reported the effectiveness of these strategies as moderate level. Exercise, particularly later in the day could promote the depth of sleep (increase stage 3 and 4 of sleep) and increase total sleep time. Moreover, exercise during daytime can make them feel more tired at bedtime (Edwards, 2003). The result was congruent with the findings from previous study in elderly adults (Li, et al., 2004), which indicated that exercise helps the elderly falling asleep more easily and having better sleep quality. In addition, Tantayothin (2004) found that the overall exercise of hypertensive patients was at fair level. Evening exercise or exercise at three hours before bedtime stimulates the autonomic nervous system to increasingly function during sleep latency. Doing something if unable to sleep until sleepiness was inconvenient because they did not want to disturb other roommates. The patients had management strategy no nap during the day at 34% because the patients were so tired from insomnia and during hemodialysis. They could not to do anything, therefore a nap was unavoidable (Intaraphoka, 1999; Parker, et al., 2003). Moreover, some patients in this study reported that taking naps during the day helped them to feel that their sleep can be compensated and they felt refreshing after napping.

In this study, it was found that common causes of insomnia were stress (90%) and anxiety (93%) from disease, treatments, complications, and financial. With regard to relaxation technique strategies for alleviating insomnia, meditation or praying before sleep were the methods most frequently used by patients in this study and the second was reading a book as 58% and 36%, respectively. They reported the effectiveness of these strategies to alleviate insomnia as moderate level. Meditation and praying are usually a bedtime for Buddhists. Physiological changes during meditation are a particular electro-encephalographic pattern characterized as a relaxed state and a slowed heart rate (Canter, 2003). Therefore, the state of relaxation facilitates sleep. In addition, praying in a bedtime routine that may promote sleep by relaxing or establish a pleasant feeling at bedtime (Floyd, 1999). Most of the patients reported they felt that the meditation and Buddhist prayer before bedtime was easy to practice and it's effective. It can calm down the mind, improve concentration, and sleeping. Relaxation techniques were used in a variety ways. According to the study

of Ancoli-Israel and Roth (1999) who reported that adult insomniacs used mental relaxation and reading for helping them to sleep. Similar results were found in a study by Ramsiri (2000). The results showed that meditation and praying before sleep were successful particularly in elders. Music increases the level of sleepiness, decreases sleep onset latency, and decreases number of nighttime awakening (Johnson, 2003).

In the area of environmental management strategies, nearly all of the subjects (94%) clean bed accessories, proper bedroom ventilation and temperature which they rated as a mild to moderate effective strategies. The strategy of eliminating noise disturbance was not under the control of the samples because it was an extrinsic factor that was hard to change e.g. noise from neighborhood (Ramsiri, 2000). Under conditions of too high or too low bedroom temperature, the results in frequent mid sleep arousal, decreased slow wave sleep and REM. In the high room temperature, people move in bed more frequently, which causes them to wake up during a night (Satinoff, 1993). The optimum temperature for sleep in Thailand was between 25 to 30 degree Celsius (Wongthida, 2006). Similar to the study of Kahawong (1995) in elderly peoples indicated that the management of no light disturbance and proper room temperature are the elimination of disturbances and discomfort motivating good sleep.

Part 3: Insomnia outcomes

According to the revised symptom management model (Dodd, et al., 2001) Outcomes emerge from symptom management strategies as well as from the symptom experience. In this study, (Table 12), the outcome dimension is focused on symptom status, emotional status, self-care ability and functional status. The results of the study were as follows:

In insomnia status, the study revealed that the ESRD patients undergoing hemodialysis had the score in this dimension at moderate level (Mean=2.17, S.D.=0.55). This meant that insomnia was decrease in moderate level. The patients could wakening in the morning with energetic and freshness. For self-care ability, the result showed that the patients had most level in self-care activities (Mean=2.91, S.D.=0.28). That meant the insomnia was decrease in the most level. The ESRD patients had adequacy of hemodialysis and continuous treatment to reduce waste

product retention. Consequently, ESRD patients can have most likely normal lifestyle that showed much ability of self-care. Consistently with the study of Jaibea (1999) who conducted the study on self-care of 41 patients with chronic kidney disease. The results showed that the samples had high ability of self-care in all aspects. In this study, the means of perform housework and exercise were at moderate level (Mean=2.24, S.D.=0.69; Mean=1.51, S.D.=0.73), respectively. The patients had received hemodialysis for a long time and stated that they were feeling weak and wanted to rest after hemodialysis. They knew the limitations of activity from disease such as anemia and fatigue. So they were carefully about physical activity or exercise. Some of the subjects stated that sometime they avoided physical activity or exercise because they lacked of information about frequency and the level of activity that could endurance. Similar result was found in the study of Petchrung (2004) who reported that 62.3% of the hemodialysis patients applied exercise for alleviate fatigue and it's effectiveness at moderate level. For functional status, in item of "can work with another", "participate with families activities", and "concentrate to talk with another" were at moderate level (Mean=1.97, S.D.=0.59; Mean=2.06, S.D.=0.63; Mean=2.16, S.D.=0.50) respectively. This meant that the insomnia was decrease in moderate level. In this study, 75% of the patients were employed, so they had a relationship with their friends or other people in the society or in the family to exchange their opinion and share their feeling. In addition, they spent amount of time in dialysis unit for long time, that made them had a chance to make a relationship with other people such as nurses, physicians and peers. The study by Habkonglek (2000) revealed that CRF patients with CAPD had excellent interpersonal relationship. This incongruence with the finding of Jaibea (2000) who found that 85.4% of ESRD patients never joined in social activities and others. According to the emotional status, the finding revealed that the subjects had a moderate level in insomnia outcomes. The means score of feeling freshness, relaxing, and consciousness or calmness were at moderate level (Mean=1.89, S.D.=0.61; Mean=1.88, S.D.=0.53; Mean=2.08, S.D.=0.39), respectively. In this study, stress and anxiety had the frequently causes of insomnia at 90% and 93%, respectively (Table 9). The results of this study agreed with Holly and colleagues (1992) who found that anxiety and stress are commonly related to insomnia in hemodialysis patients. In this study, anxiety and stress had the

frequently causes of insomnia. The hemodialysis patients, who requiring long-term hemodialysis are often concern about the unpredictability of the illness and the disruption of their lives. They often have financial problem, difficulty holding a job, the burden that they bring to their family, depression from being chronically ill, and fear of dying.

Part 4: The predictive power between gender, age, education level, monthly income, duration of hemodialysis, and frequency of hemodialysis and insomnia outcome of ESRD patients undergoing hemodialysis.

The results of this study showed that gender, age, education level, monthly income, duration of hemodialysis and frequency of hemodialysis could predict 18.7% ($p < .01$) of the variance of insomnia outcome of ESRD patients undergoing hemodialysis. The variables influencing on insomnia outcome were age and frequency of hemodialysis. The results can be explained as follows:

Age: In this study, age was the factor that had a negative relationship with insomnia outcome ($r = -.201$, $p < .05$) (Table13). Moreover, age was a significant variable that could predict insomnia outcome in ESRD patients undergoing hemodialysis ($t = -2.010$, $p < .05$) (Table14). This meant that the older ESRD patients undergoing hemodialysis should have worse insomnia outcome and the younger patients should have better insomnia outcome. In this study, it was found that 58% of the patients were between 40 to 59 years old (mean = 44.76, S.D. = 11.76) (Table2). Age has been shown to be an important risk factor for insomnia in many studies. According to the study of Mallon and Hetta (1997), the results showed that the prevalent of sleep complaints in elderly were difficulty to maintaining sleep, early morning awakening or difficulty to falling asleep. In the Thai population, it has been found that older age was still related to insomnia symptoms (Sukying and Nilchaigovit, 1997). Increased age is correlated with increased severe sleep disorders, decreased deep sleep periods and increased daytime napping (Lankford, 1994). Similarly, Han and colleagues (2002) found that age was a risk factor for insomnia of diabetic hemodialysis patients. In addition, the study of Merlino and colleagues (2006) the result showed that age could predict the sleep disorder of hemodialysis

patients. In this study, age was a significant variable influencing on insomnia outcome in ESRD patients undergoing hemodialysis.

Frequency of hemodialysis: This study found that frequency of hemodialysis was not statistically significant correlated with insomnia outcome ($r = .191, p > .05$) (Table 13). However, it was found that frequency of hemodialysis was a significant variable that could predict insomnia outcome in ESRD patients undergoing hemodialysis ($t = 2.566, p < .05$) (Table14). It is possible that there was no distribution of the data. The patients in this study had received hemodialysis treatment as two or three times per week (Table4). Thus, statistically, the relationship of frequency of hemodialysis and insomnia outcome was not clear. In addition, age was a significant variable influencing insomnia outcome. Frequency of hemodialysis also was significantly positive with age ($r = .385, p < .01$) (Table13), which resulted in enhancing influence of frequency of hemodialysis on insomnia outcome. Therefore, frequency of hemodialysis could predict insomnia outcome at statistically significant level of .05 as showed in table 14. Although, the patients had received hemodialysis treatment as two or three times per week but all of them had adequacy of hemodialysis ($kt/v > 1.2$) (Table4), that decrease the waste retention in the body. Continuous and adequacy of hemodialysis assisted alleviating uremia. Thus, the patients can have most likely in normal lifestyle. Consequently, good physical health and good psychological health could alleviate insomnia. The results of this study are congruent with the study of Mendelson and colleagues (1989) who found that after dialysis there was enhanced slow wave sleep, decrease awakenings and improvement in regularly of REM-non-REM cycles. Similarly to the study of Perl, Unruh and Chan (2006) indicated that optimizing uremia control is associated with an improvement or correction of uremia associated sleep disorder. Thus, frequency of hemodialysis was a significant variable influencing on insomnia outcome in ESRD patients undergoing hemodialysis.

Education level had the positively significant relationship with insomnia outcome ($r=.305, p<.01$) (Table 13). This indicated that the ESRD patients undergoing hemodialysis with high education may be more likely to report better insomnia outcome than patients with lower education. It was similar to the study by Petchrung (2004) who reported that education level had positive correlation with

fatigue management strategies and fatigue outcome in hemodialysis patients at statistically significant level of .01. The patients with more years of education may have more skills to seek useful health information and to utilize facilities to promote their sleep. In addition, the patients had to be routinely hemodialysis twice or three times per week, so they had opportunities to received advice and information about health care from nurses and physicians. This was person to person teaching with easy language and suited for all level education. Moreover, they could learn from their insomnia experience and insomnia management strategies, and their effectiveness. In this study, it was found that education level could not significantly predict insomnia outcome in ESRD patients undergoing hemodialysis ($t = 1.846, p > 0.05$) (Table 14). However, statistically, predictive power of education level on insomnia outcome in ESRD patients undergoing hemodialysis unable to explained which it need to be further study.

Regarding factors of gender, monthly income, and duration of hemodialysis, however, it was found that these variables could not predict insomnia outcome in ESRD patients undergoing hemodialysis in this study. The explanation for the results were as follows:

Gender: It was not statistically significant correlated with insomnia outcome of ESRD patients undergoing hemodialysis ($r = .142, p > .05$) (Table13). The finding revealed that male or female ESRD patients undergoing hemodialysis did not vary in insomnia outcomes. This could be a result of the characteristics of the sample as their were male (54%) and female (46%). Insomnia in hemodialysis patients were due to physiology, psychology and environment that happened to hemodialysis patients with no difference in gender. All of the patients could perform insomnia management strategies in this study such as meditation, praying, and clean bed accessories with no difference in gender. This result was not consistent with a study by Coren (1994) who found that gender was statistically and significantly on quality of sleep in adults; women had more opportunity of nightmare, difficulty to sleep, and frequent awakening more than men did. Similar to study of Noda and colleagues (2006) the result showed that prevalence of insomnia in hemodialysis patients more prevalent in women than in men. In contrast, Unruh, and colleagues (2003) revealed that male

patients declared more insomnia prevalence than female in dialysis patients. However, the finding was consistent with the finding in sleep study of Kosol (1995), who evaluated sleep quality in health-care personnel at Mahidol University, did not present a different quality of sleep between genders. Similar to the study of Simpson and Lee (1996), who reported that the quality of sleep of patients after cardiac surgery assessed by perception had no difference between genders. However, the evaluation by polysomnography showed that different genders had significantly different quality of sleep (Guyton & Hall, 1996).

Monthly income: This study indicated that monthly income was not statistically significant correlated with insomnia outcome of ESRD patients undergoing hemodialysis ($r = .170$, $p > .05$) (Table 13). This meant that monthly income did not affect the insomnia outcome of these patients. It indicated that the patients with a high or low monthly income did not have difference insomnia outcome. About 42% of the subjects had an average monthly income 5,000 to 10,000 baht and 20% of the subjects had average monthly income 10,001 to 15,000 baht. But the cost of hemodialysis treatment for patients in this setting was 8,000-12,000 baht per month and not including the expense for living. All of them had got financial support for hemodialysis from The Kidney Foundation of Thailand, and universal coverage or social security for medicine. As reported by the sample, only one percent of the sample indicated that there were sufficiently of incomes with saving. This finding indicated that almost all of the samples had inadequate income. It is possible that income could not predict insomnia outcome in this study because of the homogeneity of the sample. This research finding was inconsistent with the study of Petchrung (2004) on hemodialysis patients in which it was shown that participants with a higher income identified more successful fatigue management strategies.

Duration of hemodialysis: This study found that duration of hemodialysis was not statistically significant correlated with insomnia outcome of ESRD patients undergoing hemodialysis ($r = -.005$, $p > .05$). In this study, the results indicated that 60% of the patients had received hemodialysis treatment more than 5 years, which was a long time. These made them sought for insomnia management strategies aimed to control and alleviate insomnia outcome. The strategies may come from self learning or from other sources such as nurses, physicians, and peers. So they viewed

their illness experience as a normal part of life. They had direct experience of complications from ESRD and hemodialysis itself. They had learned to adjust to live well with their illness and treatment.

Therefore, it can be concluded that the six factors including gender, age, education level, monthly income, duration of hemodialysis, and frequency of hemodialysis predicted for 18.7% of the variance of insomnia outcome of ESRD patients undergoing hemodialysis. ($R^2 = .187$, $p < .01$) (Table 14). However, the significant variables influencing on insomnia outcomes were age and frequency of hemodialysis.

CHAPTER VI

CONCLUSION

Summary of the study

This study was a descriptive research aimed to study insomnia experience, insomnia management, and insomnia outcome. It also explained the predictive power between demographic factors including gender, age, education level, monthly income, duration of hemodialysis, and frequency of hemodialysis on insomnia outcome of ESRD patients undergoing hemodialysis. The subjects in this study were gathered at Hemodialysis Unit of The Kidney Foundation of Thailand at Galyanivadhna Building, The Priest's Hospital. The Revised Symptom Management Model of Dodd and colleagues (2001) was used as a conceptual framework to guide the study. The data were collected from July to August 2007.

The study instruments were questionnaires which consisted of four parts; demographic data questionnaire, insomnia experience questionnaire, insomnia management strategies questionnaire, and insomnia outcome questionnaire. Insomnia experience questionnaire was established and modified from The Pittsburgh Sleep Quality Index (PSQI) (Smyth, 1999) and the literature review. The content validity was evaluated by five experts. The instrument reliabilities were measured using Cronbach' Alpha Coefficient. A coefficient of the insomnia outcome questionnaire was 0.74. The data were collected by interviewing and were analyzed using frequency, percentage, mean, standard deviation, and Multiple Regression Analysis by enter equation.

Summary of the research findings

1. Fifty-four of the samples were male with age between 20-59 years old (88%). Fifty percent of the samples were married and 87% living with their families. Most of them (96%) were Buddhist. The education background of the sample was primary school 36%. The largest number of the samples (75%) were employed. The average monthly income of 42% of the sample was 5,001-10,000 baht and their own

expense for hemodialysis (74%). Most of them (70%) stated they had insufficient income. Forty-five of the samples were receiving hemodialysis duration from 6 to 10 years. There were equally group (50 of each) in the frequency of hemodialysis with in 2 times per week and 3 times per week. All of them had adequacy of hemodialysis. Almost of the samples presented low hematocrit and hemoglobin levels and had comorbid disease such as DM and HT.

2. Insomnia experience in ESRD patients undergoing hemodialysis

2.1 Most of the samples indicated having the sleep patterns with their bedtime as 08.00-10.59 p.m.(49%), their awakening time as 05.00-07.59 a.m.(64%) sleep latency of over 30 minutes(56%), sleep duration a night range 5-6 hours (46%), all of them had habitual sleep efficiency of less than 85%, and fairly bad subjective sleep quality (80%). They had fairly bad sleep quantity and very bad sleep quality.

2.2 The most common perceptions of insomnia in the samples were feeling of inadequate of sleep (97%) and occurred 3-4 times per week, followed by a feeling of cheerless in the morning (96%) , awakening during the night and difficulty go back to sleep (81%), difficulty falling asleep (78%), and feeling of no deep sleep (77%).

2.3 Most of the samples (64%) reported the severity of insomnia at moderate level. Insomnia greatly disturbed daily living. It also disturbed work and social interaction, respectively. In the evaluation of causes of insomnia, the most common cause was psychological including anxiety (93%), stress (90%), discouragement (84%), and feeling of family burden (81%), respectively. The other causes of insomnia were physical and environmental factors which were shortness of breath (55%), muscle cramp (22%), hot or cold bedroom (53%).

2.4 The most common response toward insomnia in the samples was physical response e.g. sleepiness, yawning, naps during the day (96%) and occurred in 3-4 times per week, and exhausted (84%). The second response was psychological responses e.g. stress and/or anxiety (93%), irritation (83%) and discouragement (53%), and behavioral responses e.g. inert (85%), decrease ability to work (85%), and less endurance and more boredom (76%). Most of them that occurred 1-2 times per week.

3. In terms of the insomnia management strategies used by ESRD patients undergoing hemodialysis, the patients used their own strategies to alleviate insomnia which included sleep promoting behavior, relaxing technique, and environmental management strategies. Environmental management strategies were the most frequently used strategies such as clean bed accessories, arranging proper room ventilation and temperature. However, they perceived these strategies as mild effectiveness to alleviate of insomnia. The second management strategy was relaxing technique such as meditation or praying before sleep, reading a book before sleep, which they perceived these strategies as moderate effectiveness to alleviate of insomnia. The third, patients used the sleep promoting behavior strategy such as regular bedtime and waking up time, avoid caffeine drink and regular exercise. The patients perceived these strategies as mild to moderate effectiveness to alleviate of insomnia.

4. This study indicated that the ESRD patients undergoing hemodialysis had insomnia outcome in moderate level. The patients perceived they can perform self-care activities at most level. The insomnia outcomes in term of symptom status, functional status, and emotional status were in moderate level.

5. Gender, age, education level, monthly income, duration of hemodialysis, and frequency of hemodialysis could predict 18.7% ($p < .01$) of the variance of insomnia outcome of ESRD patients undergoing hemodialysis. The significant variables that could predict insomnia outcome of ESRD patients undergoing hemodialysis were age and frequency of hemodialysis ($p < .05$).

Implications and Recommendations

1. Nurses who take care of hemodialysis patients should consider the significance of an appropriate sleep in both sleep quantity and sleep quality. Nurses should assess the patients individually about insomnia experience such as risk factors, severity of insomnia. Nurses also should provide or suggest insomnia management strategies which are suitable to each patient.

2. The research results also pointed out that the most common causes of insomnia were stress and anxiety. Therefore, nurses should provide appropriate

intervention to reduce stress and anxiety, such as praying, meditation, music therapy, etc. that can promote sleep quality in hemodialysis patients.

3. Insomnia greatly disturbed daily living, self-care activities, and working impact in ESRD patients undergoing hemodialysis. Hence, nurses who take care of hemodialysis patients should emphasize the causes of insomnia and provide appropriate management to reduce the symptom in order to improve the quality of life.

Recommendation for future research

1. Include other factors which not investigated in this study and related to insomnia experience, management strategy, and insomnia outcome such as adequacy of hemodialysis, comorbidity in further studies with ESRD patients undergoing hemodialysis.

2. Replicate the study using larger samples in other settings to increase generalize ability of the findings.

3. Develop the appropriate intervention program such as relaxation technique for increasing sleep quality of hemodialysis patients for further studies with using experimental design.

4. Conduct comparative studies examining effectiveness of insomnia management strategies in the population of the study.

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APPENDIX

APPENDIX A

List of Experts

There are five experts who have validated the content validity of structured reviewing questionnaires for insomnia experience, insomnia management strategies and insomnia outcomes in ESRD patients undergoing hemodialysis. There are :

1. Mrs. Thananda Trakarnvanich, M.D.
Nephrologist, Renal Unit, Department of Medicine.
Bangkok Metropolitan Medical College and Vajira Hospital, Bangkok.

2. Associate Professor. Prakong Intarasombat.
Department of Nursing.
Faculty of Medicine Ramathibodi Hospital, Mahidol University

3. Associate Professor Dr. Pongsri Srimoragot, D.N.S.
Department of Surgical Nursing.
Faculty of Nursing, Mahidol University.

4. Mrs. Issanee Putthimontree
The Head nurse of Hemodialysis Unit of The Kidney Foundation of Thailand,
at Galyanivadhna Building, The Priest's Hospital.

5. Mrs. Pakhamart Maneerat
Head of Renal unit.
Bangkok Metropolitan Medical College and Vajira Hospital, Bangkok.

APPENDIX C

PERMISSION LETTER OF DATA COLLECTION



มูลนิธิโรคไตแห่งประเทศไทย

ตึกธนาคารไทยพาณิชย์ โรงพยาบาลศิริราช 2 ถนนพหลโยธิน บางกอกน้อย กรุงเทพฯ 10700
โทร. 02-412-4090, 02-419-7187 โทรสาร 02-412-9717

ที่ 571/2550

20 มิถุนายน 2550

เรื่อง อนุมัติให้นักศึกษามาเก็บข้อมูลเพื่อประกอบการทำวิทยานิพนธ์

เรียน คณบดีบัณฑิตวิทยาลัย

อ้างถึง หนังสือบัณฑิตวิทยาลัย มหาวิทยาลัยมหิดล ที่ ศบ 0517.02(ศร)/1040 ลงวันที่ 30 เมษายน 2550

ตามหนังสือที่อ้างถึง บัณฑิตวิทยาลัย มหาวิทยาลัยมหิดล ได้ขอความอนุเคราะห์ให้นักศึกษานางดวงจิต หมดจด นักศึกษابัณฑิตวิทยาลัย มหาวิทยาลัยมหิดล หลักสูตรปริญญาโท สาขาวิชาการพยาบาลผู้ใหญ่ คณะพยาบาลศาสตร์ กำลังทำวิทยานิพนธ์ เรื่อง "ประสบการณ์ การจัดการและผลลัพธ์ของการนอนหลับไม่เพียงพอในผู้ป่วยไตวายเรื้อรังระยะสุดท้ายที่ฟอกเลือดด้วยเครื่องไตเทียม" อยู่ในความควบคุมของ อาจารย์ ดร.กรองกาญจน์ สังกาศ เก็บข้อมูลจากผู้ป่วยไตวายเรื้อรังระยะสุดท้ายที่มีอายุ 20 ปีขึ้นไป ที่มารับการรักษาด้วยการฟอกเลือดด้วยเครื่องไตเทียม ที่หน่วยไตเทียม มูลนิธิโรคไตแห่งประเทศไทย ตึกกัลยาณีวัฒนา โรงพยาบาลสงฆ์ โดยใช้วิธีวิจัยสัมภาษณ์ผู้นิยมนร่วมเข้าร่วมโครงการวิจัยแต่ละรายด้วยตนเอง ตั้งแต่วันที่ 10 พฤษภาคม - วันที่ 31 กรกฎาคม พ.ศ.2550 นั้น

มูลนิธิโรคไตแห่งประเทศไทย ซึ่งสมเด็จพระเจ้าพี่นางเธอ เจ้าฟ้ากัลยาณิวัฒนา กรมหลวงนราธิวาสราชนครินทร์ ทรงเป็นองค์ประธาน พิจารณาแล้วอนุมัติให้ นางดวงจิต หมดจด นักศึกษบัณฑิตวิทยาลัย มหาวิทยาลัยมหิดล เก็บข้อมูล ณ หน่วยไตเทียม มูลนิธิโรคไตแห่งประเทศไทย ณ ตึกกัลยาณีวัฒนา โรงพยาบาลสงฆ์ ทั้งนี้ มูลนิธิโรคไตแห่งประเทศไทยได้แจ้งให้ นางดวงจิต หมดจด ทราบแล้ว

จึงเรียนมาเพื่อโปรดทราบ

ขอแสดงความนับถือ

(ศาสตราจารย์คลินิกนายแพทย์สุพัฒน์ วาณิชย์การ)

เลขาธิการมูลนิธิโรคไตแห่งประเทศไทย

APPENDIX D

แบบฟอร์มใบยินยอมให้ทำการวิจัย

โดยได้รับการบอกกล่าวและเต็มใจ (Informed Consent Form)

การวิจัยเรื่อง ประสิทธิภาพ การจัดการ และผลลัพธ์ของการนอนหลับไม่เพียงพอในผู้ป่วยไตวาย
เรื้อรังระยะสุดท้ายที่ฟอกเลือดด้วยเครื่องไตเทียม

วันที่ให้คำยินยอม วันที่.....เดือน.....พ.ศ.....

ก่อนที่จะลงนามในใบยินยอมให้ทำการวิจัยนี้ ข้าพเจ้าได้รับการอธิบายจากผู้วิจัยถึง
วัตถุประสงค์ของการวิจัย วิธีวิจัย อันตราย หรืออาการที่อาจเกิดขึ้นจากการวิจัยหรือจากยาที่ใช้
รวมทั้งประโยชน์ที่จะเกิดขึ้นจากการวิจัยอย่างละเอียด และมีความเข้าใจดีแล้ว

ผู้วิจัยรับรองว่าจะตอบคำถามต่างๆ ที่ข้าพเจ้าสงสัยด้วยความเต็มใจ ไม่ปิดบังซ่อนเร้นจน
ข้าพเจ้าพอใจ

ข้าพเจ้ามีสิทธิที่จะบอกเลิกการเข้าร่วมโครงการวิจัยนี้เมื่อใดก็ได้ และเข้าร่วมโครงการวิจัย
นี้โดยสมัครใจ และการบอกเลิกการเข้าร่วมการวิจัยนี้จะไม่มีการรักษาโรคที่ข้าพเจ้าจะพึง
ได้รับต่อไป

ผู้วิจัยรับรองว่าจะเก็บข้อมูลเกี่ยวกับตัวข้าพเจ้าเป็นความลับ และจะเปิดเผยไว้เฉพาะใน
รูปที่สรุปผลการวิจัย การเปิดเผยข้อมูลเกี่ยวกับตัวข้าพเจ้าต่อหน่วยงานต่างๆ ที่เกี่ยวข้องกระทำได้
เฉพาะกรณีจำเป็นด้วยเหตุผลทางวิชาการเท่านั้น

ผู้วิจัยรับรองว่าหากเกิดอันตรายใดๆ จากการวิจัยดังกล่าว ข้าพเจ้าจะได้รับการ
รักษาพยาบาลโดยไม่คิดมูลค่าตามมาตรฐานวิชาชีพ และจะได้รับการชดเชยรายได้ที่สูญเสียไป
ระหว่างการรักษาพยาบาลดังกล่าว ตลอดจนเงินทดแทนความพิการที่อาจเกิดขึ้น

ผู้วิจัยรับรองว่าหากมีข้อมูลเพิ่มเติมที่ส่งผลกระทบต่อการศึกษา ข้าพเจ้าจะได้รับการแจ้งให้
ทราบโดยไม่ปิดบังซ่อนเร้น

ข้าพเจ้าได้อ่านข้อความข้างต้นแล้ว และมีความเข้าใจดีทุกประการ และได้ลงนามยินยอม
ในใบยินยอมนี้ด้วยความเต็มใจ

ลงนาม.....ผู้ยินยอม

ลงนาม.....พยาน

ลงนาม.....พยาน

ในกรณีที่ผู้ยินยอมตนให้ทำการวิจัยไม่สามารถอ่านหนังสือได้ จะต้องได้รับการยินยอมใน
ขณะที่ยังมีสติสัมปชัญญะ และระบุข้อความไว้ตามนี้ ข้าพเจ้าไม่สามารถอ่านหนังสือได้ แต่ผู้วิจัยได้
อ่าน ข้อความในใบยินยอมนี้ให้แก่ข้าพเจ้าฟังจนเข้าใจดีแล้ว ข้าพเจ้าจึงลงนาม หรือประทับลาย
นิ้วหัวแม่มือขวาของข้าพเจ้าในใบยินยอมนี้ด้วยความเต็มใจ

ลงนาม.....ผู้ยินยอม

ลงนาม.....พยาน

ลงนาม.....พยาน

APPENDIX E

RESEARCH INSTRUMENT

แบบสัมภาษณ์ประกอบการวิจัย เรื่อง

ประสบการณ์ การจัดการ และผลลัพธ์ของการนอนหลับไม่เพียงพอในผู้ป่วยไตวายเรื้อรังระยะ
สุดท้ายที่ฟอกเลือดด้วยเครื่องไตเทียม

คำชี้แจง

แบบสัมภาษณ์ชุดนี้ ผู้วิจัยจัดทำขึ้น โดยมีวัตถุประสงค์เพื่อศึกษา ประสบการณ์ การจัดการ และผลลัพธ์ของการมีอาการนอนหลับไม่เพียงพอในผู้ป่วยไตวายเรื้อรังระยะสุดท้ายที่ฟอกเลือดด้วยเครื่องไตเทียม ทั้งนี้เพื่อให้ได้ข้อมูลที่เป็นประโยชน์ในการวางแผนให้การพยาบาล ส่งเสริมให้ผู้ป่วยเข้าใจถึงสาเหตุของอาการและกลยุทธ์การจัดการกับอาการนอนหลับไม่เพียงพอได้อย่างมีประสิทธิภาพ

ในการนี้ ผู้วิจัยใคร่ขอเชิญท่านตอบแบบสัมภาษณ์ตามความเป็นจริง เมื่อผู้วิจัยรวบรวมและนำข้อมูลมาวิเคราะห์ จะนำเสนอผลการศึกษาในภาพรวมซึ่งจะเป็นประโยชน์ในการพัฒนาแนวทางการดูแลผู้ป่วยเมื่อมีอาการนอนหลับไม่เพียงพอเกิดขึ้น ขณะที่ท่านตอบแบบสัมภาษณ์ ท่านมีสิทธิ์ที่จะขอหยุดได้เมื่อท่านต้องการ ซึ่งคำตอบจากการตอบแบบสัมภาษณ์ของท่านทุกข้อผู้วิจัยจะเก็บไว้เป็นความลับ และเมื่อท่านมีข้อสงสัยเกี่ยวกับการวิจัยท่านสามารถสอบถามผู้วิจัยได้ที่

แบบสัมภาษณ์ทั้งหมดประกอบด้วย 4 ส่วน ดังนี้

ส่วนที่ 1 แบบสัมภาษณ์ข้อมูลทั่วไป

ส่วนที่ 2 แบบสัมภาษณ์ประสบการณ์การมีอาการนอนหลับไม่เพียงพอ

ส่วนที่ 3 แบบสัมภาษณ์การจัดการกับอาการนอนหลับไม่เพียงพอ

ส่วนที่ 4 แบบสัมภาษณ์ผลลัพธ์ของการนอนหลับไม่เพียงพอ

ผู้วิจัยขอขอบคุณที่ท่านกรุณาตอบแบบสัมภาษณ์

ดวงจิต หมดจด

นักศึกษาปริญญาโท สาขาการพยาบาลผู้ใหญ่

คณะพยาบาลศาสตร์ มหาวิทยาลัยมหิดล

16. ยาที่รับประทานเป็นประจำ

- () 1. ไม่มี
- () 2. มี ประเภทของยา
 - () 1. ยาลดความดันโลหิต
 - () 2. ยาขับปัสสาวะ
 - () 3. ยาแก้ปวด
 - () 4. ยาคลายเครียด
 - () 5. ยาเบาหวาน
 - () 6. อื่นๆ ระบุ.....

17. การสูบบุหรี่

- () 1. ไม่มี
- () 2. มีแต่ไม่ประจำ ระบุ.....
- () 3. มีเป็นประจำ ระบุ.....

18. ดื่มสุรา

- () 1. ไม่มี
- () 2. มีแต่ไม่ประจำ ระบุ.....
- () 3. มีเป็นประจำ ระบุ.....

19. ภาวะแทรกซ้อนที่เคยเกิดขณะ/หลังทำการฟอกเลือดด้วยเครื่องไตเทียม

- () 1. ไม่เคยเกิดเลย
- () 2. ภาวะตะคริว
- () 3. ภาวะขากระตุก
- () 4. อาการคัน
- () 5. คลื่นไส้ / อาเจียน
- () 6. อื่นๆ ระบุ.....

20. ผลการตรวจทางห้องปฏิบัติการ (ก่อนการฟอกเลือดด้วยเครื่องไตเทียม)

- ผลฮีมาโตคริตเปอร์เซ็นต์
- ผลฮีโมโกลบิน.....กรัมเปอร์เซ็นต์
- ผลยูเรียไนโตรเจน.....มิลลิกรัมต่อเดซิลิตร
- ผลครีอะตินิน.....มิลลิกรัมต่อเดซิลิตร
- ผลแคลเซียม.....มิลลิกรัมต่อเดซิลิตร
- ผลซีรั่มฟอสเฟต..... มิลลิกรัมต่อเดซิลิตร
- ผลอิเล็กโทรลิต์.....
- อื่นๆ ระบุ

ส่วนที่ 2 แบบสัมภาษณ์ประสบการณ์การมีอาการนอนหลับไม่เพียงพอ

2.1 แบบแผนการนอนหลับ

คำชี้แจง ให้ผู้วิจัยสัมภาษณ์ผู้ป่วยแล้วทำเครื่องหมาย ✓ ลงใน () หน้าข้อความหรือเติมข้อความในช่องว่างที่กำหนดซึ่งตรงกับความรู้สึกหรือประสบการณ์การนอนหลับของท่านในระยะ 1 เดือนที่ผ่านมา

1. ส่วนใหญ่ท่านเข้านอนเวลาประมาณ.....น.
2. โดยปกติท่านตื่นนอนตอนเช้าเวลาประมาณ.....น.
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2.2 การรับรู้อาการนอนหลับไม่เพียงพอ

คำชี้แจง ให้ผู้วิจัยสัมภาษณ์ผู้ป่วยแล้วทำเครื่องหมาย ✓ ลงในช่องว่างที่ตรงกับความถี่ของการเกิดอาการนอนหลับไม่เพียงพอของผู้ป่วยในลักษณะต่างๆ ตามข้อความที่กำหนด ในระยะ 1 เดือนที่ผ่านมา

ข้อ	ลักษณะแสดงถึงอาการนอนหลับไม่เพียงพอ	ความถี่ในการเกิด			
		ไม่เคยเลย	1-2 ครั้ง/ สัปดาห์	3-4 ครั้ง/ สัปดาห์	> 5 ครั้ง/ สัปดาห์
1.	นอนหลับยาก ใช้เวลานานจึงจะหลับ				
2.	รู้สึกหลับไม่สนิท				
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2.4 การตอบสนองของร่างกาย จิตใจ อารมณ์และพฤติกรรมต่ออาการนอนหลับไม่เพียงพอ

คำชี้แจง ให้ผู้วิจัยสัมภาษณ์ผู้ป่วยแล้วทำเครื่องหมาย ✓ ลงในช่องว่างที่ตรงกับความถี่ ของการเกิดอาการหรือพฤติกรรมเหล่านี้กับผู้ป่วยมากที่สุดในระยะ 1 เดือนที่แล้ว

ข้อ	อาการหรือพฤติกรรม	ความถี่ในการเกิด			
		ไม่เคยเลย	1-2 ครั้ง/ สัปดาห์	3-4 ครั้ง/ สัปดาห์	> 5 ครั้ง/ สัปดาห์
1.	ปวด/มีนสิริระ				
2.	คลื่นไส้ ไม่อยากอาหาร				
3.	อ่อนเพลีย เหนื่อยง่าย				
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ส่วนที่ 3 แบบสัมภาษณ์การจัดการกับอาการนอนหลับไม่เพียงพอ

ตอนที่ 1 วิธีการจัดการและผลลัพธ์หลังการจัดการกับอาการนอนหลับไม่เพียงพอ

คำชี้แจง ให้ผู้วิจัยสัมภาษณ์ผู้ป่วยแล้วทำเครื่องหมาย ✓ ลงในช่องว่างที่ตรงกับวิธีการจัดการกับอาการนอนหลับไม่เพียงพอเพื่อช่วยให้นอนหลับได้ดีขึ้น/เพียงพอ ที่ผู้ป่วยปฏิบัติจริงและผลลัพธ์หลังจากการปฏิบัติวิธีดังกล่าว กำหนดให้

ไม่ได้ปฏิบัติ หมายถึง วิธีการนั้นผู้ป่วยไม่ได้กระทำเลยเมื่อมีอาการนอนหลับไม่เพียงพอ

ปฏิบัติ หมายถึง วิธีการที่ผู้ป่วยกระทำเมื่อมีอาการนอนหลับไม่เพียงพอ ผลลัพธ์หลังจากการกระทำวิธีดังกล่าวช่วยทำให้นอนหลับได้เพียงพออย่างน้อยเพียงใด

แบ่งเป็น

มากที่สุด หมายถึง เมื่อผู้ป่วยกระทำวิธีการนั้นๆ ช่วยทำให้นอนหลับเพียงพอได้มากที่สุด

มาก หมายถึง เมื่อผู้ป่วยกระทำวิธีการนั้นๆ ช่วยทำให้นอนหลับเพียงพอได้มาก

พอควร หมายถึง เมื่อผู้ป่วยกระทำวิธีการนั้นๆ ช่วยทำให้นอนหลับเพียงพอได้พอควร

ไม่ได้เลย หมายถึง เมื่อผู้ป่วยกระทำวิธีการนั้นๆ ไม่ช่วยทำให้นอนหลับเพียงพอได้เลย

ข้อ	วิธีการจัดการกับอาการนอนหลับไม่เพียงพอ	การปฏิบัติ		ประสิทธิภาพของการนอนหลับหลังจากปฏิบัติวิธีดังกล่าว			
		ปฏิบัติ	ไม่ได้ปฏิบัติ	มากที่สุด	ปานกลาง	เล็กน้อย	ไม่ได้เลย
1.	เข้านอนและตื่นนอนตรงเวลา						
2.	ไม่งีบหลับตอนกลางวัน						
3.	เมื่อนอนไม่หลับจะลุกขึ้นมาทำกิจกรรมจนกระทั่งง่วงนอนจึงจะกลับไปนอนอีกครั้ง						
4.	หลีกเลี่ยง/งด การบริโภค ชา กาแฟ						
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ส่วนที่ 4 แบบสัมภาษณ์ผลลัพธ์ของการมีอาการนอนหลับไม่เพียงพอ

คำชี้แจง ให้ผู้วิจัยสัมภาษณ์ผู้ป่วยแล้วทำเครื่องหมาย ✓ ลงในช่องว่างที่ตรงกับคำตอบของผู้ป่วยมากที่สุด เกี่ยวกับความคิดเห็นต่อผลลัพธ์ของการมีอาการนอนหลับไม่เพียงพอหลังจากการจัดการกับอาการ กำหนดให้

- เห็นด้วยอย่างมาก หมายถึง ข้อความนั้นตรงกับความรู้สึกและ/หรือความสามารถในการกระทำกิจกรรมนั้นๆ ของท่านอย่างมาก
- เห็นด้วยบางส่วน หมายถึง ข้อความนั้นตรงกับความรู้สึกและ/หรือความสามารถในการกระทำกิจกรรมนั้นๆ ของท่านบางส่วน
- เห็นด้วยน้อย หมายถึง ข้อความนั้นตรงกับความรู้สึกและ/หรือความสามารถในการกระทำกิจกรรมนั้นๆ ของท่านน้อย
- ไม่เห็นด้วย หมายถึง ข้อความนั้นไม่ตรงกับความรู้สึกและ/หรือไม่มีผลต่อความสามารถในการกระทำกิจกรรมนั้นๆ ของท่านเลย

ข้อ	ข้อความ	ผลลัพธ์หลังการจัดการกับอาการนอนหลับไม่เพียงพอ			
		เห็นด้วย อย่างมาก	เห็นด้วย บางส่วน	เห็นด้วย น้อย	ไม่เห็นด้วย
1.	ท่านตื่นเช้ามาด้วยความรู้สึกสดชื่น ไม่อ่อนเพลีย				
2.	ท่านสามารถปฏิบัติตามกิจวัตร ประจำวันได้ด้วยตนเอง				
3.	ท่านสามารถช่วยเหลือทำงานบ้าน เล็ก ๆ น้อย ๆ ได้				
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BIOGRAPHY

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