A STUDY TO DETERMINE THE TYPE AND FREQUENCY OF INTERRUPTIONS SUSTAINED BY POSTCARDIOTOMY PATIENTS IN AN INTENSIVE CARE UNIT

by

BILLIE PATRICIA NICHOLSON

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Department of Nursing

The University of British Columbia
Vancouver 8, Canada

Date April 10, 1974

ABSTRACT

The environment of the intensive care unit is cited as one etiological factor of postoperative psychosis in patients following open-heart surgery. This descriptive study was undertaken to document the type and frequency of interruptions sustained by post-cardiotomy patients in one intensive care unit.

The study was designed to answer three questions:

1. How frequent are the interruptions sustained by these patients?

2. How long are the blocks of uninterrupted time?

3. What are the types of interruptions?

To collect the data a checklist of interrupting activities was utilized. The sample included 108 hours of observation that covered the first fifty-six postoperative hours. These hours were divided into early, mid, and late postoperative periods with thirty-six hours of observation in each period. To facilitate continuous observation, the observation periods were divided into four-hour blocks. A random sampling of the four-hour time blocks in each postoperative period over the days of the week was carried out.

A descriptive analysis of the data collected centered around the three questions. Also, to facilitate analysis of data the types of interruptions were organized into four main categories: (1) nursing activities, (2) patient initiated activities, (3) activities

of others, and (4) environment.

Basic to the discussion of the data were the following findings reported in the literature: (1) adults require eighty-five to ninety minutes to complete one sleep cycle, (2) there is a close resemblance between the psychosis of sleep deprivation and postcardiotomy psychosis, and (3) the environment of the postcardiotomy intensive care unit is not conducive to giving patients time for rest and sleep.

Within the limits of the small sample size the findings of the study indicated that patients were frequently interrupted. Second, the interrupted time blocks are not long enough for patients to obtain rest and sleep. Finally, nursing activities were responsible for 50 percent of the interruptions. These findings supported the findings of other studies undertaken in the postcardiotomy intensive care unit.

In addition, implications and recommendations for nurses regarding management of these patients were discussed. Finally, recommendations for further investigation were suggested.

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CHAPTER I

INTRODUCTION TO THE STUDY

Introduction

Along with other advances made in medical science over the past twenty years great strides have been made in open-heart surgery. Although many patients have benefited from the different cardiotomy procedures one untoward response, postoperative psychosis, has been noted in many of these patients during their stay in the intensive care unit.

Postcardiotomy psychosis has been reported to appear in approximately 38 percent to 57 percent of adults who have open-heart surgery. This syndrome is manifested after a three to five day lucid postoperative period and is characterized by: perceptual distortions, visual and auditory hallucinations, disorientation and paranoid ideation.[1] A review of the research reveals little agreement about the etiology of this postoperative reaction. Although many factors have been identified as the cause, it appears to result from an interaction among several factors, some physiological in origin and others related to psychological stress.[2]

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[1]Donald S. Kornfeld, "Psychiatric Complications of Cardiac Surgery," International Psychiatric Clinics 4 (February 1967): 115.

[2]Linda H. Aiken and Theodore F. Henrichs, "Systematic Relaxation As A Nursing Intervention With Open Heart Surgery Patients," Nursing Research 20 (May-June 1971): 213.

However, one etiological factor that is of particular concern to nurses and one that is partially controllable, is the environment of the intensive care unit. Kornfeld's study paid particular attention to the environment of these areas to see if it was a contributing factor in postoperative psychotic reactions. He concluded that:

> A major factor appeared to be the environment of the open-heart recovery room, where intensive nursing and medical care produced an atmosphere of sleep and sensory deprivation.[3]

Lazarus also carried out studies on the environment of the postcardiotomy intensive care unit. He stated:

> Patients frequently complain of the frightening atmosphere, the lack of sleep, the feeling of being physically restrained and the unusual and disturbing sounds to which they are exposed.[4]

These two studies recommended the modification of nursing procedures to allow for a maximum number of uninterrupted sleep periods. Also Kornfeld suggested that the usual day-awake, night-sleep cycle for each patient should be maintained whenever possible.[5]

Cardiotomy patients and nurses who work in postcardiotomy intensive care units agree that interruptions to patients' sleep and rest are too frequent. In reviewing the literature there appears to be little research that looked at kinds of interruptions sustained

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[3]Donald S. Kornfeld, S. Zimberg, and J. R. Malm, "Psychiatric Complications of Open-Heart Surgery," The New England Journal of Medicine 273 (August 1965): 292.

[4]H. R. Lazarus and J. H. Hagens, "Prevention of Psychosis Following Open-Heart Surgery," American Journal of Psychiatry 124 (March 1968): 1190.

[5]Kornfeld, "Psychiatric Complications," p. 291.

by these patients.

Nurses are responsible for the organization of nursing care. In order to modify the organization of nursing care, nurses must be aware of the type and frequency of interruptions experienced by patients in these areas.

Statement of the Problem

The purpose of this exploratory study was to document the type and frequency of interruptions sustained by postcardiotomy patients in an intensive care unit.

This study was designed to answer the following questions:

1. How frequent are the interruptions experienced by these patients?
2. How long are the blocks of uninterrupted time?
3. What are the types of interruptions?

Significance of the Problem

Sleep is one of the fascinating mysteries of life. Everyone needs sleep. The function of sleep still remains an enigma but it is recognized that sleep is a basic physiological need. Sleep deprivation studies have shown the detrimental effect of loss of sleep over long periods of time.

However, patients in postcardiotomy intensive care units frequently complain of lack of sleep.[6] Patients have described

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[6] JoAnna DeMeyer, "The Environment of the Intensive Care Unit," Nursing Forum 6 (October 1967): 262-72.

[7] L. H. Nahum, "Madness in the Recovery Room From Open-Heart Surgery or They Kept Waking Me Up," Connecticut Medicine 29 (November 1965): 771-72.

their stay in these areas as a disturbing experience. They have especially noted the unusual sounds, the frightening atmosphere, and the feeling of being physically restrained.[8,9]

The complaints of lack of sleep and the experiences described by patients who have been in these areas should concern nurses. Nurses are responsible for helping the patient meet his basic physiological need for sleep. Judgements about how best to modify nursing care to meet this need are the responsibility of nurses who work in the postcardiotomy intensive care units.[10]

Are patients continually interrupted? How much time is actually available to patients for rest and sleep? These are questions nurses should be able to answer in order to ensure patients are meeting their need for sleep.

Assumptions of the Study

The study was based on the following assumptions:

1. Sleep is a basic physiological need. Therefore if patients in the intensive care unit are constantly being interrupted they will not have enough time available to meet their physiological need for sleep.

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[8]Lazarus, "Prevention of Psychosis," p. 1190.

[9]Kornfeld, "Psychiatric Complications," p. 287.

[10]Elizabeth F. Pitorak, "Open-Ended Care for the Open-Heart Patient," American Journal of Nursing 69 (September 1969): 1896-99.

This assumption is based on Kleitman's statement that adults require eighty-five to ninety minutes to complete one sleep cycle and a representative night's sleep of about eight hours is likely to be made up of five such cycles.[11]

2. There is a close resemblance between the psychosis of sleep deprivation and the description of postcardiotomy psychosis.

This assumption is based on Kornfeld's finding that,

> The (postcardiotomy) psychosis...closely resembles the psychosis in sensory and sleep deprivation experiments. The progression from illusions to hallucinations to paranoid reactions is a typical sequence.[12]

Definition of Terms

Interruption: used to refer to any stimulus which precipitated patient activity or which increased the patient's awareness of his environment.

Intensive Care Unit: used to refer to an area designed especially for the care of the postcardiotomy patient.

Limitations of the Study

There were recognized limitations to the study:

1. The highly specialized setting of the study limits the application of the results to all types of patient care areas.

2. Limitations imposed by uncontrolled variables included:

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[11]Nathaniel Kleitman, Sleep and Wakefulness (Chicago: University of Chicago Press, 1963), pp. 112-13.

[12]Donald S. Kornfeld, "Psychiatric Complications of Cardiac Surgery," International Psychiatric Clinics 4 (February 1967): 124.

a) the difference in medical orders regarding post-cardiotomy care.

b) the differences in performance of the individual nurses who were providing patient care.

c) the effect of the presence of the investigator upon the patient and the intensive care personnel.

CHAPTER II

REVIEW OF THE LITERATURE

Introduction

In reviewing the literature it was noted that the etiological factors of postoperative psychosis were grouped under three main categories: (1) the preoperative psychological state of the individual, (2) the uniqueness of the intensive care unit environment, and (3) the physiological disturbances resulting from the surgical procedure itself.[1]

For the purpose of this study it was decided to focus on the second etiological factor, the environment of the intensive care unit. The reason for this focus is the environment can be partially controlled by nursing personnel. The results of several studies carried out in postcardiotomy intensive care units concluded that there was a similarity between the symptoms of postcardiotomy psychosis and sleep deprivation. They also recommended that nursing procedures should be modified to provide adequate sleep and to maintain the day-awake, night-asleep relationship.[2,3]

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[1]Herbert R. Lazarus and Jerome H. Hagens, Prevention of Psychosis Following Open-Heart Surgery," American Journal of Psychiatry 124 (March 1968): 76.

[2]Ibid., p. 80.

[3]Donald S. Kornfeld, Shelden Zimberg and James R. Malm, "Psychiatric Complications of Open-Heart Surgery," The New England Journal of Medicine 273 (August 1965): 291.

For this reason the literature reviewed for this study focused on: (1) the 24-hour sleep-wakefulness cycle, (2) stages and patterns of sleep, (3) sleep deprivation, (4) postcardiotomy psychosis, (5) the environment of the postcardiotomy intensive care unit, and (6) related nursing research.

The 24-Hour Sleep-Wakefulness Cycle

It was noted previously that studies by Lazarus and Kornfeld recommended that nursing procedures be modified to maintain the usual "day-awake" "night-asleep" cycles. What are these cycles and how do they affect man?

Man is conscious of the many cycles within nature that affect his life, such as the seasons of the year or the phases of the moon. However, the one that exerts the greatest influence is the day-night cycle. This theory is supported in the following statement by Mills:

> Most men are subjected throughout their lives to an alteration of light and darkness with an almost constant cycle length of 24 hours. This determines a pattern of behavior with alternating periods of rest, activity, meals, etc.,....[4]

This 24-hour cycle has been labelled "circadian" from the Latin word meaning "about a day." Scientists used this term because the rhythms within the cycle are not exactly 24 hours but have a

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[4] J. N. Mills, "Human Circadian Rhythms," Psysiological Reviews 46 (January 1966): 129.

period of approximately 24 hours.[5]

The circadian rhythms appear to result from two factors: (1) an internal biological clock, possibly within the hypothalmus, and (2) synchronizers in the external environment, of which light and social factors are the most important.[6]

The importance of these circadian rhythms is becoming increasingly recognized because they appear to influence many physiological functions of the human body. Some of the physiological parameters that have shown these rhythms and function with maximum and minimum periods of activity are: metabolic rate, body temperature, heart rate, level of hormones, and renal blood flow.[7] The most familiar one is body temperature because it is the easiest to measure. It rises and falls with clock-like regularity each 24 hours. The lowest body temperature occurs during sleep and the highest during the time a person is more active or alert.[8]

Man and his environment are in constant interaction with each other. Menaker states:

> Organisms are not passive responders. They have internal accurate time-measuring systems or 'clocks'. The environ-

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[5]Nathaniel Kleitman, Sleep and Wakefulness (Chicago: University of Chicago Press: 1963), p. 132.

[6]R. T. W. L. Conroy, "Jet Travel and Circadian Rhythms," Nursing Times 68 (March 1972): 371.

[7]Mills, "Human Circadian Rhythms," pp. 128-71.

[8]U. S., Department of Health, Education and Welfare, Current Research on Sleep and Dreams (Washington, D.C.: Public Health Service Publication No. 1389, 1965), p. 5.

ment acts on the organism to keep the clock set to correct time.[9]

How flexible are these 24-hour cycles? Studies have proven that although the daily pattern of rhythms varies from one individual to another, individuals, very rarely, can function on a cycle that is not approximately 24 hours long.[10] Kleitman's famous experiment showed that subjects in time can adjust to a 21-hour or 28-hour day. However, if the timetable varies from the 24-hour day by three hours either way most subjects cannot adjust. Also the younger subjects can adapt easier than the older ones.[11]

This experiment and others support the hypothesis about the biological clock that controls the rhythms of the body, that it "runs on a 24-hour schedule, which can be altered only slightly and only if given time to adjust."[12]

Stages and Patterns of Sleep

In recent years, research into the phenomenon of sleep has revealed that it is not a single uniform state but a complex and dynamic one. The electroencephlogram has helped identify the differences in brain activity between the sleeping and waking state, and

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[9]Michael Menaker, "Biological Clocks," Bioscience 19 (August 1969): 681.

[10]U. S. Department of Health, Education and Welfare, Current Research on Sleep and Dreams, p. 5.

[11]Kleitman, Sleep and Wakefulness, pp. 172-84.

[12]Nicole Beland-Marchak, "Circadian Rhythms," Canadian Nurse 64 (December 1968): 41.

those activities that characterize the stages of sleep.

The stages of sleep as outlined by Dement and Kleitman are the most widely accepted.[13] From E.E.G. readings they identified the five stages of sleep and stated that an individual progresses from Stage 1 to Stage 4 and moves progressively back up the stages to Stage 1. Rapid eye movement (REM) sleep is the stage when the person is ascending from Stage 2 to Stage 1 which is differentiated from descending Stage 1. This term is used because during this stage jerky, rapid eye movements can be seen beneath the closed eyelids of the sleeper.[14]

In the past there has been confusion with the terminology used to describe the stages of sleep. However, today the acceptable standard terminology used is rapid eye movement (REM) and non rapid eye movement (NREM) and the latter is further subdivided into four numbered stages.[15]

In healthy adults a representative night's sleep of about eight hours is made up of approximately five of what Kleitman termed basic rest activity cycles, referred to as BRAC, that are about

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[13]W. C. Dement and N. Kleitman, "Cyclic Variations in E.E.G. During Sleep and Their Relation to Eye Movements, Body Motility and Dreaming," Electroencephlography and Clinical Neurophysiology 9 (November 1957): 673-90.

[14]E. Aserinsky and N. Kleitman, "Two Types of Occular Motility Occurring in Sleep," Journal of Applied Physiology 8 (July 1955): 1-10.

[15]Frank R. Freemon, Sleep Research; A Critical Review (Illinois: Charles C. Thomas, 1972), p. 4.

eighty-five to ninety minutes in length.[16] It has also been hypothesized that these BRAC operate during the waking hours as well.[17]

A typical night's sleep in young adults has been described in a number of studies. It has been noted that initially a person going to sleep descends from Stage 1 to Stage 2, to Stage 3 and to Stage 4 in that order. In Stage 1, the person may experience a floating sensation or drifting. His body muscles are relaxing. He can be easily awakened by a noise or spoken word and if awakened he may assert he has not been sleeping. This stage lasts only a few minutes. As the person descends into Stage 2 he is more relaxed but he still awakens easily as in Stage 1. However, if awakened at this point a person might feel he had been "indulging in reverie."[18]

In Stage 3 sleep a person's muscles become very relaxed, vital signs decrease and he is more difficult to awaken. A person is in deep sleep in Stage 4. He is very relaxed and rarely moves; if he is awakened he will respond very slowly. After about seventy minutes of predominately Stages 3 and 4 NREM sleep, the first REM sleep occurs. In this stage, rapid eye movements are seen, vital signs become exceedingly variable and vivid dreaming takes place. After about ten to fifteen minutes of REM sleep a person will descend

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[16]Kleitman, Sleep and Wakefulness, p. 113.

[17]Nathaniel Kleitman, "Basic Rest-Activity Cycle in Relation to Sleep and Wakefulness," Sleep; Physiology and Pathology ed. Anthony Kales (Philadelphia and Toronto: J. B. Lippincott Co., 1969), p. 37.

[18]U. S. Department of Health, Education and Welfare, Current Research on Sleep and Dreams, p. 11.

again to Stage 4.[19]

As the night progresses the ratio of REM sleep increases. Studies show stage 4 sleep occurs predominately during the first third of the night, and REM sleep predominates the final third of the night. About twenty to twenty-five percent of the total sleep of young adults is spent in REM sleep, 5 percent in stage 1 (NREM), 50 percent in stage 2, and 20 percent in stages 3 and 4 combined.[20]

The pattern of sleep from night to night in a single individual remains relatively constant, although patterns vary from individual to individual. However, with increasing age a very slight decrease in REM percentage and a somewhat larger decline in NREM, stage, may occur.[21]

In recent years the great interest in sleep research shown by scientists has led to the forming of many hypotheses to explain the function of the various stages of sleep. There have been several theories advanced especially in regard to REM and NREM, stage 4, sleep. It was hypothesized that the former was needed to deal with stressful experiences and the latter was required to provide a chance for rest and relaxation. However, more recent theories state that each stage is vital and necessary.

> Our increasing knowledge about sleep seems to indicate that each stage serves different organismic functions and

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[19]Ibid., pp. 11-13.

[20]R. J. Berger, "The Sleep and Dream Cycle," Sleep: Physiology and Pathology, p. 21.

[21]Freemon, Sleep Research, p. 11.

is therefore characterized by different clusters of physiological activities.[22]

The physiological changes that occur during sleep have been investigated by many researchers. NREM, Stage 4, sleep has been described as the 'quieter phases' of sleep. It is characterized by slow, steady heart and respiratory rates, lower blood pressure, absence of rapid eye movement, a decrease in muscular tonus and decrease in body temperature. In REM sleep there is a transitory increase in systolic blood pressure, heart rate, respiratory rate and in twitching movements of the muscles of face and limbs.[23,24]

Sleep Deprivation

Despite the extended knowledge of the physiology, neurophysiology, biochemistry and psychology of sleep the restorative function of sleep still remains an enigma. One approach to studying the function of sleep is to examine what happens to an individual who is deprived of sleep.

There have been many studies carried out in the laboratory that look at what happens to individuals who are deprived of sleep. These experiments have studied three main types of sleep deprivation: (1) total, (2) partial, and (3) differential. Studies of total and partial deprivation usually focus on the length of time

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[22] R. J. Berger, "Physiological Characteristics of Sleep," Sleep; Physiology and Pathology, p. 72.

[23] Ibid., pp. 68-79.

[24] Fredrick H. Lowry, "Recent Sleep and Dream Research: Clinical Implications," Canadian Medical Association Journal 102 (May 1970): 1069-77.

given to sleep. Differential sleep deprivation involves deprivation of any one of the stages of sleep.

The results of studies on total sleep deprivation were dependent upon the length of time subjects went without sleep. In subjects who were awake sixty hours, neurological examinations showed weakness of flexion of the neck, hand tremor, awkwardness, nystagmus, ptosis, dysarthria, poverty of facial movements, peculiar preoccupation with details especially those related to personal belongings, short attention span and an apathetic appearance.[25] After 100 to 120 hours without sleep subjects experienced visual distortions, such as halos around objects, which may progress to frank visual hallucinations. Also in some individuals paranoid ideation may become prominent. However, it was found that subjects may try to conceal these psychotic symptoms, therefore they may easily be missed by the researcher. Neurological findings at this time included: slurring of speech, inability to concentrate, increased sensitivity to pain, episodes of disorientation to time, and immediate memory loss such as forgetting the task at hand.[26]

However, further studies have shown that these neurological changes associated with sleep loss are transitory and after one or two nights of recovery sleep there is a dramatic reversal of the pattern of behavior.[27] Recovery from these acute symptoms is

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[25]J. F. Sassin, "Neurological Findings Following Short Term Sleep Deprivation," Archives of Neurology 22 (January 1970): 54-56.

[26]Louis J. West, "Psychopathology Produced by Sleep Deprivation," Sleep and Altered States of Consciousness (Baltimore: Williams & Wilkens Co., 1967), p. 537.

[27]Sassin, "Neurological Findings," p. 56.

associated with increased total sleep time and a marked increase in the percentage of time spent in the different stages of sleep. It was found that on the first recovery night time spent in NREM sleep, especially stage 4, showed a marked increase. On the other hand, the percentage of REM sleep remained relatively the same on the first recovery night but increased significantly on the following nights. This increase of time spent in these two stages of sleep is accompanied by a decrease in the amount of NREM stage 2 sleep. Therefore the stability of the basic ninety minute cycle is preserved despite the increase in one of the stages of sleep.[28]

The research on differential deprivation involved depriving subjects of some particular stage of sleep, for example depriving the individual of REM sleep. Studies have shown that when REM sleep was deprived it caused a decreased onset and heightened level of REM sleep on the following night. Other studies on deprivation of Stage 4 sleep revealed there was a decreased latency and increased amount of Stage 4 sleep when the subjects returned to normal sleep patterns. The stability of the normal sleep pattern from night to night and the results of these studies indicate that a constant percentage of REM and NREM, stage 4, sleep is needed each night.[29]

The vast amount of research into the function of sleep has revealed how little we know. As Freemon states:

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[28]R. J. Berger and I. Oswald, "Effects of Sleep Deprivation on Behavior, Subsequent Sleep and Dreaming," Journal of Mental Science 108 (April 1962): 457-65.

[29]Wilse B. Webb, "Partial and Differential Sleep Deprivation," Sleep; Physiology and Pathology, pp. 221-31.

> ....such a complex phenomenon as sleep probably has many functions, some neurochemical, some psychologic, some ontogenic.[30]

Postcardiotomy Psychosis

As stated in chapter one the incidence of postoperative psychosis is higher in open-heart surgical patients in comparison to other surgical patients.[31] Although there have been many factors identified as contributing to its occurrence, there is little agreement about the cause. Abram identified such factors as degree of preoperative anxiety, the use of denial as a defense mechanism and the fear of death as significant in the development of psychosis after open-heart surgery.[32] Other factors that may contribute to its development are: age, severity of preoperative illness, length and complexity of the operative procedure, time on cardiopulmonary bypass, sex, and length of stay in intensive care unit.[33]

Lazarus and Kornfeld looked at the similarity between the symptoms of postcardiotomy psychosis and sleep deprivation.[34,35]

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[30]Freemon, Sleep Research, p. 160.

[31]Chase P. Kimball, "Psychological Responses to Open-Heart Surgery," AORN 12 (February 1970): 73.

[32]Harry S. Abram, "Adaptation to Open-Heart Surgery: A Psychiatric Study to the Threat of Death," The American Journal of Psychiatry 122 (December 1965): 659-67.

[33]P. H. Blachy and Albert Starr, "Post-Cardiotomy Delerium," American Journal of Psychiatry 121 (October 1964): 371-75.

[34]H. R. Lazarus and J. H. Hagens, "Prevention of Psychosis Following Open-Heart Surgery," American Journal of Psychiatry 124 (March 1968): 1190-95.

[35]Donald S. Kornfeld, "Psychiatric Complications of Cardiac Surgery," International Psychiatric Clinics 4 (February 1967): 115-31.

These symptoms included the following behaviors: acute excitement, disorientation, confusion, depression, illusion, hallucinations, and paranoid behavior. Also, another similarity between the two was seen in the time sequence. Kornfeld noted that the description of the fifth day turning point in sleep deprivation studies when flagrant psychotic symptoms appear, closely parallel the clinical experience in both time of onset and rapid clearing with adequate sleep.

Environment of the Postcardiotomy Intensive Care Unit

The environment of the intensive care unit is one of the factors that contributes to postoperative psychosis in open-heart patients.[36] DeMeyer interviewed twenty-four cardiac surgical patients to document their perception of their experience in the intensive care unit. These patients spoke of the number of people who examined them or checked the equipment attached to them, the people who talked about them without including them in the conversation, and a general sense of urgency in the environment.[37]

Other studies have supported these findings, that the stay in the intensive care unit is a very disturbing experience. The environment is described as one where patients are kept close to each other only separated by curtains and they are chained down by wires

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[36]Ibid., p. 115.

[37]JoAnna DeMeyer, "The Environment of the Intensive Care Unit," Nursing Forum 4 (October 1967): 263.

attached to electrodes. Also, there are constant and unusual sounds, for example, the hissing of oxygen and the endless clicking of monitors. They concluded that environmental factors made prolonged uninterrupted sleep impossible for the adult in the open-heart intensive care unit.[38]

Another study at Temple University looked at interruptions sustained by these patients. They stated the biggest deterent to sleep was the number of interruptions by nurses and physicians. They found that all patients suffer from some degree of sleep deprivation, sensory over-stimulation and human isolation.[39]

These patients are critically ill and do need constant observation following open-heart surgery. Pitroak and Rae describe the kind and type of nursing care that must be carried out during this period. However, they recommend along with Kornfeld, Lazarus and DeMeyer, that nursing procedures be geared to provide adequate sleep and rest, and to maintain the day-awake, night-sleep relationship.[40,41]

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[38] L. H. Nahum, "Madness in the Recovery Room From Open-Heart Surgery or They Kept Waking Me Up," Connecticut Medicine 29 (November 1965): 771.

[39] "Intensive Care Gives Patients Little Rest," Journal American Medical Association 210 (December 1969): 1682.

[40] Elizabeth Pitorak, "Alleviating Cardiac Patients' Fear Important Part of Nurses' Role," Hospital Topics 44 (May 1966): 127.

[41] Nancy Mara Rae, "Caring for Patients Following Open-Heart Surgery," American Journal of Nursing 63 (November 1963): 77-82.

Existing Nursing Research

Several nurse researchers have carried out studies on sleep deprivation following open-heart surgery. Three studies have been conducted at the University of Washington. Elwell, in 1967, studied duration of interruptions which initiated activity and the relationship between their duration, the actual amount of sleep obtained, and the time available for sleep for four subjects 11:00 P.M. to 7:00 A.M. on their first, second and third nights following surgery. In 1968, McFadden observed four postcardiotomy subjects on their fourth to sixth postoperative nights to determine if they were deprived of sleep. Both investigators found indications of sleep deprivation in their subjects. The third study, in 1969, was carried out by three investigators, Garner, Hickman and Fugate. They observed four subjects for twenty-four hours over eight postoperative days. In addition, they looked at the number, frequency and character of potential interruptions. The results showed signs of sleep deprivation in their subjects. In 1972, Walker documented the interactions sustained by four cardiotomy patients in the intensive care unit during an eight hour period for three consecutive days. Her study revealed a very high number of interactions for each patient.

Summary

This chapter focused on the environment of the intensive care unit as one of the three main factors that contribute to postoperative psychosis. It was noted that there was a similarity between

the symptoms of sleep deprivation and postcardiotomy psychosis by several researchers. Also, several studies recommended the maintenance of the twenty-four hour sleep wakefulness cycle in patients who are nursed in these areas. The literature review focused on the following: (1) the 24-hour sleep-wakefulness cycle, (2) stages and patterns of sleep, (3) sleep deprivation, (4) post-cardiotomy psychosis, and (5) the environment of the open-heart intensive care unit.

Researchers had noted that interruptions by doctors and nurses were the biggest deterrent to sleep. In reviewing existing research there appeared to be a lack of available studies on the type and frequency of interruptions experienced by patients in postcardiotomy intensive care units.

CHAPTER III

METHODOLOGY

Introduction

This study was designed as a descriptive survey to collect data on the type and frequency of interruptions sustained by post-cardiotomy patients in an intensive care unit. In this chapter the following will be discussed: adaptation and content of the tool, the setting and patient care activities of the intensive care unit, the pilot study, the sample and method of collecting data.

Adaptation of the Tool

The form used in this survey was a checklist of interrupting activities. It was adapted from the one used by Garner in her study. Adaptation was accomplished by reviewing the form in the light of pertinent information found in the literature, utilizing the routine nursing care procedures of the hospital setting where the study was carried out, having the form reviewed by senior nurses who work in a postcardiotomy intensive care unit and then by testing the form during the pilot study. The result of these procedures indicated the tool had content validity.

Checklist of Interrupting Activities

The checklist of interrupting activities used for collecting the data is found in Appendix A. Both the content and the order of

the checklist underwent change from the form used by Garner. The changes were made to add items that were pertinent to the purpose of the study and to delete ones that were not. A change in the order of activities was made for practicality and ease of use. Also, because continuous observations were pertinent to the study a different format was used. At the top of the form a space was provided to note the date, time and postoperative day of the patient.

To facilitate the analysis of the data the types of activities were organized under four categories (Appendix B, page 55):

1. Nursing activities included any interruptions by a nurse in giving care either in direct contact or indirect contact with the patient.

These activities were grouped according to the kind of nursing care; that is: (a) measures to provide comfort, (b) monitoring measures, (c) measures to support respiration, (d) circulation, (e) nutrition and elimination, and (f) nurse communicating with patient. The latter refers to interruptions initiated by the nurse talking directly to the patient when no other activity was apparent.

2. Patient initiated activities included any interruptions that were initiated by the patient, without any other apparent provoking stimulus.

3. Activities of others included any interruptions by any individual other than a nurse.

4. Environmental activities included any interruption by an individual or thing not related to the care of the patient.

The Setting

The setting in which the study took place was the post-cardiotomy intensive care unit of a 2,000 bed hospital. The intensive care unit which can accommodate twelve patients consists of one area with ten patient care units and another area with two patient care units.

The area containing the ten units provided the setting in which the observations were made. This area is rectangular in shape with a jog at one end. There are doors at each end and two doors that open into a corridor which runs along the length of one side of the unit. The unit is partitioned off with six patient care units on one side and four patient care units on the other side of the partition. There are two nursing stations, one at each end of the unit. The main station is at the end of the area with the six care units. At the other end just off from the nurses' station was a dirty utility area with a hopper sink. Eight patient care units are side by side and face a row of windows. The other two care units are in the area of the jog and face in the opposite direction towards the main nurses' station.

Each care unit is approximately four feet from the adjoining one. Every unit has a monitor over the head of the bed, under which a Mark VII Bird Respirator is mounted on the wall. Also mounted on the wall is a sphygmomanometer. An intravenous pole on a track is on the ceiling directly over the patient's bed. There are four drawers for supplies and patients' belongings built into the wall for each unit. Also, oxygen, suction and compressed air outlets and underwater chest suction are part of the individual patient

units.

The unit is a neutral color with white walls and ceiling, gold curtains between care units and a tan floor. The nurses wear white uniforms. Light for the patient care areas is provided by a large, set-in, ceiling light, the intensity of which was varied independently for each unit. Additional light comes from the nurses' station and utility area.

Patient Care Activities

Since the number of interruptions depended partly on the nursing care these patients received, the usual routines will be briefly described.

On the operative day and then as long as their condition dictated, postcardiotomy patients were the sole responsibility of one registered nurse. When their condition improved the patients shared a nurse with one or more other patients.

The immediate postoperative care of these patients included a vital signs check every five minutes for several readings on admission to the area. After the first readings the vital signs were checked every fifteen minutes until stable, then every thirty minutes for the first eight hours. Then they were reduced to every hour and after thirty-six hours they were taken every two hours. The temperature was taken every fifteen to thirty minutes until normal, and then every two hours. Also, an hourly central venous pressure was taken and a head to toe check three times a shift, which included: pupils, limb movement, level of consciousness, color, chest expansion, breath sounds, abdomen and pedal pulses.

Other activities included: hourly stripping of chest tubes,

nasotracheal suctioning, measuring urine output and any additional care or therapy indicated by the patient's condition. Continuous oxygen by mask was given for the first three postoperative days. As the patient progressed the amount of care was adjusted accordingly.

Specimens for blood gases, hemoglobin and serum electrolytes and a chest x-ray were taken on return from the operating room and every morning for the first three postoperative days. E.C.G. tracings were taken on admission to the intensive care unit after surgery and then once a shift for forty-eight hours and then as necessary.

The patient usually returned from the operating room with an endotracheal tube, an intravenous catheter, arterial catheter, central venous pressure line, two chest tubes and a Foley catheter. Each one of the tubes is removed as soon as possible.

The Pilot Study

To test the adapted observational tool, to check for practicality and ease of use of the tool, to check observer reliability, to determine the best location for the observer to carry out her study and to determine the feasibility of observing continuously for a period of time, a two-hour pilot study was conducted by the observer and another master's student in nursing. The time chosen was a period from 9:00 A.M. to 11:00 A.M. It was felt that this would be a time when many activities would be occurring.

The results of the pilot study were as follows. In the first half hour of the two-hour pilot study there was 95 percent agreement between the observers regarding the types of interruptions.

With regards to the frequency of interruptions the results of one observer was six minutes of no interruptions, whereas the second observer noted eight minutes of no interruptions. However, the last hour and one-half there was 100 percent agreement between the observers both in the types and frequency of interruptions. It was felt by the two observers that the discrepancy in the results of the first thirty minutes of observation may have been due to the observers' unfamiliarity with the checklist itself.

The results of the Pilot Study indicated that it was feasible to observe for a four-hour period and that there were few intra-observer differences in the recording.

The Sample

The sample included 108 hours of observation which were divided into twenty-seven four-hour blocks. The four-hour blocks were: 2:00 P.M. - 6.00 P.M., 6:00 P.M. - 10:00 P.M., 10:00 P.M. - 2:00 A.M., 2:00 A.M. - 6.00 A.M., 6:00 A.M. - 10:00 A.M., and 10:00 A.M. - 2:00 P.M. These time blocks were chosen because most patients returned from the operating room between 12:00 M. and 2:00 P.M. It was decided that the observation for the first post-operative period could begin at 2:00 P.M. The time postoperatively was also taken into consideration because of the change in patients' condition in the first few days. It was decided to look at post-operative time in an early period, zero to sixteen hours, a middle period, sixteen to thirty-six hours, and a late period, thirty-six to fifty-six hours. In each postoperative period there were thirty-six hours of observations. A random sampling of the four-hour time blocks in each postoperative period over the days of the week was

carried out and can be seen in Appendix C, page 57 .

Adult patients who had surgery where the cardiopulmonary bypass machine was used were observed. Children were eliminated from the study because the incidence of postoperative psychosis is rare in their cases.[1]

Collection of the Data

Before beginning the study a resume of the study was sent to the Acting Director of Nursing via the liaison person between the university and the hospital. The investigator received written permission to carry out the study. The unit supervisor was contacted and she put the investigator in touch with the head nurse of the postcardiotomy intensive care unit.

Nurses working in the area were informed about the purpose of the study at a staff meeting. Also individual nurses caring for patients being observed were asked at each observation time if they would object to the investigator observing their patient.

The Human Rights Committee at the University were also sent a resume of the study. As the study did not fall under the jurisdiction of this committee, the investigator could begin her observations.

Permission from individual patients was not obtained because there was no invasion of the patient's privacy or risk involved. Also, no record of names was kept and the routine care was not

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[1]Donald S. Kornfeld, Sheldon Zimberg, and James R. Malm, "Psychiatric Complications of Open-Heart Surgery," The New England Journal of Medicine 273 (August 1965): 292.

altered in any way.

All observations over the 108 hours were recorded by the investigator. The investigator arrived at the area approximately ten minutes before the hour the observations were to begin. This gave her time to select the patient who was to be observed, that is, the patient who was in the particular postoperative time period of the sample. The investigator stationed herself where she was able to view the patient without interfering with care. The design of the unit made it impossible for the observer to be out of the line of vision of the patient.

A watch with a second hand was used for the minute by minute observation and was set at the same time as the clock in the unit. The observation began as the second hand was at the twelve o'clock mark of the first minute of the first hour. Each observation was recorded on the checklist of activities for every minute over the four-hour period. The observation period ended when the second hand reached the twelve o'clock mark of the first minute of the beginning of the fifth hour. All observations were completed in a six-week period.

Summary

This chapter has presented the methodology of the study which included: the adaptation and content of the tool, a description of the setting and patient care activities of the postcardiotomy intensive care unit, a resume of the pilot study, the sample and the method of data collection.

CHAPTER IV

ANALYSIS OF THE DATA

Presented in this chapter are the data obtained by the method described in Chapter III. Answers were sought to the following questions:

1. How frequent are the interruptions experienced by these patients?
2. How long are the blocks of uninterrupted time?
3. What are the types of interruptions?

Presentation of Findings

Frequency of Interruptions

Table 1 indicates the average time between interruptions in the four hour blocks within the three postoperative periods. The early postoperative period had the longest average time between interruptions, that is, one interruption occurring every 2.43 minutes. In the mid and late postoperative period the average times between interruptions were almost identical, 1.97 and 1.95 minutes respectively.

However, the greatest average time between interruptions in the four hour time blocks was between 2:00 A.M. to 6:00 A.M., 3.02 minutes in the early postoperative period and 3.33 minutes in the late postoperative period. The lowest average time between inter-

TABLE 1

AVERAGE TIME IN MINUTES BETWEEN INTERRUPTIONS IN THE FOUR-HOUR TIME BLOCKS IN EACH POSTOPERATIVE PERIOD

Time Blocks	Average Time in Minutes Between Interruptions		
	Early Postoperative Period	Mid Postoperative Period	Late Postoperative Period
2-6 P.M.	2.65	1.47	1.38
6-10 P.M.	2.00	1.60	1.63
10-2 A.M.	2.08	2.65	...
2-6 A.M.	3.02	...	3.33
6-10 A.M.	...[a]	1.94	2.01
10-2 P.M.	...	2.18	1.40
Period Average	2.43	1.97	1.95

[a]No observations made.

ruptions was 1.38 minutes in the late postoperative period between 2:00 P.M. and 6:00 P.M.

Length of the Blocks of Uninterrupted Time

Findings relevant to the second question regarding the length of the uninterrupted time blocks are shown in Table 2. The data reveal that there are no uninterrupted time blocks of over fifty minutes in any postoperative period. The early postoperative period has two uninterrupted time blocks of forty-one to fifty minutes in length. In the mid and late postoperative periods the longest blocks

TABLE 2

NUMBER AND DURATION OF UNINTERRUPTED TIME BLOCKS IN THE THREE POSTOPERATIVE PERIODS

Duration	Number of Uninterrupted Time Blocks			
	Early Postoperative Period	Mid Postoperative Period	Late Postoperative Period	Total
5 mins. or less	213	181	185	579
6 to 10 mins.	36	26	27	89
11 to 20 mins.	14	21	14	49
21 to 30 mins.	7	3	3	13
31 to 40 mins.	1	2	1	4
41 to 50 mins.	2	0	0	2
over 50 mins.	0	0	0	0

of uninterrupted time were thirty-one to forty minutes. The greatest total number of uninterrupted time blocks in all three postoperative periods were five minutes or less in length.

The average number and length of uninterrupted time blocks in each four-hour time block are shown in Table 3. Averages were computed for this table because there were unequal numbers of the four-hour blocks in the three postoperative periods. The total number and duration of uninterrupted time blocks for all the four-hour time blocks are shown in Appendix D. The shortest uninterrupted time blocks were between 2:00 P.M. and 6:00 P.M. in the mid post-operative period, with no blocks longer than ten minutes.

TABLE 3

AVERAGE NUMBER AND DURATION OF THE UNINTERRUPTED TIME BLOCKS IN THE FOUR-HOUR BLOCKS IN THE THREE POSTOPERATIVE PERIODS

Duration	Average Number of Uninterrupted Time Blocks					
	Four Hour Time Blocks					
	2-6 P.M.	6-10 P.M.	10-2 A.M.	2-6 A.M.	6-10 A.M.	10-2 P.M.
Early Postoperative Period						
5 mins. or less	25.0	25.0	24.3	20.0	...[a]	...
6 to 10 mins.	4.5	4.0	3.3	4.0	...	...
11 to 20 mins.	1.0	2.0	.66	3	...	...
21 to 30 mins.	1.0	.5	1.0	.5	...	...
31 to 40 mins.	0	0	0	.5	...	...
41 to 50 mins.	.5	0	.33	0	...	...
over 50 mins.	0	0	0	0	...	...
Mid Postoperative Period						
5 mins. or less	29.0	22.5	19.5	...	18.5	15.5
6 to 10 mins.	3.0	.5	4.5	...	2.0	4.5
11 to 20 mins.	0	1.0	3.5	...	2.5	3.5
21 to 30 mins.	0	1.0	.5	...	0	0
31 to 40 mins.	0	0	0	...	1.0	0
41 to 50 mins.	0	0	0	...	0	0
over 50 mins.	0	0	0	...	0	0
Late Postoperative Period						
5 mins. or less	16.0	22.33	...	15.0	21.0	23.0
6 to 10 mins.	2.0	3.33	...	5.0	3.0	2.0
11 to 20 mins.	1.0	1.33	...	2.0	4.0	1.0
21 to 30 mins.	.5	0	...	2.0	0	0
31 to 40 mins.	.5	0	...	0	0	0
41 to 50 mins.	0	0	...	0	0	0
over 50 mins.	0	0	...	0	0	0

[a]No observations made.

Types of Interruptions

Tables 4 and 5 show the types of interruptions in each of the three postoperative periods.

The data in Table 4 reveal that the total number of interruptions increases over the three postoperative periods. The greatest total number of interruptions in all three periods was the result of nursing activities. Environmental interruptions were the second highest, with the greatest frequency in the mid postoperative period.

TABLE 4

NUMBER AND PERCENTAGE OF INTERRUPTIONS IN EACH CATEGORY WITHIN THE THREE POSTOPERATIVE PERIODS

Category	Number and Percentage of Interruptions					
	Early Postoperative Period		Mid Postoperative Period		Late Postoperative Period	
	No.	%	No.	%	No.	%
Nursing activities	644	58	568	43	769	50
Patient initiated activities	126	11	135	10	233	15
Activities of others	102	9	283	22	269	17
Environment	248	22	334	25	262	18
Total	1,120	100	1,320	100	1,533	100

TABLE 5

NUMBER OF INTERRUPTIONS IN THE TYPES OF ACTIVITIES IN THE THREE POSTOPERATIVE PERIODS

Types of Activities	Number of Interruptions		
	Early Postoperative Period	Mid Postoperative Period	Late Postoperative Period
Nursing activities			
Comfort measures	139	195	270
Monitoring measures	226	166	216
Circulation measures	74	68	76
Respiration measures	128	55	50
Nutrition and elimination measures	12	48	105
Nurse communicating with patient	65	36	52
Total	644	568	769
Patient initiated activities	126	135	233
Activities of others			
Personal visitors	26	38	41
Doctor	16	20	4
Housekeeping	...	2	4
Laboratory	5	5	38
X-ray	7	10	5
Physiotherapist	48	208	177
Total	102	283	269
Environment			
Noise	109	144	109
Lights	6	5	2
Telephone	11	10	14
Talking	115	163	129
Monitor alarm	7	12	8
Total	248	334	262

Tables 6 to 8 contain a further breakdown of the types of interrupting activities. Each category in these tables is represented as 100 percent and the types of activities were calculated as a percentage of the total.

Data from Table 6 show the percentage of interruptions by types of nursing activities. In the three postoperative periods comfort and monitoring were responsible for over 55 percent of the interruptions.

The percentage of interruptions by others is indicated in Table 7. In all three postoperative periods the physiotherapist was responsible for the greatest number of interruptions. However, types of interruptions by others were only responsible for 9 percent, 22 percent and 17 percent of the total number of interruptions in the early, mid and late postoperative periods respectively (see Table 4).

Environmental interruptions as shown in Table 8 reveal that noise and talking were responsible for over 90 percent of these interruptions in all three postoperative periods. As indicated in Table 1 environmental factors were the second most frequent type of interruption.

The data in Table 9 show the average number of interruptions in the four categories of activity for the different times of day. Nursing activities increased over the postoperative period between 2:00 P.M. to 6:00 P.M. However, in the 10:00 P.M. to 2:00 A.M. and the 2:00 A.M. to 6:00 A.M. time blocks, nursing activities decreased as postoperative time increased. Patient initiated activities increased over the postoperative period. This increase is what would be expected in a normal postoperative recovery course. Environmental

TABLE 6

PERCENTAGE OF INTERRUPTIONS BY TYPES OF NURSING ACTIVITIES IN THE THREE POSTOPERATIVE PERIODS

Types of Nursing Activities	Percentage of Interruptions		
	Early Postoperative Period	Mid Postoperative Period	Late Postoperative Period
Comfort measures	21.5	34	35
Monitoring	35	29	28
Circulation	11.5	12	10
Respiration	20	10	6.5
Nutrition and Elimination	2	9	14
Nurse Communicating with Patient	10	6	6.5
Total	100	100	100

TABLE 7

PERCENTAGE OF INTERRUPTIONS BY ACTIVITIES OF OTHERS IN THE THREE POSTOPERATIVE PERIODS

Activities of Others	Percentage of Interruptions		
	Early Postoperative Period	Mid Postoperative Period	Late Postoperative Period
Personal visitors	25	13	15
Doctor	16	7	1.5
Housekeeping	0	1	1.5
Laboratory	5	2	14
X-ray	7	4	2
Physiotherapist	47	73	66
Total	100	100	100

TABLE 8

PERCENTAGE OF INTERRUPTIONS BY ENVIRONMENTAL ACTIVITIES IN THE THREE POSTOPERATIVE PERIODS

Environment	Percentage of Interruptions		
	Early Postoperative Period	Mid Postoperative Period	Late Postoperative Period
Noise	44	43	42
Lights	2.5	1.5	1
Telephone	4.5	3	5
Talking	46	49	49
Monitor alarm	3	3.5	2
Total	100	100	100

TABLE 9

AVERAGE NUMBER OF INTERRUPTIONS IN THE CATEGORIES OF ACTIVITY IN THE FOUR-HOUR BLOCKS IN THE THREE POSTOPERATIVE PERIODS

Category of Activity	Average Number of Interruptions					
	Four-Hour Blocks					
	2-6 P.M.	6-10 P.M.	10-2 A.M.	2-6 A.M.	6-10 A.M.	10-2 P.M.
Early Postoperative Period						
Nursing	71.5	80.5	75	57.5	...[a]	...
Patient Initiated	10	8	14.6	23	...	...
Others	19.5	28	1.6	1	...	...
Environment	6.5	23	57.6	8	...	...
Mid Postoperative Period						
Nursing	89	108.5	36.5	...	55.5	38
Patient	7	5.5	26	...	11	21.5
Others	52	5	20.5	...	40.5	49.5
Environment	43	57	28	...	40	21.5
Late Postoperative Period						
Nursing	121	88.6	...	37	52	93
Patient Initiated	23.5	18.6	...	49	20	30.5
Others	37	21.6	...	1	40	37.5
Environment	11	43.6	...	10	29	35

[a]No observations made.

interruptions were the highest in most of the time blocks in the mid postoperative period.

Discussion of the Findings

The findings that emerged as significant in this study were: (1) that patients in postcardiotomy intensive care units were interrupted so frequently that there was little time available for rest and sleep, and (2) nursing care activities were responsible for the greatest number of these interruptions.

These findings were similar to the findings of other studies carried out in postcardiotomy intensive care units by Kornfeld and Lazarus.

Patients can not sleep if they are constantly interrupted. The data in Table 1 demonstrate that the frequency of interruptions in all time blocks over the three postoperative periods was high. The range for the total postoperative period was from one interruption occurring every 1.40 minutes to one interruption occurring every 3.33 minutes. The frequency of interruptions noted in this study seemed to reflect the tendency of postcardiotomy intensive care units to provide continued care without regard to time of day and the 24-hour sleep-wakefulness cycle.

In order to complete one sleep cycle an adult requires approximately eighty-five to ninety minutes of uninterrupted rest.[1] The data in Table 2 reveal there are no uninterrupted time blocks over fifty minutes in any of the postoperative periods. These findings

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[1]Nathaniel Kleitman, Sleep and Wakefulness (Chicago: University of Chicago Press, 1963), p. 91.

indicated that there was no time available to patients for periods of prolonged, uninterrupted rest. Therefore, patients in the first fifty-six hours postoperatively were unable to complete one sleep cycle because of the constant interruptions.

Also, the data suggested that patients were totally deprived of REM sleep. As noted previously, in Chapter 2, REM sleep is the stage when a person is ascending from Stage 2 to Stage 1. This stage of sleep occurs approximately after seventy minutes of sleep. As mentioned in the literature review each stage of sleep is vital and necessary. These findings suggested that patients were not meeting their physiological need for sleep in the first fifty-six hours postoperative in a postcardiotomy intensive care unit.

Three studies from the University of Washington by Elwell, McFaddin and Garner found that patients in an intensive care unit following open-heart surgery were deprived of sleep.

Studies have indicated that intensive nursing and medical care is the biggest deterrent to sleep in the open-heart intensive care unit.[2] The data in Table 4 support these findings. Nursing activities were the most frequent source of interruptions for all three postoperative periods.

The next most frequent activities were environmental. Talking among the hospital personnel and noise together total 90 percent of these interruptions. Although it was beyond the scope of this study to document in detail the cause of the noise the investigator

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[2]Donald S. Kornfeld, Shelden Zimberg, and James R. Malm, "Psychiatric Complications of Open-Heart Surgery," The New England Journal of Medicine 273 (August 1965): 291.

did note some of the specific noises. These included such things as: respirators clicking, hoppers flushing, blinds snapping, addressograph banging, pounding I.V. bottle on the floor, restocking drawers, emptying garbage pails, whistling of housekeepers and doors slamming. By controlling these environmental interruptions the total number of interruptions might be decreased on an average by 22 percent. As noted earlier in Chapter 1, postcardiotomy patients complained of the noisy environment of the intensive care unit.

Summary

This chapter presented the findings of the study and the discussion of those findings. The data were analyzed in the light of the three questions posed in the statement of the problem.

CHAPTER V

SUMMARY, IMPLICATIONS AND RECOMMENDATIONS FOR NURSING CARE, AND RECOMMENDATIONS FOR FURTHER INVESTIGATION

Summary

The incidence of postoperative psychosis following open-heart surgery, as reported in the literature, is quite high. One of the possible contributing factors which has been cited is the environment of the intensive care unit. Postcardiotomy patients have complained about the noisy atmosphere and the lack of sleep during their stay in the intensive care unit. Several researchers have noted the similarity between those symptoms of sleep deprivation and postcardiotomy psychosis. The biggest deterrent to sleep in the postcardiotomy intensive care unit is attributed to the number of interruptions by nursing and medical personnel.

The purpose of this study was to document the type and frequency of interruptions sustained by postcardiotomy patients in an intensive care unit. To accomplish this, the data were collected by the investigator utilizing a non-participant checklist of interrupting activities. The sample included 108 hours of observation covering the first fifty-six postoperative hours, divided into early, mid and late postoperative periods. In each postoperative period there were thirty-six hours of observation. To facilitate continuous observation the observation periods were divided into four-

hour blocks, for example, 2:00 P.M. to 6:00 P.M. A random sampling of the four-hour blocks in each postoperative period over the days of the week was carried out to ensure unbiased selection.

A review of the literature focused on the environment of the postcardiotomy intensive care unit which is considered to be one etiological factor of postcardiotomy psychosis.

A descriptive analysis of the data collected centered around the three questions posed in the statement of the problem. The questions related to the length of the uninterrupted time blocks and the frequency and types of interruptions. In order to facilitate the analysis of the data the types of interruptions were organized into four main categories: (1) nursing activities, (2) patient initiated activities, (3) activities of others, and (4) environment.

The data regarding the frequency of interruptions indicate the total average time between interruptions is 2.12 minutes for the entire observation period. Also, the greatest length of average time between interruptions is only 3.33 minutes, recorded between 2:00 A.M. and 6:00 A.M. in the late postoperative period.

There are no uninterrupted time blocks over fifty minutes in the three postoperative periods. In the total observation there are two blocks of uninterrupted time, forty to fifty minutes long. However, both of these blocks occur during the day.

The data show that the number of interruptions increased from the early postoperative period to the late postoperative period from 1,120 to 1,533. Nursing activities constituted the highest number of interruptions. Percentage of the total number of

interruptions in each category for the 108 hours of observation is shown as follows:

Category of Interruptions	Percentage
Nursing Activities	50
Patient Initiated Activities	12
Activities of Others	16
Environment	22

The conclusions that can be made from these findings are that patients in the postcardiotomy intensive care unit are frequently interrupted and there is very little time available for rest and sleep.

Implications and Recommendations for Nursing Care

Nurses have the responsibility for helping patients meet their physiological need for sleep. Also, several studies have recommended that nurses in postcardiotomy intensive care units reorganize their care to maintain the patient's day-awake and night-asleep cycle. Intensive care nursing requires that the patients be interrupted more than patients who are not in intensive care units. However, nurses should be able to provide adequate care in these areas and still help the patient meet his individual sleep need by reducing the number of interruptions.

Some recommendations to implement this aspect of care are:

1. Nursing care plans in intensive care units should incorporate the patient's need for sleep.

2. Nursing histories should include the patient's sleep

pattern to maintain the usual day-awake and night-asleep cycle.

3. Reorganization of routine nursing procedures such as vital signs to allow for a maximum amount of uninterrupted time for rest and sleep.

4. Nurses should educate other hospital personnel to the patient's need for sleep and include them in planning care to allow for maximum rest periods.

5. Nurses should be aware of the impact of environmental stimuli on the completion of the sleep cycle and their role in controlling them.

Recommendations for Further Investigation

The findings of this study suggest other studies which might be carried out:

1. A similar study might be designed utilizing two or three investigators to obtain data over a twenty-four hour period for the entire postoperative stay in the open-heart intensive care unit.

2. A study might be done to further analyze the environmental stimuli in the postcardiotomy intensive care unit.

3. An experimental study utilizing a different approach to organizing nursing care to allow the patient a maximum amount of uninterrupted time for rest and sleep.

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APPENDIX A

CHECKLIST OF INTERRUPTING ACTIVITIES

Date: Postoperative Day:

Time:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Medication															
Bed Bath															
Oral Hygiene															
Dressing															
Linen Change															
Restraints															
Other															
Chest Auscult.															
Vital Signs															
Blood Pressure															
Temperature															
I.V.															
Monitor Lead															
C.V.P.															
Hypother.Blanket															
Turn-Postion															
Pass. Exercise															
Ambulation															
Strip Chest Tube															
Postural Drainage															
Cough-Deep Breathe															
I.P.P.B.															
N.T. Tube Care															
Bag & Suction															
02 Therapy															
Measure Urine															
Foley Catheter															
Bedpan-Urinal															
Fluids Offered															
Oral Feeding															
Weight															
Nurse Comm. c Pt.															
Pt. Initiated Act.															
Visitors															
Doctor															
Housekeeping															
Laboratory															
X-Ray															
Physio. Therapy															
Environment:															
Noise															
Lights															
Telephone															
Talking															
Monitor Alarm															

APPENDIX B

CATEGORIES OF TYPES OF ACTIVITIES

Categories of Types of Activities

1. Nursing Activities

a) Comfort
- medication
- bed bath
- oral hygiene
- dressing
- linen change
- restraints
- other

b) Monitoring
- chest auscultation
- vital signs
- blood pressure
- temperature
- I.V.
- monitor lead
- C.V.P.

d) Circulation
- hypothermia blanket
- turn and position
- passive exercises
- ambulation

d) Respiration
- strip chest tube
- postural drainage
- cough and deep breathe
- I.P.P.B.
- N.T. tube care
- bag and suction
- O_2 therapy

e) Nutrition and Elimination
- measure urine
- foley catheter
- bedpan - urinal
- fluids offered
- oral feeding
- weight

f) Nurse communicating with patient

2. Patient Initiated Activities

3. Activities of Others
- personal visitors
- doctors
- housekeeping staff
- laboratory staff
- X-ray
- physiotherapist

4. Environment
- noise
- lights
- telephone
- talking
- monitor alarm

APPENDIX C

RANDOM SAMPLE OF TIME FOR OBSERVATION PERIODS

RANDOM SAMPLE OF TIME FOR OBSERVATION PERIODS

Early Postoperative Period
2:00 P.M. - 6:00 A.M.)

Mon.	Tues.	Wed.	Thur.	Fri.	Sat.	Sun.
2 AM - 6 AM 2 PM - 6 PM 10 PM - 2 AM		2 AM - 6 AM	2 PM - 6 PM 6 PM - 10 PM	6 PM - 10 PM 10 PM - 2 AM 10 PM - 2 AM		

Mid Postoperative Period
(6:00 A.M. - 2:00 A.M.)

	6 PM - 10 PM 10 PM - 2 AM 6 AM - 10 AM		6 AM - 10 AM 6 PM - 10 PM 10 PM - 2 AM	10 AM - 2 PM 2 PM - 6 PM	10 AM - 2 PM	

Late Postoperative Period
(2:00 A.M. - 10:00 P.M.)

		6 PM - 10 PM	6 AM - 10 AM 6 PM - 10 PM	10 AM - 2 PM	2 PM - 6 PM 2 PM - 6 PM 6 PM - 10 PM	10 AM - 2 PM 2 AM - 6 AM

Total time blocks:

6:00 A.M. - 10:00 A.M.	=	3	
10:00 A.M. - 2:00 P.M.	=	4	
2:00 P.M. - 6:00 P.M.	=	5	
6:00 P.M. - 10:00 P.M.	=	7	
10:00 P.M. - 2:00 A.M.	=	5	
2:00 A.M. - 6:00 A.M.	=	3	

APPENDIX D

TABLES RELATED TO UNINTERRUPTED TIME BLOCKS

TABLE 10

NUMBER AND DURATION OF UNINTERRUPTED TIME BLOCKS IN EACH FOUR-HOUR BLOCK IN THE EARLY POSTOPERATIVE PERIOD

Four-Hour Blocks	Number of Uninterrupted Time Blocks						
	Duration						
	5 mins. or less	6-10 mins.	11-20 mins.	21-30 mins.	31-40 mins.	41-50 mins.	over 50 mins.
2-6 P. M.	32	4	1	1	0	0	0
2-6 P.M.	18	5	1	1	0	1	0
6-10 P.M.	31	4	2	0	0	0	0
6-10 P.M.	19	4	2	1	0	0	0
10-2 A.M.	27	4	1	1	0	0	0
10-2 A.M.	30	7	1	1	0	0	0
10-2 A.M.	16	0	0	1	0	1	0
2-6 A.M.	11	2	3	1	1	0	0
2-6 A.M.	29	6	3	0	0	0	0
Total	213	36	14	7	1	2	0

TABLE 11

NUMBER AND DURATION OF UNINTERRUPTED TIME BLOCKS IN EACH FOUR-HOUR BLOCK IN THE MID POSTOPERATIVE PERIOD

Four-Hour Blocks	Number of Uninterrupted Time Blocks						
	Duration						
	5 mins. or less	6-10 mins.	11-20 mins.	21-30 mins.	31-40 mins.	41-50 mins.	over 50 mins.
6-10 A.M.	21	3	0	0	0	0	0
6-10 A.M.	16	1	5	0	2	0	0
10-2 P.M.	20	7	4	0	0	0	0
10-2 P.M.	11	2	3	0	0	0	0
2-6 P.M.	29	3	0	0	0	0	0
6-10 P.M.	28	1	1	1	0	0	0
6-10 P.M.	17	0	1	1	0	0	0
10-2 A.M.	24	4	4	0	0	0	0
10-2 A.M.	15	5	3	1	0	0	0
Total	181	26	21	3	2	0	0

TABLE 12

NUMBER AND DURATION OF UNINTERRUPTED TIME BLOCKS IN EACH FOUR-HOUR BLOCK IN THE LATE POSTOPERATIVE PERIOD

Four-Hour Blocks	Number of Uninterrupted Time Blocks						
	Duration						
	5 mins. or less	6-10 mins.	11-20 mins.	21-30 mins.	31-40 mins.	41-50 mins.	over 50 mins.
2-6 A.M.	15	5	2	2	0	0	0
6-10 A.M.	21	3	4	0	0	0	0
10-2 P.M.	16	2	1	0	0	0	0
10-2 P.M.	30	2	1	0	0	0	0
2 -6 P.M.	25	2	0	0	0	0	0
2-6 P.M.	7	2	2	1	1	0	0
6-10 P.M.	11	4	3	0	0	0	0
6-10 P.M.	25	5	1	0	0	0	0
6-10 P.M.	35	2	0	0	0	0	0
Total	185	27	14	3	1	0	0

APPENDIX E

TABLES RELATED TO TYPES OF INTERRUPTIONS

TABLE 13

NUMBER OF INTERRUPTIONS IN THE TYPES OF ACTIVITY WITHIN THE FOUR-HOUR TIME BLOCKS IN THE EARLY POSTOPERATIVE PERIOD

Types of Activity	Number of Interruptions									
	Four-Hour Time Blocks									
	2-6 P.M.	2-6 P.M.	6-10 P.M.	6-10 P.M.	10-2 A.M.	10-2 A.M.	10-2 A.M.	2-6 A.M.	2-6 A.M.	Total
Medication	2	3	5	2	3	4	8	4	2	33
Bed Bath	..	..	15	11	..	..	..	6	..	32
Oral Hyg.	..	..	3	2	..	..	1	..	..	6
Dressing	..	..	..	..	3	..	..	..	..	3
Linen	..	..	3	4	1	..	2	3	..	13
Other	1	2	4	5	11	6	12	4	7	52
Chest Ausc.	1	2	2	..	2	2	2	2	6	19
V.S.	14	8	..	4	3	8	9	..	7	53
B.P.	..	7	..	7	6	5	8	..	3	36
Temp.	4	6	4	4	5	5	5	1	1	35
I.V.	..	5	2	..	10	5	7	7	6	42
Monitor	..	..	..	8	..	..	..	..	..	8
C.V.P.	..	6	3	7	7	6	1	..	3	33
Hypo.Blank	..	..	..	..	..	..	..	..	..	..
Turn-Pos.	..	6	11	5	10	11	7	6	17	73
Pass.Ex.	..	..	..	1	..	..	..	..	..	1
Chest Tube	2	2	10	6	8	..	3	5	4	40
Cough D.B.	..	6	..	2	6	..	..	1	..	15
N.T. Tube	8	11	..	..	..	..	..	..	..	19
Bag & Suct.	13	15	1	..	..	..	..	..	..	29
02 Ther.	..	1	3	3	8	4	..	4	2	25
Meas.Urine	..	1	..	..	1	2	2	1	0	7
Foley Cath.	..	..	1	2	2	..	..	..	..	5
Nur. comm.	12	5	21	..	7	4	3	2	11	65
Pt.Int.Act.	3	17	6	10	8	7	29	41	5	126
Visitors	2	..	3	21	..	..	..	..	..	26
Doctor	2	9	4	1	..	..	..	..	..	16
Lab.	..	..	2	1	..	..	..	2	..	5
X-ray	..	..	4	3	..	..	..	..	..	7
Physio.	19	7	8	9	..	..	5	..	..	48
Environ:										
Noise	1	..	11	2	22	26	38	8	1	109
Lights	..	..	..	..	2	3	..	..	1	6
Tel.	..	..	4	1	4	1	1	..	..	11
Talking	7	4	22	5	10	21	42	1	3	115
Mon.Alarm	..	1	..	1	3	..	..	..	2	7
Total	91	124	152	127	142	120	185	98	81	1120

TABLE 14

NUMBER OF INTERRUPTIONS IN THE TYPES OF ACTIVITY WITHIN THE FOUR-HOUR TIME BLOCKS IN THE MID POSTOPERATIVE PERIOD

Types of Activity	Number of Interruptions									
	Four-Hour Time Blocks									
	6-10 A.M.	6-10 A.M.	10-2 P.M.	10-2 P.M.	2-6 P.M.	6-10 P.M.	6-10 P.M.	10-2 A.M.	10-2 A.M.	Total
Medication	4	1	2	1	3	4	1	2	1	19
Bed Bath	12	2	..	..	6	13	14	..	..	47
Oral Hyg.	2	..	..	..	1	3	..	..	..	6
Dressing	..	..	..	..	15	..	18	..	..	33
Linen	4	..	..	..	3	9	13	..	..	29
Other	1	6	1	18	2	19	5	8	1	61
Chest Ausc.	3	..	..	..	..	..	..	3	2	8
V.S.	3	1	1	4	5	2	3	4	1	24
B.P.	6	1	4	5	6	..	..	4	3	29
Temp.	4	2	4	2	4	6	2	4	2	30
I.V.	4	3	1	4	5	6	16	7	8	54
Monitor	1	..	..	..	..	..	1	..	..	2
C.V.P.	2	..	..	2	13	1	..	..	1	19
Turn.Pos.	11	16	..	2	6	16	12	2	2	67
Pass. Ex	1	..	..	..	..	..	..	..	..	1
Chest Tube	..	..	..	5	..	4	..	2	..	11
Cough-D.B.	..	8	..	..	4	..	..	4	..	16
02 Ther.	3	1	2	1	5	5	5	2	4	28
Meas.urine	..	..	..	3	..	..	..	2	..	5
Foley Cath.	..	..	1	2	..	..	..	..	..	3
Fluids	..	..	..	7	5	4	5	2	..	23
Oral feed	..	..	..	..	..	17	..	..	..	17
Nurse comm.	3	6	..	4	6	7	8	1	1	36
Pt.Init.Act	18	4	23	20	7	11	..	18	34	135
Visitors	16	..	..	..	18	..	4	..	..	38
Doctor	4	10	1	..	..	5	..	..	..	20
Housekeep	..	..	2	..	..	..	..	..	..	2
Lab.	..	..	..	4	..	1	..	..	..	5
X-ray	8	2	..	..	..	..	..	..	..	10
Physio.	41	..	22	70	34	..	..	23	18	208
Environ:										
Noise	34	2	4	11	16	23	24	10	20	144
Lights	1	..	..	..	..	..	2	1	1	5
Tel.	2	..	..	..	..	3	2	..	3	10
Talking	38	1	5	21	26	42	13	9	8	163
Mon.Alarm	2	..	1	1	1	2	1	4	..	12
Total	228	66	74	187	191	203	149	112	110	1320

TABLE 15

NUMBER OF INTERRUPTIONS IN THE TYPES OF ACTIVITY WITHIN THE FOUR-HOUR TIME BLOCKS IN THE LATE POSTOPERATIVE PERIOD

Types of Activity	Number of Interruptions									
	Four-Hour Time Blocks									
	2-6 A.M.	6-10 A.M.	10-2 P.M.	10-2 P.M.	2-6 P.M.	2-6 P.M.	6-10 P.M.	6-10 P.M.	6-10 P.M.	Total
Medication	3	3	..	2	5	2	3	3	1	22
Bed Bath	..	2	..	..	9	..	21	25	7	64
Oral Hyg.	..	..	..	..	2	2	1	..	..	5
Dressing	..	..	12	18	..	2	4	..	1	37
Linen	..	6	..	1	4	6	11	10	13	51
Other	2	2	9	6	10	40	3	8	11	91
Chest Ausc.	..	4	..	..	8	..	..	..	..	12
V.S.	3	7	3	3	5	6	6	5	4	42
B.P.	6	7	2	7	9	7	..	8	2	48
Temp.	5	2	3	7	5	7	4	8	3	44
I.V.	2	8	3	4	..	8	2	14	12	53
Monitor	..	..	..	1	..	..	..	..	..	1
C.V.P.	..	..	..	6	..	..	7	2	1	16
Turn.Pos.	5	2	8	4	20	6	5	2	7	59
Ambulation	..	..	4	13	..	..	..	..	..	17
Chest Tube	..	..	..	..	..	..	..	..	4	4
Cough-D.B.	..	2	..	..	..	5	..	..	..	7
02 Ther.	6	3	3	1	4	3	8	2	9	39
Meas.Urine	..	1	..	4	..	1	..	..	..	6
Bed Pan	3	..	..	..	6	..	4	..	..	13
Fluids	..	2	..	1	1	..	1	1	..	6
Oral Feed	..	..	35	11	23	11	..	..	..	80
Nur.comm.	2	1	7	8	12	13	7	2	..	52
Pt.Int.Act.	49	20	24	37	1	46	22	4	30	233
Visitors	..	..	..	..	..	10	..	14	17	41
Doctor	..	..	..	2	..	..	1	..	1	4
Housekeep	..	..	2	1	..	..	..	1	..	4
Lab.	1	8	10	15	..	..	..	2	2	38
X-ray	..	5	..	..	..	..	..	..	..	5
Physio.	..	27	23	22	21	43	23	5	13	177
Environ:										
Noise	7	15	11	16	9	4	14	19	14	109
Lights	1	1	..	..	..	..	..	..	..	2
Tel.	1	3	1	1	..	..	1	3	4	14
Talking	1	7	21	19	2	7	26	25	21	129
Mon.Alarm	..	3	..	1	..	..	..	2	2	8
	97	141	181	211	156	229	174	165	179	1533

APPENDIX F

NUMBER OF PATIENTS OBSERVED BY SEX ACCORDING TO THE TYPE OF SURGERY

TABLE 16

NUMBER OF MALE AND FEMALE PATIENTS
OBSERVED ACCORDING TO THE
TYPE OF SURGERY

Types of Surgery	Number of Patients	
	Male	Female
Aortic Valve Replacement	1	..
Atrial Myoxma	1	..
Atrial Septal Defect	..	3
Mitral Valve Replacement	3	2
Open Mitral Commissurotomy	..	2
Single Bypass Graft	4	4
Double Bypass Graft	5	..
Triple Bypass Graft	1	1
Total	15	12

APPENDIX G

TABLES RELATED TO INTERRUPTED AND UNINTERRUPTED TIME

TABLE 17

NUMBER OF MINUTES OF INTERRUPTED AND UNINTERRUPTED TIME IN EACH FOUR-HOUR BLOCK IN THE EARLY POSTOPERATIVE PERIOD

Four-Hour Blocks	Number of Minutes	
	Interrupted Time	Uninterrupted Time
2-6 P.M.	103	137
2-6 P.M.	78	162
6-10 P.M.	131	109
6-10 P.M.	108	132
10-2 A.M.	110	130
10-2 A.M.	93	147
10-2 A.M.	142	98
2-6 A.M.	63	177
2-6 A.M.	87	153
Total	1,120	1,040

TABLE 18

NUMBER OF MINUTES OF INTERRUPTED AND UNINTERRUPTED TIME IN EACH FOUR-HOUR BLOCK IN THE MID POSTOPERATIVE PERIOD

Four-Hour Blocks	Number of Minutes	
	Interrupted Time	Uninterrupted Time
6-10 A.M.	193	47
6-10 A.M.	54	186
10-2 P.M.	67	173
10-2 P.M.	153	87
2-6 P.M.	163	77
6-10 P.M.	128	112
6-10 P.M.	172	68
10-2 A.M.	94	146
10-2 A.M.	87	153
Total	1,320	840

TABLE 19

NUMBER OF MINUTES OF INTERRUPTED AND UNINTERRUPTED TIME IN EACH FOUR-BLOCK IN THE LATE POSTOPERATIVE PERIOD

Four-Hour Blocks	Number of Minutes	
	Interrupted Time	Uninterrupted Time
2-6 A.M.	72	168
6-10 A.M.	119	121
10-2 P.M.	176	64
10-2 P.M.	158	82
2-6 P.M.	183	57
2-6 P.M.	120	120
6-10 P.M.	145	95
6-10 P.M.	141	99
6-10 P.M.	153	87
Total	1,533	627