INCIDENCE OF INTERRUPTIONS PREVENTING REST OR SLEEP EXPERIENCED BY THREE PATIENTS IN THE CARDIAC RECOVERY ROOM

by

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CHAPTER I

INTRODUCTION

Sleep patterns have long been of interest to man. Most persons suffer from a type of insomnia at some time. There is much in the literature on how to remedy this malady (19). Man tends to sleep better in familiar surroundings under his own set of circumstances. If he is taken out of this environment, he tends to be thrown out of his normal cycle.

It is not known why man must sleep to restore his well-being and efficiency. Nor is it known whether some chemical substance accumulates in the brain during sleep, to be removed by the sleep it promotes (24).

Lack of sleep produces fatigue. All stimuli that normally keep people awake become less effective. When people are sleep-deprived, they are prone to become unaware or unresponsive to external events and to suffer from alterations of awareness (such as hallucinations) and disorders of thought and speech construction (24).

Persons who have open heart surgery have a history of heart problems and may have spent many sleepless nights both at home and in the hospital. Their sleeplessness may be caused by pain, shortness of breath, anxiety, and a change in environment. The patient is usually brought to the hospital

three to five days prior to surgery to allow for proper preparation. This time period adds to the anxiety of the impending surgery and separates the person from the family unit during a highly stressful time. It is highly probable that the patient may be fatigued before surgery.

Few studies have been done to obtain information on the effect of loss of sleep in patients during the postoperative period. Sleep loss may be due to pain and the many treatments required to sustain the patient's life. The patient must be awake enough to cough and "deep breathe" and yet be kept sufficiently comfortable to perform those taxing activities.

Statement of the Problem

This study was confined to the observations of postoperative open heart surgery patients in the cardiac recovery room. Many activities are essential for carrying out medical orders, nursing functions, and meeting the patient's physical needs. These include relief of pain, care and interpretation of the cardiac monitor and respirator, adequate replacement of fluids by use of intravenous therapy, and proper handling of the chest tubes and the trachesotomy or endotracheal tube. The frequency with which these activities must be performed provide little uninterrupted time for the patient to rest or sleep. Do postoperative open heart surgery patients have sufficient opportunity for rest or sleep in the cardiac recovery room? Previous studies have established that open heart

surgery patients are sleep-deprived in the immediate postoperative phase. These studies have not observed patients directly and consistently for the entire twenty-four-hour period.

Purpose of the Study

This study was undertaken for a four-fold purpose: (1) To ascertain the frequency of patient care activities (interruptions) that interfered with the continuity of rest and sleep during the first sixty-eight to seventy-two postoperative hours. This purpose was based on the premise that rest and sleep could be obtained at any time in the twenty-four-hour period when there was relative freedom from interruption. (2) A further purpose was to compare the cumulative sleep periods with the patient's normal sleep pattern. (3) Concomitant to these purposes, it was endeavored to determine whether the patients felt they had enough time for rest and sleep while in the cardiac recovery room. (4) A final purpose was to obtain suggestions from the patients regarding means of making them more comfortable while in the cardiac recovery room.

Selection of the Participants

Those selected for inclusion in this study:

1. had some type of open heart surgery;
2. were twenty-one years of age or over;
3. were able to speak and understand English;

4. had no previous history of mental problems or brain injury;
5. were alert;
6. gave consent for inclusion in the study.

Limitations

This study was limited to:

1. data collected by observation of three postoperative cardiac patients selected as above;
2. observations totaling sixty-eight to seventy-two hours for each patient made by nine observers, each functioning individually;
3. observations made in one hospital between November 13, 1972 and November 18, 1972;
4. responses to a preoperative interview regarding normal sleep patterns;
5. comments during a postoperative follow-up conference.

Frame of Reference

For purposes of this study, the term interruption refers to any stimulus which warrants patient activity or any stimulus which increases the patient's awareness of his environment.

Nursing personnel consisted of all who administered nursing care, namely registered nurses and nursing students.

Medical personnel included private physicians and surgeons, house staff, residents, interns, and medical students.

Auxiliary personnel consisted of X-ray and E.C.G.

technicians, persons employed for housekeeping, maintenance, dietary, and inhalation therapy.

Description of the Study

A search of the literature was made to obtain information on normal sleep, the different theories of sleep, and previous studies done on sleep deprivation. A tool for data collection was devised based on the format used in two sleep deprivation studies. Permission was obtained from the authors of the two studies to utilize the forms devised for those studies (Appendix A). The forms were modified as appropriate. To determine the feasibility of the forms for recording observations, one patient was observed for a period of eight hours. The preoperative interview guide was used with one coronary patient to test the tool for clarity and ascertain the time involved in the interview. The form is found in Appendix B.

Permission to do the study was obtained from the Head of the Division of Cardio-Pulmonary Surgery and the Director of Nursing Service of the selected hospital. The investigator met with the supervisors of the Cardiac Recovery Room to explain the study and to discuss any problems that might be encountered. The patients were selected from the surgery schedule for the week of November 13, 1972. Five patients were selected by the previously mentioned criteria. All five patients were visited preoperatively. The purpose of this visit was two-fold: (1) to gain the patient's permission to

be included in the study, and (2) to obtain demographic information and a prior sleep pattern history. The visit lasted from forty-five to sixty minutes. The number of patients was later reduced to three. The data collection started at 2:30 p.m. on Monday, November 13, when the first patient entered the cardiac recovery room after surgery, and continued until 1:30 p.m. on November 18. The observations started the minute the patient arrived in the cardiac recovery room and continued until moved from the cardiac recovery room, a period of sixty-eight to seventy-two hours per patient. The observers confined their activities to observation only and did not participate in patient care.

Patient A was observed for sixty-eight hours and then was moved to the ward. Patient B was observed for seventy-two hours. Patient C was observed for seventy-hours; the first two hours were not observed due to a communication problem between the observers. Patient D was observed for two hours only and then dropped from the study. It was found to be too difficult to observe four patients at the same time.

The number and nature of interruptions was recorded to show the frequency with which the patients were disturbed each hour for the observation period. The information was scanned to determine the amount of opportunity for rest and sleep, and also to determine if the patients rested better during their normal sleep cycle than at other times of the day.

The patients were interviewed postoperatively after they had been moved onto a general ward. The purpose of this visit

was to investigate how the patients felt about the amount of sleep or rest that they were allowed in the cardiac recovery room. They were asked if they thought there was anything that could have been done to make their stay in the cardiac recovery room more comfortable.

Due to the small population, no general conclusions could be made. It is hoped that this study will be of value to persons doing further studies in this field, and to nurses working in cardiac recovery rooms with the postoperative heart surgery patient.

CHAPTER II

REVIEW OF LITERATURE

A search of the literature was made to obtain information on normal sleep, the different theories of sleep, and previous studies done on sleep deprivation.

Normal Sleep

Sleep is a normal phenomenon of man; all men sleep, but the amount of sleep required varies with each individual. Some function adequately on four hours while others may need eight or nine hours of sleep or more. Long before the advent of modern medical science, the number of eight hours of sleep was decided. Maimonedes (20) decreed that day and night was twenty-four hours, and it was enough for man to sleep one-third of them. The prescribed requirement of eight hours of sleep has been followed ever since despite the lack of scientific proof.

What is termed sleep is not a single uniform state. It consists of regularly alternating periods of rapid eye movement (REM), associated with highly distinctive physiological and psychological activity, and with non rapid eye movement (NREM) (18).

According to the standardized scoring system now widely

used by investigators in sleep and dream research, sleep is divided into stages:

STAGE I: A relatively low voltage, mixed frequency E.E.G. with slow eye movement. The sleeper may have the sensation of drifting or floating in space and, if awakened, may insist that he has not been asleep. It is a relatively short period lasting from one to seven minutes.

STAGE II: Sleep spindles (bursts of twelve to fourteen cycles per second activity) and K complexes (well-delineated polyphasic high voltage waves which are generally maximal over vertex regions) occurring on a background of relatively low voltage, mixed E.E.G. activity. The subject appears to sleep soundly and has no vision if an eyelid is gently opened; however, he can be awakened easily and then may still claim that he has not slept.

STAGE III: Moderate amounts of high amplitude, slow wave E.E.G. activity. There is a high threshold for external stimuli.

STAGE IV: Large amounts of high amplitude, slow wave E.E.G. activity, of which more than fifty per cent is two cycles per second or slower. This is the deepest stage of sleep, from

which there are no reports of mentation. Vital signs are very regular.

STAGE REM: An E.E.G. picture indistinguishable from Stage I but associated with episodic REM, with low amplitude electromyogram. There is a high degree of central and autonomic nervous system activation, including vivid dreaming (3).

The non rapid eye movement period has the qualities which are normally associated as sleep: a slow onset of drowsiness to deep sleep with increased muscle relaxation, a slowing of the heart rate, regular respiration, a fall in temperature and blood pressure, and a decreasing response to external stimuli.

Great psychophysiological upheaval takes place during the REM periods. The E.E.G. is fast, irregular, of low voltage characteristic of very light sleep, with evidence of high central nervous system arousal. According to Lowry (18) there are cortical evoked potentials which resemble those of the waking state with a spontaneous neuronal discharge in both cortical and subcortical blood flow and brain temperature. The central nervous system is aroused in some degree other than the waking state, and yet the subject appears to be deeply alseep. There is a marked loss of muscle tone. Equally remarkable are the peripheral changes which take place. All the vital functions are irregular with wide

variation of pulse rate, respiratory rate, blood pressure, and temperature.

REM periods can be noted about every ninety minutes during sleep. There is some support for the hypothesis that the specific cyclic pattern of activation is present throughout the entire twenty-four-hour period; however, there is no way of detecting it during the waking period (32). During the night, there are four to six REM periods, increasing in length toward the morning hours.

An inverse but linear relationship exists between age and the percentage of REM time in sleep: approximately eighty per cent in a baby ten weeks premature, fifty per cent in a full term neonate, thirty-five per cent in a one-year-old child, and a gradual decline in adult levels after forty-five years of age. The most striking change in the sleep of the elderly is a decline in the amount of deep, slow wave sleep. Whereas, children have twenty to thirty per cent and young adults ten to fiften per cent of Stage IV sleep, in the elderly, this stage accounts for zero to four per cent of total sleep (18).

Not all persons sleep at night, but almost everyone sleeps for a long period some time in every twenty-four hours. It is not known if there is an intrinsic need to sleep for a long stretch or if some absolute amount of sleep could be distributed differently as needed. A sleep schedule seems to be intermingled with body clocks of roughly twenty-four hours. Man's body will function smoothly only when its billions of

components interknit with proper timing. A timing device within the cells pace out the meter, and sleep is generated by those tempos (20).

The cycle of sleep and waking probably results from a myriad of biological rhythms that revolve around the interval of twenty-four hours. Although most people do not sense the rhythms, they are important attributes. They can influence a person's response to surgery, judgment, stamina under pressure, and competence at work. The circadian rhythms might be called man's inner clockwork. The term circadian was coined by Halberg (13) to indicate a periodicity of around twenty-four hours, in part individually acquired, but inborn in man.

One of the obvious signs of this daily rhythm is body temperature which varies two degrees every twenty-four hours. The body temperature rises during the day and falls at night, the lowest point being around 2:00 to 5:00 a.m. Normally a person will feel his best during the hours that his temperature is high, and if awake when it falls to the low point, he may feel chilled and fatigued.

Theories of Sleep

Two lines of current research offer theories rather than conclusions. They can be grouped as: (1) neural theories of sleep and (2) humoral theories of sleep.

Researchers suspect that a body of hormones may influence both sleep and mood. This theory is in its infant stage of study.

Neural Theories

In the last part of the nineteenth century, Duval (15) suggested that the dentrites of cortical cells could be retracted by a sort of ameboid movement, thus breaking the contacts and resulting in the state of sleep. There were several variations of the dendritic theory. Among them was one by Legendre (15) with his idea that vacuolization of dendrites led to the retraction of the nerve cell, and one by Cajal (15) who suggested that the neuroglia cells might be endowed with ameboid motion and that the movements of their pseudopodia separated adjacent neurons. No one substantiated the existence of ameboid movement, and nothing more was heard about the dendritic theory until 1956. At that time Purpura (28), from his observations on unanesthetized paralyzed cats, concluded that there was an indication that ". . . high frequency stimulation of the ascending bulbar reticular system alters synaptic activity of cortical dendrites." By Purpura's scheme, ". . . persisting dendritic inhibition resulting from reticulo-cortical synaptic excitation is believed to underlie the alternation in electro-cortical activity associated with behavioral arousal.

A different group of neural theories, the inhibitory, appeared earlier than those referring to dendrites and is still current. One of the first proposals in this field was made by Brown-Sequard (15) in 1889. According to him, the onset of sleep accompanied by the closure of the eyelids and

changed position of the eye appeared to be an inhibitory reflex. Like the dendritic theories, the inhibitory theories had nothing factual to rely upon, but they appealed to and were adopted by a number of subsequent workers. The popularity was undoubtedly due to their being considered more physiological than were the histological theories. Each worker had his own theory on how the inhibition performed its task.

Sheppard (30) proposed an inhibitory theory, the substance of which was that as a person went to sleep he became absorbed in a mass or complex of fatigue sensations which tended strongly to inhibit other processes, especially motor activity and consciousness of strain sensation from the muscles.

Pavlov (26) was one of the chief exponents of the inhibitory nature of the onset of sleep. He concluded from the study of conditioned reflexes that cortical inhibition was localized sleep and that sleep was due to widespread cortical inhibition. This sleep was brief, from a few seconds to a few minutes with rapid termination. The abrupt change suggests animal hypnosis rather than the physiology of sleep.

A different theory accounts for the onset of sleep by the supposition that there is an interruption in the afferent pathways leading to the cerebral cortex. It was mainly because of the striking results of Bremer (15) that functional deafferentation of the cortex during sleep became established. He could obtain the same E.E.G. patterns in the cat's cerebral cortex after "isolating" it by cutting through the brain stem

just behind the origin of the third nerves, as those obtained during sleep. That suggested to him that in normal sleep the cortex becomes deafferented. Adrian (2) came to the same conclusion based on his study of the E.E.G. patterns of monkeys subjected to dial anesthesia.

Claparede (15) said that sleep was an "instinct." He considered sleep not a passive but an active function in that it prevents possible intoxication or exhaustion from continual wakefulness. Sleep is achieved by active interest and will of the animal obeying the "law of momentary interests" which can be stated: "At each moment the instinct which is of greatest importance predominates over other instincts." Sleep, according to Claparede, results from loss of interest in the environment, and one awakens because one becomes tired of sleeping. In the meantime there has been restoration of the organism through rest.

Humoral Theories of Sleep

The common factor which characterizes humoral theories of sleep is the production and accumulation of certain substances, either in the tissues in general or in specific organs such as the brain. When a certain concentration of such substances has been reached, the activity of the brain is depressed either directly or indirectly. The gradual removal of these substances during sleep leads to the awakening state.

Dubois (15) developed the theories of carbon dioxide

autonarcosis, in which CO_2 accumulates in sufficient quantities to slow up the oxidative processes of the nervous system, producing sleep; CO_2 continues to accumulate during sleep and, having reaches a higher concentration, causes awakening. His three successive theories have been summarized by Pieron (15) as follows: (1) there is only one sleep center which is excited by a specific concentration of CO_2 producing sleep, and paralyzed by higher concentration causes awakening; (2) there are two centers, one for sleep and the other for awakening, with a certain concentration of CO_2 which stimulates the former while a higher concentration of CO_2 stimulates the latter; (3) there is a center of wakefulness which is paralyzed by a specific amount of CO_2 and stimulated by a higher concentration of CO_2.

Bancraft and Rutzler (15) brought forth a theory that "sleep must be due in part to a reversable agglomeration of some proteins in the centers of consciousness." They did not know the nature of the agglomeration substance or substances. It is thought that a peptizing agent such as sodium rhodanate will decrease the irritability and make sleep possible, though not causing it. A larger dose of the peptizing agent may act on the centers of consciousness and thereby prevent sleep. Psychosis, according to the investigators, is due unquestionably to an overdispersed state, and if the person suffering from psychosis sleeps normally, one portion of the brain must be over-agglomerated at times even though another portion is overdispersed.

Mueller's (15) theory was that the secretion of the cerebrospinal fluid into the third ventricle induced sleep by an increase in intraventricular pressure and the reabsorption of the fluid led to awakening. Gans (12) offered a working hypothesis that sleep influences the flow of cerebrospinal fluid so that it passes from the ventricles into the subarachnoid spaces by a transcerebral route, bringing glucose to and removing waste products from the brain cells.

Sleep may be due to the action of products of intermediary metabolism such as alcohol and ureides, according to Kalter and Katzenstein (15). Dienst and Winter (15) held that through metabolic activity of the organism there occur shifts in the acid-base equilibrium which result in a tonus change of the autonomic system which, in turn, activates the sleep center and led to the onset of sleep. Mueller (15) advanced the possibility that the cerebral cells are charged with "bioelectric energies" during sleep, and McCormick (21) felt that sleep was a replenishment of the B_1 reserves of the brain.

Accepting the view that sleep leads to an excitation of the parasympathetic system, Kikichi (15) maintained that sleep does not always diminish the irritability of the sympathetic system, but rather alternately increases and decreases it. Zondek and Bansi (15) felt that the inhibition of action of certain hormones is necessary for narcosis and even normal sleep. They held that vagotonic conditions are associated with an inhibition of the absorption of these hormones, while

sympathiocotonic conditions have the opposite effect. Ewen (11) saw signs of parasympathetic over-reaction in ten schizophrenics and suggested that the mechanism responsible for sleep may also be operating to cause schizophrenia. Having produced sleeplike states through the action of acetylcholine on the hypothalamus, Dikshit (9) considered sleep to be a parasympathetic function. Hess's (15) theory was that "animal" apparatus loses its freedom of function not because of exhaustion, but because the rest phase of the "vegetative" apparatus places inhibitory influences in the pathway of the "animal" conduction pathways. According to Hess, sleep is an excellent example of parasympathetic function, which is manifested by constriction of the pupils. The waking state comes from the sympathetic system, bringing about a disinhibition of the animal elements of the organism's functions. From the changes in twelve physiological variables in five subjects during prolonged sleep deprivation, Ax and Luby (4) interpreted their results as evidence of "profound sympathetic fatigue."

It can be noted that there are many theories about the cause or causes of sleep. It is still not known if any one specific mechanism is responsible for causing sleep or the awakening state. Selkurt (29) said that the state of sleep is thought to be caused by diminished corticopetal sensory influences, and awakening to their increase. All the research that has been done in the past reveals that there is need for sleep and that the absence of sleep results in poor function.

The reasons still remain unknown.

Studies on Sleep Deprivation

Numerous studies have been done on sleep deprivation in both man and animals. The first experiments on animals were done by Manaceine (as cited by Kleitman, 15) in 1894. He found that puppies died when kept awake for ninety-two to one hundred and forty-two hours. They showed a marked hypothermia; the red blood cell count decreased from five to two million, but later increased due to a thickening of the blood.

The first sleep deprivation study on man was done by Patrick and Gilbert (25) in 1896. They kept three young persons awake for ninety hours; during this time submitted them to a variety of physiological and psychological tests. The results showed a decrease in sensory activity, reaction time, motor skills, and memorizing ability. Of significance was the fact that one person had visual hallucinations and a gradual decrease in body temperature with the preservation of the twenty-four-hour curve. At the end of the experiment the subjects slept for twelve hours and seemed to be completely restored to normal upon awakening.

Since the advent of open heart surgery, surgeons have become cognizant of the increase of postoperative reactions such as delirium, hallucinations, paranoia, and disorientation. Behrendt and Austen (6) stated that paranoia, depression, delusions, and agitation are common among critically ill cardiac patients and make postoperative care difficult.

These reactions are related somewhat to sleep deprivation, prolonged inability to talk because of the endotracheal or tracheostomy tube, and the impersonalization of the intensive care unit. The authors felt that careful preoperative orientation and frequent explanation of what is happening during the recovery phase helped to minimize the problem.

A study done by Kornfeld, Zimber, and Malm (16) on ninety-nine adult patients subjected to open heart surgery at the Columbia-Presbyterian Medical Center revealed that a psychosis of the acute organic variety occurred in thirty-eight per cent of the adult patients. The psychosis did not occur in the twenty children studied. It occurred in the adult patients after a lucid interval of three to five days and cleared shortly after the patient was transferred to the regular hospital environment. An increase in preoperative incapacitation or an increased amount of time on the heart-lung machine did not reveal an increase in the likelihood of delirium. A higher incidence of delirium did occur in patients having two valves manipulated than in those having only one valve manipulated. The researchers concluded that a major factor in the increase of delirium was the environment of the open heart recovery room which produced an atmosphere is both sleep and sensory deprivation. Modifications in the structure and procedures in the intensive care unit were suggested to decrease this effect.

During a six-month period, twenty-three patients at the University of Virginia Hospital scheduled for open heart

operations were interviewed by Abrams (1). The investigator acted as a psychiatrist and was one of a team which included a cardiologist and a neurologist. The patients were seen both preoperatively and postoperatively. The interviewing lasted for one hour and included the patient's life history, his attitudes toward his heart disease and the approaching surgery, his general personality structure, and typical defense mechanisms for dealing with and handling anxiety. Postoperative follow-up consisted of a daily visit until the time of discharge. In the preoperative psychiatric interview, the two most common reactions to the stress of the surgery were: (1) denial or a life-threatening situation facing the patient (thirty-three per cent) and (2) a breakthrough of the anxiety with its full expression during the interview (thirty-eight per cent). The postoperative results revealed that the patients were in a state of complete apathy and fatigue after having faced a life-threatening situation and survived. The recommendations were that: (1) the patient should be given a preview of what would be seen when awakening in the intensive care unit; (2) a description of the equipment; (3) at times, a visit to the intensive care unit. The foregoing would increase the trust and honesty needed in the doctor-patient relationship.

Blachly and Starr (7) studied one hundred and sixty-four heart surgery patients age fifteen years or over at the University of Oregon Medical School Hospital. A psychiatric evaluation was done one or two days prior to surgery and

every day or two postoperatively until the patient's status had returned to preoperative level or until discharge. It was reported that sleep deprivation might be a factor in the postcardiotomy delirium. The patients said they slept but that it was not satisfying. Significant psychiatric changes occurred postoperatively in thirty-five patients (twenty-one per cent), eleven (thirty-three per cent) of whom died during the first week. Fifteen of the remaining twenty-four (sixty-one per cent) had delirium. The delirium occurred in fifty-seven per cent of the one hundred and thirty-nine patients who survived. No specific recommendations were made; however, the authors felt that both sleep deprivation and perceptual deprivation plus metabolic changes contributed to the delirium.

Egerton and Kay (10) assessed ninety preoperative patients who were undergoing open heart and thoracic procedures. The patients were seen a few days before surgery and about five times a week following surgery until discharge. Psychotic disturbances were most frequent in the six weeks following surgery, and neurotic disturbances were predominant in the three-month follow-up. It was found that delirium was preceded by one or two sleepless nights, and the incidence of delirium dropped when adequate sedation was introduced. Delirium occurred more frequently in the open heart surgery patients than after other thoracic procedures. Recommendations were: (1) subdivision of the recovery ward to allow segregation of noisy or critically ill patients; (2) provision

of inaudible monitoring devices; and (3) a more interesting patient environment to decrease the incidence of psychotic disturbances.

Two groups of open heart patients were observed in two separate locations in the city of Milwaukee, Wisconsin by Lazarus and Hagens (17). A control group of thirty-three patients were at Saint Luke's Hospital and the experimental group of twenty-one patients at the Milwaukee County General Hospital. The experimental group was seen by a psychiatrist prior to surgery. After the visit he made specific recommendations about the care and management of the patient. He instructed nurses to include specific attention to the psychological condition of the patient in the immediate postoperative period. This included a positive, supportive, reality-oriented relationship with the patient as soon as feasible. The psychiatrist did not visit the control group.

The results indicated that eleven of the thirty-three (thirty-three per cent) in the control group experienced psychological reactions following surgery, and only three of the twenty-one (fourteen per cent) in the experimental group did so. The researchers' recommendations were: (1) modification of nursing procedures to correct for minimal sleep and sensory deprivation; (2) maintenance of monitoring equipment outside the room; (3) allowing the patient maximum mobility; and (4) the elimination of monotonous sounds. The investigators felt that the personal relationship between the patient and the nurse was most crucial.

Hazen (14) said that symptoms of psychosis appear between the second to seventh postoperative day and can occur as late as the fourteenth day. Symptoms usually lasted only twenty-four to forty-eight hours with complete remission. He advised that the patient be watched closely for potential psychiatric complications. He further advised the use of well-trained personnel, adequate sedation for the patient, and reassurance and the establishment of a favorable patient-psychiatric staff relationship during the preoperative period.

Nurses have long been aware of the results of sleep loss upon their patients. Florence Nightingale (23) wrote never "to allow a patient to be awakened intentionally or accidentally." She indicated that if he aroused out of his first sleep, he is likely to have no more sleep. "It is an intelligible fact that if a patient is awakened after a few hours instead of a few minutes of sleep, he is more likely to sleep again."

McFadden and Giblin (22) conducted a study of four patients fo find if there was sleep deprivation during the patients' fourth, fifth, and sixth postoperative nights. They selected the first four patients who were twenty-one years of age or older and were scheduled for open heart surgery. The patients were visited by the investigators the night before surgery and a prior sleep pattern history was obtained. The nursing staff observed the patients for the longest duration of uninterrupted rest per hour that each patient received for the first three postoperative days and

nights. On the fourth, fifth, and sixth nights the investigators observed the patient for one minute out of every five minutes from 11:00 p.m. to 7:00 a.m. to determine the apparent periods of sleep.

In summary, all patients were considered to be deprived of sleep the first through the third nights as compared to previous sleep histories. All four patients were considered to be sleep deprived on the fourth through the sixth postoperative nights when compared to their prior sleep patterns. It was concluded that none of the four patients received enough uninterrupted rest or sleep the other sixteen hours of the day to allow them adequate rest according to their previous sleep histories. Three of the four subjects demonstrated behavior changes which might have been related to sleep loss. The recommendations included: (1) a study to utilize three investigators to obtain data on observed periods of sleep on the first through sixth postoperative days; (2) a follow-up study with a larger population to compare results; (3) a study to analyze the environmental stimuli which appear to interfere with sleep or rest of the patient in the intensive care unit after open heart surgery; and (4) a similar study of a different population such as general surgery patients or coronary care patients.

A study by Woods (33) sought to ascertain if sleep deprivation does occur in selected postoperative open heart surgery patients, the amount of uninterrupted rest apparently available to the patients, if behavioral manifestations

indicative of sleep deprivation occur, and the nature of nursing measures which may interfere with patients' sleep. Four patients in a three-hundred-twenty-bed teaching hospital were selected and observed by a nonparticipant observer at ten-minute intervals for the first eight postoperative nights (11:00 p.m. to 7:00 a.m.). The conclusions were: (1) the frequency of interruptions of sleep seems to reflect the tendency of the intensive care unit to provide continual care without regard to the time of day or diurnal patterns; (2) the number of interruptions varied with the patients' conditions; and (3) the most frequent interruptions during the second and third postoperative days were due to direct monitoring and measures to promote respiration. The recommendations for nursing care were: (1) the patient's need for sleep should be incorporated into the nursing care plans; (2) nursing measures should be grouped to coincide in an attempt to permit one or more sleep cycles between interruptions; (3) nursing histories of the patient's previous sleep routines can provide data upon which to base such activities as positioning and completion of pre-sleep routines; and (4) nurses should consider their role in controlling environmental stimuli to promote the sleep-wakefulness rhythm.

Walker (31) observed four cardiotomy patients in the intensive care unit of Firmin Desloge Hospital of Saint Louis University. Each patient was observed for an eight-hour period a day for three consecutive days. Observations included the total time of each interaction and the person

doing the interacting with the patient. The greatest number of interactions in eight hours for all four patients was recorded on the first day. Interactions decreased in frequency from the first to the third day. Three of the four patients complained of sleep loss. One observation was that nurses need to be more aware of the amount of sleep the patient receives. Recommendations included: (1) distinguish between essential and nonessential duties; (2) reorganize the nursing procedures to allow time for maximum rest; (3) educate other personnel to the reason for planned sleep; and (4) give attention to the external stimuli such as providing privacy, dimming lights, and controlling noise.

Summary of Literature

A number of interesting theories have been advanced concerning the causes and need for sleep. The neural and humoral theories are currently the most accepted. However, much is still conjecture.

Investigative studies of sleep deprivation in human subjects have revealed a decrease in sensory activity, memorizing ability, and motor skills.

It has been noted that an increased number of patients who have had open heart surgery experience various psychotic reactions during the postoperative period. The relationship of such reactions to sleep deprivation is not fully established but is under continued study.

Nurses have long been cognizant of their patients' need

for sleep. Several studies conducted by nurses have shown that open heart surgery patients do not have opportunity to sleep due to the large amount of activity involved in their care. In each instance the number of patients studied has been small; hence further investigation is suggested.

CHAPTER III

REPORT OF THE STUDY

This study was undertaken for the purposes stated in Chapter I and followed the steps as designed. The setting for the study consisted of a four-hundred-ninety-bed teaching hospital.

The cardiac recovery room was opened in August, 1972. It is sufficiently spacious so more than the current seven-bed accommodations are possible. The placement of beds is such that four beds parallel to each other face the east with the one at the end placed in a glassed-in cubicle for isolation purposes. Three other beds face the south. The nurse's station faces north and is so located that all beds can be observed from the station other than the one in the isolation room.

The area around each bed is such that necessary equipment can be readily used. There is wall suction. A small monitor is installed above each bed; monitor tracings were run throughout the day.

The unit is pleasantly lighted by use of windows and ceiling lights that can be dimmed at night. A large clock is suspended from the ceiling with time visible on both sides, but it cannot be seen by all patients.

Procedure

An initial step in undertaking this study consisted of obtaining authorization from the Head of the Division of Cardio-Pulmonary Surgery. A synopsis of the proposal was submitted and approval granted.

A conference was held with the Director of Nursing Services for purposes of explaining the study and eliciting cooperation of the staff involved in the care of the patients in the cardiac recovery room. Permission to carry out the study was readily obtained and interest assured (Appendix A).

To arrange for continuous competent observation, professional colleagues were approached. Their interest in the study motivated them to volunteer as observation staff. All observers were experienced professional nurses and as such had already developed considerable astuteness in making observations. Such skill was deemed essential because the observation of interruption of the patient's time for rest or sleep consisted of differentiating activities to which the patient reacted from those which resulted in no reaction.

Each supervisor of the cardiac recovery room was contacted. The study was described in detail. There was discussion regarding where the observers would be placed, their attire, and their relationship to the staff. The supervisors were assured that in no way would the observers interfere with the functions of the unit's personnel.

The surgery schedule was reviewed and four patients

selected. A schedule for the observers was prepared, with blocks of observation time varying from three to ten hours.

Each patient was visited individually prior to the surgical date. The purpose of the visit was to obtain permission to be included in the study, to elicit certain demographic information, and to procure a history of usual sleep patterns. The forms used for recording this information are found in Appendix B. Approximately forty-five to sixty minutes were spent with each patient discussing the pending surgery and prior sleep patterns. Patients were told that the observers would neither participate in patient care nor in any manner deter the functioning of others. They were informed that after they had been moved from the recovery room, the investigator would visit them again to ask some questions.

The observers were contacted individually to clarify the nature of the observations to be made and to inform them concerning some of the arrangements made with the staff, such as where the patients would be located, the vantage point for observations, and how to use the form for recording.

The focus of this study was to ascertain, by observation, the amount of activity that interferred with the patient's opportunity for rest or sleep during the first three days in the postoperative cardiac recovery room. Such interference has been designated as interruption. The rationale for confining the observation to a three-day period approximating sixty-eight to seventy-two hours is derived

from sleep studies previously made. Kleitman (15) found that a waking period of sixty-two to sixty-five hours resulted in personality changes. Since cardiac patients in the postoperative period have been known to develop psychotic disorders, there could be a relationship between such complications and a lack of sleep. The observations made in this study should be considered as providing baseline data only. The significance of such data can be enhanced only by comparison with the patient's usual sleep pattern. Each patient is described individually.

Patient A

Patient A was a fifty-seven-year-old female who had an aortic valve replacement with a double vein graft.

She claimed to be a restless sleeper who awakened frequently during the night, usually three times. The awakenings occurred at 3:00 a.m., 4:00 a.m., and 7:00 a.m. She went to bed at 10:00 p.m. and arose at 9:00 a.m. No bedtime routine was followed, and she always fell asleep immediately. The only time she napped during the day was if she had had a particularly restless night. The nap took place at 12:30 p.m. and lasted about thirty minutes. She usually slept on her left side, and she never took any medication to help her sleep. She always felt rested in the morning unless she had had a restless night, and then she felt better after a nap. She normally slept eight or nine hours a night. The reasons she gave for not being able to sleep in the hospital on

previous hospitalizations were anxiety, getting used to the bed, and noises with which she was not familiar.

Patient B

Patient B, a sixty-one-year-old male having his third heart surgery, had an aortic valve replacement and a vein graft to the right coronary artery.

He stated that he was a sound sleeper and did not awaken during the night. He claimed to sleep only four hours a night, but a closer estimate would be five and one-half hours per night. He went to bed at 10:00 p.m. and read until 1:00 a.m. He went to sleep immediately and slept until 5:00 a.m. and was awakened with shortness of breath. He then went into the kitchen and slept for one hour longer leaning on a counter top. He almost always took an afternoon nap which lasted from thirty minutes to one hour. He slept on either the right or left side and rarely on his back. The only medications he took at bedtime was Darvon plain 100 mg. for headaches which he attributed to reading. He always felt rested when he awoke in the morning. The reasons he gave for not being able to sleep in the hospital on previous admissions were the noise caused by the personnel's wooden shoes and from their gregariousness.

Patient C

The patient selected and interviewed was a sixty-two-year-old female who was scheduled for her second mitral valve

replacement. The first mitral valve replacement was done in March, 1972 and had been unsuccessful. This surgery was cancelled to allow an emergency surgery to be done on the person who became Patient C. He was a sixty-one-year-old male with coronary artery disease. He was located in another hospital and was interviewed there before being transferred to the hospital where the surgery was done. He had a double vein graft.

He reported that he was a restless sleeper who awakened frequently during the night. He slept eight hours, but the rest was not continuous. He retired at 10:30 p.m. and awakened at 3:00 a.m. and stayed awake until 5:00 a.m. Then he slept until 9:00 a.m. There was not any specific routine which he followed, and he usually went right to sleep when he went to bed. He always took an afternoon nap which lasted from 1:30 p.m. until 3:30 p.m. To sleep, he felt most comfortable on his back. He always took 10 mg. of Valium at bedtime.

Patient D

This patient was a thirty-three-year-old male who had a mitral valve replacement in February, 1972. The valve was malfunctioning and was replaced on November 16, 1972.

He normally went to bed at 11:30 p.m. and awoke several times during the night. These times were usually different each night. He arose at 9:00 a.m. and upon arising did not ever feel rested. He never took an afternoon nap, and he

followed no bedtime routine. When previously hospitalized, the reasons he gave for not being able to sleep were having to go to the bathroom, nervousness, apprehension, and a change in his environment. He was later excluded from the study.

Actual Observations

Most of the observations were made from a room adjacent to the cardiac recovery room. However, on the third day of observing it was necessary to move directly into the unit. Patient D was observed for several hours immediately postoperatively and then dropped from the study. The reason for this was that it was too difficult to observe closely four patients at the same time.

The study was continuous, beginning at 2:30 p.m. on Monday and continuing through until 1:30 p.m. on Saturday.

Patient A arrived in the cardiac recovery room at 2:30 p.m. on Monday and was released at 11:00 a.m. on Thursday. She had had some bleeding problems in surgery which accounted for her late arrival in the cardiac recovery room. She was observed for sixty-eight and one-half hours. She was awake and moving all her extremities within thirty minutes after her arrival. An endotracheal tube was in place and was removed at 9:00 p.m. on the first postoperative evening.

During the first twenty-four hours, there were eighty-seven interruptions of rest for a total of ten hours and eleven minutes. There was no period of at least one hour

free from interruption. Of these interruptions, ten were made by medical personnel, four by inhalation therapists, two by X-ray technicians, two by the E.C.G. technician, and seventy-six by nursing personnel. These included personal care, the monitoring of the respirator and cardiac monitor, and the giving of intravenous fluids. A nurse was usually at the bedside when the interruptions were made by personnel from other departments.

On the second day of observation she was interrupted fifty-five times. Thirty-eight were nursing interventions, two were made by the medical staff, two were made by the E.C.G. technician, one was attributed to the X-ray technician, and one also to visitors. One interruption was attributed to the noise created by the personnel at the 3:00 p.m. change of shifts. The amount of interruption totaled four hours and twenty-eight minutes. The patient was turned from her back to her side for the first time sixteen hours after arriving in the cardiac recovery room.

The last day of observation, the interruptions totaled three hours and twenty-four minutes. There were forty-five interruptions, of which thirty-eight were due to nursing personnel, seven to physicians, three to the X-ray technician, four were due to environmental factors, namely noise resulting from construction elsewhere in the building, and one interruption was attributed to the E.C.G. technician.

During the course of the sixty-eight-hour observation time, there were only five hours during which Patient A was

without interruption. The first uninterrupted hour occurred at 10:00 p.m. the second day of observation, the second was at 6:00 a.m. the next morning, and the last occurred at 2:00 a.m. and 6:00 a.m. on the last day of observation. The opportunity for rest or sleep was not in continuity.

Patient B arrived in the cardiac recovery room at 5:00 p.m. on Tuesday. His late arrival was due to bleeding problems encountered in the operating room. He had an endotracheal tube in place for his entire period of observation. He was awake and moving all extremities within one hour after his arrival in the cardiac recovery room.

The first day he was interrupted ninety-nine times, eighty by the nursing staff attending to personal hygiene, caring for the monitor and respirator, suctioning the endotracheal tube, and giving intravenous medications and fluids. Seventeen interruptions were made by the physicians, two were made by the X-ray technicians, one each was attributed to the E.C.G. technician and visitors. Four interruptions were due to environmental factors, namely noise due to construction elsewhere in the building. The total time of interruptions for this day was seven hours and forty-nine minutes.

During the second twenty-four hours he was interrupted one hundred and twelve times. One interruption each was attributed to the E.C.G. personnel, the X-ray technician, and visitors. Inhalation therapists interrupted three times, the physician sixteen times, and the nursing personnel were

responsible for eighty-four interruptions. These totaled eleven hours and thirty-two minutes. The patient was turned onto his side eighteen hours after he arrived in the cardiac recovery room. On this second day of observation, his blood pressure dropped and he went into ventricular fibrillation. He was defibrillated four times, three times on the evening shift and once on the night shift. This accounted for an increase in interruptions.

On the last day of his observation, Patient B was interrupted a total of four hours and fifty-five minutes. This represented sixty-nine interruptions. Fifty-six were nursing interruptions, eleven interruptions were made by the physicians, and one each was attributed to the X-ray technician, E.C.G. technician, and visitors.

During the course of the seventy-two-hour observation time, there was no period without interruption for as long as one hour.

Patient C arrived in the cardiac recovery room at 1:30 p.m. on Wednesday. He had no problems while in the operating room. He was observed for seventy hours while in the cardiac recovery room. He was awake and moving all his extremities within thirty minutes after his arrival. An endotracheal tube was in place and was removed at 9:30 a.m. on the second postoperative day. Due to a misunderstanding between the observers, this patient was not observed until 3:30 p.m.

He was interrupted a total of six hours and fifty-five minutes during the first twenty-four hours. Seventy-five

interruptions were made by the nursing staff which included the previously-mentioned nursing activities. Seventeen interruptions were made by the physicians; the X-ray technicians, E.C.G. technicians, and the visitors accounted for one interruption each. This was a total of ninety-five interruptions the first day of observation.

During the second twenty-four-hour period, he was interrupted sixty-six times, of which fifty were by the nursing personnel, seven by the physicians, five by the inhalation therapist, and one interruption each was attributed to the E.C.G. technician, X-ray technician, and visitors.

During the last day of observation he was interrupted by the nursing staff twenty-eight times, two times by the physicians, three times by the inhalation therapists, twice by visitors, and once each by the E.C.G. technician and X-ray technician. This was a total of thirty-seven interruptions for the twenty-four-hour period, which added up to three hours and fourteen minutes of interruption.

During the course of the seventy-hour observation time, only one hour was without interruption. This occurred at 4:00 a.m. on the first postoperative day.

Distribution of Interruptions

The first two purposes for undertaking this study were to ascertain the frequency of patient care activities (interruptions) that interferred with the continuity of rest and sleep during the first sixty-eight to seventy-two postoperative

hours and to compare the cumulative sleep periods with the patient's usual sleep pattern. As noted above, the observations supply data regarding the frequency and amount of interruption of possibility for rest or sleep and also indicate to some degree the reasons for the interruption. Those responsible for patient care activities were the medical and nursing staff and the various therapists. Family visitors used discretion in the number of visits; these were interruptions and have been recorded as such. It is reasonable to include the family among those who contribute to patient care. Although it had been planned to confine the observations to patient care activities, it was impossible to avoid recognizing the influence of such uncontrollable factors as noise due to construction elsewhere in the building. Accordingly, such incidents were recorded.

Tables 1, 2, and 3 show the distribution of interruptions according to the purposes and the day on which they occurred.

Table 1. Distribution of 187 Interruptions According to Cause and Day of Occurrence for Patient A.

Day	Nursing Care	Physician Visits	Technician Activities*	Family Visits	Noise	Total
1	26	10	8	0	0	87
2	38	2	3	1	1	55
3	38	7	4	1	4	45

*includes X-ray, E.C.G., and inhalation therapists

Table 2. Distribution of 278 Interruptions According to Cause and Day of Occurrence for Patient B.

Day	Nursing Care	Physician Visits	Technician Activities*	Family Visits	Noise	Total
1	80	17	3	1	4	99
2	84	16	5	1	3	109
3	56	11	2	1	0	70

*includes X-ray, E.C.G., and inhalation therapists

Table 3. Distribution of 174 Interruptions According to Cause and Day of Occurrence for Patient C.

Day	Nursing Care	Physician Visits	Technician Activities*	Family Visits	Noise	Total
1	65	6	2	1	0	99
2	50	6	7	1	0	66
3	28	2	5	2	0	37

*includes X-ray, E.C.G., and inhalation therapists

Whereas the tables show the number of interruptions, Figures 1, 2, and 3 show the duration of interruption each hour of observation for each of the three patients. The frequency of occurrence is also shown. The lack of opportunity for rest or sleep for more than short periods is obvious. The information needed to fulfill the first purposes of this study was shown on Tables 1, 2, and 3 and on the following figures.

Day ONE of OBSERVATION
Day of Surgery
RETURNED 2:30 P.M.
11 - 13 - 72

Total Interruption : 10 hours 11 min.
Number of Interruption: 87

Day TWO of OBSERVATION
First Post-operative Day

Total Interruption: 4 hours 28 min
Number of Interruption: 55

Day THREE of OBSERVATION
SECOND Post-operative Day

Total Interruption : 3 hours 24 min
Number of Interruption : 45

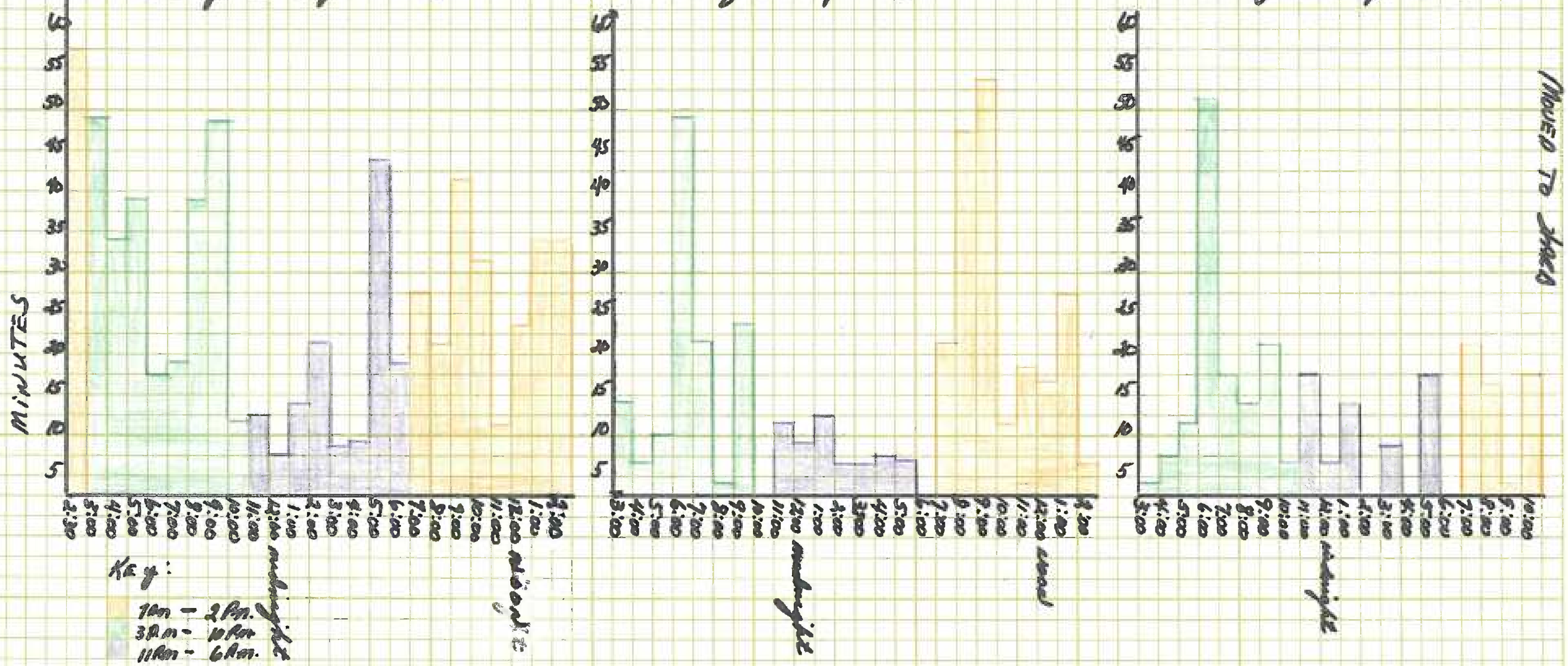

Figure 1. Interruption Expressed in Time on Patient A During Her Stay in the Cardiac Recovery Room.

TELEDYNE POST

20MA 300 8X8 PER INCH
LITHO IN U.S.A

DAY ONE of OBSERVATION
DAY of SURGERY
RETURNED 5:00 P.m.
11-14-72

Total Interruption: 7 hours 49 min
Number of Interruption: 99

DAY TWO of OBSERVATION
First Post-operative DAY

Total Interruption: 11 hours 32 min
Number of Interruption: 112

DAY THREE of OBSERVATION
Second Post-operative DAY

Total Interruption: 4 hours 55 min
Number of Interruption: 69

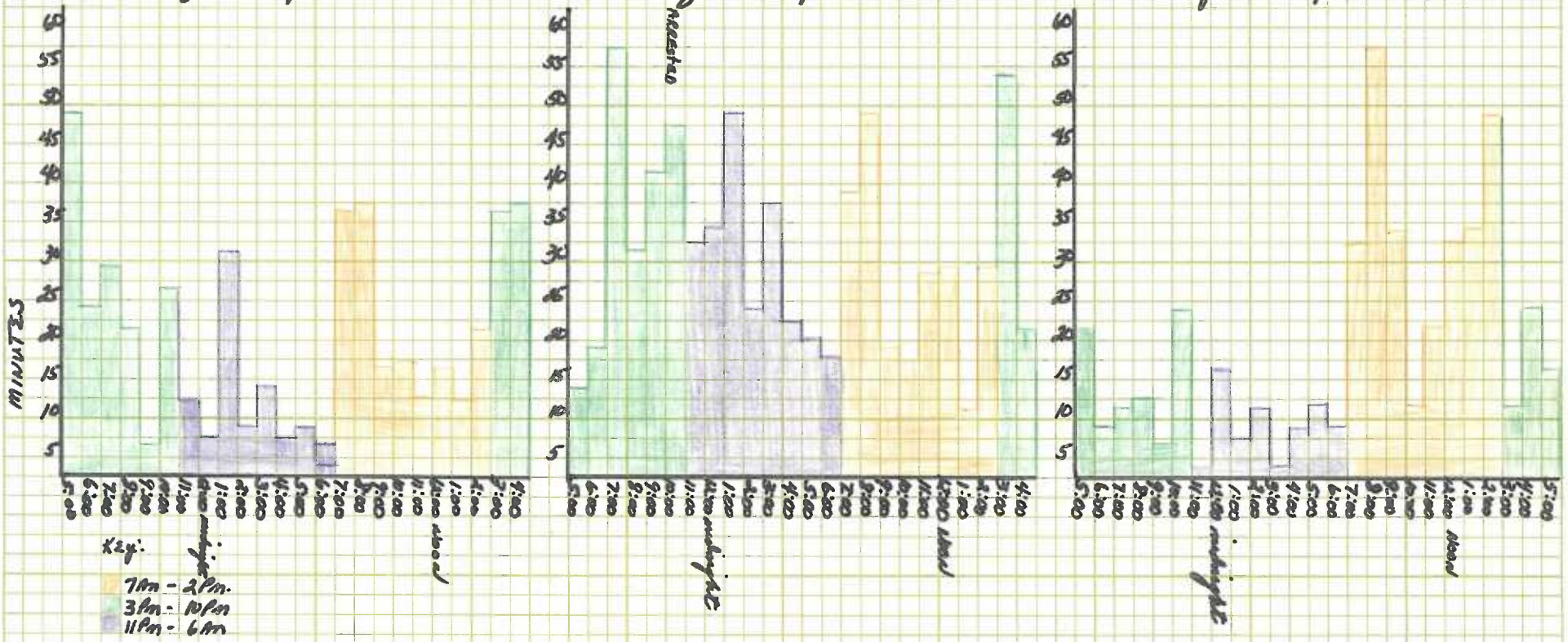

Figure 2. Interruption Expressed in Time on PATIENT A During His STAY in the CARDIAC RECOVERY Room.

TELEDYNE POST

20MA 300 8X8 PER INCH
LITHO IN U.S.A.

DAY ONE of OBSERVATION
DAY of SURGERY
Returned 1:30 P.M.
11-15-72

Total Interruption: 6 hours 55 min
Number of Interruption: 95

DAY TWO of OBSERVATION
First Post-operative DAY

Total Interruption: 4 hours 33 min
Number Interruption: 66

DAY THREE of OBSERVATION
SECOND Post-operative DAY

Total Interruption: 3 hours 14 min
Number of Interruption: 36

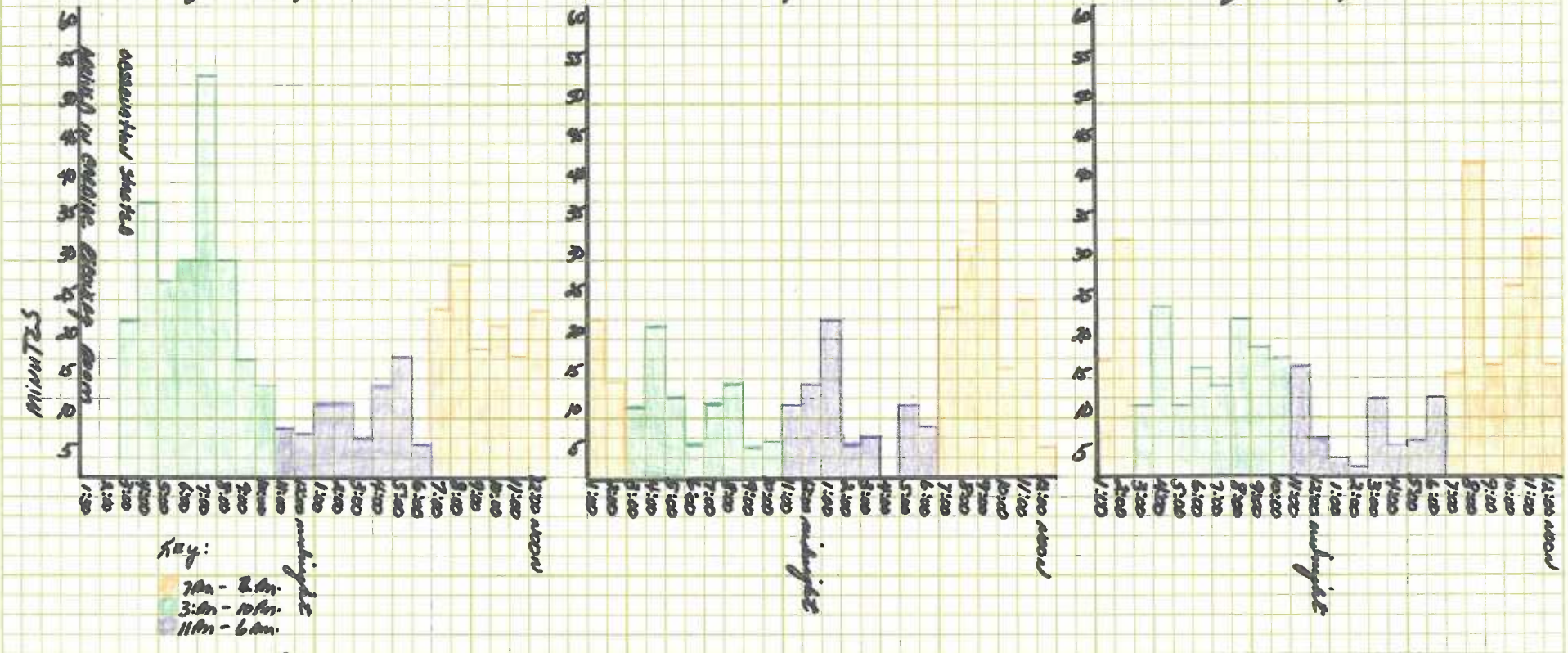

Figure 3. Interruption Expressed in Time on Patient C During His Stay in the Cardiac Recovery Room.

Follow-Up Visits

Two further purposes for undertaking this study were to elicit from the patients their own responses to whether or not they felt they had had enough time for rest or sleep while in the cardiac recovery room and also to obtain their suggestions regarding means of making them more comfortable during that postoperative phase.

In the primary interview the patients had been told that the investigator would visit them several days after they were moved out of the cardiac recovery room. Each patient was visited for about twenty minutes on the second or third day after leaving the recovery room. Five simple questions were posed (Appendix B). The responses were not very revealing; in fact, all gave the same answers. They indicated that they never knew the difference between day and night. During the day the recovery room is well-lighted due to the window arrangement and artificial lighting; at night the lights can be dimmed. However, these three patients seemingly had not sensed the difference. Thus they could not give specific replies to the first three questions.

> Upon awakening in the morning did you feel well rested?
>
> Did you sleep better during your normal sleep cycle or at some other time during the twenty-four-hour period?
>
> Would following your normal bedtime routine (as closely as possible) have helped you sleep better?

The patients did not say they had slept or not slept, but merely that they did not distinguish day from night.

Several explanations might be advanced for the patients' inability to respond to these questions, namely:

1. They may have had little recall of their recovery room experience due to the amount of sedation received or other reasons.
2. The post-recovery room visit may have occurred at the wrong time, either too soon or too late.
3. The questions may have been incompletely understood.

These are merely conjectures and beyond the scope of this study. However, the inability to obtain postoperative data by interview has significance for any future replications of this study.

The fourth question asked if positioning had been related to the comfort necessary for falling asleep. They did not actually answer this question. Patients A and B complained that they had been left on their backs for long periods. Patient C normally slept on his back; he was turned earlier than the other patients. The comments made no reference to sleep subsequent to being turned off the back.

The final question sought suggestions regarding anything more that could be done to make the cardiac recovery room stay more comfortable. The patients had no suggestions. They all voiced admiration and gratitude to the physicians and nurses in the cardiac recovery room.

It is not uncommon for patients who have been in the recovery room to make comments to the effect that they were experiencing an overwhelming sense of fatigue. During the

follow-up visit, all of the patients appeared to be tired, although they made no reference to that.

Miscellaneous Comments

The data collection for this study was continuous from November 13, 1972 to November 18, 1972. The week the data were collected was the time of the annual Heart Association Convention in Dallas, Texas which was attended by a number of the surgical staff. Although the patients were not slighted by the absence of several physicians, this may account for the small number of physician visits during that week. In reviewing the data, it was noted that there were more physician visits on Friday of that week. This may have been due to the fact that there was no scheduled surgery on that day, thus making the physicians more available.

Only the head nurse and the supervisors of the cardiac recovery room knew exactly what the observers were measuring so that no change in the nursing care was obvious. One of the housekeeping personnel told an observer that he thought she was an efficiency expert and that the observers were going to tell the staff how to do their jobs more efficiently. She only replied that the observations were not being made with regard to job efficiency.

Comparison With Other Studies

This study, based on around-the-clock observations of postcardiotomy patients differs from that conducted by

McFadden and Giblin, who replied on observations made by the nursing staff during the first three postoperative nights, following which the investigators undertook interrupted observations for three nights from 11:00 p.m. to 7:00 a.m. The nursing staff was responsible for all aspects of patient care for all patients under their direction; hence the consistency and reliability of their observations might well be questioned. The investigators' interrupted observations account for only one-third of a twenty-four-hour period, and thus make no reference to the possibility of rest or sleep at other times.

The study by Woods likewise confined the observations to the 11:00 p.m. to 7:00 a.m. period. Although the investigator indicated sleep deprivation in the selected patients, the data must be considered in reference only to the night hours. Her recommendations were in the form of advice regarding changes in nursing care plans rather than any further study of the problem of sleep deprivation in postcardiotomy patients. Similar comments can be made regarding the study by Walker.

The design of this study provided for the collection of more complete data than the other studies. The conclusion that the patients were sleep deprived is substantiated to a greater extent by means of consistent, continuous observation for each twenty-four-hour period rather than being confined to eight hours at night.

In comparison with the studies after which this study

was designed, the following similarities were noted:

1. All three patients were considered to be deprived of sleep.
2. None of the patients received enough uninterrupted rest or sleep at any time during the twenty-four-hour period to allow adequate rest.
3. The greatest number of interruptions occurred the first day, with the exception of Patient B who had the most interruptions on the second day due to cardiac arrest.
4. Interruptions decreased in frequency from the first to the third day.

The following differences were noted:

1. None of the patients in this study demonstrated behavior changes which might have been related to lack of sleep.
2. None of the patients in this study complained of sleep loss.

CHAPTER IV

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS FOR FURTHER STUDY

Summary

This study was undertaken to: (1) ascertain the frequency of patient care activities (interruptions) that interfered with the continuity of rest and sleep during the first sixty-eight to seventy-two postoperative hours; (2) compare the cumulative sleep periods with the patients' normal sleep patterns; (3) determine whether the patients felt they had enough time for rest and sleep while in the cardiac recovery room; and (4) obtain suggestions from the patients regarding means of making them more comfortable while in the cardiac recovery room.

Four patients were selected for study. All were visited preoperatively to obtain demographic information and a prior sleep pattern history. Observations were made by nine experienced professional nurses who did not participate in patient care. The observations in the cardiac recovery room were continuous for periods of sixty-eight to seventy-two hours. Due to difficulty in making precise observations on four patients simultaneously, one was dropped from the study. Observation revealed that at no time was there opportunity for rest or sleep for any period of time resembling a normal

sleep pattern.

All three patients were considered to be sleep deprived. None of the patients demonstrated behavior changes which might be attributed to sleep loss. Attempts to obtain information from the patients during a post-recovery room interview proved to be futile. The patients did not indicate whether they had slept or not slept, but merely that they could not differentiate day from night. They did not complain of fatigue despite the rigorous regimen they had undergone during the days in the recovery room. Patients A and B complained that they had been left on their backs a long time, but did not indicate whether a later change of position had aided them in resting or sleeping. None had any suggestions regarding means that could be utilized to make the stay in the cardiac recovery room more comfortable. All expressed admiration for and gratitude to the patient care staff. This certainly could be interpreted as being a powerful psychological factor in contributing to recovery.

This study substantiated the findings of previous studies and carried the data collection to the point of identifying a real problem, namely that at no time during the early postoperative phase was the patient given an opportunity to rest or sleep. It is not known how detrimental to recovery such deprivation may be; neither is it known how much some of the frequently found behavior changes in post-cardiotomy patients are related to sleep deprivation. Although some of the studies have recommended changes in

nursing care plans to provide opportunity for uninterrupted rest and sleep, it is not known if such recommendations have been implemented and, if they have, what differences, if any, have resulted. Certainly this study and those on which it was based have many implications for nursing.

Conclusions

The nature of this study does not lend itself to the formulation of specific conclusions. It was possible by observation to determine the frequency and duration of interruption of opportunity for rest or sleep and to identify the personnel or factors responsible for said interruptions. To that extent the purposes of the study were fulfilled.

Recommendations for Further Study

1. A replication of this study is merited with such modifications as:
   a. a larger number of patients;
   b. a larger number of observers, perhaps working in pairs for shorter periods of observation time or perhaps using interrupted rather than continuous observation;
   c. a series of observations in different hospitals and thus possibly obtaining data that might reveal differences.
2. It is further recommended that an activity analysis be performed to determine exactly what constitutes patient care in the cardiac recovery room during the postoperative phase. Such analysis might be

useful in ascertaining what measures have priority and in distributing patient care in such fashion as to provide longer time periods for rest or sleep.

3. Development of interdisciplinary plans for patient care that provide longer time periods without interruption is another recommendation. The implementation of such plans would probably involve the use of control and experimental groups. Ultimately it might be possible to ascertain: if given the opportunity to sleep, would the patient sleep? A further finding could be a determination of whether the reduction in nurse or physician interruptions diminish the quality of care and affect the patient adversely.
4. In recognition of the inadequate information obtained during the follow-up interviews, a study would be valuable if designed to obtain data at different time periods or by different techniques in an endeavor to improve the data collection.
5. It is not known if sleep deprivation is unique to postcardiotomy patients. Hence it is recommended that studies be made with postoperative patients in other critical care units.

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APPENDICES

APPENDIX A

Correspondence

May 15, 1972
13605 S.W. Jenkins Road
Beaverton, Oregon 97005

Dr. Laverne Johnson
Naval Electronics Laboratory Medical
Neuropsychiatric Research Unit
United States Naval Hospital
San Diego, California 92152

Dear Sir:

I am a graduate student in the nursing department at the University of Oregon. I heard you speak here during the Winter Quarter about your sleep research findings.

I am doing a field study on sleep deprivation of cardiac surgery patients in their first three twenty-four-hour periods in the cardiac recovery room. I will start my data collecting sometime during this coming summer.

I am looking for references on the restorative processes that can be attributed to sleep or rest. Thusfar I have been totally unsuccessful, and I wondered if you could help me in my search. If there has been something written on this subject, I thought you would be the one who would know about it.

I certainly appreciate any assistance you can give me.

Sincerely,

[redacted]

Joan Reneion

NEUROPSYCHIATRIC RESEARCH, BLDG. 20-2W
NAVAL HOSPITAL
SAN DIEGO, CALIFORNIA 92134

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IN REPLY REFER TO:

23 May 1972

Ms Joan Fenelon
13605 S.W. Jenkins Road, Apt. 58
North Beaverton, Oregon 97005

Dear Ms Fenelon:

I wish I could be of more assistance in your request for information on the restorative processes that can be attributed to sleep or rest. Unfortunately, we are still uncertain as to the exact significance of sleep and what the restorative processes are.

I am enclosing some reprints of our work which may be of some help, and I would refer you to a book entitled "Sleep, Physiology and Pathology" edited by Anthony Kales, published by J. B. Lippincott, Philadelphia, 1969, which contains relatively current summaries in the various aspects of sleep.

Best of luck in your field study.

Sincerely,

[redacted]

Laverne C. Johnson, Ph.D.

Encls.

If I can do any more to help you, please let me know. If you feel your needs can be met by direct correspondence to the author, I'll cancel your request.

Frances R. Spradlin (Mrs.)
Interlibrary Loans

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SAINT LOUIS UNIVERSITY

School of Nursing and Allied Health Professions
Coronary Care Nursing Program

1325 SOUTH GRAND BOULEVARD
SAINT LOUIS, MISSOURI 63104

PROJECT OF BI-STATE
REGIONAL MEDICAL PROGRAM

August 1, 1972

Frances R. Spradlin
University of Oregon Medical School
3181 S.W. Sam Jackson Park Road
Portland, Oregon 97201

Dear Mrs. Spradlin,

In answer to your inquiry concerning my nursing thesis entitled POSTSURGERY HEART PATIENT: AMOUNT OF UNINTERRUPTED TIME FOR SLEEP AND REST DURING THE FIRST, SECOND, AND THIRD POSTOPERATIVE DAYS IN A TEACHING HOSPITAL. It is in the Nursing School library at St. Louis University. However, it was checked out in 1971 and has not been returned.

Most of the thesis content was published under the above title in Nursing Research 21(2) Mar-Apr, 1972, p. 164. I will be happy to answer any further questions your patron might have. I can be contacted at the above address.

Sincerely,

[redacted]

Betty Boyd Walker, R.N., M.S.N.
Assistant Project Director
Coronary Care Program

BBW/fm

August 11, 1972
7862 North Interstate
Portland, Oregon 97217

Mrs. Betty Boyd Walker
St. Louis University
Assistant Project Director Coronary Care Program
1325 South Grand Boulevard
St. Louis, Missouri 65104

Dear Mrs. Walker:

I am the graduate student at the University of Oregon who is interested in your thesis. I am sorry that it is unobtainable, but I did see the thesis content which was published in Nursing Research, March-April, 1972.

My field study differs from your thesis in both time and number. I am planning to obtain previous sleep histories from two open heart surgery patients prior to surgery. Then I will follow them for the first seventy-two hours in the cardiac recovery room and compare the amount of time allowed for rest or sleep with the amount of sleep they usually receive outside the hospital environment.

I was particularly interested in your data recording sheet in Nursing Research, March-April, 1972, p. 167, and I would like your permission to use it as my data-collecting record in my field study. I found it to be both concise and yet useful in obtaining all the information which I think is vital for my study.

Awaiting your reply.

Sincerely,

[redacted]

Joan Fenelon

SAINT LOUIS UNIVERSITY

School of Nursing and Allied Health Professions
Coronary Care Nursing Program

PROJECT OF BI-STATE
REGIONAL MEDICAL PROGRAM

1325 SOUTH GRAND BOULEVARD
SAINT LOUIS, MISSOURI 63104

August 23, 1972

Joan Therese Fenelon
7862 North Interstate
Portland, Oregon 97217

Dear Ms. Fenelon,

Your research project sounds both interesting and useful. I am very interested in your conclusions after you tabulate the data. If you have time to write me or to send me a copy I'd appreciate it.

I would be very pleased to have you use the data recording sheet that I devised for my study. Please feel free to modify it any way you wish.

Best of luck with your field study.

Sincerely,

[redacted]

Betty Boyd Walker, R.N., M.S.N.
Assistant Project Director
Coronary Care Program

BBW/fm

August 11, 1972
7862 North Interstate
Portland, Oregon 97217

University of Washington
School of Nursing
Seattle, Washington 98195

Dear Madam:

I am a graduate student at the University of Oregon located in Portland, Oregon. I am in the process of writing my field study and would find it of value to me if I could correspond with Eileen Hohf McFadden. I am interested in using two of the tools which she used in her thesis, "A Study of Sleep Deprivation in Patients Having Open-Heart Surgery." I would like to have her permission to use these tools. If you have her address in your files, I would appreciate your sending it to me.

Awaiting your reply,

Sincerely,

[redacted]

Joan Fenelon

UNIVERSITY OF WASHINGTON
SEATTLE, WASHINGTON 98195

School of Nursing
Office of the Dean

August 15, 1972

Ms. Joan T. Fenelon
7862 N. Interstate
Portland, Ore. 97217

Dear Ms. Fenelon:

This will acknowledge receipt of your letter dated August 12 requesting the address of Eileen McFadden whose thesis was entitled, "A Study of Sleep Deprivation in Patient's Having Open-Heart Surgery".

You may write to Mrs. McFadden at the following address:

RR #4, Box 3110-20
Libby, Montana 59923

We wish you success with your field study.

Sincerely yours,

[redacted]

Edith A. Metz
Graduate Program Adviser

EAM:gj

August 25, 1972
7862 North Interstate
Portland, Oregon 97217

Mrs. Eileen McFadden
RR #4, Box 3110-20
Libby, Montana 59923

Dear Mrs. McFadden:

I am a graduate student at the University of Oregon in Portland. I am presently writing a field study on the amount of uninterrupted time for sleep or rest allowed for the post-cardiac surgery patient during the first seventy-two hours in the cardiac recovery room.

My field study is much less detailed than your thesis. I am interested in using your prior sleep pattern sheet. I will compare the amount of time allowed for rest or sleep to the amount of rest or sleep that the patients usually receive in their own home environment. The results will be displayed on a histogram.

I will be following only two patients for the first seventy-two hours in the cardiac recovery room. I am only trying to determine if there is indeed a large deficit between hours allowed for rest and the amount of rest the person normally receives.

I am anxiously awaiting your reply and any suggestions that you may have.

Sincerely,

[redacted]

Joan Fenelon

Rt. #4, Box 311-20
Libby, Mt 59923
August 30, 1972

Ms. Jean Therese Fenelon
7662 N. Interstate
Portland, Oregon 97217

Dear Ms. Fenelon:

I was pleasantly surprised and pleased to receive your letter dated August 25, 1972. Naturally, you have my permission to use the Prior Sleep Pattern Data Sheet which I developed to be utilized with my thesis study.

It is always a pleasure to find other nurses are interested in the subject of your thesis. Eventhough I am no longer actively involved in nursing, my interest continues in all new knowledge related to sleep deprivation in cardiac patients. I would be very interested in learning the results of your field study. Good Luck!

Sincerely,

[redacted]

Eileen M. McFadden

October 24, 1972

Mrs. Lee Killiam
Director of Nursing Service
University of Oregon Medical School Hospital
Portland, Oregon

Dear Mrs. Killiam:

In partial fulfillment of requirements for a Master of Nursing degree at the University of Oregon School of Nursing, I am undertaking a study on the amount of uninterrupted time allowed for sleep or rest for the postoperative heart surgery patient. It will consist of observing the patient in the cardiac recovery room for interruptions in the first sixty-eight to seventy-two hours after surgery. The observers will be skilled professional nurses who will in no way hinder the nursing care which these patients will require. I would like to start collecting data about the 6th of November if this meets with your approval.

Upon completion of this study, copies of the report will be placed in the library at the University of Oregon Medical School.

Yours Sincerely,

[redacted]

Miss Joan Fenelon is a regularly enrolled graduate student at the University of Oregon School of Nursing. Any assistance you can offer Miss Fenelon will be greatly appreciated.

LUCILE GREGERSON
Field Study Adviser

APPENDIX B

Data Collection Forms

DEMOGRAPHIC AND DESCRIPTIVE INFORMATION

NAME_____ HOSPITAL NUMBER_____

AGE_____ MARITAL STATUS_____

I. HISTORY

1. Has there been any mental illness in the family requiring hospitalization?

   a. yes _____
   b. no _____
   c. not noted_____

2. How many family members were involved?_____

3. Have you had any previous history of central nervous system pathology prior to admission?

   a. yes _____
   b. no _____
   c. not known_____
   d. describe _____
   _____

II. SURGERY

1. Preoperative diagnosis_____

2. Postoperative diagnosis_____

PRIOR SLEEP PATTERN

As a graduate student in the University of Oregon School of Nursing, I am interested in studying the sleep patterns of patients prior to hospitalization and during hospitalization. To do this, it will be necessary to observe you for three days and three nights during your stay in the cardiac recovery room. In the reporting of the information and observations obtained, your personal identity will remain strictly confidential.

Would you be willing to participate? I would greatly appreciate your assistance.

Sincerely,
Joan Fenelon, R.N.

NAME_____ DATE_____

1. I am generally a
   a. sound sleeper_____
   b. restless sleeper_____

2. I wake up at night
   a. frequently_____
   b. occasionally_____
   c. never_____

2. If the answer to the above question is frequently or occasionally, how many times does this occur during the course of a night? _____times
   a. about how long is it from the time you go to sleep until you wake up the first time?_____
   b. about how long do you sleep between the times you wake up?_____
   c. about how long is it between intervals of sleep? _____
   d. about what hours of the night do you wake up? _____

4. What time do you usually go to bed?_____

5. What time do you usually wake up?_____

6. Do you have a bedtime routine which you follow before going to sleep at night?
   a. yes_____
   b. no_____

7. If the answer to the above question is yes, briefly describe the routine (i.e., drink warm milk, take a bath, etc.)_____

8. Do you fall asleep as soon as you go to bed?
   a. always_____
   b. almost always_____
   c. seldom_____

9. Do you take naps during the day?
   a. seldom_____
   b. almost always_____
   c. always_____

10. If you take a nap during the daytime,
   a. how long does it last?_____
   b. what time of the day does the nap occur?_____

11. To go to sleep, I usually lie
   a. on my back_____
   b. on my stomach_____
   c. on my right side_____
   d. on my left side_____

12. Do you take medication to help you go to sleep at night?
   a. seldom_____
   b. almost always_____
   c. always_____

13. If medication is taken either always or almost always, list the medication.
   _____

14. Do you feel rested after a night's sleep?
   a. seldom_____
   b. almost always_____
   c. always_____

15. If you have been in a hospital before, did you have any difficulty sleeping?
   a. yes_____
   b. no_____

16. Do you recall what kept you from sleeping?_____
   _____

POSTOPERATIVE DATA COLLECTION INTERVIEW

1. Upon awakening in the morning, did you feel rested?

2. Did you sleep better during your normal sleep cycle or at some other time during the twenty-four-hour period?

3. Would following your normal bedtime routine (as closely as possible) have helped you to sleep better?

4. What part did positioning play in allowing you the comfort necessary to fall asleep?

5. Do you think anything further could have been done for you during your stay in the cardiac recovery room to make your stay more comfortable?

DATA COLLECTION FORM

NAME _____ AGE _____ TIME SHEET # _____

Rest of Day

Date Hour	# & Description	Begin	End	Total time	Nursing	Medical	Activities	Visitors	Environment	Facilities	Comments or Suggestions

SAMPLE OF DATA COLLECTION FORM

NAME Mr. A AGE 61 TIME SHEET # 2

P.O.D. 1st

DATE 11-15-72 HOUR	# of Interruptions	BEGIN	ENDS	TOTAL TIME	NURSING	MEDICAL	ANX.	VISITORS	ENVIRON MENTAL	POSITION	COMMENTS OR SUGGESTIONS
5 AM	1	5:50	5:57	7	1					BACK	Vital signs taken off stapler Lot of muscle twitching
6AM	III	6:31 6:32 6:50	6:32 6:33 6:51	1 1 1	III						
7AM	IIII	7:08 7:19 7:26 7:31	7:17 7:24 7:28 7:31	9 5 2 3	III	1				BACK	STABLE TALKING @ foot of bed ON 1 tube Lights on @ 7:30 AM
8AM	IIII	8:15 8:22 8:27 8:32 8:53	8:22 8:25 8:30 8:46 9:00	7 3 3 14 8	IIII		X RAY 1			BACK	Q Resp Tec Suctioned Am care done by 2 Nurses
9AM	IIII 1	9:09 9:58 9:10 9:27 9:41 9:45	9:09 10:00 9:26 9:31 9:45 9:48	9 2 16 4 1 3	IIII 1					BACK	Cont Am care removing equipment cleaning stand
10 AM	III	10:12 10:26 10:52	10:14 10:28 1/2 11:00	2 2 1/2 8	II				Nurses taking @ foot 2 beds for 2 minutes 1	pt. side	
11 AM	IIII	11:08 11:13 11:54 11:58	11:09 11:15 11:58 12:00	2 2 4 2	IIII						As above
12 NOON	III	12:12 12:17 12:34 12:55 12:57	12:13 12:18 12:35 12:57 1:05	5 1 1 2 8	III		1 cleaning 1 mopping		2 pts Nurses for lunch 1 unit talking @ desk	BACK	IVs checked pt awake, moving hands + feet almost all broken
1 PM	III II	1:06 1350 1:14 1:55 1:27 1:38 1:40	1:07 1:51 1:15 200 1:28 1:39 1:41	1 1 1 5 1 1 1	III	III	Engineer to fix pump 1		New pt admitted to unit 1	Back	New urgent pt admitted to unit

Typed by Roberta Erickson

AN ABSTRACT OF THE FIELD STUDY OF

JOAN THERESE FENELON

For the MASTER OF NURSING

Date of receiving this degree: June 8, 1973

Title: INCIDENCE OF INTERRUPTIONS PREVENTING REST OR SLEEP EXPERIENCED BY THREE PATIENTS IN THE POSTOPERATIVE CARDIAC RECOVERY ROOM

Approved: [redacted]
Associate Professor in Charge of Field Study

The purpose of this study was to ascertain the frequency of patient care activities (interruptions) that interfered with the continuity of rest or sleep during the first sixty-eight to seventy-two postoperative hours; to compare the cumulative sleep periods with the patient's normal sleep pattern; to determine whether the patients felt they had enough time for rest or sleep while in the cardiac recovery room; and to obtain suggestions from the patients regarding means of making them more comfortable while in the cardiac recovery room.

Demographic information was obtained plus a history of prior sleep pattern. Direct continuous observation was made

on four postcardiotomy patients; the number was later reduced to three. The observations were made by nine observers. Whereas in previous studies observations were made for eight-hour night periods, in this study data was collected for sixty-eight to seventy-two consecutive hours for each patient. The follow-up visit proved to be nonproductive.

The findings included similarities to the studies after which the study was designed. The similarities were:

1. All three patients were considered to be deprived of sleep.
2. None of the patients received enough uninterrupted rest or sleep at any time during the twenty-four-hour period to allow adequate rest.
3. The greatest number of interruptions occurred the first day, with the exception of Patient B who had the most interruptions on the second day due to cardiac arrest.
4. Interruptions decreased in frequency from the first to the third day.

The following differences were noted:

1. None of the patients in this study demonstrated behavior changes which might have been related to lack of sleep.
2. None of the patients in this study complained of sleep loss.

The nature of this study does not lend itself to the formulation of specific conclusions. It was possible by observation to determine the frequency and amount of interruption of opportunity for rest or sleep and to identify the personnel or factors responsible for said interruptions. To that extent the purposes of the study were fulfilled.

Recommendations for further study include:

1. A replication of this study is merited with such modifications as:
   a. a larger number of patients;
   b. a larger number of observers, perhaps working in pairs for shorter periods of observation or perhaps using interrupted observation rather than continuous;
   c. a series of observations in different hospitals and thus possibly obtain data that might reveal differences.
2. It is further recommended that an activity analysis be performed to determine exactly what constitutes patient care in the cardiac recovery room during the postoperative phase. Such analysis might be useful in ascertaining what measures have priority and in distributing patient care in such fashion as to provide longer time periods for rest or sleep.
3. Development of interdisciplinary plans for patient care that provide longer time periods without interruption is another recommendation. The implementation of such plans would probably involve the use of control and experimental groups. Ultimately it might be possible to ascertain: if given the opportunity to sleep, would the patient sleep? A further finding could be a determination of whether the reduction in nurse or physician interruptions diminish the quality of care and affect the patient adversely.

4. In recognition of the inadequate information obtained during the follow-up interviews, a study would be valuable if designed to obtain data at different time periods or by different techniques in an endeavor to improve the data collection.
5. It is not known if sleep deprivation is unique to postcardiotomy patients. Hence it is recommended that studies be made with postoperative patients in other critical care units.