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Subjective sleep characteristics of patients hospitalized in a coronary care unit

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The University of Arizona, 1988
SUBJECTIVE SLEEP CHARACTERISTICS OF PATIENTS
HOSPITALIZED IN A CORONARY CARE UNIT

by

Vernone Erickson Lindell

A Thesis Submitted to the Faculty of the
COLLEGE OF NURSING
In Partial Fulfillment of the Requirements
For the Degree of
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In the Graduate College
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1988
STATEMENT BY AUTHOR

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ABSTRACT

The purpose of this study was to test the reliability and validity of the Verran and Snyder-Halpern (VSH) Sleep Scale on patients hospitalized in a coronary care unit (CCU) and to investigate the sleep characteristics of patients hospitalized in the CCU setting. Eighteen subjects aged 43 to 78 completed 30 nights of study using the VSH Sleep Scale. Results were compared to means from groups of healthy subjects and subjects hospitalized on general medical-surgical units. The VSH Sleep Scale demonstrated reliability in this group of CCU subjects. Factor analysis showed loadings on four factors rather than the theoretical three factors probably due to small sample size. The mean scores for this sample of CCU patients indicated their nighttime sleep was disturbed and ineffective. Significantly different sleep characteristics were demonstrated between CCU and healthy subjects. Comparisons between CCU and general medical-surgical subjects evidenced no differences in sleep characteristics.
CHAPTER 1

INTRODUCTION

One of the most common complaints heard from hospitalized patients is the difficulty in obtaining enough sleep in the hospital setting. Although the aspect of sleep itself does not begin to be completely understood, it is known to be vital to the well-being of all humans both from a psychological and physiological standpoint. For the nurse, knowledge of sleep and sleep problems can contribute substantially to the care patients receive (Albert & Albert, 1974). The patient's environment has always been the nurse's concern. The nurse creates the atmosphere on any unit and is in a powerful position to manipulate the patient's environment to promote rest and quiet (Kelly, 1985; Noble, 1979; Snyder-Halpern, 1985). The focus of this study was to test the reliability and validity of the Verran and Snyder-Halpern (VSH) Sleep Scale on patients hospitalized in a coronary care unit (CCU). The focus was also to investigate by subjective measurement the sleep characteristics of patients hospitalized in the coronary care unit setting.
Most people spend approximately one-third of their lives asleep. A 70 year old person will have spent 27 years of his life asleep. Sleep is something familiar and enjoyed by all of us. Despite this fact, no one really knows what sleep is for. Dement (1976) suggests that sleep "is to prevent us from wandering around in the dark and bumping into things" (p. 19). Perhaps our primitive ancestors used sleep as a place to hide from the terrors of the night. It is true that our ancestors slept during the hours when they were the least efficient, during the depressed phase of their circadian rhythms (Dement, 1976).

There are many variations to the stages and cycling of sleep due to such variables as age and sex (Dement, 1976). Hayter (1980) discusses one variation of the stages and cycling of sleep. There are usually five stages of sleep and the average person has four or five sleep cycles each night passing through these five stages. Each cycle lasts from 90-120 minutes. The two main stages of sleep are rapid eye movement (REM) or dream sleep and non REM (NREM) sleep.

Stage I NREM sleep is the first stage of sleep. The person is relaxed and dreamy but still somewhat aware of his surroundings. Stage I lasts only a few minutes. In stages II and III NREM the sleep is progressively
deeper. The person is not aware of his surroundings but awakens easily.

Stage IV is the stage of deep profound sleep. Arousal is difficult from Stage IV sleep. Pulse, respirations and blood pressure decrease and there is little body movement during this stage.

A typical sleep cycle encompasses approximately 90 minutes of sleep time after which a person gradually returns through the lighter stages of sleep. After reentering Stage II he proceeds to REM sleep and then back through Stages II, III, and IV again. This cycling of sleep repeats itself throughout the night (see Figure 1). However, during the early part of the night sleep is dominated by NREM stages especially Stages III and IV. As the night progresses REM sleep stages become progressively longer (Dement, 1976).

During REM sleep a person shows a high degree of both cerebral and physiological activation (Dement, 1976; Williams, Karacan, & Hursch, 1974). The electroencephalogram (EEG) of REM resembles the EEG of waking states. During REM the sympathetic nervous system appears to be activated. There is an increase in body temperature, an increase in cerebral blood flow and oxygen consumption. Heart rate, blood pressure and cardiac output approach or surpass waking values and frequently become erratic.
Wakefulness

Stage I NREM → Stage II NREM → Stage III NREM → Stage IV NREM

REM

Stage II NREM ← Stage III NREM

Figure 1. Typical Sleep-Stage Cycle. -- From Sanford, 1982.
(Williams et al., 1974). Respirations vary and periods of apnea have been reported (Aserinsky, 1965). REM has been associated with both premature ventricular contractions of the heart and nocturnal angina (Karacan, Elliot, & Williams, 1974; Nowlin, Troyer, & Collins, 1965).

According to Snyder-Halpern (1985) patients entering the health care system undergo an alteration in normal sleep habits. Factors that may disturb a patient's sleep include nursing care observations or procedures, noise, light, pain, anxiety, fear, other patients, visitors, and lack of privacy.

Coronary Care Units (CCU's) have been developed in hospitals for the purpose of preserving and maximizing myocardial performance in patients with potential or actual cardiac problems. The primary purpose of such a unit according to Sanford (1982) is the reduction in cardiac work which is achieved by allowing the patient to rest. Ideally, physical activity by the patient is decreased and sources of noise and other disturbances are limited to reduce both the physiological and psychological demands on the body. The coronary care unit presents special problems for the nurse in promoting normal sleep patterns for patients. This is due to the necessity for close observation of patients for 24 hour periods of time. This continual 24 hour activity decreases the patient's
ability to direct energy towards healing and prolongs recovery (Snyder-Halpern, 1985).

In any critical care unit or intensive care unit of a hospital, sleep deprivation may quickly become problematic. Patients admitted to critical care units because of frequent procedures and 24-hour intensive monitoring will probably suffer sleep disturbance (Kartmann, 1985).

In a study of sleep in patients in a respiratory intensive care unit Hilton (1976) concluded that patients had difficulty meeting their normal needs for sleep. Hilton (1976) used polygraph recordings on 10 patients for 48 hours to discover factors that definitely disturbed patients' sleep. The primary disrupting factors were noise created by staff members and environmental noise. Noble (1979) also found communication among staff to be the most disturbing noise factor. In Hilton's (1979) study the second most disturbing factor was therapeutic procedures done while the patient was sleeping or trying to sleep. During the 48 hours the patients were attached to polygraphic recordings, no complete sleep cycles were experienced by any of the patients. Total sleep time was from 6 minutes to 13.3 hours in the first 24 hour period. Possible sleep disturbing factors occupied an average of 20 minutes per hour.
Aurell and Elmqvist (1985) conducted a study of continuous polygraphic recordings on nine patients in a surgical intensive care unit. They found that patients were severely deprived of sleep. The mean cumulative sleep time for these patients was less than two hours in a 24 hour period. Significantly, Aurell and Elmqvist reported that sleep time estimated by the nursing staff was consistently overestimated when compared with polygraphic recordings.

Sanford (1982) stated that normal sleep in the coronary care unit is impossible. Qualitative and quantitative disturbances in sleep occur in the CCU because of the unfamiliar nature of surroundings, circadian phase shifts, disrupted sleep stage cycles and the effects of medication on sleep stages. One of the biggest challenges to the nurse in the CCU is to minimize disruptions in sleep while still staying within the framework necessary to manage actual or potential severe cardiovascular compromise (Sanford, 1982).

Qualitative and quantitative aspects of sleep are disturbed in the entire hospital setting as well as in the CCU. Qualitative disturbances in sleep happen when the patient is aroused for any reason during his normal period of bulk sleep. If he is aroused at any point during the normal progression of the sleep cycle he does not return
to that stage but starts the sleep cycle over from the beginning. Frequent sleep interruptions can lead to a predominance of lighter stages of sleep resulting in feelings of sleep deprivation (Sanford, 1982).

Quantitative disturbances occur when one sleeps in an unfamiliar bed, in a different room, or in the presence of unfamiliar noise or light. Characteristically there is a decrease in overall sleep time due to a decrease in REM sleep and also an increase in sleep latency (Coble, McPortland, & Silva, 1974).

Age is also a factor in the quantitative and qualitative aspects of sleep. As a person ages, total sleep time decreases. The percentage of time in the lighter stages of sleep increases as do the number of arousals (Feinberg, 1969; Hayter, 1983). When Hayter (1983, 1985) studied healthy older individuals between the ages of 65 and 93 she found a significant increase in time in bed, an increase in total sleep time when naps were included and an increase in number and length of naps. Also the number and length of wake time after sleep onset in persons over 75 increased. Hayter concluded that changes in sleep behavior should be expected as age increases.

If for some reason a person is deprived of a stage of sleep, on subsequent nights he will make up the
percentage of time spent in that stage. After marked REM sleep stage deprivation a person will go into REM more quickly and remain there longer than usual (Hayter, 1980). This is referred to as REM rebound, a dramatic increase in REM sleep that follows periods of REM deprivation (Dement, 1976).

Patients who are already stressed by disease or trauma do not need the extra stress of increased REM. The high physiologic demands of REM, REM deprivation and REM rebound are especially dangerous for a patient who has coronary artery disease. Physiological demands of REM can lead to arrhythmias. Cardiac patients seem to have more pain and experience heart failure more frequently between 4:00 a.m. and 6:00 a.m. This is the time most people have the majority of their REM sleep (Adams, 1980; Hayter, 1980; Hilton, 1976; Webb, 1969; Wotring, 1982).

A classic technique for determining the function of a physiological process has been to remove it or prevent it from happening. Sleep deprivation studies have been performed for this same reason to better understand the function of sleep. Selective sleep deprivation studies in which subjects are deprived of REM or NREM stages of sleep have supplied clues to the necessity of REM for brain restitution. Subjects deprived of REM demonstrate increased perceptual difficulties leading to

NREM sleep is thought to represent a period of physiological anabolism, recuperation, reversal of physical fatigue and restocking of energy substrates (Berger, 1969). Physical fatigue seems to be the primary result of NREM deprivation as opposed to the highly psychological effects of REM deprivation (Adams, 1980; Webb, 1969). With NREM sleep deprivation physical, rather than mental symptoms are apparent. After strenuous physical activity, the need for Stage IV NREM sleep is greater than usual (Hayter, 1980).

Hilton (1976) identified behavioral changes in patients related to sleep deprivation. Behaviors Hilton observed were mumbling, slurring and rambling speech, disordered thinking, demand for more attention than usual, exaggerated anger, frequent complaints and arguments, sensory disturbance, diplopia, visual illusions or hallucinations, auditory hallucinations, nightmares, disorientation, delusions, paranoia, motor impairment, hyperactivity and restlessness.

Chuman (1983) discussed signs and symptoms of sleep deprivation. Difficulty with memory, concentration, motor skills, a change in mood, increased fatigue,
increased irritability and aggressiveness. People appear listless and serious; neurological changes occur along with mood and performance. Mild nystagmus, hand tremor, ptosis of the eyelids, expressionless face, decreased speech quality and word pronunciation all occur. Pain tolerance is decreased. Cortico-steroid and catecholamine output levels are increased (Chuman, 1983).

Ideally, treatment for sleep deprivation is prevention (Brewer, 1985). Factors of sensory overload, especially noise, lights and staff activity interfere with adequate sleep. Humans have a biological clock which requires light dark cycles and periods of quiet to regulate their sleep patterns (Baker, 1984). Without these cycles sleep deprivation occurs.

Helton, Gordon, and Nunnery (1980) reported on ICU Syndrome or mental status alterations in critically ill patients. This syndrome manifests symptoms similar to those of sleep deprivation. Sleep deprivation has been shown to be one etiologic factor in this syndrome also known as ICU psychosis (Noble, 1979). Noble (1979) also reported that mortality is higher in patients who exhibit ICU psychosis.

Helton et al. (1980) correlated symptoms of mental status alteration or ICU syndrome: disorientation, combativeness, hallucination, paranoia and delusions with
sleep disruptions in 62 patients in a coronary care unit (CCU) and a surgical intensive care unit (SICU). In the CCU fewer patients complained of sleep deprivation than those in the SICU. This may be due to the fact that a coronary care unit is generally quieter than a large surgical intensive care unit (Baker, 1984).

Recently several authors have looked at sleep in hospitalized patients especially patients hospitalized in critical care areas (Aurell & Elmqvist, 1985; Baker, 1984; Brewer, 1985; Carter, 1985; Fabijan & Gosselin, 1982; Fernsebner, 1983; Hansell, 1984; Helton, Gordon & Nunnery, 1980; Hilton, 1976; Kartmann, 1985; Noble, 1979; Snyder-Halpern, 1985; Weber, Oszko, Bolender & Gupiak, 1985; Webster & Thompson, 1986). However, few research studies have been conducted to establish the quantity and quality of patients' sleep patterns. As a result little research has been conducted on ways sleep patterns may be maintained while still providing 24 hour nursing care especially necessary in the critical care areas. A search of the literature found no studies conducted on sleep patterns in the coronary care unit.

Good reasons exist for the lack of studies. One reason is the difficulty and expense of measuring sleep patterns through objective measurements using the sophisticated instrumentation of the electroencephalogram...
(EEG), the electromyogram (EMG), and the electroculogram (EOG). Even though objective measurements may be the most effective and accurate measurement of sleep (Chuman, 1983), they require a great deal of technical training, are costly, and are difficult to use in the clinical setting. The second reason for lack of research is the lack of reliable and valid instrumentation to measure sleep patterns through subjective data with self report methods. Although subjective sleep measurements such as sleep questionnaires cannot report on the length or percentage of time a person spends in each stage of sleep, they do have advantages. Subjective instrumentation is convenient and inexpensive. Johns (1971) states that certain aspects of a night's sleep can only be tested by subjective description. Only the subject himself can tell us whether he feels refreshed or tired when he awakens in the morning.

Statement of the Problem

As is evident from this introduction, there are significant problems with sleep patterns in patients hospitalized in critical care areas of acute care facilities. Sleep deprivation in the critical care area has been referred to as a "circular phenomenon" (Weber, Oszko, Bolender & Grysiak; 1985, p. 15). As sleep deprivation continues the patient's progress is impeded
which may result in a longer stay in the critical care area. With a longer stay in these areas more sleep deprivation and sleep fragmentation occur and the circular phenomenon continues.

Sleep problems in the critical care areas need more clarification. Further studies on patients' sleep patterns through both objective and subjective data are needed. Studies must be done in order to ultimately maintain patients' sleep patterns while still maintaining adequate 24 hour nursing care in the critical care units. Sleep must be considered a priority for critically ill patients. Sleep is a restorative process and sleep deprivation impedes recovery and alters mental status (Helton et al., 1980).

**Purpose of the Study**

The purpose of this study was to test the reliability and validity of the Verran and Snyder-Halpern (VSH) Sleep Scale with adult patients hospitalized in the coronary care unit of an acute care facility. The purpose was also to investigate by subjective measurement the sleep characteristics of patients hospitalized in a coronary care unit. Specifically, the following research questions were posed:

1. Does the Verran and Snyder-Halpern (VSH) Sleep Scale reliably measure subjective patterns of
sleep in patients hospitalized in a coronary care unit (CCU)?

2. Does the VSH Sleep Scale evidence the same subscale factors in CCU patients as it does in healthy subjects and patients hospitalized on general medical-surgical units?

3. What are the mean values of sleep characteristics in the sample of CCU patients?

4. How do the mean values of the CCU sample Sleep Scale characteristics compare with the mean values from samples of healthy subjects and the mean values of patients hospitalized on general medical-surgical units?

**Significance of the Research**

This study looked at sleep patterns of patients hospitalized in the coronary care unit, an area where sleep research was practically non-existent. Nursing research on sleep continues to be significant because altered sleep patterns further endanger already critically ill patients (Richards, 1985). Altered sleep patterns result in sleep deprivation, an increase in hospital costs, and potentially an increase in mortality. Simple subjective instrumentation needs to be developed and tested before nursing interventions can be developed to alleviate sleep problems in hospitalized patients.
Summary

In this chapter a review of the literature as it relates to sleep in hospitalized patients and more specifically sleep patterns of patients hospitalized in critical care areas was presented. The problems of sleep in the critical care areas as well as the significance of needed research in that area were discussed. The testing of a subjective sleep scale, the VSH Sleep Scale, in CCU patients as one purpose of this study was addressed. The investigation of sleep characteristics of CCU patients by subjective measurement was also addressed as the second purpose of this study.
CHAPTER 2

CONCEPTUAL FRAMEWORK

The conceptual framework for this study was based on sleep patterns of adult patients hospitalized in coronary care units (CCU's) in an acute care facility. The framework was a taxonomy of sleep characteristics associated with three sleep factors as depicted in Figure 2. The first factor (Factor 1), sleep disturbance, was associated with the characteristics of mid-sleep awakening (MSA), wake after sleep onset (WASO), movement during sleep (MDS), sleep latency (SL), soundness of sleep (SS), quality of disturbance (QD), and quality of latency (QL). The second factor (Factor 2), sleep effectiveness, was associated with the characteristics of rest upon awakening (RUA), subjective quality of sleep (SQS), total sleep period (TSP), total sleep time (TST), and sleep sufficiency evaluation (SSE). The third factor (Factor 3), sleep supplementation, was associated with the characteristics of wake after final arousal (WAFA), daytime sleep (DTS), AM sleep (AMS) and PM sleep (PMS).

The framework consisted of one construct: sleep characteristics. Two concept levels were identified.
Figure 2. Conceptual Framework of Taxonomy of Sleep Characteristics.  
-- Verran & Snyder-Halpern, unpublished manuscript.
Level one included the three factors of disturbance, effectiveness and supplementation. Level two included the characteristics associated with each factor as stated above.

The original taxonomy on which this framework was based was developed by Snyder-Halpern and Verran (1987). In the original taxonomy the factors with their associated characteristics and respective definitions were derived deductively from review of the literature. The taxonomy was then tested empirically on 69 subjects who each completed sleep questionnaires on three consecutive mornings yielding a sample size of 207. This study resulted in the emergence of a revised taxonomy (Snyder-Halpern & Verran, 1987). A second study then tested the revised taxonomy with 48 healthy adult subjects for three consecutive days for a total of 144 sleep ratings (Verran & Snyder-Halpern, unpublished manuscript). A third study took place with 76 adult patients hospitalized on general medical-surgical units of acute care facilities (Verran & Snyder-Halpern, unpublished manuscript). The taxonomy which emerged from the third empirical study was the framework for this researcher's study. The definition of sleep characteristics used in the present taxonomy of the VSH Sleep Scale is found in Appendix A.
Sleep Characteristics

Mid Sleep Awakening (MSA) defined as the number of awakenings during the sleep period (Snyder-Halpern & Verran, 1987), was originally deduced from studies by Baekeland and Hoy (1971), Johns (1975a, 1975b) and Parrott and Hindmarch (1978, 1980). Age is a factor in MSA. Feinberg (1969) states that the number of arousals during sleep increases as age increases. The average number of awakenings increases from one per night to six per night from young adulthood to age 60 (Hayter, 1980, 1983). MSA may be spontaneous due to discomfort or the need to urinate (Hayter, 1980). MSA in the coronary care unit may be due to the frequent need for nursing assessments and procedures during the entire 24 hour period (Sanford, 1982).

Wake after Sleep Onset (WASO) was defined as estimate of the amount of time spent awake during the total sleep period (TSP) (Verran & Snyder-Halpern, unpublished manuscript). Age is a factor in WASO. Hayter (1980, 1983) states that the time awake after sleep onset increases nine times from young adulthood to age 60.

Movement during Sleep (MDS) was defined as the subjective estimate of the amount of movement during sleep (Snyder-Halpern & Verran, 1987). MDS was originally deduced from studies by Baekeland and Hoy (1971), Johns
Johns (1971) and Parrott and Hindmarch (1978, 1980). Johns (1971) found that normal subjects tend to move 20 to 60 times during the night with each movement lasting a few seconds. The frequency of movements increases during the night.

Sleep Latency (SL) was defined as estimate of the amount of time from settling down to sleep until falling asleep (Snyder-Halpern & Verran, 1987). Older people require significantly longer to go to sleep than do younger persons (Hayter, 1980, 1983). Baekeland and Hoy (1971) in an early study of reported vs. recorded sleep characteristics found that presleep tension favored longer sleep latencies. Johns (1975a, 1975b) stated that falling asleep rapidly depends on a person's ability to relax and inhibit mental activity. The ability to fall asleep may vary in the same subject from night to night (Johns, 1975a, 1975b).

Soundness of Sleep (SS) was defined as the subjective estimate of sleep depth (Snyder-Halpern & Verran, 1987). It was also originally deduced from studies by Baekeland and Hoy (1971) and Parrott and Hindmarch (1978, 1980). Stage IV NREM is what most people tend to think of as sleep. They tend to assess adequacy of their sleep on the basis of how long they feel they were in the deep stage of oblivion Stage IV provides
(Hayter, 1980). Stage IV decreases with age and is a factor in older persons not feeling their sleep is as sound (Hayter, 1983, 1985). Sanford (1982) stated that frequent sleep interruptions in the CCU can lead to a predominance of lighter stages of sleep resulting in feelings of sleep deprivation.

Quality of Disturbance (QD) was defined as the subjective estimate of sleep disturbance due to awakenings (Snyder-Halpern & Verran, unpublished manuscript). Sanford (1982) stated that qualitative disturbances in sleep occur when the patient is aroused for whatever reason during his normal period of bulk sleep.

Quality of Latency (QL) was described as the subjective estimate of difficulty in going to sleep (Snyder-Halpern & Verran, unpublished manuscript). In their subjective study of sleep Parrott and Hindmarch (1978, 1980) evaluated the ease of getting to sleep.

Rest upon Awakening (RUA) was defined as the subjective estimate of how rested the person is upon awakening (Snyder-Halpern & Verran, 1987). This characteristic was originally deduced from Parrott and Hindmarch (1978, 1980). Johns (1971) states that rest upon awakening can only be evaluated by subjective means. Only the subject himself can tell us how he feels after a night's sleep. Sanford (1982) reports that, despite the
fact that patients in the CCU spend many hours with their eyes closed apparently sleeping, they hardly ever report feeling rested.

Subjective Quality of Sleep (SQS) was defined as individual estimate of sleep time along dimensions of satisfaction, quality, and disturbance in sleep (Snyder-Halpern & Verran, 1987). This characteristic was originally deduced from Johns (1975a, 1975b) and Parrott and Hindmarch (1978, 1980). Hilton (1976) states quality of sleep is dependent upon orderly progression of sleep stages and quantity of time in each sleep stage. Sanford (1982) stated that in order to achieve a subjective feeling of rest, sleep must be quantitatively and qualitatively adequate. Frequent sleep interruptions can lead to a predominance of lighter stages of sleep resulting in feelings of sleep deprivation (Sanford, 1982). The usual sleep environment: pillows, blankets, light, noise, as well as usual bedtime routine: bath, shower, snack and sleep aides can affect the SQS (Sanford, 1982).

Total Sleep Period (TSP) was defined as estimate of total time from settling down for sleep to awakening in the morning (TST + WASO) (Snyder-Halpern & Verran, 1987). A sleep history should be taken on every patient entering the health care system as the first step in seeking
effective sleep. Sanford (1982) stated that the history should include the number of hours usually slept.

**Total Sleep Time (TST)** was defined as estimate of amount of time spent in actual sleep during the total sleep period (TSP) (Snyder-Halpern & Verran, unpublished manuscript). Johns (1975a, 1975b) studied the total duration of sleep time in a factor analysis of sleep characteristics.

**Wake after Final Arousal (WAFA)** was defined as the estimate of time in bed from initial morning arousal to final awakening (Snyder-Halpern & Verran, unpublished manuscript). Johns (1975a, 1975b) discussed the amount of time in bed after awakening as a factor in a subjective sleep questionnaire. In a sleep study of older persons, Hayter (1983) studied wake time after final arousal.

**Sleep Sufficiency Evaluation (SSE)** was defined as the estimate of adequacy of amount of sleep (Snyder-Halpern & Verran, unpublished manuscript).

**Daytime Sleep (DTS)** was defined as estimate of time asleep during the morning and the afternoon other than primary sleep period (Verran & Snyder-Halpern, unpublished manuscript). Daytime sleep is divided into a.m. sleep (AMS) and p.m. sleep (PMS). Hayter (1980) stated REM sleep predominates during morning naps. This is significant if a patient is suffering from REM sleep.
deprivation. Stage III sleep predominates in late afternoon or evening naps. Hayter (1985) stated many older persons may need afternoon naps which have a higher percentage of NREM to restore energy at that time of day. The number of daytime naps both morning and afternoon increases with age. By age 75 the number of naps and the amount of naptime increases resulting in a gradual increase in total sleep time in a 24 hour period (Hayter, 1983). Sanford (1982) stated if naps are customary at certain times of the day this practice should be continued as possible in the hospital setting.

**Summary**

In this chapter, the conceptual framework for this study which was a taxonomy of sleep characteristics associated with the sleep factors of disturbance, effectiveness, and supplementation was presented. This taxonomy was developed by Verran and Snyder-Halpern for the VSH Sleep Scale. The VSH Sleep Scale was the operational indicator for this research study.
CHAPTER 3

METHODOLOGY

The purpose of this study was to test the reliability and validity of the Verran and Snyder-Halpern (VSH) Sleep Scale on adult patients hospitalized in the coronary care unit of an acute care facility. The purpose was also to investigate by subjective measurement the sleep characteristics of patients hospitalized in a coronary care unit. Specifically, the following research questions were posed:

1. Does the Verran and Snyder-Halpern (VSH) Sleep Scale reliably measure subjective patterns of sleep in patients hospitalized in a coronary care unit (CCU)?

2. Does the VSH Sleep Scale evidence the same subscale factors in CCU patients as it does in healthy subjects and patients hospitalized on general medical-surgical units?

3. What are the mean values of sleep characteristics in the sample of CCU patients?

4. How do the mean values of the CCU sample Sleep Scale characteristics compare with the mean values
This chapter described the setting, sample, protection of human rights, data collection, protocol, instrumentation and data analysis for this study.

**Setting and Sample**

A 16 bed cardiothoracic intensive care unit was used for this study. The unit is a combined coronary care and cardiothoracic critical care area in a not-for-profit community hospital in a southwestern city.

A sample size of 25 male or female adult patients admitted to the coronary care unit were invited to participate in this study. Criteria for subject inclusion were:

1. Male or female adult 18 years or older.
2. No history of sleep disorder, seizure disorder or brain damage.
3. No history of chronic alcoholism.
4. Able to read and speak English.
5. Able to physically and mentally complete study instrument.

The criterion of no history of sleep disorder, seizure disorder, or brain damage was chosen to eliminate...
neurologic abnormalities in subjects. These abnormalities may affect usual sleep.

Subjects were not asked to participate in the study if they had a recent history of alcoholism. Active alcoholics have changes in REM and stages III and IV NREM. Withdrawal of alcohol from chronic alcoholics often results in an initial period of REM rebound (Williams, Karacan, & Hursch, 1974).

Only subjects who were able to read and speak English were asked to participate in the study. Subjects needed to be physically and mentally capable of completing the study instrument to participate in this study. Patients in critical care areas are often physically and mentally unable to participate in studies that require them to be alert and oriented.

The unit of analysis for this study was one night of sleep. The investigator desired that each subject would complete two nights of sleep study in the CCU for this research project. However, this was impossible to achieve since the number of clients available to participate in the study and the length of time clients actually spent in the CCU were limited. Clients not seen as critical were rapidly transferred out of the unit. Many prospective subjects spent only one night in the unit.
before being transferred to the post coronary care unit or discharged.

**Protection of Human Rights**

This study received approval as an exempt study from the University of Arizona College of Nursing Human Rights Review Committee. See Appendix B for the approval form. Subjects were assured of anonymity and told of their right to withdraw from the study at any time. If the patient agreed to participate in the study, he or she was provided with a study consent form. Although as an exempt study only a disclaimer was required, the agency where the research took place required a patient signed consent. See Appendix C for a copy of the consent form.

**Data Collection Protocol**

Staff nurses on the unit and patient's charts and kardexes on the unit were used as resources in obtaining possible subjects for study. If a patient met the above criteria he, or she was provided with a consent form.

The data for this study was collected by one investigator. Subjects were approached in the late afternoon or early evening and asked to complete a Subject Information Questionnaire as shown in Appendix D with the assistance of the investigator. The subject was also asked to complete the Verran and Snyder-Halpern (VSH)
Sleep Scale within two hours of awakening following the night of sleep. See Appendix E for a copy of the Verran and Snyder-Halpern (VSH) Sleep Scale. The investigator checked back with the participant to see if the VSH Sleep Scale was being completed. A sleep research form (Appendix F) was placed in the patient's kardex to alert the staff that the patient was participating in a sleep study and not to alter his usual care in any way.

Instrumentation

The operational indicator for the study was the VSH Sleep Scale. The VSH Sleep Scale is a visual analogue instrument utilizing a 100 millimeter response line. Appendix E is a photocopy of the VSH Sleep Scale in which the scale has been reduced from the original 100 millimeter line. The visual analogue format was used by Snyder-Halpern & Verran (1987) because it has been shown to be highly effective in the measurement of attitudes and subjective feelings (Snyder-Halpern & Verran, 1987).

This instrument utilizes a scaling technique with a 100 millimeter line where the subject makes a mark on the line to indicate his feelings or attitudes in relationship to two extreme statements. Location of the vertical marks is measured in millimeters from the zero end point and given a score of that measured value. The zero point is designed to give a score of zero or absence
of a sleep characteristic. Therefore the higher the score on each item the greater the value of that sleep characteristic. The exception to this is the characteristic of sleep efficiency which is reverse scored. The technique also permits an increased variability of response in contrast to the forced-choice format provided by the more traditional Likert-type scale (Snyder-Halpern & Verran, 1987).

The visual analogue scale has been used as a format in sleep questionnaires by several investigators for subjective measurement of sleep (Aitkin, 1969; Herbert, Johns & Dore, 1976; Parrott & Hindmarch, 1978, 1980). A visual analogue scale is particularly appropriate for patients in critical care areas because of its simplicity and ease of administration (Richards, 1985).

The VSH Sleep Scale is a relatively new instrument. The initial taxonomy for this study which was deduced from a review of the literature proposed four factors of sleep characteristics: 1) fragmentation, 2) length, 3) latency, and 4) depth. After empirical study, factor analysis yielded two rather than four factors: 1) sleep disturbance and 2) sleep effectiveness. Additional items were then added to the taxonomy which was retested with healthy and hospitalized subjects.
Results from studies indicated that the theta reliability for the analogue scale was quite good for a new instrument. The overall theta for the first study on 48 healthy subjects with a total of 144 sleep ratings was 0.88. Theta reliability for the factor of sleep disturbance was 0.87 and 0.75 for the factor of sleep effectiveness. In the study of 76 hospitalized patients, the overall theta was 0.91. The theta reliability for the factor of sleep disturbance was 0.86 and the theta reliability for the factor of sleep effectiveness was 0.89 (J. A. Verran, personal communication, June 25, 1987). Both of the studies had moderate evidence to support the taxonomy and both of the studies had concurrent validity. The current version of the VSH Sleep Scale had an added factor of sleep supplementation. No reliability or validity data were available for the third factor (J. A. Verran, personal communication, June 25, 1987).

A demographic data questionnaire labeled Subject Information Questionnaire was also used to collect demographic data on all of the subjects. This scale is shown in Appendix D.

Data Analysis

Data analysis for this study was done by examining each of the four research questions. The first question addressed the reliability of the VSH Sleep Scale when used
with patients hospitalized in a coronary care unit. This question was analyzed by the reliability coefficient theta for a scale with non-parallel items.

The second research question asked if the VSH Sleep Scale evidenced the same subscale factors in CCU patients as it did in healthy subjects and patients hospitalized on general medical-surgical units. Analysis of this question was done by common factor analysis solution with varimax rotation.

The mean values of sleep characteristics in the sample of CCU subjects was addressed in the third question. Descriptive statistics were used to analyze this research question.

Comparison of mean values of the CCU sample sleep scale characteristics with the mean values of healthy subjects and the mean values of patients hospitalized on general medical-surgical units was the basis of the fourth research question. Analysis was done by comparing means from the subjects in the CCU sample with the mean values of two other groups of subjects previously tested by Verran and Snyder-Halpern. The first comparison group of subjects tested were healthy subjects with 144 data sets (Verran & Snyder-Halpern, 1985a). The second comparison group of subjects tested were hospitalized patients on general medical-surgical units with 76 data sets (Verran &
Snyder-Halpern, 1985b). T-tests for differences between the study group and each of the two comparison groups were done.

**Summary**

In this chapter the methodology used in this study was described. The setting, sample, protection of human rights, and data collection protocol were addressed. The operational indicator, the VSH Sleep Scale, and plans for the analysis of data based on the research questions were also discussed.
RESULTS

In this chapter results of the statistical analyses of the data collected during this study are presented. Eighteen subjects completed 30 nights of sleep study in a coronary care unit for 30 units of analysis. The first section in this chapter is a description of the sample. The remaining sections in the chapter address the research questions proposed for the study. The second section addresses the reliability analysis. The third section addresses the factor analysis. The fourth section presents the sleep characteristics of coronary care unit subjects. The fifth section presents the sleep characteristic comparisons.

Description of the Sample

This study utilized subjects admitted to a 16 bed cardiothoracic intensive care unit. The unit was a combined coronary care and cardiothoracic surgical unit. Subjects either had an acute cardiovascular event or a history of cardiovascular disease causing their admission to the particular unit. Eighteen subjects participated in
the study. Twelve subjects completed two nights of sleep study while 6 subjects completed one night of sleep study for a total of 30 units of analysis. Fifteen (83%) of the subjects were male and three (17%) of the subjects were female. Subjects' ages ranged from 43 to 78 years of age with a mean age of 59.78. The majority of the subjects were married (83%).

Normal sleep time began for the participants between 2000 and 0100 and continued until 0400 to 0800. Thirteen (72%) of the subjects reported no sleep loss from their illness. Nine (50%) of the subjects used some routine assistance such as reading or television to fall asleep. None of the subjects used sleeping medication on a routine basis prior to their hospital admission.

None of the subjects had worked a night shift with daytime sleep in the last two months and none of the subjects planned to work a night shift with daytime sleep in the future. Seven (40%) of the participants stated they were under stress. Seven (40%) of the subjects were employed full time and seven (40%) were retired.

**Reliability Analysis**

The first research question proposed in Chapter 3 addressed reliability of the VSH Sleep Scale: (1) Did the Verran and Snyder-Halpern (VSH) Sleep Scale reliability
measure subjective patterns of sleep in patients hospitalized in a coronary care unit (CCU)?

This question was analyzed by the reliability coefficient theta for a scale with non-parallel items. A theta level of $\geq .70$ was used as an acceptable criterion level (Nunnally, 1978). The subscale factor of disturbance showed a coefficient theta of .85. The effectiveness subscale coefficient theta was .83 and the supplementation subscale coefficient theta was .78. The three factors of disturbance, effectiveness, and supplementation all demonstrated acceptable reliability when measuring sleep of patients hospitalized in a coronary care unit.

Factor Analysis

The second research question was addressed with factor analysis. (2) Did the VSH Sleep Scale evidence the same subscale factors in CCU patients as it did in healthy subjects and patients hospitalized on general medical-surgical units?

Analysis of this question was done by common factor analysis with varimax rotation. If the same subscale factors were found in CCU patients as in healthy subjects and patients hospitalized on general medical-surgical units, the characteristics would load on three factors. One factor would have the disturbance
characteristics, one factor would have the effectiveness characteristics and one factor would have the supplementation characteristics. The criterion for factor loadings is \( \geq 0.50 \) with a criterion \( \geq 0.20 \) difference between loadings (Carmines & Zeller, 1979). The characteristics, however, loaded on four factors as shown in Table 1. This does not support the structure from the other two samples. Four of the characteristics, midsleep awakening (MSA), wake after sleep onset (WASO), subjective quality of sleep (SQS), and AM sleep (AMS) did not have clear loadings on one factor but each loaded about equally on two factors. Only those characteristics with clear loadings are underlined in Table 1.

Factor one loaded the disturbance characteristics of soundness of sleep (SS) and quality of disturbance (QD). Factor one also had negative significant loadings for rest upon awakening (RUA) and total sleep time (TST). These loadings may indicate a combination disturbance and effectiveness factor.

Factor two was clearly a latency factor with loadings on sleep latency (SL) and quality of latency (QL). Factor three loaded two of the supplementation characteristics, wake after final arousal (WAFA), and PM Sleep (PMS). It also loaded the characteristic of sleep sufficiency evaluation negatively. Factor four loaded
Table 1. Factor Analysis*  

<table>
<thead>
<tr>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Factor 3</th>
<th>Factor 4</th>
</tr>
</thead>
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<tr>
<td>Disturbance</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Midsleep Awakening&lt;sup&gt;b&lt;/sup&gt;</td>
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<td>-.05</td>
<td>.19</td>
</tr>
<tr>
<td>Wake After Sleep Onset&lt;sup&gt;b&lt;/sup&gt;</td>
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<td>.58</td>
<td>.06</td>
</tr>
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<td>Movement During Sleep</td>
<td>.22</td>
<td>.14</td>
<td>-.07</td>
</tr>
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<td>Sleep Latency</td>
<td>.21</td>
<td>.79</td>
<td>.05</td>
</tr>
<tr>
<td>Soundness of Sleep</td>
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<td>.12</td>
<td>.07</td>
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<td>.24</td>
<td>.37</td>
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<td>.06</td>
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Effectiveness  
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<th>Factor 3</th>
<th>Factor 4</th>
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<td>-.16</td>
</tr>
<tr>
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<td>.55</td>
<td>-.29</td>
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<tr>
<td>Total Sleep Time</td>
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<td>-.36</td>
<td>.14</td>
</tr>
<tr>
<td>Sleep Sufficiency Evaluation</td>
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<td>-.17</td>
<td>-.64</td>
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</tbody>
</table>

Supplementation  
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</tr>
</thead>
<tbody>
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<td>.16</td>
<td>.87</td>
</tr>
<tr>
<td>Daytime Sleep</td>
<td>.23</td>
<td>.17</td>
<td>.37</td>
</tr>
<tr>
<td>AM Sleep</td>
<td>.08</td>
<td>.58</td>
<td>.55</td>
</tr>
<tr>
<td>PM Sleep</td>
<td>.13</td>
<td>-.07</td>
<td>.67</td>
</tr>
</tbody>
</table>

*<sup>n</sup> = 30  
<sup>a</sup>Total Sleep Period not included in total factor analysis.  
<sup>b</sup>Characteristic loading on two factors.  
<sup>c</sup>Significant factor loading
movement during sleep (MDS), a disturbance characteristic; and daytime sleep (DTS), a supplementation characteristic.

This factor structure and loadings are clearly uninterpretable in light of previous research on sleep. This may be due to the small sample size for this factor analysis. However, the characteristics are factoring together on the components of disturbance, effectiveness and supplementation when only subscale items are considered. This was evidenced by the high theta coefficients. In order to compute the theta coefficients a factor analysis by subscale was necessary.

Mean Values of Sleep Characteristics of CCU Subjects

Question three addressed the mean values of sleep characteristics in the CCU population. (3) What were the mean values of sleep characteristics in the sample of CCU patients? Descriptive statistics were used to answer this question.

Table 2 shows the means and standard deviations for the sleep characteristics associated with the factor of sleep disturbance of CCU subjects for the first and second nights of sleep and for the totals of the two nights of sleep. Most characteristics did not differ across the two nights. There was however at least 10 points difference between the means of nights one and
Table 2. Mean Values of Characteristics of Sleep Disturbance of CCU Subjects

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>First Night</th>
<th></th>
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<th></th>
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<td>S.D.</td>
<td>N</td>
<td>Mean</td>
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<td>32.09</td>
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<td>46.92</td>
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<tr>
<td>Wake After Sleep Onset</td>
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<td>41.50</td>
<td>28.51</td>
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<tr>
<td>Sleep Latency</td>
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<td>51.75</td>
</tr>
<tr>
<td>Soundness of Sleep</td>
<td>17</td>
<td>48.88</td>
<td>35.80</td>
<td>11</td>
<td>59.00</td>
</tr>
<tr>
<td>Quality of Disturbance</td>
<td>18</td>
<td>54.67</td>
<td>36.29</td>
<td>12</td>
<td>58.83</td>
</tr>
<tr>
<td>Quality of Latency</td>
<td>18</td>
<td>44.67</td>
<td>37.60</td>
<td>12</td>
<td>52.00</td>
</tr>
</tbody>
</table>
nights two on the characteristics of mid sleep awakening (MSA), movement during sleep and soundness of sleep (SS). MSA was more disturbed on the first night of sleep. MDS and SS were more disturbed on the second night of sleep.

The factor of sleep effectiveness with its associated characteristics is shown in Table 3. Means and standard deviations for first and second nights of sleep and for the total of the two nights are also shown in Table 3. Again most characteristics did not differ across the two nights. Rest upon awakening (RUA) and total sleep time (TST) differed by more than 10 points between the means of nights one and nights two. Both RUA and TST were more effective on the first night of sleep.

Table 4 represents the factor of sleep supplementation and its associated characteristics. The means and standard deviations for the two nights are also presented. PM sleep is the only characteristic where the mean differs by more than 10 points from the first night to the second night. PM sleep supplementation was more than 20 points higher on the first night than on the second night.

Sleep Characteristic Comparisons

Question four addressed the comparison of sleep characteristics of the CCU sample with the healthy sample and the sample of patients hospitalized on general
Table 3. Mean Values of Characteristics of Sleep Effectiveness of CCU Subjects

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>First Night</th>
<th></th>
<th></th>
<th>Second Night</th>
<th></th>
<th></th>
<th>Total</th>
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<td>45.92</td>
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<td>53.70</td>
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<td>50.06</td>
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<td>Total Sleep Period</td>
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<td>100.78</td>
<td>20.88</td>
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<td>Sleep Sufficiency Evaluation</td>
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Table 4. Mean Values of Characteristics of Sleep Supplementation of CCU Subjects

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<td>26.99</td>
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<td>PM Sleep</td>
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medical-surgical units. (4) How did the mean values of the CCU sample sleep scale characteristics compare with the mean values of healthy subjects and the mean values of patients hospitalized on general medical-surgical units? This research question was analyzed by comparing means from the subjects in the CCU sample with the mean values of the two other comparison groups of subjects previously tested by Verran and Snyder-Halpern. This comparison was done by t-tests between the CCU sample and the healthy sample. Results of the t-tests for these two groups is shown in Table 5. Overall the CCU sample demonstrated significantly greater disturbances and significantly less effective sleep than the healthy sample. When using t-tests, all the sleep characteristics were found to be significantly different at the $p < .05$ level with the exception of total sleep time and wake after final arousal. Two of the characteristics, AM Sleep and PM Sleep, were not included in the VSH Sleep Scale at the time it was administered to healthy subjects. Therefore no comparison was done on these two items.

The results for the comparison between the patients hospitalized on general medical-surgical units and the subjects in the CCU sample are shown in Table 6. The t-tests found no significant differences between the sleep characteristics of the general medical-surgical
Table 5. Sleep Characteristic Comparisons for the Healthy Sample and the CCU Sample

<table>
<thead>
<tr>
<th>Disturbance Characteristics</th>
<th>Healthy Sample (n = 144)</th>
<th>CCU Sample (n = 30)</th>
<th>t-test</th>
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<tr>
<td>Mid Sleep Awakening</td>
<td>34.22 29.42</td>
<td>53.60 33.30</td>
<td>-3.18*</td>
</tr>
<tr>
<td>Wake After Sleep Onset</td>
<td>22.08 18.59</td>
<td>44.83 27.03</td>
<td>-5.55*</td>
</tr>
<tr>
<td>Movement During Sleep</td>
<td>34.40 24.08</td>
<td>49.50 31.14</td>
<td>-2.94*</td>
</tr>
<tr>
<td>Sleep Latency</td>
<td>17.06 20.46</td>
<td>49.86 32.14</td>
<td>-7.09*</td>
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<tr>
<td>Soundness of Sleep</td>
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<td>52.86 34.91</td>
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<tr>
<td>Quality of Disturbance</td>
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<td>56.33 34.06</td>
<td>-6.10*</td>
</tr>
<tr>
<td>Quality of Latency</td>
<td>16.51 25.06</td>
<td>47.60 36.24</td>
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</tr>
<tr>
<td>Effectiveness Characteristics</td>
<td></td>
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</tr>
<tr>
<td>Rest Upon Awakening</td>
<td>67.21 23.57</td>
<td>53.70 34.19</td>
<td>2.60*</td>
</tr>
<tr>
<td>Subjective Quality of Sleep</td>
<td>70.36 25.06</td>
<td>49.17 37.07</td>
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<tr>
<td>Total Sleep Time</td>
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<td>Sleep Sufficiency Evaluation</td>
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<td>46.33 33.33</td>
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<td>Supplementation Characteristics</td>
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<tr>
<td>Wake After Final Arousal</td>
<td>30.31 33.88</td>
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<td>Daytime Sleep</td>
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<td>34.53 26.63</td>
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<tr>
<td>AM Sleep</td>
<td>not measured</td>
<td>37.93 29.92</td>
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</tr>
<tr>
<td>PM Sleep</td>
<td>not measured</td>
<td>48.70 27.23</td>
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</table>

*Significantly different at 2 tailed p .05.
Table 6. Sleep Characteristic Comparisons for the General Medical-Surgical Sample and the CCU Sample

<table>
<thead>
<tr>
<th></th>
<th>Gen. Med-Surg Sample (n = 76)</th>
<th>CCU Sample (n = 30)</th>
<th>t-test</th>
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<td>53.60</td>
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<tr>
<td>Wake After Sleep Onset</td>
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<td>44.83</td>
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<td>Movement During Sleep</td>
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<tr>
<td>Rest Upon Awakening</td>
<td>57.02</td>
<td>28.22</td>
<td>53.70</td>
</tr>
<tr>
<td>Subjective Quality of Sleep</td>
<td>49.25</td>
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<tr>
<td>Total Sleep Time</td>
<td>47.11</td>
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<td>Sleep Sufficiency Evaluation</td>
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<td>Supplementation Characteristics</td>
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<tr>
<td>Wake After Final Arousal</td>
<td>35.62</td>
<td>31.98</td>
<td>36.83</td>
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<tr>
<td>Daytime Sleep</td>
<td>21.63</td>
<td>19.84</td>
<td>34.53</td>
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<tr>
<td>AM Sleep</td>
<td>not measured</td>
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</tr>
<tr>
<td>PM Sleep</td>
<td>not measured</td>
<td></td>
<td>48.70</td>
</tr>
</tbody>
</table>

*Significantly different at 2 tailed p .05.
sample and the CCU sample with the exception of daytime sleep. The CCU group had significantly more daytime sleep than the general medical-surgical sample. Again no comparison was done on the two items of AM Sleep and PM Sleep. They were not included in the VSH Sleep Scale at the time it was administered to general medical-surgical subjects.

**Summary**

The results of the study were presented in this chapter. The sample of CCU subjects was also described. The results of the data analysis for the four research questions was addressed. Analysis of reliability for the VSH Sleep Scale showed good evidence of reliability when determined by theta coefficients. Factor analysis showed the factors loading on four factors rather than three factors as it did when used with previous populations. The mean values of sleep characteristics of CCU subjects was presented. Sleep characteristic comparisons between CCU subjects and healthy subjects and between CCU subjects and general medical-surgical subjects was also presented.
CHAPTER 5

CONCLUSIONS

The first purpose of this research study was to test the reliability and validity of the Verran and Snyder-Halpern (VSH) Sleep Scale on adult patients hospitalized in the coronary care unit of an acute care facility. The second purpose was to investigate by subjective measurement the sleep characteristics of patients hospitalized in a coronary care unit. The results of this study were presented in Chapter 4. In this chapter the results, limitations of the study, recommendations for further research, and implications for nursing are discussed.

Interpretation of Results

Reliability

The disturbance and effectiveness factors of the VSH Sleep Scale showed strong evidence of reliability as measured by coefficient theta. The supplementation factor had moderate evidence of reliability as measured by coefficient theta. Therefore, based on this analysis it would appear the Verran and Snyder-Halpern Sleep Scale is
a reliable subjective measurement of sleep in a coronary care unit sample when the subjects are physically and mentally capable of completing the sleep scale.

Factor Analysis

Factor analyses done on the VSH Sleep Scale for this study showed the factors loading on four factors rather than the usual three factors of disturbance, effectiveness and supplementation. These factors were not interpretable in light of previous research with the scale and in light of previous objective sleep research on which the subscales were based. The most likely conclusion for this result is that the analyses procedure was inappropriate for the small sample size and therefore the results are biased.

Sleep Characteristics of CCU Subjects

Sleep Disturbance. Subjects in the CCU showed a moderate amount of wakefulness during the night as indicated by their average mid-sleep awakening (MSA) score of 53.60. Scores of MSA ranged from 0 to 95 on the VSH Sleep Scale. On the VSH Sleep Scale the zero point is designed to give an absence of a sleep characteristic with a range of 0 to 100 millimeters. Therefore, the higher the score on each item the greater the value of that sleep characteristic.
When measuring wake after sleep onset (WASO) the range in scores was also from 0-95. The average score was 44.83 indicating subjects in the CCU felt they were awake for an approximation to time of 4.48 hours during each night of sleep study.

Subjects showed a moderate amount of movement during sleep (MDS) with an average of 49.5. The range of MDS on the sleep scale was from 0-95.

Sleep latency (SL) measurement showed a moderate amount of difficulty with falling asleep. The average score was 49.86 with a range of 0-99.

Soundness of sleep (SS) showed a mean of 52.86 which suggests CCU subjects' sleep was moderately sound. There was a range of 0 to 100 for SS.

The quality of disturbance (QD) and the quality of latency (QL) was also moderate for CCU subjects. QD showed a mean of 56.33 with a range of 0-97. QL showed a mean of 47.60 with a range of 0-98.

The characteristics of sleep disturbance in CCU subjects indicated they experienced a substantial amount of disrupted sleep. The range of scores indicated a wide range of variability in all sleep disturbance characteristics for this population. In regard to the sleep characteristics of CCU subjects, each of the characteristics had large standard deviations. This is
typical of other data collected with this scale (Epstein, 1988) and indicates the wide range of difference in sleep characteristics in all populations (J. A. Verran, personal communication, February 20, 1988). These large differences also seem to be a factor with visual analogue scales using a wide (0 to 100 mm) response line (J. A. Verran, personal communication, February 20, 1988).

Sleep Effectiveness. Coronary Care Unit subjects reported a moderate amount of rest upon awakening (RUA). The mean was 53.70 with a range of 0-100. Subjective quality of sleep showed an average of 49.16 also with a range of 0-100.

The total sleep period (TSP) evidenced a large amount of time in settling down for sleep to awakening in the morning. The mean was 99.86 with a range from 68 to 164. However, the reported total sleep time (TST) or the time actually asleep was considerably less. The mean was 55.03 with a range of 2 to 95. The total sleep period was nearly twice the total sleep time which means CCU subjects spent many hours awake during their total sleep period as supported by the literature in Chapter 1. The sleep sufficiency evaluation also showed a moderate score of 46.33 with a range of 0-100.

A summary of the sleep effectiveness characteristics would indicate that subjects in the CCU do
not get an effective night's sleep. Again there was a wide range of scores indicating a high degree of variability among the subjects' sleep.

Sleep Supplementation. Wake after final arousal (WAFA) showed an average score of 36.8 with a range of 0 to 92. Daytime sleep (DTS) reported a score of 34.53 or an approximation to time of 3.45 hours of DTS for CCU subjects. The range for DTS was 0-92. AM Sleep (AMS) averaged 37.91 with a range of 0 to 90. PM Sleep (PMS) averaged 48.70 with a range of 0 to 97. In summary, CCU subjects were able to supplement their night time sleep with a moderate amount of daytime sleep. The largest portion of DTS took place in the PM with an approximation to time of 4.8 hours. Once again there was a large variety in the subjects' sleep as shown by the range of sleep supplementation characteristic scores.

Conclusion. According to this data and for the sample, the night time sleep of patients hospitalized in coronary care units was disturbed and ineffective. CCU subjects were able to supplement their nighttime sleep with daytime sleep.
Comparisons with Healthy Subjects

**Sleep Disturbance.** Statistically significant differences were found between healthy subjects and CCU subjects on all characteristics in the sleep disturbance factor. CCU subjects reported considerably more mid sleep awakening (MSA) and wake after sleep onset (WASO). They also reported more movement during sleep (MDS) which seems logical with more MSA and more WASO.

Sleep latency (SL) in the healthy population was reported to be 1.7 and 4.98 in the CCU sample which is a considerable difference. Soundness of sleep was reported to be less in CCU subjects than in healthy subjects. Quality of disturbance and quality of latency were both reported as significantly less in CCU subjects. In conclusion, patients hospitalized in the CCU area of acute care facilities had sleep that is significantly more disturbed when compared to the sleep of a healthy sample.

**Sleep Effectiveness.** Statistically significant differences were found between healthy subjects and CCU subjects on all characteristics of sleep effectiveness with the exception of total sleep time (TST). The healthy sample indicated it slept 6.10 hours on the approximation
to time while the CCU sample indicated it slept on the approximation to time of 5.50 hours.

CCU subjects reported significantly less rest upon awakening (RUA). The total sleep period for CCU subjects was 9.98 and 8.30 for the healthy subjects. Sleep sufficiency evaluation, or the adequacy of amount of sleep, was significantly less for the CCU sample. In conclusion, the CCU population experienced significantly less effective sleep than the healthy population experienced.

Sleep Supplementation. A significant difference was found in the daytime sleep (DTS) of CCU subjects and the DTS of healthy subjects. Healthy subjects averaged .49 on DTS while CCU subjects averaged 3.45 on DTS. Wake after final arousal was the other supplementation characteristic that was analyzed. WAFA was not found to be significantly different in healthy subjects and CCU subjects.

Conclusion. In conclusion CCU subjects had significantly more disturbed sleep and significantly less effective sleep than healthy subjects. CCU subjects were able to significantly supplement their sleep by day time sleep in the coronary care unit.
Comparisons with General Medical-Surgical Subjects

**Sleep Disturbance.** There were no significant differences found in the sleep characteristics of disturbance between the general medical-surgical sample and the CCU sample. This would indicate that the sleep of CCU subjects on the factor of disturbance was very similar to the general medical-surgical population.

**Sleep Effectiveness.** Again there were no significant differences found between the CCU subjects and the general medical-surgical population in the sleep characteristics of effectiveness. This also indicates that the sleep of CCU subjects on the factor of effectiveness was very similar to the general medical-surgical population.

**Sleep Supplementation.** There was a significant difference found in the daytime sleep of CCU subjects when compared to general medical-surgical subjects. CCU patients slept an approximation to time of 3.45 hours during the day while general medical-surgical patients slept an approximation to time of 2.16 hours during the day.

**Conclusion.** Patients in the CCU reported nearly the same characteristics of sleep on the factors of
disturbance and effectiveness. The literature stated that sleep in intensive care areas is more disturbed and less effective than sleep on general medical-surgical units. However, the acuity of the CCU patients that were able to participate in this sleep study probably resembled general medical-surgical patients more closely than typical intensive care unit patients. CCU patients with very high acuities were not physically or mentally able to participate in this study. On the factor of supplementation the subjects in the CCU slept significantly more during the day time than the general medical-surgical subjects. This may be due to the fact that CCU patients are kept in bed for the majority of the 24 hour day.

Another factor that may have resulted in no significant difference found between the sleep of general medical-surgical subjects and CCU subjects was the coronary care unit itself. The CCU utilized for this study was a 16 bed unit with all private rooms. Sliding glass doors, heavy curtains, and carpeting in each room all added to a quiet atmosphere on the unit. Subjects stated that the area was quiet and in general their sleep was not disturbed by noises outside their rooms. This atmosphere is different from critical care area with open
spaces containing more than one bed and other areas that were not designed for quiet.

**Limitations of the Study**

Limitations of the study included the small sample size of 18 subjects with 30 units of analysis. Originally the study was planned for 25 subjects with 50 units of analysis. However, it took three months to recruit the 18 subjects who were able to participate in the study.

The intent for patients to be hospitalized for at least two nights in the coronary care unit to participate in the study presented a problem. Prospective payment systems quickly force patients out of critical care areas. Subjects who were well enough to complete a sleep scale were transferred out of the CCU after the first night of study. Several subjects completed the second night of study in the post coronary care unit. It was difficult to follow patients and their sleep scales when they were transferred out of the CCU and nights of analysis are missing because of swift transfers.

There were several Spanish speaking patients on the unit. They were not able to participate in the study as the investigator only spoke English and the VSH Sleep Scale at this time is not available in Spanish.

The last criterion, ability to physically and mentally complete the study instrument posed the greatest
problem. Many potential subjects were too sick to be interested in participating in the study. Although they were willing to be interviewed by the investigator, they were not able to complete a paper and pencil instrument at this time. Invasive equipment, pain, fatigue, and the inability to sit up in bed were all factors that kept patients from participating in the study. Several elderly patients seemed to have trouble understanding the concept of the study and the instrument itself and declined to participate for these reasons.

Recommendations for Further Research

The study should be replicated with a larger sample size. More than one acute care facility might be needed to accomplish this. The study should be conducted in an intensive care area that is designed as an open ward since many of these units are still in existence. A qualitative study for patients in critical care areas might bring forth other characteristics of sleep for study. Subjects in this study were able to answer questions from the interviewer but were not able to do the paper and pencil test. This suggests that a study where the interviewer marks the responses might be more appropriate for this population. An objective sleep study comparing this subjective instrument, the VSH Sleep Scale, would also be interesting.
Implications for Nursing

Findings from this study have contributed to the knowledge base in nursing in the area of sleep in general and more specifically in sleep in patients in coronary care units. As health care personnel continue to know more about sleep characteristics of their patients, hopefully plans for implementing care to increase sleep effectiveness and decrease sleep disturbance will become a reality.

This study has also contributed to the testing of instrumentation in the science of nursing, specifically in the area of subjective sleep instrumentation where there has been a void. Further testing of the Verran and Snyder-Halpern Sleep Scale will increase its potential for use in clinical nursing research.

Summary

The purpose of the study was to test the reliability and validity of the Verran and Snyder-Halpern (VSH) Sleep Scale on patients hospitalized in a coronary care unit (CCU and to investigate the sleep characteristics of patients hospitalized in the CCU setting. Results of this study were compared to means from groups of healthy subjects and subjects hospitalized on general medical-surgical units. The VSH Sleep Scale demonstrated reliability in this group of CCU subjects.
Factor analysis of the data showed loadings on four factors rather than the theoretical three factors. The mean scores for this sample of CCU patients indicated their sleep was disturbed and ineffective. Significantly different sleep characteristics were demonstrated between CCU subjects and healthy subjects. Comparisons between CCU subjects and general medical-surgical subjects evidenced no differences in the sleep characteristics. Recommendations for further research and implications for nursing were presented.
APPENDIX A

DEFINITION OF SLEEP CHARACTERISTICS
ON VERRAN AND SNYDER-HALPERN
(VSH) SLEEP SCALE

Mid-Sleep Awakening (MSA): The number of awakenings during the sleep period.

Wake after Sleep Onset (WASO): Estimate of amount of time spent awake during the total sleep period (TSP).

Movement during Sleep (MDS): Subjective estimate of the amount of movement during sleep.

Sleep Latency (SL): Estimate of the amount of time from settling down to sleep until falling asleep.

Soundness of Sleep (SS): Subjective estimate of sleep depth.

Quality of Disturbance (QD): Subjective estimate of sleep disturbance due to awakenings.

Quality of Latency (QL): Subjective estimate of difficulty in going to sleep.

Rest upon Awakening (RUA): Subjective estimate of how rested the person is upon awakening.

Subjective Quality of Sleep (SQS): Individual estimate of sleep time along dimensions of satisfaction, quality, and disturbance in sleep.
Total Sleep Period (TSP): Estimate of total time from settling down for sleep to awakening in the morning (TST + WASO).

Total Sleep Time (TST): Estimate of amount of time spent in actual sleep during the total sleep period (TSP).

Wake after Final Arousal (WAFA): Estimate of time in bed from initial morning arousal to final awakening.

Sleep Sufficiency Evaluation (SSE): Estimate of adequacy of amount of sleep.

Daytime Sleep (DTS): Estimate of time asleep during the morning and the afternoon other than primary sleep period.

AM Sleep (AMS): Estimate of time asleep during the morning other than the primary sleep period.

PM Sleep (PMS): Estimate of time asleep during the afternoon other than the primary sleep period.
TO: Ms. Vernone Lindell  
FROM: Linda R. Phillips, PhD, RN, FAAN  
Acting Director of Research  
DATE: July 9, 1987  
RE: Human Subjects Review:

Your project has been reviewed and approved as exempt from University review by the College of Nursing Ethical Review Subcommittee of the Research Committee and the Director of Research. A consent form with subject signature is not required for projects exempt from full University review. Please use only a disclaimer format for subjects to read before giving their oral consent to the research. The Human Subjects Project Approval Form is filed in the office of the Director of Research if you need access to it.

We wish you a valuable and stimulating experience with your research.

LRP/ms
APPENDIX C

SUBJECT CONSENT FORM
THE DESCRIPTION OF SLEEP CHARACTERISTICS
OF PATIENTS HOSPITALIZED IN
CORONARY CARE UNITS

Consent

The purpose of this study is to evaluate the sleep characteristics of hospitalized adults in the Coronary Care Unit and to examine the factors which disrupt patient sleep. The purpose is also to test a questionnaire that evaluates sleep on this population of patients. You are being asked to voluntarily complete a questionnaire regarding your hospitalization and an Information Questionnaire about yourself. The Sleep Scale must be completed within two hours of awakening tomorrow morning and the next morning. The Information Questionnaire may be completed at any time. It takes about 15 minutes to complete both forms. Your completed questionnaires will be collected tomorrow afternoon and the following afternoon. In addition your medical chart will be reviewed to obtain information regarding your hospital stay and the medications you are taking. There is no cost or payment for your participation in this study.

By signing this consent and responding to the questionnaires, you will be giving your consent to participate in the study. Your name is not on the questionnaires, and only the investigator who collects
your information will have access to your responses. You may choose not to answer some or all of the questions, if you so desire. Whatever you decide, the investigator-subject relationship will not be affected in any way. You may ask questions and receive answers about the study any time you wish. There are no known risks to this study. Although there is no direct benefit for you, the information obtained may contribute to a better understanding of ways to improve patient care.

I have read the above consent. The nature, demands, risks and benefits of the project have been explained to me. I understand that I may ask questions and that I am free to withdraw from the project at any time without incurring ill will or affecting my care. A copy of this consent has been given to me.

Patient Signature ___________________ Date _____

Witness Signature ___________________ Date _____

Principal Investigator:

Vernone E. Lindell, R.N., B.S.
APPENDIX D

SUBJECT INFORMATION QUESTIONNAIRE

Directions: Please circle or fill in the one correct response.

Subject Number: _________________________

1. What is your sex?  A. Female  B. Male

2. What is your age? ________________

3. What is your marital status? _________________________

4. What are your normal sleeping hours? ________ to ________

5. During the last two months, has your illness led to sleep loss or disruption in your normal sleep times? YES NO

6. Do you have any routine assistance for achieving sleep; e.g., a radio, TV, reading, etc. If YES, please list below: YES NO

7. Have you worked a night shift with daytime sleeping within the last two months? YES NO

8. Are you planning to work the night shift and sleep during the day within the next two months? YES NO

9. In your opinion, are you currently experiencing any stress which might disrupt your normal sleep patterns? YES NO

10. Select the ONE option which most accurately reflects your employment status:

☐ 1. Full-time student
☐ 2. Full-time employment
☐ 3. Part-time employment
☐ 4. Retired
☐ 5. Unemployed

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### SUBJECT INFORMATION QUESTIONNAIRE

**CHART FORM**

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<tr>
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<tr>
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<tr>
<td>Frequency of Dose (day before study night)</td>
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<td>17. Chronic sleeper use:</td>
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APPENDIX E

VERRAN AND SNYDER-HALPERN (VSH)
SLEEP SCALE
### VERRAN AND SNYDER-HALPERN SLEEP SCALE

**Directions:**
Answer each question by placing a vertical mark across the answer line at a point which BEST REFLECTS YOUR OPINION.

**Example:**
Happy                      Sad

Answer all of the following questions about your last night’s sleep. Consider the night’s sleep to begin from the time you first tried to go to sleep to the time you were finally “up” in the morning.

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<th>Scale #</th>
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<tbody>
<tr>
<td>1. Did not awaken</td>
<td>Was awake ten hours</td>
</tr>
<tr>
<td>2. Had no sleep</td>
<td>Excluding time awake, had ten hours of sleep</td>
</tr>
<tr>
<td>3. Did not sleep during the day yesterday</td>
<td>Slept ten hours during the day</td>
</tr>
<tr>
<td>4. Did not sleep yesterday morning</td>
<td>Slept off and on yesterday morning</td>
</tr>
<tr>
<td>5. Did not sleep yesterday evening</td>
<td>Slept off and on yesterday evening</td>
</tr>
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<td>6. Fell asleep immediately</td>
<td>Did not fall asleep</td>
</tr>
<tr>
<td>7. Slept lightly</td>
<td>Slept deeply</td>
</tr>
<tr>
<td>8. Had no trouble with disrupted sleep</td>
<td>Had a lot of trouble with disrupted sleep</td>
</tr>
<tr>
<td>9. Didn’t wake at all</td>
<td>Was awake off and on all night</td>
</tr>
<tr>
<td>10. Had no trouble falling asleep</td>
<td>Had a lot of trouble falling asleep</td>
</tr>
<tr>
<td>11. Didn’t move</td>
<td>Tossed all night</td>
</tr>
<tr>
<td>12. Awoke exhausted</td>
<td>Awoke refreshed</td>
</tr>
<tr>
<td>13. After morning awakening, stayed awake</td>
<td>After morning awakening, dozed off and on</td>
</tr>
<tr>
<td>14. Had a bad night’s sleep</td>
<td>Had a good night’s sleep</td>
</tr>
<tr>
<td>15. Had enough sleep</td>
<td>Did not have enough sleep</td>
</tr>
</tbody>
</table>

9/84 (Revised 2/85) (Revised 6/86)
REQUEST FORM

I request permission to copy the Verran-Snyder-Halpern (VSH) Sleep Scale for use in my research entitled, SUBJETTIVE SLEEP CHARACTERISTICS OF PATIENTS HOSPITALIZED IN A CORONARY CARE UNIT.

In exchange for this permission, I agree to submit to Dr. Verran or Dr. Snyder-Halpern, a copy of each data collection tool (i.e., subject information questionnaire, subject information questionnaire chart form, and VSH Sleep Scale) for each subject tested. These data will be used to establish a normative data base for clinical populations. No other use will be made of submitted data. Credit will be given to me in reports of normative statistics that make use of data I submitted for pooled analyses.

(Signature)
November 30, 1987
(Date)

Position and Full Address of Investigator(s)

GRADUATE STUDENT

COLLEGE OF NURSING

UNIVERSITY OF ARIZONA

TUCSON, ARIZONA 85721

Permission is hereby granted to copy the VSH Sleep Scale for use in the research described above.

Joyce A. Verran, Ph.D., R.N. OR Rita Snyder-Halpern, Ph.D., R.N.
November 1, 1987 (Date)

Please send two signed copies of this form to:

Joyce A. Verran, Ph.D., R.N.
College of Nursing
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Tucson, Arizona 85721
(602) 626-6205 OR
(602) 626-6154

Rita Snyder-Halpern, Ph.D., R.N.
St. Joseph's Hospital Centers
15855 Nineteen Mile Road
Mt. Clemens, Michigan 48044
(313) 263-2642
APPENDIX F

SLEEP RESEARCH FORM

THE UNIVERSITY OF ARIZONA COLLEGE OF NURSING

Sleep Research

Patient __________________________ in room __________________________ has agreed to participate in a study evaluating the sleep of hospitalized patients. The patient's participation involves completing a questionnaire about his/her sleep during the nights of __________________________. This questionnaire will be completed during the first two hours after awakening on the mornings of __________________________. Questionnaires were distributed and will be collected by __________________________, who will also collect data on medication administration and diagnosis from the patient's medication record and chart.

Please do not alter the care of the patient in any way. Any questions about this study may be directed to the principal investigator collecting data.

Vernone E. Lindell, R.N., B.S.
Principal Investigator
298-2709
LIST OF REFERENCES


