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Signature Barbara Ann Gill

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A NURSING CARE APPROACH FOR PROMOTION OF
NATURAL SLEEP IN THE HOSPITALIZED INDIVIDUAL

by

BARBARA POUL GILL

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Approved:

Mrs. Laura Walker RN PhD
Head, Major Department

Virginia E. Felton
Chairman, Examining Committee

K. Goering
Graduate Dean

MONTANA STATE UNIVERSITY
Bozeman, Montana

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ABSTRACT

The purposes of the study were: (1) to test the application of a nursing care approach designed to promote natural sleep in the hospitalized individual, (2) to compare the sleep patterns of hospitalized individuals having the routine bedtime care with those having the approach designed for the study, and (3) to expand the breadth of the concept of individualized patient care in nursing.

The study was done in a community hospital during July, August, and September, 1970. The population was made up of adults admitted to the medical-surgical units. Twenty subjects were selected and divided into two groups of ten; experimental and control groups. The control group received routine hospital care, including that given at bedtime. The experimental group received routine hospital care except at bedtime when the nursing care approach designed for the study was employed. The two groups were interviewed and the patient record examined to gather data on the taking of medication for sleep and feelings of being rested following a night's sleep in the hospital.

A null hypothesis and four alternate hypotheses were formulated and utilized in analysis of the data.

Null hypothesis: A nursing care approach that is designed to allow individuals to maintain, as near as possible, their regular hour and pre-retirement activities will make no significant difference in the amount of medication taken for sleep, nor the subjectively reported "rested" feeling following a night's sleep in the hospital.

Alternate hypotheses: (1) Individuals receiving the nursing care approach designed for the study will require less medication for sleep.

(2) Individuals receiving the nursing care approach designed for the study will require more medication for sleep.

(3) Individuals receiving the nursing care approach designed for the study will subjectively report feeling "rested" following a night's sleep in the hospital.

(4) Individuals receiving the nursing care approach designed for the study will subjectively report a lack of feeling "rested" following a night's sleep in the hospital.

A null hypothesis was rejected and alternate hypotheses 1 and 3 were accepted. Additional findings of the study were: (1) the majority of subjects when at home went to bed at approximately 10 p.m. and not 9 p.m., the bedtime in hospitals; (2) subjects not resting well in the hospital had the same problem at home; (3) subjects did not always know when they were receiving medication for sleep; and (4) subjects frequently took medications only on the first night of hospitalization.

Chapter 1

INTRODUCTION

In an era that might well be termed the era of individualized or patient centered care for nursing, there seems to be one aspect of the individual that is being overlooked. This aspect is sleep.

The hospital ritual of having everybody in bed by a specific time fails to take into consideration that sleep patterns, like other normal physiological processes, are unique to the individual. Little opportunity is provided for the hospitalized individual to maintain his regular retirement hour and activities. The hospital bedtime routine seems to support Levine's statement that "The activities of the hospital are for the convenience of the personnel rather than the patient."¹

Statement of the Problem

The promotion of sleep is frequently a goal of nursing care; however, the multiplicity of factors that influence sleep rarely are considered when the hour and activities of bedtime are planned for the hospitalized individual.

Purposes of the Study

The purposes of the study were: (1) to test the application of

¹Myra Estrin Levine, Introduction to Clinical Nursing, (Philadelphia: F. A. Davis Company, 1969), p. 430.

a nursing care approach designed to promote natural sleep in the hospitalized individual, (2) to compare the sleep patterns of hospitalized individuals having the routine bedtime care with those having the approach designed for the study, and (3) to expand the breadth of the concept of individualized patient care in nursing.

Null Hypothesis

A nursing care approach that is designed to allow individuals to maintain, as near as possible, their regular hour and pre-retirement activities will make no significant difference in the amount of medication taken for sleep, nor the subjectively reported "rested" feeling following a night's sleep in the hospital.

Alternate Hypotheses

(1) Individuals receiving the nursing care approach designed for the study will require less medication for sleep.

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(4) Individuals receiving the nursing care approach designed for the study will subjectively report a lack of feeling "rested" following a night's sleep in the hospital.

Assumptions

The study was based on the following assumptions:

- (1) Sleep is a normal physiological activity in man.
- (2) Sleep is influenced by endogenous rhythms.
- (3) Sleep is influenced by the immediate environment.
- (4) Sleep is influenced by the organismic state of the individual.
- (5) Sleep is influenced by habitual pre-retirement activities.

Methodology

The sample consisted of adults admitted to the medical-surgical units of a community hospital. Experimental and control groups were paired by age range and medical diagnosis. The control group received the routine hospital care, including that at bedtime. The experimental group received routine hospital care except at bedtime when the nursing care approach designed for the study was employed.

Limitations

The study has the following limitations:

- (1) The Hawthorne effect could be present in the experimental group.
- (2) Environmental variables over which the investigator had no control may affect the findings. Examples of these variables are early awakening for laboratory procedures and periodic entrances into the room by the night personnel to check on the individual.
- (3) The subjectivity of the individuals in reporting the "rested" feeling.

(4) The population from which the sample was secured was small.

Definition of Terms Used

Pre-retirement activities. Those activities in which the individual habitually engages the hour prior to retiring for sleep.

Sleep. A state of consciousness, occurring at night, that is characterized by a loss of critical reactivity to events in the environment.²

Natural sleep. Sleep that is achieved without the aid of pharmacological agents.

Routine bedtime care. The care normally administered to hospitalized individuals at bedtime.

Hour of sleep. In most hospitals this is 9 p.m.

Nursing care approach. The nursing care approach designed for the study provided that the investigator assist all individuals in the experimental group with their pre-retirement activities. In assisting this group the investigator provided opportunities for discussion of any anxiety producing activities associated with hospitalization. The investigator also attempted to provide, as near as possible, maintenance of the hour and activities of bedtime the individuals followed at home.

²Vernon B. Mountcastle (ed.), Medical Physiology II (12th ed.; Saint Louis: The C. V. Mosby Company; 1968), p. 1322.

Justification for the Study

Man spends approximately one-third of his day in sleep. The hospitalized individual is no different in his need for sleep than man in general. Sleep and rest are considered important in the healing process; yet it is not uncommon to hear the hospitalized individual say, "I'll be glad to get home so I can get some rest and sleep."

Chapter 2

REVIEW OF LITERATURE

INTRODUCTION

Sleep, the somewhat mysterious one-third of man's life has always been of interest to him. As a result of this interest there is a wealth of literature available on sleep; the physiological, psychological, and socio-cultural aspects each having been studied.

"Rhythmic alternations in the level of activity are characteristic of all living systems...."³ Rhythmic fluctuations in man include cycles lasting only milliseconds, such as chemical changes of membranes; circadian cycles (circa = about, diem = day), as in body temperature; and longer cycles, such as the lunar menstrual cycles in women.⁴ Though the "clock" governing these rhythmical alternations may be influenced by variations in external factors such as cosmic irradiation, there is much evidence to support the theory that these rhythms are endogenous and innate.⁵

Lobban states that "The most commonly recognized example of a circadian rhythm in man is the recurrent phenomenon of nocturnal sleep."⁶

³Mountcastle, p. 1322.

⁴Ernest Hartmann, The Biology of Dreaming (Springfield: Charles C. Thomas Publishers, 1967), p. 74.

⁵Mountcastle, p. 1322.

⁶Mary C. Lobban, "The Entrainment of Circadian Rhythms in Man," Biological Clocks, Vol. XXV, Cold Spring Harbour Symposia on Quantitative Biology (Cold Spring Harbour: The Biological Laboratory, 1960), p. 325.

The endogenous clock theory for regulation of sleep is supported by the observation that man consistently sleeps during a particular period of the twenty-four hour day. Additional support is offered by the observation that specific sleep time may be altered to some extent by such external factors as noise, brightness, and temperature; however, when these external factors are eliminated, the endogenous rhythm will again emerge with an accuracy that deviates only slightly from that occurring originally.⁷

Nocturnal sleep as an endogenous rhythm is perhaps summed up best in the following statement by Mills: "The ease with which some people can adjust their habit to an alternation of phase or cycle length is thus no evidence against an endogenous rhythm and the difficulty experienced by others is in favor."⁸

Since nursing is directly concerned with sleep in the ill individual (be he in the general hospital, mental health institution, or home) it behooves the nurse to know about sleep. Those physiological, anatomical, psychological, socio-cultural and pharmacological aspects adjudged helpful to the nurse in dealing with the ill individual are considered in the following section of this paper.

⁷Werner P. Koella, Sleep (Springfield: Charles C. Thomas Publishers, 1967), p. 144.

⁸J. N. Mills, "Human Circadian Rhythms," Physiological Reviews Vol. XXXIV (1966), p. 134.

PHYSIOLOGICAL AND ANATOMICAL ASPECTS OF SLEEP

"Sleep is a state of consciousness that differs from alert wakefulness by a loss of critical reactivity to events in the environment, indeed by a profound alternation in the function of the brain...."⁹ The alternation in the brain's function is not one long period of inactivity, as was thought for many years. There are characteristic changes in the central nervous system that can be recorded on the electroencephalogram (EEG) of the sleeping individual. These characteristic changes are classified into five stages or phases of sleep and correlated with specific levels of consciousness in the following manner:

Stage 1: Record in which EEG alpha waves are slowed very slightly; seen in quiet relaxed wakefulness or as drowsiness supervenes.

Stage 2: Record with spontaneous "sleep spindles"; runs of a few seconds' duration consisting of regular 14-15/sec. waves superimposed upon a low-voltage background with admixture of 3-6/sec. waves; associated with sleep of intermediate depth.

Stage 3: Record with some sleep spindles but now on a background of slower 1-2/sec. delta waves; associated with sleep of intermediate depth.

Stage 4: Record consisting entirely of high-voltage slow delta waves without spindling; associated with a phase of sleep in which the threshold of awakening is greatly elevated.¹⁰

⁹Mountcastle, p. 1322.

¹⁰W. C. Dement and N. Kleitman, "Cyclic Variations of EEG During Sleep and their Relation to Eye Movements, Body Motility and Dreaming," Electroencephalographic Clinical Neurophysiology, IX (1957), p. 675-676.

The fifth stage of sleep is referred to as rapid eye movement sleep (REM), emergent Stage 1, paradoxical, D-sleep or Stage 1-REM. The record of this phase is associated with the presence of rapid, twitch-like eye movements (REMs), an accelerated heart and respiratory rate, and by occasional gross body movements occurring against a background of decreased muscle tone (paradoxical sleep).¹¹ The EEG record is very near that seen in Stage 1, but the auditory stimulus needed to arouse the individual from sleep is five to ten times that needed in drowsy Stage 1 (emergent Stage 1).¹²

In the course of a night's sleep there are recurring cycles of the stages of sleep. The cycles usually occur in the following manner: Stage 1 to Stage 2 to Stage 3 to Stage 4 to Stage 3 to Stage 2 to Stage 1. The cycle of stages usually occurs from four to six times during an eight hour sleep period. One such cycle of sleep stages takes, on an average, one-hundred minutes to complete. The amount of time spent in the various stages differs as the sleep period progresses. Foulkes states that the later cycles differ from the earlier ones in two respects:

- (1) A greater proportion of each cycle subsequent to the first will be spent in Stage 1-REM sleep, with correspondingly less time

¹¹Ralph J. Berger, "Morpheus Descending," Psychology Today, (June, 1970), p. 33.

¹²Mountcastle, p. 1325-1326.

spent in NREM* Stages 2, 3, and 4. The first Stage 1-REM period is approximately ten minutes long; the second may be about twenty minutes in length; and toward morning these periods may persist for as much as forty to sixty minutes of a ninety to one-hundred minute cycle. (2) The nature of NREM sleep between these Stage 1-REM periods also changes. Stage 4 will generally be experienced only in the first and perhaps, the second cycles. Toward morning, the cyclic alternation may simply be Stage 1 to Stage 2 to Stage 1.¹³

There is an apparent phylogenetic and ontogenetic development in sleep. Phylogenetically the hunting species (man, the cat, the dog) spend more time in Stage 1-REM than hunted species (rabbits, ruminants). Hunting species spend an average of twenty percent of total sleep time in Stage 1-REM sleep as opposed to a five to ten percent average in hunted species.¹⁴

Ontogenetically there is a decrease in total sleep time. In four mammal species (man, the cat, the rat, and sheep) Jouvét found that the newborn spent at least twice as much time in Stage 1-REM sleep as the adult.¹⁵ In man the amount of time spent in Stage 1-REM sleep falls rapidly from fifty percent in the newborn to an average of twenty-five percent by school age. The NREM stages decrease more gradually

*NREM - Non REM stages of sleep; Stage 1, Stage 2, Stage 3, and Stage 4.

¹³David Foulkes, The Psychology of Sleep (New York: Charles Scribner's Sons, 1966), pp. 24-25.

¹⁴Michel Jouvét, "The States of Sleep," Scientific American, Vol. CCXVI (February, 1967), p. 70.

¹⁵Jouvét, p. 72.

from eight hours in the infant to five hours in the older adult.¹⁶

The transition from one stage of sleep to the next is a gradual process, states Kales; there is a progression of physiological variables until all the characteristics of the particular sleep stages are fully expressed.¹⁷ Physiological variables that accompany the sleep stages take on more meaning when comparison is made between the waking, NREM, and REM levels.¹⁸

Snyder *et al.* found that respiration, heart rate, and systolic blood pressure showed a constant relationship to the EEG cycles of sleep. During Stages 2, 3, and 4 the three functions oscillated quite regularly around a relatively stable line; however, during Stage 1-REM periods the mean level changes were small, they showed wide and erratic fluctuations. At times the systolic blood pressure rose thirty mm. Hg. above the surrounding levels during Stage 1-REM. In many instances marked changes in all three variables occurred at once, especially during bursts of REMs. On other occasions changes occurred in one variable singly. Abrupt rises were often associated with gross body movement or transient arousals. The blood pressure fell roughly twenty percent throughout the night, reaching its' minimum between 1.5 and 2.5

¹⁶Mountcastle, p. 1338.

¹⁷Anthony Kales (ed.), Sleep Physiology and Pathology (Philadelphia: J. B. Lippincott Company, 1969), p. 66.

¹⁸Kales, p. 67.

hours after onset of sleep and then gradually rose over the rest of the night to a level near that at sleep onset. Respiration and heart rate fell five to ten percent throughout the night; however, the lowest levels were occasionally recorded during the early hours of sleep.¹⁹

During Stage 1-REM sleep the level of activation of the autonomic nervous system resembles closely that of wakefulness, states Berger. Marked changes are seen in the metabolic activity and variability of vegetative activities; respiration, blood pressure and heart rate.²⁰

"In summing up available information", Kleitman states, "That the lowest blood pressure is more likely to occur in the first half of the night and that it precedes, rather than coincides with the lowest heart rate during sleep."²¹

A great variation in respiratory patterns exists among individuals during sleep.²² Kleitman regards the decreased irritability of the respiratory center and the resulting near-unanimity in findings

¹⁹Fredrick Snyder *et al.*, "Changes in Respiration, Heart Rate, and Systolic Blood Pressure in Human Sleep," Journal of Applied Physiology, Vol. XIX (May, 1964), pp. 417-19.

²⁰Ralph J. Berger, "Physiological Characteristics of Sleep," Sleep Physiology and Pathology, ed. Anthony Kales (Philadelphia: J. B. Lippincott Company, 1969), pp. 68-69.

²¹Nathaniel Kleitman, Sleep and Wakefulness (Chicago: The University of Chicago Press, 1963), p. 44.

²²Mountcastle, p. 1324.

concerning changes in alveolar air and blood gases as the outstanding change in respiratory function during sleep.²³

Skeletal musculature is at its most relaxed state during Stage 1-REM sleep; however, small twitchings and trembling movements of facial muscles and limbs occur periodically. Gross body movements, seen during all stages of sleep, occur most frequently during Stage 1-REM and with least frequency during Stage 3 and 4.²⁴

Closed eyelids, deviation of the eyes upward and outward and the powerful contraction of the anal and vesicular sphincters are cited as examples of what Kleitman identifies as "special muscular" conditions associated with sleep.²⁵

Penile erections occur frequently in Stage 1-REM sleep. "Ohlmeyer and co-workers found that erections occurred on an average of every eighty-five minutes and lasted for a mean duration of twenty-five minutes during the night's sleep."²⁶

There are changes in the concentration of blood constituents during sleep. Some of these changes are due to the diurnal cyclic variation in the hypothalamic-pituitary functioning. The decrease in

²³Kleitman, Sleep and Wakefulness, p. 52.

²⁴Berger, "Physiological Characteristics of Sleep", p. 67.

²⁵Kleitman, Sleep and Wakefulness, p. 8.

²⁶Kleitman, Sleep and Wakefulness, p. 112.

blood level and urinary excretion of ketosteroids during nocturnal sleep are a result of the hypothalamic-pituitary function.²⁷ An increase in the secretion and osmolality of urine suggests an increase in the secretion of anti-diuretic hormone by the neurohypophysis during Stage 1-REM sleep. Berger states further that a series of peak elevations occurring toward the end or soon after each Stage 1-REM period are found superimposed on the gradual rise of plasma 17-hydroxycorticoids that occurs during the night.²⁸

Johns, Cornell, and Masterton found changes in the basal skin resistance (BSR) and galvanic skin responses (GSR) during sleep. The BSR increased in a smooth curve during the night. Decreases were found in the BSR during brief awakenings and in a few cases during Stages 3 and 4 sleep; however, there were often no indications from the BSR alone of changes in sleep stages. GSRs initially decreased at sleep onset. Very few GSRs were found in sleep Stages 1 or 2 but in Stages 3 and 4 the number of GSRs increased markedly. There were few, if any, GSRs during Stage 1-REM sleep. The number of GSRs alone could not be used as an accurate measure of the duration of the different stages of sleep.²⁹

²⁷Mountcastle, p. 1324.

²⁸Berger, "Physiological Characteristics of Sleep", p. 67.

²⁹M. W. Johns, B. A. Cornell, and J. P. Masterton, "Monitoring Sleep of Hospital Patients by Measurement of Electrical Resistance of Skin," Journal of Applied Physiology, Vol. XXVII (December, 1969), pp. 899-900.

A characteristic phenomenon found in healthy individuals only during sleep or anesthesia is a positive Babinski's sign. This toe-extension response to scratching of the sole of the foot has not been associated with any particular stage of sleep.³⁰

The decrease in body temperature that occurs during sleep has not been associated with any particular stage of sleep but is above all, states Kleitman, associated with the twenty-four hour body temperature curve.³¹ This is perhaps supported by the findings of Geschickter, Andrews, and Bullard that a reduction in rectal temperature was associated with nocturnal sleep but not with afternoon naps.³²

"The condition of the extrinsic eye musculature is of significance because ocular activity is related to normal sleep and ocular symptoms are prominent in pathological sleep."³³ Normal rapid eye movements are described as binocularly conjugate and resembling waking eye movements of visual fixation. The movements occur with similar speeds in all directions. The rate of rapid eye movements (REMs) is relatively constant from night to night and is characteristic of each individual.

³⁰Kleitman, Sleep and Wakefulness, p. 16.

³¹Kleitman, Sleep and Wakefulness, p. 53.

³²Edmund H. Geschickter, Patricia A. Andrews, and Robert W. Bullard, "Nocturnal Body Temperature Regulation in Man: A Rationale for Sweating in Sleep," Journal of Applied Physiology, Vol. XXI (March, 1966), p. 623.

³³Kleitman, Sleep and Wakefulness, p. 11.

The REMs are more often horizontal than vertical in the adult man.³⁴

The pupil is narrowly constricted during sleep, indicating changes in the intrinsic eye musculature. Mountcastle states that the pupil, though narrowly constricted, still displays a light reflex.³⁵

The sleep-wakefulness rhythm is a highly complex process involving many neural mechanisms. The reticular formation is supposed to exert a generalized alerting effect on the cerebral cortex; and the hypothalamus may well relay some of this influence and/or itself arouse the cortex to visceral conditions that demand attention.³⁶ Specific regions in the brain stem involved in the initiation and maintenance of sleep are (1) the intralaminary nuclei of the thalamus, (2) the caudate nucleus, (3) the preoptic area, and (4) medullary areas around the nucleus solitarius. Most of these areas are either part of or in close association to the brainstem reticular formation.³⁷

Anson histologically describes the reticular formation (Formatio reticularis) in the following manner:

³⁴Berger, "Physiological Characteristics of Sleep", p. 72.

³⁵Mountcastle, p. 1332.

³⁶H. Chandler Elliott, Textbook of Neuroanatomy (second edition; Philadelphia: J. B. Lippincott Company, 1969), p. 411.

³⁷K. Akert, "The Anatomical Substrate of Sleep," Sleep Mechanisms Vol. XVIII, Progress in Brain Research, eds. K. Akert, C. Bally, and J. P. Schade (New York: American Elsevier Publishing Company, Inc., 1965), pp. 16-17.

The gray substance of the spinal cord is not sharply delimited from the white. Small bundles of myelinated fibers are especially prominent at the margins of the gray, and projections of gray substance extend into the deeper portions of the funiculi. Such intermingling of white and gray substance is most prominent along the lateral margins of the posterior and anterior columns, especially in the middle zone. This region is known as the reticular formation. It is most abundant in the cervical cord.³⁸

In the early days of neurology, states Elliott, the reticular formation was, in a sense, a catch-all about which little was known. The name reticular formation was applied descriptively to all regions of the central nervous system in which cells and fibers are mingled in a reticular (net-like) manner. The activity of the reticular formation, constituting the motor level immediately above the spinal reflex system, is still reflex in character but is elaborate enough at its highest level to maintain integrated standing and even pacing of a sort in lower mammals.³⁹

The reticular formation of the brainstem, because of its apparent functioning to alert the cortex, is frequently referred to as the reticular activating system (RAS). However, Elliott states, "The alternate name 'activating system' may be a misnomer, since the system probably contains inhibitory elements...."⁴⁰

³⁸Barry J. Anson (ed.), Morris' Human Anatomy (twelfth edition; New York: McGraw-Hill Book Company, 1966), p. 923.

³⁹Elliott, p. 251.

⁴⁰Elliott, p. 252.

French states that all the great sensory nerve trunks in the body have brush-like branches which stream into the reticular formation. Sensory signals on their way to the cortex by the direct pathways also feed into the reticular formation which in turn alerts or arouses the cortex. Once aroused the cortex can then interpret the in-coming signals. The alerting of the cortex by the reticular formation is not of a specific nature. Any stimulus, whether from the organ of hearing, seeing, or touch, is relayed in much the same way.⁴¹

It does appear that the reticular formation learns to be selective in its sensitivity to particular stimuli. The selectivity is perhaps illustrated by the fact that a mother awakens to the first whimper of her child while the father sleeps soundly. However, this same father may awaken at the slightest smell of smoke in the house. French implies that this discriminative ability of the reticular formation is a necessity. "Imagine how life would be if you could not shut out most of the environment from consciousness and were at the mercy of the thousands of sights and sounds simultaneously clamoring for attention."⁴²

Sleep has traditionally been viewed as either a passive or active process. Pavlov, Kleitman and Hess are frequently considered

⁴¹J. D. French, "The Reticular Formation," Scientific American Vol. CLXXXVI (May, 1957), pp. 54-55.

⁴²French, pp. 55.

as supporters of the passive process. Sleep is the result of a decrease in incoming stimuli and a withdrawal of the alerting of the reticular formation. Without reticular formation arousal the brain falls passively asleep. The current leader supporting sleep as an active process is Moruzzi. From his work it is now clear that the brainstem activating mechanism produces behavioral sleep.⁴³

Jouvet states that sleep is subject to both passive and active controls. The active control is the result of brain structures applying brakes to the reticular formation, while the passive control is due to decreasing the number of incoming stimuli.⁴⁴

There are two specific areas in the brainstem that are responsible for sleep, according to Jouvet. The first area is the nuclei of Raphe', a collection of nerve cells at the midline of the brainstem. A dorsal area of the pons, known as the locus coeruleus, is the second area essential for sleep. The nuclei of Raphe' has been found to contain cells high in serotonin, while the cells of the locus coeruleus contains high levels of noradrenalin. As a result of these findings Jouvet suggests the following:

We can put together a working hypothesis about the mechanisms that control sleep. It seems that the Raphe' system is the seat responsible for the onset of light sleep, and that it operates through the secretion of serotonin. Similarly the locus coeruleus

⁴³Mountcastle, pp. 1331-1336.

⁴⁴Jouvet, p. 72.

harbors the system responsible for producing deep sleep, and this uses noradrenalin as its agent. In cyclic fashion these two systems apply brakes to the reticular activating system responsible for wakefulness and also influence all the other nerve systems in the brain, notably those involved in dreaming.⁴⁵

There are indications that other areas and chemical substances may be involved in sleep. Peón, in studying the effects of localized chemical stimulation of various areas of the central nervous system on sleep and wakefulness, obtained the following results: (1) Acetylcholine, depending on the area of the central nervous system where applied, could cause sleep or arousal, (2) Atropine application caused the acetylcholine to be ineffective in causing sleep or arousal, (3) Procaine injected intraspinally prevented sleep otherwise produced by acetylcholine stimulation of a slightly caudal hypnogenic point in the spinal cord, and (4) Noradrenalin caused alerting when applied in the mesencephalic reticular formation, ventromedial hypothalamus and the upper medial preoptic region. Peón concludes from his study that, "There is in the brain an anatomically circumscribed sleep system, the activation of which produces sleep through direct inhibition of the mesodienciphalic vigilance system."⁴⁶

⁴⁵Jouvet, p. 72.

⁴⁶Raúl Hernández Peón, "Central Neuro-Humoral Transmission in Sleep and Wakefulness," Sleep Mechanisms Vol. XVIII, Progress in Brain Research, eds. K. Akert, C. Bally, and J. P. Schade (New York: American Elsevier Publishing Company, Inc., 1965), pp. 114-115.

Akert appears to agree with Peón when he sums up his findings on the anatomical substrate of sleep by stating:

The anatomical substrate of sleep can no longer be regarded as a center, but must be seen as an integrated system on which peripheral receptors, humoral factors, ascending and descending pathways of the reticular formation, and the neocortex and paleocortex all impinge on one another in multiple circuits.⁴⁷

PSYCHOLOGICAL ASPECTS OF SLEEP

Murray states that descriptively the psychologist can conceptualize sleep in one of the following ways: (1) a particular form of response with a characteristic level of activity and reactivity or (2) for those more introspectively inclined, as a particular state of consciousness. Theoretically the question is does sleep fit into one of the three main categories of behavioral variables; reflex, goal response, or learned habit?⁴⁸

Most psychologists conceive of the sleep phenomenon as determined by some sort of motivational system. As a motive it is assumed that sleep shares the following characteristics with other primary psychological motives: (1) it serves a biological function, (2) it operates through physiological mechanisms, (3) its deprivation motivates learning and performance as well as posing a biological, behavioral,

⁴⁷Akert, "The Anatomical Substrate of Sleep", p. 16-17.

⁴⁸Edward J. Murray, Sleep, Dreams, and Arousal, (New York: Appleton-Century-Crofts, 1965), p. 12.

and personality adjustment, and (4) lastly, it is shaped and developed through cultural and social learning and may become involved in psychopathology.⁴⁹

Monroe found the following differences in the sleep behavior, psychophysiological functioning, and personality pattern of individuals who classified themselves as either good or poor sleepers: (1) good sleepers fell asleep more quickly than the poor sleepers, (2) good sleepers averaged more sleep time and less awake time than did poor sleepers, (3) EEG records of poor sleepers averaged more Stage 2 sleep but significantly less Stage 1-REM sleep than did good sleepers, (4) poor sleepers consistently had higher mean temperatures, with the highest mean reading for good sleepers being lower than the lowest mean for poor sleepers, (5) poor sleepers had a higher mean number of phasic vasoconstrictions per minute during all stages of sleep, and (6) the poor sleepers had more body movements than did good sleepers.⁵⁰

Analysis of the Minnesota Multiphasic Personality Inventory (MMPI) revealed differences in good and poor sleepers in psychological make-up. The good sleepers possessed greater adaptiveness and availability of ego resources. The Cornell Medical Index also indicated that

⁴⁹Murray, p. 12.

⁵⁰Lawrence J. Monroe, "Psychological and Physiological Differences Between Good and Poor Sleepers", Journal of Abnormal and Social Psychology, Vol. LXXII (1967), pp. 259-263.

the poor sleepers had greater psychosomatic and emotional disturbances.⁵¹

Dreams and Dreaming

The greatest interest of the psychologist in sleep appears to be in the dreams resulting from the period. Foulkes states that individual differences in dream recall after a night's sleep are attributable to a waking personality dimension called self-awareness. Those persons who generally deny or ignore their world of private and subjective experiences during wakefulness seem to recall fewer dreams.⁵²

Inferences about waking behaviors gleaned from dream content are usually validated in a subtle rather than direct manner. Dreaming, states Foulkes, allows self exploration in a context of relative freedom. Dream content may present aspects of self-conception and motivation not revealed in waking behavior. A dreamer is relatively free from the presence and standards of others and as a consequence, may actually reveal more about certain facets of the personality in his dream than in daytime behavior.⁵³

Persons with healthier personalities tend to experience more vivid dreams at sleep onset while more vivid dreaming during Stage 1-REM sleep is seen in individuals with signs of emotional disturbances. Foulkes attributes the presence of vivid nocturnal fantasy in the emotionally disturbed individual to "... some inability of the ego to

⁵¹Monroe, p. 263.

⁵²Foulkes, p. 59.

⁵³Foulkes, pp. 87-88.

adequately master those pressures which beset it, while the presence of vivid hypnogogic fantasy on the other hand; varies directly with the adaptability and strength of the ego."⁵⁴ Foulkes further states that Stage 1-REM sleep may make possible the exploration of ones predicaments but that wish fulfillment is not the essence of dreaming.⁵⁵

Anxiety and stress have been found to influence sleeping patterns. Baekeland, Lasky, and Koulack found that sleep following a psychologically stressful film differed from that following a neutral film in the following ways: (1) the number of awakenings associated with Stage 1-REM periods increased but not that of NREM stages, (2) the proportion of Stage 1-REM periods terminating in spontaneous awakenings increased, and (3) the frequency of REMS (REM density) increased during Stage 1-REM periods. These investigators concluded that these results suggest, "the stress film produced a specific REM sleep disturbing effect via anxiety which carried over into the subjects sleep and dreams, and that increased REM density is secondary to drive enhancement."⁵⁶

Hartmann states that stress and anxiety often produce poor sleep and frequent awakenings. The increased number of awakenings associated

⁵⁴Foulkes, p. 191.

⁵⁵Foulkes, p. 160, 166.

⁵⁶Frederick Baekeland, Richard Lasky, and David Koulack, "Effects of a Stressful Presleep Experience on Electroencephalograph-Recorded Sleep," Psychophysiology, Vol. IV (January, 1968), p. 367.

with a state of unusual stress or great anxiety decreases the amount of Stage 1-REM sleep.⁵⁷

Stress and anxiety are frequently associated with pregnancy and seem to be especially prevalent during the last trimester. In comparing morning dream recall of pregnant women with those of non-pregnant female college students, Van DeCastle and Kinder found that the dreams of the pregnant women revealed; (1) a greater percentage of architectural references, (2) pregnancy related concerns such as doctors' appointments, dietary restrictions, physical clumsiness, and reduced locomotion, (3) feelings of physical and sexual unattractiveness together with feelings that her husband finds other women more appealing are quite common, and (4) dependency-independency conflicts in relation to her mother were frequently present. During the last trimester dreams frequently dealt with the unborn child. Dreams of the unborn child generally occurred in a context of anxiety; the baby often was described as deformed, of unusual size, or possessing the ability to talk or walk at birth.⁵⁸

Sheldon noted the sleeping patterns of individuals when he developed his body structure-temperament types. The viscerotonic likes to sleep, sleeps well and long, preferably going to bed early and getting up late. The cerebrotonic is a poor sleeper and most alert late at night,

⁵⁷Hartmann, Biology of Dreaming, p. 92.

⁵⁸R. L. Van DeCastle and Peggy Kinder, "Dream Content During Pregnancy," Psychophysiology, Vol. IV (January, 1968), p. 375.

hates to go to bed as well as to get up and often is "worthless" in the early part of the day. Somatotonics require little sleep, get up early and feel good in the morning.⁵⁹

Sleep Deprivation

Sleep loss studies are generally of one of three types; (1) total deprivation, (2) partial deprivation, and (3) differential deprivation. That sleep is essential can easily be demonstrated simply by depriving people of sleep for a few days.⁶⁰

Fiorica *et al.* found that young men deprived of sleep for eighty-four to eighty-six hours showed a decrease in psychomotor performance but physiological systems were relatively unaffected.⁶¹

The prevailing mood following sleep deprivation is one of apathy and depression. Irritability, anxiety, and elation are intermittently seen as the time without sleep progresses. After prolonged total deprivation, confusion, disorientation, memory impairment, and visual misconceptions occur. Chronic psychotic patients frequently show a return to acute symptoms after prolonged sleep loss.⁶²

⁵⁹W. H. Sheldon, The Varieties of Temperament, Harpers, 1942, Cited by Nathaniel Kleitman, in Sleep and Wakefulness (Chicago: The University of Chicago Press, 1963), p. 120.

⁶⁰Julius Segal and Gay Gaer Luce, "To Sleep: Perchance to Dream," Today's Health, Vol. XXXXVII (October, 1969), p. 50.

⁶¹Vincent Fiorica *et al.*, "Physiological Responses of Men During Sleep Deprivation," Journal of Applied Physiology, Vol. XXIV (February, 1968), pp. 167-176.

⁶²Murray, p. 245.

Electroencephalographic recordings immediately following partial and differential deprivation studies have shown that Stage 4 and Stage 1-REM are "made-up" first and thus appear to be necessary stages.⁶³

Segal and Luce state that chronic sleep loss, by far the most common type of deprivation occurring in day to day activities, results in alternation in sleep patterns. Some stages such as Stage 4 and Stage 1-REM are maximized at the expense of the lighter transitional levels of Stages 2 and 3.⁶⁴

CULTURAL-SOCIOLOGICAL ASPECTS OF SLEEP

"The primary situation in which socialization takes place in all cultures", states Murray, "is the family."⁶⁵ Proposing sleep as a basic motive molded to the customs of society, Murray suggests that the following aspects of motivation are under social control: (1) time of motive satisfaction, (2) place for gratification of motives, (3) proper dress for motivational behavior, and (4) the object used for gratification of the motive.⁶⁶

⁶³Anthony Kales *et al.*, "Dream Deprivation: An Experimental Reappraisal," Nature, Vol. CCIV (1964), pp. 137-138; see also Wilse B. Webb and H. W. Agnew, Jr., "Sleep: Effects of a Restricted Regime," Science, Vol. CL (1965), pp. 1745-1747.

⁶⁴Segal and Luce, p. 51.

⁶⁵Murray, p. 287.

⁶⁶Murray, pp. 387-388.

The overall developmental change in the sleeping pattern of man is from polyphasic to monophasic. The child in the United States by the end of his first year has usually consolidated his sleeping time into a long twelve to fourteen hour nocturnal period beginning around 7 p.m. and a one to two hour nap in the late morning or early afternoon. This consolidation of the sleeping pattern may be entirely maturational but the culture operates to tilt the pattern into a desirable preponderance of night sleeping. The wide variation in the duration of sleep in all age groups may very well reflect cultural differences.⁶⁷

"Society has a strong interest in regulating sleeping behavior", states Murray. A society without regulated sleep or with complete sleep freedom would have to keep trains and other transportation running continuously; would have to keep eating establishments and recreational facilities open all night; provide essential heat and other utilities all night, and provide for naps during the working day. Sleep that is not regulated might very well be more disruptive on the organized community than defecating or copulating at will, according to Murrays' speculations.⁶⁸

Sleeping patterns have been found to vary from culture to culture. The Arab Bedouins maintain an essentially polyphasic sleep

⁶⁷Murray, pp. 292-296.

⁶⁸Murray, p. 300.

pattern due to fear of intruders. The South American Siesta is an apparent adaptation of the sleeping pattern to the tropical heat. People of the Yucatan Peninsula consider it appropriate to awaken and go visiting at 3 a.m. Many cultures negatively sanction daytime sleeping as is seen in the Navaho proverb, "A man lying down in the daytime is a lazy man." Hindus slip into dozing states at will, especially when hungry or idle. Variances in sleeping patterns appear to be related to economic and environmental conditions of living.⁶⁹

Such simple things as body position and direction during sleep show cultural influences. Navaho children never sleep with a hand over their face while many American children have been found to do so. The Tibetans and Aleuts sleep most of the time in a knee-chest position. Indian tribesmen of New Mexico will not sleep toward the east, since they commonly bury the dead in that direction.⁷⁰

The western scientist reacts to the mysteriousness of sleep in a characteristic way; by doing experiments and writing books on sleep. Many primitive tribesmen turn to religion in an effort to accomodate this mysterious time of each day.⁷¹

The "Protestant Ethic" with a religious tradition of asceticism and control of impulse, is the dominant religious ideology of the

⁶⁹Murray, p. 301.

⁷⁰Murray, p. 301.

⁷¹Murray, p. 302.

United States, states Murray. The Puritanical teaching that hard work is good in the eyes of God and is the best defense against weaknesses of the flesh, religious doubts, or feelings of unworthiness appears to be an integral part of this "Protestant Ethic". As a result of these Puritanical teachings in the "Protestant Ethic" Weber states,

Waste of time is thus the first and in principle the deadliest of sins. The span of human life is infinitely short and precious to make sure of one's own election. Loss of time through sociability, idle talk, luxury, even more sleep than is necessary for health, six or at the most eight hours, is worthy of absolute moral condemnation.⁷²

Murray states that the following findings, obtained on an opinionnaire given to college students, are consistent with attitudes influenced by the "Protestant Ethic": (1) approval of shorter sleeping times but disapproval of longer than eight hours of sleep, (2) approval of idiosyncratic sleeping patterns provided the individual was making a contribution to society, (3) strong disapproval of separate bedrooms for married couples but strong approval for sharing of a double bed by married couples, and (4) strong disapproval of communal or families sleeping together. The disapproval of families sleeping together Murray interprets as "middle class America's dread of incest".⁷³

Child-rearing techniques in the sleep area range from strict to overpermissive. The goal of most parents, however, is to see that the

⁷²M. Weber, The Protestant Ethic and the Spirit of Capitalism (New York: Scribners Sons, 1930), pp. 157-158.

⁷³Murray, pp. 303-312.

child has enough rest and sleep to maintain health but to sleep at a convenient and socially desirable time. Many parents and experts overestimate the child's need for sleep. Murray further states,

While most of the theoretical discussion centers around bad effects of the strict methods, the available evidence shows that sleep disturbances in children are related to overpermissiveness and to mothers overabsorbed in the maternal role.⁷⁴

PHARMACOLOGICAL ASPECTS OF SLEEP

In discussing the pharmacological aspects of sleep, one is dealing with drugs acting on the central nervous system. Drugs acting on the central nervous system are divided into two general categories, stimulants and depressants. For purposes of classification, the depressants are further divided into three classes depending on the level of central nervous system depression: (1) sedatives, (2) hypnotics, and (3) anesthetics.⁷⁵ Krug states, "The only difference between a hypnotic and a sedative action is one of degree."⁷⁶ When a drug is given around bedtime and is given in full dosage, producing sleep soon after administration, it is known as an hypnotic. When the drug is given in reduced dosage and given several times during the day and perhaps again at

⁷⁴Murray, pp. 315-325.

⁷⁵Wallace D. Winter, "Neurophysiological Classification of Psychoactive Drugs," Sleep Physiology and Pathology, ed. Anthony Kales (Philadelphia: J. B. Lippincott Company, 1969), pp. 298-299.

⁷⁶Elsie E. Krug, Pharmacology in Nursing, (9th ed. Saint Louis: The C. V. Mosby Company, 1963), p. 222.

bedtime, it is called a sedative. "Sedation is a calming, quieting effect and, of course, the patient who is calm and relaxed during the day usually sleeps better at night."⁷⁷

Central nervous system stimulants are classified as mild, moderate, or marked stimulants. Winter states that, "Classifying drug-induced status is misleading, since unresponsiveness to stimuli might be caused by anesthesia or convulsions."⁷⁸

Krantz states that the pharmacological profile of any drug acting on the central nervous system should include the response of the reticular formation.⁷⁹ The barbiturates, frequently used as sedatives and hypnotics in the hospital setting, apparently cause a functional blocking or deactivation of the reticular formation. As a result of the deactivation of the reticular formation, the passage of impulses to the cerebral cortex is decreased.⁸⁰

Kales *et al.*, in a study of the effects of drugs on the various sleep stages, found that the barbiturate pentobarbital (Nembutal) caused a marked decrease in Stage 1-REM sleep as well as delaying the appearance

⁷⁷Krug, p. 222.

⁷⁸Winter, p. 299.

⁷⁹John C. Krantz, Jr. and C. Jelleff Carr, The Pharmacologic Principles of Medical Practice, (7th ed., Baltimore: The Williams and Wilkins Company, 1969), p. 55.

⁸⁰Krantz, p. 180.

of the first Stage 1-REM period. The night following the administration of Nembutal (recovery night) was characterized by a marked increase (rebound) in Stage 1-REM sleep.⁸¹

Depression of the reticular formation, with decrease in the amount of Stage 1-REM sleep, has been found in many of the drugs used as hypnotics and sedatives. Methyprylon (Noludar) slightly decreases Stage 1-REM sleep; delays the onset of the first Stage 1-REM period and on recovery night shows a moderate increase in Stage 1-REM sleep.⁸² Glutethimide (Doriden) markedly decreases the percent of Stage 1-REM sleep; delays the onset of the first Stage 1-REM period; and is followed by marked rebound in Stage 1-REM sleep on recovery nights.⁸³ Chloral hydrate, one of the oldest of the hypnotics, causes little alternation in Stage 1-REM sleep; only a slight delay in the onset of the first Stage 1-REM period; and no rebound increase in Stage 1-REM sleep.⁸⁴ Dalmane, one of the newer non-barbiturate hypnotics, has been found to produce sleep patterns indistinguishable from regular sleep.⁸⁵

⁸¹Anthony Kales *et al.*, "Effects of Drugs on Sleep (Noludar, Doriden, Nembutal, Chloral Hydrate, Benadryl)," Psychophysiology, Vol. IV (January, 1968), pp. 391-392.

⁸²Kales, "Effects of Drugs on Sleep", p. 391.

⁸³Kales, "Effects of Drugs on Sleep", p. 391.

⁸⁴Kales, "Effects of Drugs on Sleep", p. 391.

⁸⁵Ernest Hartmann, "Pharmacological Sleep Studies in Man: Pentobarbital (Nembutal), Amitriptyline (Elavil), Chlordiazepoxide (Librium), and RO 5-6901 (Dalmane), Psychophysiology, Vol. IV (January, 1968), p. 391.

The alternation of normal sleep stages has been found to occur also in individuals who are receiving drugs classified as central nervous system stimulants. Amphetamines cause a marked decrease in Stage 1-REM sleep as well as rebound in Stage 1-REM on recover nights.⁸⁶

Tranquilizers, of the sedative and antidepressant types, have been found to alter Stage 1-REM sleep. Imepamine (Tofranil) decreases Stage 1-REM sleep and is followed by rebound in Stage 1-REM on recovery nights.⁸⁷

Lysergic acid diethylamide (LSD) in small, very carefully controlled doses, has been found to increase the length of a particular Stage 1-REM period several hours after the administration but the overall Stage 1-REM sleep for the night is not increased.⁸⁸

CLINICAL ASPECTS OF SLEEP

Stage 1-REM sleep, states Hartmann, can be considered a psychosomatically stressful period, or a period of increased susceptibility to psychosomatic illness. The stress of the Stage 1-REM period is involved with the activation of the autonomic and

⁸⁶Ian Oswald, "Sleep and Dependence on Amphetamines and other Drugs," Sleep Physiology and Pathology, ed. Anthony Kales (Philadelphia: J. B. Lippincott Company, 1969), p. 325.

⁸⁷Hartmann, "Pharmacological Sleep Studies in Man", p. 391.

⁸⁸Oswald, p. 325.

neuroendocrine systems. Hartmann further suggests that whatever organ or system (target system) is effected in stressful situations might be found to exhibit the same response during Stage 1-REM periods. Turning this suggestion around somewhat, Hartmann theorizes that the organ or system most active during Stage 1-REM periods might be the organ or system most likely to be effected by stress in waking life.⁸⁹

Recording changes in the blood pressure during Stage 1-REM sleep, might well be used in making a differential diagnosis in the cause of hypertension. Hartmann states that the individual whose hypertension is stress related should show a greater increase in blood pressure during Stage 1-REM periods than one whose hypertension is due to structural blood vascular changes.⁹⁰

Individuals with Angina Pectoris usually experience their nocturnal attacks of pain during Stage 1-REM periods. Depression of the S-T segment has been found to occur almost exclusively during the Stage 1-REM periods in persons with Angina Pectoris.⁹¹ Asthmatic and emphysematous anoxic attacks, also frequently occur during Stage 1-REM periods.⁹²

⁸⁹Hartmann, The Biology of Dreaming, pp. 114-115.

⁹⁰Hartmann, The Biology of Dreaming, p. 119.

⁹¹Hartmann, The Biology of Dreaming, pp. 105-106.

⁹²J. Allan Hobson, "Sleep: Physiological Aspects," New England Journal of Medicine Vol. CCLXXI (December, 1969), p. 1345.

Hospital personnel are frequently heard to comment on the number of critically ill who die in the early pre-dawn hours. Hartmann suggests that the rapid changes in the cardiovascular system associated with the activity of the autonomic nervous system during Stage 1-REM periods could be responsible for these early pre-dawn deaths.⁹³

The cardiovascular system is not the only system influenced by Stage 1-REM periods. Kales and Tan found that individuals with duodenal ulcers had 3 to 20 times more gastric acid secretion during the night than did normal subjects. Though the ulcer patients showed an increased secretion throughout the night, peak secretions were usually associated with Stage 1-REM periods.⁹⁴

Deprivation of Stage 1-REM sleep is thought to be a possible cause of some forms of delirium. Hartmann states that alcoholic delirium tremens is the result of the repeated or continuous suppression of Stage 1-REM sleep. "It is possible that delirium tremens represents a breaking through of the D-State mechanism into waking life when the alcohol which has suppressed its expression is removed."⁹⁵

⁹³Hartmann, The Biology of Dreaming, p. 104.

⁹⁴Anthony Kales and Tjiauw-Ling Tan, "Sleep Alternations Associated with Medical Illnesses," Sleep Physiology and Pathology Anthony Kales ed. (Philadelphia: J. B. Lippincott Company, 1969), pp. 148-149.

⁹⁵Hartmann, p. 109.

Deprivation of sleep has been considered a contributing factor in the delirium or psychiatric complications frequently seen following open-heart surgery. Kornfeld, Zernberg, and Malm found that a psychosis of the acute organic type occurred in 38 percent of 99 patients subjected to open-heart surgery. The psychotic condition usually occurred three to five days following surgery and was resolved within twenty-four hours following the patients transfer from the intensive care recovery room to the standard hospital environment. The clinical picture of visual and auditory hallucinations, disorientation, and perceptual distortions seen during the acute psychotic episode resembled the syndrome reported in experimental situations of sleep and sensory deprivation. The investigators decided the environment of the intensive care area was one of the major factors contributing to the post operative psychosis. Frequent awakenings by the staff, noise of the equipment in the intensive care unit, together with the patients anxiety, made sleep practically impossible.⁹⁶

Psychotic episodes and withdrawal symptoms seen when addicted individuals are taken off drugs, suggests Hartmann, are the result of repeated suppression of Stage 1-REM sleep. Visual and auditory hallucinations, disorientation, and perceptual distortions commonly seen in

⁹⁶Donald S. Kornfeld, Sheldon Zimberg, and James R. Malm, "Psychiatric Complications of Open-Heart Surgery," New England Journal of Medicine Vol. CCLXXIII (July, 1961), pp. 290-292.

withdrawal are reminiscent of those seen in prolonged sleep deprivation.⁹⁷

Insomnia, the inability to sleep, is a common occurrence in many medical and psychiatric disorders. Hartmann states, "There are probably as many patterns of insomnia as there are insomniacs."⁹⁸

Anxiety is a major factor in many cases of insomnia. Comparisons within subject as well as between subjects show that the more anxious the individual the more difficulty experienced in falling asleep. In addition to having more difficulty in falling asleep the more anxious subjects woke up more often during the night. Many individuals who suffer from insomnia, states Hartmann, underestimated the amount of sleep they get during the night. The frequent awakenings tended to be interpreted as a long period of wakefulness. Many individuals who complain of sleeping two hours or less at night have been found to sleep at least four hours a night.⁹⁹

SUMMARY

Sleep has always mystified man. Primitive tribesmen turn to religion to explain sleep while western man studies and writes books

⁹⁷Hartmann, Biology of Dreaming, p. 110.

⁹⁸Hartmann, Biology of Dreaming, p. 110.

⁹⁹Hartmann, Biology of Dreaming, p. 99.

about sleep.

A night's sleep is not the one long period of inactivity once thought but is made up of four to six cycles of the five distinctive stages of sleep. A number of physiological changes occur during sleep. The greatest changes in physiological functioning appear to be associated with Stage 1-REM sleep. Many of the changes occurring in Stage 1-REM sleep are the result of increased activity of the autonomic nervous system.

Dreams associated with sleep are of interest to the psychologist. Dreams may reveal more accurately some phases of the individuals personality than does waking behavior.

Sleep is influenced by cultural mores. The "Protestant Ethic" appears to have had a great deal of influence on the sleeping habits of individuals in the United States.

Most pharmacological agents used to produce sleep or to delay sleep onset have been found to alter normal sleeping patterns. The changes most often seen following the taking of these medications are: decreased Stage 1-REM sleep, delayed onset of the first Stage 1-REM periods, and rebound in Stage 1-REM on recovery nights.

Clinically Stage 1-REM sleep, with the associated activity of the autonomic nervous system, appears to be a psychosomatically vulnerable time. Individuals waking with anginal pectoris pain awaken almost exclusively from a Stage 1-REM period.

Chapter 3

METHODOLOGY AND ANALYSIS OF DATA

Methodology

The investigation and data collection of the study were conducted during July, August, and September of 1970 in a community hospital of approximately one-hundred beds. The target population for the study was adults admitted to the medical-surgical units.

The original study design was to use a control and an experimental group, paired by age and medical diagnosis. After reviewing the literature on sleep, a data gathering tool (consisting of twelve items) was constructed. See Appendix, Data Gathering Tool. The items of the tool were constructed so that completion of the tool revealed sleep habits of the subjects; this information was then used for pairing subjects and planning the nursing care approach used with the experimental group.

The investigator visited each subject on the day of admission to the hospital, interviewed him, and completed a data gathering tool. Subjects who reported taking medications routinely for sleep at home and those unable to communicate directly with the investigator were eliminated from the study. The patient record was used to obtain the diagnosis.

It became evident early in the process of gathering data that paired sampling was going to be difficult; this was due to a limited target population and limited time in which to complete the study. Pairing by both medical diagnosis and age was not possible. After surveying hospital admission records for a week, it did appear possible to

pair by age. Therefore, the pairing of the groups was done by age only. (The investigator was aware, however, that the subject's illness was a variable influencing sleep behavior and is another of the uncontrolled variables which tends to make results of the study less valid).

The sample population consisted of twenty subjects, divided into two groups of ten. Group I, the control group, received "routine" hospital care, including the normal nursing care given at bedtime. The investigator visited these subjects each day, interviewed them regarding feelings of being rested following the night's sleep, and examined the patient record for medications taken for sleep.

Group II, the experimental group, also received "routine" hospital care except at bedtime, at which time the investigator utilized the nursing care approach designed for the study. These subjects were also interviewed daily regarding their feelings of being rested following each night's sleep; the patient record of these subjects was also examined for medications taken for sleep.

Analysis of Data

The analysis of data was done by means of a null hypothesis: a nursing care approach that is designed to allow individuals to maintain, as near as possible, their regular hour and pre-retirement activities will make no significant difference in the amount of medication taken for sleep, nor the subjectively reported "rested" feeling following a night's sleep in the hospital.

The alternate hypotheses were four in number:

1) Individuals receiving the nursing care approach designed for the study will require less medication for sleep.

2) Individuals receiving the nursing care approach designed for the study will require more medication for sleep.

3) Individuals receiving the nursing care approach designed for the study will subjectively report feeling "rested" following a night's sleep in the hospital.

4) Individuals receiving the nursing care approach designed for the study will subjectively report a lack of feeling "rested" following a night's sleep in the hospital.

Four tables were constructed from the data gathered. The data from each group were tabulated as a unit. Due to the size of the groups no statistical analysis was attempted on the data. Group tabulations and comparisons were used in nonstatistical generalizations for the findings.

Table 1 shows the total number of nights the subjects were hospitalized, the number of nights medication was taken for sleep, and the percentage of nights medications were taken for sleep.

The ten subjects in the control group were in the hospital for a total of 63 nights, the range was from 3 to 18 nights. Of the 63 nights hospitalized, the subjects took medication for sleep 45 nights

Table 1

Number of nights hospitalized, number and percentage of nights medications taken for sleep.

Control Group				Experimental Group			
		No. nights hospitalized	No. nights taking medicine	Percentage of nights taking medicine			
Subject	No. nights hospitalized	No. nights taking medicine	Percentage of nights taking medicine	Subject	No. nights hospitalized	No. nights taking medicine	Percentage of nights taking medicine
Mr. F. C.	4	4	100	Mrs. L. G.	5	0	0
Mr. J. E.	3	0	0	Mr. R. H.	5	4	80
Mrs. L. Y.	3	0	0	Mr. F. C.	8	4	50
Mr. M. C.	5	5	100	Mr. J. A.	9	9	100
Mr. J. S.	18	13	72	Mrs. C. P.	5	4	80
Mr. B. W.	10	10	100	Mrs. C. S.	8	0	0
Mrs. L. T.	4	2	50	Mrs. V. C.	3	0	0
Mrs. M. B.	5	1	20	Mrs. K. L.	3	0	0
Mrs. E. P.	7	6	85	Mrs. M. R.	4	0	0
Mr. E. B.	4	4	100	Mrs. R. A.	3	2	66
N = 10	63	45		N = 10	53	23	

or an average of 63 percent of the nights.

The ten subjects in the experimental group were hospitalized a total of 53 nights; the range was from 3 to 9 nights. Of the 53 nights hospitalized, the subjects took medication for sleep 23 nights or an average of 38 percent of the nights.

On a number of occasions the investigator found a discrepancy in regard to the subjects reporting having received medications for sleep and what was recorded on the patient record. In the case of Mr. J. S. three nights in a row he reported not having taken medication for sleep but the patient record indicated he had received the medication for sleep.

Mr. J. A. of the experimental group revealed to the investigator on the fourth night of his hospitalization that he had "stretched the truth a little" when he reported that he did not routinely take medication for sleep at home. He had been taking two tranquilizers and an analgesic when he went to bed at home.

Mrs. M. B. took her only sleeping medication on the first night of hospitalization.

Mrs. L. T. took sleeping medication on the first night of hospitalization and again on the last night of hospitalization.

Mr. F. C. took medication for sleep the first three nights of hospitalization and again the last night in the hospital. In assisting this subject in preparing for retirement the last night of his

hospitalization he discussed at some length the fact that he was going to drive himself home (90 miles away). Mr. F. C. has a cast on the right leg and was going to drive a jeep.

Mrs. R. A. took sleeping medication on the first and last nights of hospitalization.

Table 2 shows the total number of nights the subjects were hospitalized, the number of mornings reporting feeling rested, and the percentage of the mornings reporting feeling rested.

The ten subjects in the control group were in the hospital for a total of 63 nights; the range was 3 to 18 nights. The subjects reported feeling rested 48 mornings or an average of 75 percent of the mornings following the night's sleep in the hospital.

The ten subjects in the experimental group were hospitalized for a total of 53 nights; the range was from 3 to 9 nights. The subjects reported feeling rested 43 mornings or an average of 81 percent of the mornings following the night's sleep in the hospital.

Castor oil, used in preparing for x-ray examinations, prevented four of the subjects from resting during one night.

Mrs. C. S., of the experimental group, had an intravenous infusion running two nights until after midnight. One of the nights the infusion ran all night and had to be restarted a number of times during the night.

Table 2

Number of nights hospitalized, number and percentage of mornings feeling rested after night's sleep.

Control Group				Experimental Group			
Subject	No. nights hospitalized	No. mornings reporting rested	% of mornings reported rested	Subject	No. nights hospitalized	No. mornings reporting rested	% of mornings reported rested
Mr. F. C.	4	0	0	Mrs. L. G.	5	4	80
Mr. J. E.	3	3	100	Mr. R. H.	5	4	80
Mrs. L. Y.	3	3	100	Mr. F. C.	8	7	87
Mr. M. C.	5	3	60	Mr. J. A.	9	6	66
Mr. J. S.	18	15	83	Mrs. C. P.	5	5	100
Mr. B. W.	10	7	70	Mrs. C. S.	8	8	100
Mrs. L. T.	4	3	75	Mrs. V. C.	3	2	75
Mrs. M. B.	5	5	100	Mrs. K. L.	3	2	75
Mrs. E. P.	7	6	86	Mrs. M. R.	4	2	50
Mr. E. B.	4	3	75	Mrs. R. A.	3	3	100
N = 10	63	48		N = 10	53	43	

Mrs. K. L. had a cathartic one night and was so worried that she would soil her bed that she did not rest during the night. Mrs. K. L. is 76.

Mr. M. C., of the control group, after a second morning of feeling tired on awakening told a nurse that at home he slept with boards under the mattress. The boards were placed under the mattress and on the third morning he felt "much better".

Mr. M. C. and Mrs. E. P. were each prevented from resting during one night by the other individual in the semi-private room.

It was not uncommon to be told by the subjects, "I did not feel good this morning but have napped during the day."

Table 3 shows a comparison of the two groups in the number of nights hospitalized, the number and percentage of nights taking medication and the number and percentage of mornings feeling rested after the night's sleep in the hospital.

A comparison of the two groups shows that the control group took medication for sleep 45 nights or 63 percent of the 63 nights hospitalized, while the experimental group took medication for sleep 23 nights or 38 percent of the 53 nights hospitalized.

The control group reported feeling rested 48 mornings or 75 percent of the 63 mornings following the night's sleep in the hospital. The experimental group reported feeling rested 43 mornings or 81 percent of the mornings following the night's sleep in the hospital.

Comparison of groups in number of nights hospitalized, number and percentage of nights taking medication and mornings feeling rested.

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Employing nonstatistical generalization in interpreting the data from Table 1 (p. 43), Table 2 (p. 46), and Table 3 (p. 48), it appeared that rejection of a null hypothesis; a nursing care approach designed to allow individuals to maintain, as near as possible, their regular hour and pre-retirement activities, will make no significant difference in the amount of medication taken for sleep, for the subjectively reported "rested" feeling following a night's sleep in the hospital, is indicated. Acceptance of alternate hypotheses (1) individuals receiving the nursing care approach designed for the study will require less medication for sleep, and (2) individuals receiving the nursing care approach designed for the study will subjectively report feeling "rested" following a night's sleep in the hospital, seemed appropriate.

Because of the small sample size and inability to control essential variables, such as diagnosis, analysis of the data through the hypotheses does not appear to be the most appropriate nor favorable way. However, analysis of the data based on the purposes of the study appears more appropriate. Analysis of the data from Table 1 (p. 43), Table 2 (p. 46), and Table 3 (p. 48), reveals that the subjects in the control group took medication for sleep a greater percentage of the time than did the experimental group. Subjects in the experimental group reported feeling rested a greater percentage of the time than did those in the control group. From these findings it appears that allowing hospitalized individuals to choose their bedtime and pre-retirement

activities promotes a more restful night and less need of medication for sleep.

Summary

Adults admitted to the medical-surgical units of a community hospital were interviewed using a data gathering tool designed to reveal information about sleep habits and previous hospitalizations. Twenty subjects were selected from those interviewed and divided into control and experimental groups. The control group received the routine hospital care, including that given at bedtime. The experimental group received the nursing care approach designed for the study. The two groups were interviewed and the patient record examined to ascertain data on the taking of medication for sleep and feelings of being rested following the night's sleep.

The subjects in the control group were hospitalized for an average of 6.3 nights, took medication for sleep an average of 4.5 nights, and reported feeling rested an average of 4.8 mornings. In comparison the subjects in the experimental group were hospitalized for an average of 5.3 nights, took medication for sleep an average of 2.3 nights, and reported feeling rested an average of 4.3 mornings.

Utilizing nonstatistical generalization a null hypothesis was rejected and alternate hypotheses 1 and 3 were accepted (see p. 2 for statement of hypotheses).

Chapter 4

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The purposes of the study were: (1) to test the application of a nursing care approach designed to promote natural sleep in the hospitalized individual, (2) to compare the sleep patterns of hospitalized individuals having the routine bedtime care with those having the approach designed to, as near as possible, replicate their normal pre-retirement activities and bedtime at home, and (3) to expand the breadth of the concept of individualized patient care in nursing.

A null hypothesis and four alternate hypotheses were formulated.

Null hypothesis: A nursing care approach that is designed to allow individuals to maintain, as near as possible, their regular hour and pre-retirement activities will make no significant difference in the amount of medication taken for sleep, nor the subjectively reported "rested" feeling following a night's sleep in the hospital.

Alternate hypotheses: (1) Individuals receiving the nursing care approach designed for the study will require less medication for sleep.

(2) Individuals receiving the nursing care approach designed for the study will require more medication for sleep.

(3) Individuals receiving the nursing care approach designed for the study will subjectively report feeling "rested" following a night's

sleep in the hospital.

(4) Individuals receiving the nursing care approach designed for the study will subjectively report a lack of feeling "rested" following a night's sleep in the hospital.

Adults admitted to the medical-surgical units of a community hospital made up the population. Twenty subjects were selected, paired by age, and divided into two groups of ten; control and experimental groups. The control group received routine hospital care, including that normally given at bedtime. The experimental group received routine hospital care except at bedtime when the nursing care approach designed for the study was employed.

Data on medication taken for sleep and feelings of being rested were gathered by using the semi-structured interview and examination of the patient record. Tabulation and comparisons of the data gathered from the two groups appears on a nonstatistical basis to reject a null hypothesis and accept the alternate hypotheses 1 and 3.

Conclusions

The conclusions presented are based on nonstatistical generalization of the data obtained.

A null hypothesis: A nursing care approach designed to allow individuals to maintain, as near as possible, their regular hour and pre-retirement activities will make no significant difference in the amount of medication taken for sleep, nor the subjectively reported

"rested" feeling following a night's sleep in the hospital, was rejected.

Alternate hypotheses: (1) Individuals receiving the nursing care approach designed for the study will require less medication for sleep, and (3) individuals receiving the nursing care approach designed for the study will subjectively report feeling "rested" following a night's sleep in the hospital, were accepted.

Additional conclusions drawn from the data collected include the following: (1) the majority of the subjects when at home went to bed at approximately 10 p.m. and not at 9 p.m., the bedtime for hospitals (see Appendix, Table 4, p. 57); (2) subjects not resting well in the hospital had the same problem at home; (3) subjects did not always know when they were receiving medication for sleep although the medication was to be given on demand; and (4) subjects frequently took medications only on the first night of hospitalization.

Recommendations

It is recommended that further nursing studies on sleep in hospitalized individuals be carried out. Specific areas which appear to need study are (1) the effects of anxiety, frequently associated with hospitalization, on the taking of medication for sleep, (2) the therapeutic effects of including questions regarding sleep habits on nursing histories or the admission interview, (3) the effects of hospitalization on sleeping habits following discharge from the hospital

and returning home, and (4) the replication of this study, done on a larger sample with pairing of more variables such as age, medical diagnosis, and perhaps occupation, to validate the study.

APPENDIX

Data Gathering Tool

Date _____

Name _____ Age _____

What is your occupation? _____

Diagnosis _____

What time do you normally go to bed? _____

What time do you normally get up? _____

How many hours do you estimate you sleep at night? _____

Do you take a daily nap? _____

Do you have trouble sleeping? _____

Do you take medication for sleep? _____ How often? _____

What? _____

What do you normally do the hour just before you go to bed? _____

Are you easily waked up during the night? _____

Have you been in the hospital before? _____

Table 4
Pairing of Subjects and Summary of Data Collected on Initial Visit

Pairing of Subjects and Summary of Data Collected on Initial Visit																						
Control Group						Experimental Group																
Subject	Age	Diagnosis	Occupation	Bedtime	Arise	hrs. sleep	Trouble No. sleep	Medi- cation for sleep	Pre- retirement activities	Easily Previ- waked at night	Presi- ouly at night	Subject	Age	Diagnosis	Occupation	Bedtime	Arise	hrs. sleep	Trouble No. sleep	Medi- cation for sleep	Pre- retirement activities	Easily Previ- waked at night
Mr. F. C.	70	Bronchitis	Retired	10:00 p.m.	7:00 a.m.	7	Yes	No	Watch T.V. Read	Yes	Yes	Mrs. L. G.	73	Cardiac	Housewife	10:00 p.m.	8:00 a.m.	6	Yes	Occas.	Watch T.V. Bathe	Yes
Mr. J. E.	67	Labyrinthine	Antique dealer	10:00 p.m.	7:00 a.m.	8	No	Occas.	Watch T.V. Snack	Yes	Yes	Mr. R. H.	68	Phantom limb, left leg	Supervisor Cement Plant	11:00 p.m.	8:00 a.m.	5	Occas.	Yes	Watch T.V. Bathe	Yes
Mrs. L. T.	41	Low abdominal pain	Licensed practical nurse	11:00 p.m.	7:00 a.m.	8	No	Occas.	Watch T.V. Bathe	Yes	Yes	Mr. F. C.	50	Closed reduction of femur fracture	Timber	10:00 p.m.	5:00 a.m.	7	No	No	Watch T.V.	No
Mr. M. C.	62	Back pain	Retired	10:00 p.m.	7:00 a.m.	4	No	Yes	1-2 Watch T.V. times/ week	Yes	Yes	Mr. J. A.	55	Pain in right knee	Electrician	10:00 p.m.	7:00 a.m.	6	No	Yes	Occas. Watch T.V. Brush teeth	Yes
Mr. J. S.	72	Ulcer, obesity	Retired	9:00 p.m.	8:00 a.m.	10	Yes	No	Watch T.V. Bathe	No	Yes	Mrs. C. P.	72	Ulcers	Housewife	9:00 p.m.	7:00 a.m.	10	No	No	Watch T.V. Bathe	No
Mr. B. W.	73	Pyelitis	Retired	9:00 p.m.	5:00 a.m.	8	Yes	Yes	Nothing particular	Yes	Yes	Mrs. C. S.	82	Cerebral arterio- sclerosis	Housewife	9:00 p.m.	8:30 a.m.	11	Yes	No	Nothing particular	No
Mrs. L. T.	29	Back pain	Housewife & Drive-In Manager	11:00 p.m.	7:00 a.m.	7	No	No	Bathe	Yes	Yes	Mrs. V. C.	23	Fatigue & obesity	Housewife	11:00 p.m.	7:00 a.m.	8	Yes	No	Bathe	Yes
Mrs. M. B.	67	Nausea, vomiting, vertigo	Retired	10:00 p.m.	7:30 a.m.	9	No	No	Watch T.V. Bathe	No	No	Mrs. K. L.	76	Fatigue & dizziness	Retired	10:30 p.m.	8:00 a.m.	5	Yes	No	Eat Snack	No
Mrs. E. P.	67	Multiple myeloma	Housewife	10:30 p.m.	7:00 a.m.	7	Occas.	Yes	Occas. Watch T.V.	Yes	Yes	Mrs. M. R.	74	Congestive heart failure	Housewife	10:30 p.m.	8:00 a.m.	6	Yes	No	Watch T.V.	No
Mr. E. B.	60	Sacroiliac sprain	Engineer	10:00 p.m.	6:00 a.m.	8	No	No	Read	No	Yes	Mrs. R. A.	50	Chest & leg pains	Housewife	10:00 p.m.	6:00 a.m.	8	No	No	Watch T.V.	No

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