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LOMA LINDA UNIVERSITY

Graduate School

A STUDY OF THE RELATIONSHIP BETWEEN PREOPERATIVE
ANXIETY AND POSTOPERATIVE VOMITING

by

Taye Grace Emori

A Thesis in Partial Fulfillment
of the Requirements for the Degree
Master of Science in the Field of Nursing

96407

September 1965

Each person whose signature appears below certifies that he has read this thesis and that in his opinion it is adequate, in scope and quality, as a thesis for the degree of Master of Science.

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Taye Grace Emori

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CHAPTER I

INTRODUCTION

There is an increasing awareness among health workers that somatic problems are often the result of emotional stress. Studies have demonstrated that many physiologic manifestations can be explained on a psychological basis. Thus in trying to find the precipitating cause for symptoms, it is often of value to consider the role of the patient's psyche.

Postoperative vomiting is a problem which concerns the patient and medical and nursing staffs alike. The desirability of lowering the incidence of vomiting lies in the fact that complications of vomiting may not only delay, but often threaten the ultimate recovery of the surgical patient. Identification of the factors which may cause postoperative vomiting is the initial step in finding ways to reduce its occurrence. There are indications that the presence of anxiety may be a determining factor in postoperative vomiting. These indications have been derived for the most part as the result of empirical observations rather than through careful research.

I. NEED FOR THE STUDY

Much study has gone into trying to identify the factors which cause or contribute to postoperative vomiting. These studies, however, have been largely devoted to anesthetic agents, type of surgery, and the physical characteristics of the patients who vomit after surgery. Whether or

not the emotional status of the patient contributes to the incidence of postoperative vomiting is as yet a moot question.

Why should this be a matter of concern to nursing? Providing emotional and physical comfort for the patient is an important aspect of nursing. The effect of physical discomfort upon the emotions can usually be recognized. However, physical manifestations of emotional discomfort are far more subtle and varied. If it can be established that postoperative vomiting is a symptomatic manifestation of preoperative anxiety, the nurse, by virtue of her close relationship with the patient, is in a position to take measures that would help alleviate the distress. These measures may consist in reporting the patient's anxiety to his doctor, or referring him to the hospital chaplain. More important, the nurse may herself help allay the patient's fears by giving him emotional support. If conservative measures to relieve his anxiety are unsuccessful, the physician may give the patient a medication to relieve the anxiety and thus lessen his chances of vomiting.

II. THE PROBLEM

The Purpose of the Study

It was the purpose of this study to identify the role of preoperative anxiety as a significant contributing factor in the incidence of immediate postoperative vomiting. By isolating preoperative anxiety as a determinant of postoperative vomiting, it was hoped that at least one cause of postoperative vomiting could be controlled or minimized through nursing or medical measures.

Hypothesis

The hypothesis of this study was that the more anxiety experienced by a patient before surgery, the greater was his chance of vomiting immediately after surgery.

Subhypotheses

The following subhypotheses were made to support the main hypotheses:

1. The higher the preoperative blood pressure, the greater the chance of postoperative vomiting.
2. The higher the preoperative heart rate, the greater the chance of postoperative vomiting.
3. The higher the preoperative Anxiety Differential score, the greater the chance of postoperative vomiting.
4. The lower the preoperative eosinophil count, the greater the chance of postoperative vomiting.

Statement of the Problem

The problem of this study was to measure the amount of anxiety each surgical patient experienced before surgery and then observe his vomiting pattern as to incidence and frequency immediately after surgery.

Assumptions

The following assumptions were accepted for this study:

1. The patients did not receive information or counselling which significantly increased or decreased their anxiety after the administration of the anxiety measurement tests.

2. The tests given to the patients were valid measuring devices of anxiety.

3. The administration of the tests, and the added attention accompanying it did not contribute significantly in altering the anxiety levels either upward or downward.

Limitations

This study was conducted during the ten week period beginning January 19, 1964 and ending March 31, 1964. Because of the strict criteria employed for the selection of the patients, only twenty nine patients were available for the study and are not representative of all patients undergoing surgery.

Definition of Terms

For the purposes of this paper, the terms used are defined as follows:

Vomiting--A labored rhythmic activity, with or without the forceful expulsion of the gastrointestinal contents through the mouth.

Preoperative anxiety--The feeling of uneasiness or emotional distress which the preoperative patient experiences but may not be able to admit or express.

Immediate postoperative period--The two hour period immediately following the anesthetized patient's admission to the recovery room.

III. METHODOLOGY

The descriptive survey method of research was used in this study. A review of literature, which is reported in Chapter II, was done to establish the rationale and need for this study. After permission to

conduct the study at the selected hospital was obtained, patients who met the criteria for selection were given tests to determine the amount of anxiety they were experiencing on the evening before surgery. Following surgery, the vomiting activities of these patients were observed and recorded by the nurses in the recovery room. The scores on the measurements of anxiety tests and the vomiting activities of the patients were compared to find any relationships. Also, a comparison between the vomiting and nonvomiting groups was made.

The method of gathering the data is described in Chapter III. In Chapter IV, the data is presented and analyzed. Conclusions and recommendations resulting from the study are made in Chapter V, and the study is summarized in Chapter VI.

CHAPTER II

REVIEW OF THE LITERATURE

In order to establish the underlying basis and need for this study, a review was made of research studies reported within the last ten years to identify the factors which contribute to postoperative vomiting. A survey was made of the studies and statements by authorities which indicated that a relationship existed between preoperative anxiety and postoperative vomiting. The rationale for the selection of the physiologic and psychologic measures of anxiety is presented in the concluding section.

I. FACTORS WHICH CONTRIBUTE TO POSTOPERATIVE VOMITING

Many studies have been conducted for the purpose of evaluating anesthetic medications, techniques and effectiveness of antiemetic drugs in the incidence and control of postoperative nausea and vomiting. The identification of the factors which contribute to postoperative emetic symptoms were supporting evidence and were secondary considerations in these studies.

Adriani and others stated that retching and vomiting were expected complications of surgery. "Both patient and doctor are surprised when they do not occur."¹ In 1936, a survey of 10,000 patients indicated

¹ John Adriani, James Arens, and S. O. Antony, "Post Anesthetic Vomiting," American Journal of Surgery, 103:2, January, 1962.

40.6 per cent of the patients vomited after surgery.² However, Adrian study of 2,230 patients in 1962 revealed that the vomiting rate had declined to 23 per cent.³

This figure which was similar to those reported by most of the other investigators in recent years appeared to be the irreducible percentage which persists in spite of the advances in surgery, anesthesiology, and pharmacology.

Dent listed broad etiologic factors which may excite the vomiting center: (1) impulses received from the cerebral centers, (2) reflex impulses arising from the gastrointestinal tract, (3) chemical materials carried to the vomiting centers, and (4) dehydration and electrolyte imbalance.⁴ The role of these factors in the incidence of postoperative vomiting are identified in the following studies.

In the study by Dent and others, 3000 unselected surgical patients were observed in the recovery room for retching and vomiting. Nausea was excluded from the study since it was thought to be too subjective to accurately evaluate. Of the 3000 patients studied, the first 2000 patients were designated as control for the remaining 1000 patients who were treated on the antiemetic, Marezine. The highest incidence of vomiting was associated with ether and cyclopropane anesthesia. The vomiting rate in the control group for each anesthetic agent was 38 and 34 per cent respectively. The open drop method of anesthesia administration caused a higher incidence

²Sara J. Dent, V. Ramchandra, and C. R. Stephen, "Postoperative Vomiting, Incidence, Analysis and Therapeutic Measures in 3,000 Patients," Anesthesiology, 16:264, July, 1955.

³Adriani, op. cit., p. 2.

⁴Dent, op. cit., p. 264.

of vomiting than intubation. It was believed that the endotracheal tube prevented the irritating gases from reaching the stomach, thus reducing the incidence of vomiting. As to the site of operation, the patients who had head and neck surgery had a 38.1 per cent vomiting rate as compared to 30.0 per cent and 21.3 per cent vomiting rate for patients with abdominal and extra-abdominal surgeries respectively.⁵

Belleville and others in 1960 reported a study on 3,792 surgical patients which was conducted to identify the factors which may cause postoperative vomiting.⁶ The patients were observed in the recovery room every half hour for two and a half hours. Among the conclusions drawn from this study were:

1. The most important factor related to postoperative vomiting appeared to be the sex of the patient. Of the patients who received an antiemetic medication, 38 per cent of the women vomited, while only 9.3 per cent of the men vomited.

2. There appeared to be a hormonal factor involved in the incidence of vomiting. Women in the third or fourth week of their menstrual cycle vomited more than women in the first and second weeks.

3. In men, the incidence of nausea and vomiting decreased progressively with age, while there was no significant decline in women until their eighth decade.

4. Merperidine as a preoperative medication was found to cause more nausea and vomiting than morphine.

⁵ Ibid., pp. 264-272.

⁶ J. Weldon Belleville, and others, "Postoperative Vomiting IV, Factors Related to Postop Nausea and Vomiting," Anesthesiology, 21:186-193, March-April, 1960.

5. Patients who were intubated vomited less than patients who breathed from a mask. This concurs with the finding of Dent and others.

6. Hypotension of thirty millimeters or more seemed to cause nausea and vomiting.

7. A direct increase in the incidence of nausea and vomiting to increase in anesthetic time was observed among women who had the same anesthetic agent.

8. Patients with intra-abdominal procedures had the highest incidence of nausea and vomiting.

9. Obese patients were found more frequently in the vomiting group than thin patients. The authors believed that this suggested that fatty stores of anesthetic agents and concomitantly long desaturation time may be related to nausea and vomiting.

10. Differing from Dent's findings, in this study, patient's anesthetized with cyclopropane experienced a higher rate of vomiting than any other group.

Burtles and associates' study of 2,500 cases in England to assess the more important factors that affect the incidence of postoperative vomiting agreed with Belleville's observation that patient's who had undergone longer surgeries and female patients both experienced a higher incidence of postoperative vomiting.⁷ There was also agreement that there was a steady decline in the incidence of vomiting as the patient's age increased. Ether was found to be associated with a higher rate of vomiting than any other anesthetic agent. Thirty three per cent of the ether anesthetized patients and 24 per cent of the cyclopropane anesthetized patients vomited.

⁷R. Burtles and B. W. Peckett, "Postoperative Vomiting, Some Factors Affecting Its Incidence," British Journal of Anesthesiology, 29:114-123, March, 1957.

Burtles also found that the posture of the patient during surgery was a factor in inducing vomiting. Patients who were in Trendelenburg or reverse Trendelenburg positions during surgery experienced more vomiting than patients in other positions. However, the author thought that this may have been associated more with the type of surgery that was performed on patients than on the position during surgery. Patients who underwent fenestrations of the middle ear had an extremely high rate of vomiting--75 per cent as compared to 25 per cent for intra-abdominal surgery.

Heiser's intensive study of 98 surgical patients revealed a 41.9 per cent incidence of vomiting sometime during a 48 hour period.⁸ He reported that the length and amount of anesthesia had little effect on the incidence of vomiting as long as the course was smooth and the level of anesthesia relatively light. Deep anesthesia for even a short period was enough to produce vomiting. Heiser also reported a low incidence of nausea and vomiting in patients who had undergone cholecystectomies.

Bronica and his colleagues evaluated 2,827 surgical patients who were selected at random.⁹ During the observation period of 24 hours on each patient, 22.3 per cent of the patients manifested retching and/or vomiting. Again, female patients experienced a higher incidence of emetic symptoms than men. Cyclopropane produced less retching and vomiting than ether in this study group. Also, two thirds of the patients with stomach and duodenal and gall bladder surgeries experienced some degree of nausea and vomiting. In contrast to the previously reported studies,

⁸ John H. Heiser, "Post Anesthetic Nausea and Vomiting," Oral Surgery, Oral Medicine and Oral Pathology, 2:1213-1222, December, 1952.

⁹ John J. Bronica, and others, "Postop Nausea and Vomiting," Western Journal of Surgery, 67:332-338, November-December, 1959.

Bronica found a significant increase of nausea and vomiting in patients in their sixth and seventh decade of life. He felt that this was related to the fact that these patients usually underwent surgeries of greater magnitude than any other age group.

It was evident that there were many reasons why patients vomit after surgery. Some of the suggested causes of postoperative vomiting were examined by the majority of the studies, while other causes were isolated findings reported by only one author. Of those factors which were studied by many investigators, there was agreement about only one of them: female patients have a higher incidence of vomiting than male patients. Other factors in which there were general agreement were: older patients vomited less frequently than younger patients, patients who were intubated did not vomit as often as those with open drop method of anesthesia, and the more anesthetic a patient received, either as the result of the depth or length of administration, the greater would be his chances of vomiting. Ether and cyclopropane was found to cause the greatest number of patients to vomit. There was an equal division in four studies as to which one of the two caused the greatest number of patients to vomit. There was no conclusive evidence that any one site of surgery was associated with the highest incidence of vomiting. However, intra-abdominal and head and neck surgeries were given as the leading factors. Hypotension, type of preoperative medication and the weight of the patient were mentioned by one author as factors which may be related to postoperative vomiting.

Many of the discrepancies in the findings of the various studies could be attributed to differences in criteria for determining emetic symptoms and differences in the length of time the patients were observed for vomiting.

II. RELATIONSHIP BETWEEN ANXIETY AND POSTOPERATIVE VOMITING

With the exception of one study, the following portion of the review of literature are statements made by authorities regarding their support or opposition to the belief that anxiety and postoperative vomiting are related. The purpose of presenting these statements was to demonstrate that the conclusions concerning the relationship between preoperative anxiety and postoperative vomiting were drawn as the result of conjecture rather than careful research. This indicated that there was a need for additional study on this subject.

Previous Studies

Only one research study which dealt directly with the problem of preoperative emotional distress and postoperative vomiting was found in published literature. In a series of three studies by Dumas and Leonard, patients who received direct and intensive emotional support by a nurse before surgery, had a lower incidence of vomiting than the control patients who received only routine care.¹⁰ *

Although Janis did not evaluate the effect of anxiety on vomiting, he demonstrated that the reaction to the surgery postoperatively was predictable to a large degree by the patient's preoperative emotional status. After careful psychoanalysis of twenty two presurgical patients, he grouped them into three categorical levels of preoperative fear: (1) low, (2) moderate and (3) high. Each patient's postoperative course was then observed. The patients who denied any fear before surgery, generally were more angry

¹⁰ Rhetaugh G. Dumas and Robert C. Leonard, "Emotional Distress and Postoperative Vomiting," Nursing Research, 12:12-15, Winter, 1963.

and resentful after surgery than patients in the other groups. The patients in the moderately fearful group exhibited the least amount of postoperative emotional disturbance. Although the patients in the high fear group continued to be highly anxious after surgery, they had a positive attitude towards the hospital staff and their care. Janis believed that the patients who were rated "low" in anxiety tended to spontaneously develop "blanket immunity" which was readily shattered by actual stress stimuli.¹¹

These two studies demonstrated the role of preoperative anxiety in determining the course after surgery.

Somatic Manifestations of Anxiety

Throughout history, it has been recognized that emotions like fear and anxiety have a profound and pervasive inter-relationship with the sickness or health of the organism. When a person is threatened by pain, frustration, or anxiety, he reacts by either a physiologic and/or psychologic mobilization for fight or flight. Repression of these reactions often cause a variety of somatic symptoms.¹² Physiologically, these manifestations of anxiety express themselves through sympathetic, hormonal, motor and cortico-thalamic mechanisms.¹³

¹¹Irving Lester Janis, Psychological Stress: Psychoanalytic and Behavior Studies of Surgical Patients (New York: John Wiley and Sons, 1958), p. 401.

¹²Leon J. Saul, Emotional Maturity (Philadelphia: J. B. Lippincott Company, 1947), p. 5.

¹³Louis P. Thorpe, The Psychology of Mental Health (second edition; New York: The Ronald Press, 1960), p. 126.

Frank stated that:

Each person has his own characteristic way of reacting emotionally, of exhibiting his emotions overtly and of recovering after such disturbances. Indeed, his emotional reactions and affective responses are often the most significant expressions of the individual and the way he has developed and matured as a personality.¹⁴

When anxiety was expressed directly, the person experienced it with all the physiologic and somatic discomfort implied by a sense of impending disaster. If anxiety is blotted out, it may mediate itself directly through organic and somatic functions.¹⁵

Many gastric symptoms have been associated with emotional disturbances. Selye has said that the gastrointestinal tract is especially sensitive to general stress. "Signs of irritation and upset of the digestive organs may occur in any type of emotional stress."¹⁶

Wolff stated that vomiting occurs when certain individuals are confronted with a fact which they wish had never happened. Vomiting corresponds to the patient's efforts to restore things to their original situation.¹⁷

Dent, an anesthesiologist, stated that the vomiting center may be stimulated by impulses received from the cerebral centers. Psychic stimulation of the vomiting center is possible before and after surgery and may be responsible for some of the retching.¹⁸

¹⁴Lawrence K. Frank, Feelings and Emotions (Garden City, New Jersey: Doubleday and Company, Inc., 1954), p. 5.

¹⁵Bernard B. Raginsky, "Some Psychosomatic Aspects of General Anesthesia," Anesthesiology, 11:401, July, 1950.

¹⁶Hans Selye, The Stress of Life (New York: McGraw-Hill Book Company, Inc., 1956), p. 178.

¹⁷Harold G. Wolff, Stress and Disease (Springfield, Illinois, Charles C. Thomas Publishers, 1953), pp. 132 and 134.

¹⁸Dent, op. cit., p. 565.

Hollender believed that anxiety in the postoperative period may contribute to such symptoms as vomiting, anorexia, and urinary retention.¹⁹

Parkhouse viewed postoperative vomiting as most often a purposeless response to an abnormal stimulus: psychological, physical, or pharmacological.²⁰

Riding, on the other hand, completely disagreed that postoperative vomiting was related to anxiety. He stated:

The idea that sickness after anaesthesia is due in some way to poor mental outlook or lack of moral fibre should now be dead; it is difficult to believe that patients are sick because they expect to be. Nervousness and emotional upset do not appear to be an important factor.²¹

A need for studies correlating vomiting with anxiety was seen when differences of opinion regarding this matter were expressed by qualified people. Also, it was apparent that many of these statements were made only on the basis of empirical observations.

III. MEASUREMENTS OF ANXIETY

Normal body physiology and mental attitude are altered as the result of anxiety. The changes which occur are described to present the rationale for the use of the selected measurements of anxiety.

¹⁹Marc Hollender, The Psychology of Medical Practice (Philadelphia: W. B. Saunders Company, 1958), p. 143.

²⁰James Parkhouse, "The Cure for Postoperative Vomiting," British Journal of Anaesthesia, 35:190, March, 1963.

²¹J. E. Riding, "The Prevention of Postoperative Vomiting," British Journal of Anaesthesia, 35:180-188, March, 1963.

Effect of Anxiety on Body Physiology

Schottstaedt stated, ". . . attitudes and emotions are associated with physiologic changes which may give rise to symptoms in many parts of the body."²²

Martin proposed that the neurophysiologic construct of anxiety may partially involve the functions of the posterior hypothalamus and its effects on the sympathetic nervous system, the adrenal medulla, and the pituitary-adrenocortical system.²³

It is believed that the purpose of the sympathetics is to provide extra energy for the body in states of stress. This extra energy is called the sympathetic alarm reaction or stress reaction.²⁴ Usually, when any part of the sympathetic nervous system is stimulated, the entire system or major portions of it are stimulated at the same time. The release of norepinephrine or epinephrine by the adrenal medulla helps prepare the individual to deal with emergencies.²⁵

In a number of studies reported by Martin the response pattern associated with experimentally induced anxiety conforms rather closely to the response pattern associated with epinephrine injections.²⁶

²²William Schottstaedt, Psychophysiologic Approaches in Medical Practice (Chicago: The Year Book Publishers, 1960), p. 22.

²³Barclay Martin, "The Assessment of Anxiety by Physiological Behavioral Measures," Psychological Bulletin, 58:235, May, 1961.

²⁴Arthur C. Guyton, Textbook of Medical Physiology (second edition; Philadelphia, W. B. Saunders Company, 1961), p. 266.

²⁵William F. Ganong, Review of Medical Physiology (Los Altos, California: Lange Medical Publications, 1963), p. 268.

²⁶Martin, op. cit., p. 238.

In general, it is found that epinephrine leads to increased palmar conductance, systolic blood pressure, heart rate, cardiac output, forehead temperature, central nervous stimulation, blood sugar level; and decreased diastolic blood pressure, peripheral resistance, hand temperature, and salivary output.²⁷

The selected measurements of anxiety, heart rate, systolic blood pressure, respiration rate and eosinophil count are discussed in terms of the sympathetic system reactivity to anxiety.

Heart rate and systolic blood pressure. Two of the usual effects of sympathetic hyperactivity are increased heart rate and arterial pressure. Heart rate and cardiac output increased substantially in medical students before what was considered to be an anxiety arousing situation—oral examination.²⁸ Malmo and associates reported increased heart rate in neurotic subjects after criticism as compared to decreased heart rate after praise.²⁹

In a study by Clemens, there was increased systolic blood pressure following an injection of epinephrine. He stated that this result supported the hypothesis that the magnitude of systolic blood pressure rise is a fairly reliable index of sympathetic reactivity.³⁰

Malmo believed that certain physiologic measures may serve as indicant of the intensity of behavioral arousal. He said that from available

²⁷ Ibid., pp. 237-238.

²⁸ John B. Hickman, and others, "Cardiovascular Reactions to Emotional Stimuli. Effect on the Cardiac Output, Arteriovenous Oxygen Difference, Arterial Pressure and Peripheral Resistance," Journal of Clinical Investigation, 27:298, March, 1948.

²⁹ Robert B. Malmo and others, "Physiologic Study of Personal Interaction," Psychosomatic Medicine, 19:105-119, March-April, 1957.

³⁰ Theodore L. Clemens, "Autonomic Nervous System Responses Related to the Funkenstein Tests: I. To Epinephrine," Psychosomatic Medicine, 19:273, July-August, 1957.

data it appeared that physiologic measures such as heart rate, blood pressure and respiration provide reliable measures of the arousal variables.³¹

Respiration rate. Though the respiratory rate has not been used as widely as the previously discussed physiologic measures of anxiety, Guyton stated that many emotional states can affect the character of respiration. Fear, for instance, usually increases ventilatory rate as well as the heart action. This supposedly prepares the body for action and gives the animal extra capability to oppose impending danger. Because many emotional states affect the sympathetic-parasympathetic centers, the modification of the activity of the respiratory center by anxiety, worry, rage, etc., can be easily understood.³²

Eosinophil count. Eosinopenia results from hyperactivity of the adrenal cortex.³³

The levels of circulating eosinophils are intimately related to the activity of the adrenal cortex. Alarming stimuli when applied to animals, are followed by a marked fall in the level of circulating eosinophils. Regardless of the mechanism of the eosinopenia, it is known that stress leads to the release of ACTH from the hypothalamus, the ACTH in turn stimulates the adrenal cortex, which releases its steroid hormone in large quantities. These steroids produce a fall in eosinophils.³⁴

³¹Robert B. Malmo, "Anxiety and Behavioral Arousal," Psychological Review, 64:278, September, 1957.

³²Guyton, op. cit., p. 561.

³³Israel Davidson and Benjamin B. Wells, Clinical Diagnosis by Laboratory Methods (thirteenth edition; Philadelphia: W. B. Saunders Company, 1962), p. 211.

³⁴M. Roche, and others, "The Level of Circulating Eosinophils and Their Response to ACTH in Surgery," New England Journal of Medicine, 242:307, March 2, 1960.

A similar eosinopenia may be obtained by an injection of epinephrine or purified ACTH. ACTH acts directly on the adrenal cortex, while epinephrine acts through stimulation of the hypothalamus and secondary stimulation of the adrenal cortex. The eosinopenia following administration of ACTH and epinephrine is the basis for some tests of adrenal function.³⁵

A gradual lowering of the eosinophil levels of preoperative patients as a day of surgery approached was partially attributed to preoperative tension by Roche and others. The lowest eosinophil level occurred while the patient was in surgery. It was interesting to note that in almost all cases, the eosinophil level reached or exceeded preoperative levels within two or four days after surgery.³⁶

Dreyfuss and Feldman carried out observations in healthy medical students who were under the stress of taking examinations. An average of 44 per cent less eosinophils were found in these students before the tests than when the counts were repeated in twenty-four hours or a few days after the tests were taken.³⁷

Psychometric Test of Anxiety

Psychometric tests of anxiety have been found to be reliable indices of anxiety. There are a number of tests of anxiety, some designed to measure situational anxiety, while others measure manifest anxiety.

³⁵ Ibid.

³⁶ Ibid., p. 310.

³⁷ F. Dreyfuss and S. Feldman, "Eosinopenia Induced by Emotional Stress," Acta Medica Scandinavica, 114:107-122, 1952.

The Anxiety Differential is one test used to measure situational anxiety. The rationale behind this scale is that the person who is anxious for a short period of time perceives things differently than at a time when he is not experiencing anxiety. Alexander and Husek in their initial report stated that the Anxiety Differential items differentiated between anxiety and control conditioning when the experimental group was subjected to bodily harm anxiety. In another study, Alexander and Husek reported that the Anxiety Differential differentiated between the anxiety group who saw a highway accident film and the non-anxiety control group who saw baby pictures only. They stated that "the Anxiety Differential is apparently able to differentiate between anxious and non-anxious states of the same individuals as well as anxious and non-anxious groups."³⁸

A study by Kent and Husek compared the reaction of stutterers and non-stutterers to certain stressful situations. Large and significant differences in scores obtained by each group demonstrated that the Anxiety Differential was a reliable anxiety measuring instrument.³⁹

In summary, anxiety and other factors which were believed to be contributory to postoperative vomiting were identified through a review of literature. The psychosomatic aspects of vomiting and the rationale for the use of the selected methods for the measurement of anxiety were also reviewed.

³⁸ Sheldon Alexander and Theodore R. Husek, "The Anxiety Differential: Initial Steps in Development of a Measure of Situational Anxiety," Educational and Psychological Measurement, 22:329, Summer, 1962.

³⁹ Deryck R. Kent and Ted R. Husek, "A Comparison of Normal and Stuttering Male Adolescents Under Stress," (paper read at the Annual Convention of the American Psychological Association, Los Angeles, California, September, 1964).

CHAPTER III

METHOD OF THE STUDY

In this chapter, the method used to gather the data to test the hypothesis that anxiety is a causative factor in immediate postoperative vomiting is presented. The descriptive survey method was selected as the technique of investigation. The setting of the study, the criteria for the selection of the patients, and the gathering and scoring of the data are described.

Literature was surveyed to determine the need for this study and to discover the factors which researchers believed contribute to post-operative vomiting. Also, the rationale for the use of the tests of anxiety was reviewed.

I. METHOD OF APPROACH

Selection of Facilities

The data for the study were collected at a 170 bed university medical center hospital. The purpose and proposed method of the study were presented to the executive committee of the hospital who approved of the study and granted permission to the investigator to use the facilities of the hospital. The head of the department of anesthesia agreed to supervise the study and assist in controlling the variable factors in the administration of preoperative medication and anesthesia. The chief of surgical services sent memoranda to the surgical staff members describing the study and asking for their cooperation. The director of nursing

service agreed to permit the recovery room nurses to participate in the study by recording the vomiting activities of the selected patients. Permission was received from the director of the clinical laboratory to use the laboratory facilities to examine the blood samples of the study patients.

Criteria for the Selection of the Patients

Criteria for the selection of the patients for study were formulated partially as the result of the review of literature concerning the factors which contribute to postoperative vomiting. Patients were also required to possess certain abilities which were necessary to carry out the mechanics of the testing program.

Patients selected for the study were:

1. Men and women between twenty and seventy years old.
2. Those scheduled for abdominal surgery with a predicated anesthetic time of between one and three hours.
3. Those able to read and comprehend English.
4. Those who conducted themselves in a rational manner.

Patients who were specifically excluded from the study were:

1. Those scheduled for abdominal surgeries which often require the placement of a naso-gastric tube.
2. Those on antiemetic medications before or during surgery.
3. Those with any known endocrine disorders.
4. Those on hormone drugs such as insulin or epinephrine because of their tendency to drop the eosinophil level in a manner similar to anxiety.⁴⁰

⁴⁰William R. Best, and others, "Clinical Value of Eosinophil Counts and Eosinophil Response Tests," Journal of the American Medical Association, 151:705, February 28, 1953.

Those patients who met the above criteria were selected each evening from the surgery schedule which was posted on the afternoon before the surgery. The patient's verbal consent to participate in the study was obtained after he had been told that this was a study designed to help make the postoperative period more comfortable for the surgical patient.

II. COLLECTION OF THE DATA

The Anxiety Differential scale, heart rate, blood pressure, and blood sample for the eosinophil count were administered or taken in that order on twenty-nine selected patients on the evening before the scheduled surgery. Following surgery the vomiting activities of the patients were observed by the nurses in the recovery room for two hours after surgery.

Administration of Anxiety Tests

The Anxiety Differential scale which was given first to each patient contained fifty-three items. After the patients were carefully instructed on how to mark the scale, they were given about fifteen minutes to complete it. Instruction consisted of reading the directions on the front of the Anxiety Differential scale with the patient. The investigator observed the marking of the first one or two items by each patient to see that the patient understood the directions. No comment as to the nature of the anxiety scale was made to the patients.

With the patient in a recumbent position, an auscultory blood pressure measurement was made with a standard aneroid sphygmomanometer. Heart rate was determined by palpation of the radial artery for a period of one minute. The blood sample was withdrawn from a vein in the arm with a

twenty-two gauge needle and immediately transferred to a vial containing an ant clotting agent. The blood sample was taken to the laboratory for testing within two hours of its collection.

Observation of Vomiting Activities *

Separate sheets with the patients' names and room numbers were prepared on which the nurses in the recovery room were to record the vomiting activities of the selected patients.*

The recovery room nurses were instructed to record the number of times each patient vomited or retched during the two hour period immediately following surgery by marking each episode with a "V". The two hour period was divided into thirty minute quarters. The observers were asked to record the episode number in the appropriate time period. That is, if the patient vomited for the first time during the second half hour period, the nurse was to write "V" under episode 1, second one-half hour.

III. METHOD OF SCORING

The scoring method of each anxiety measure and vomiting pattern are described.

Anxiety Differential

The Anxiety Differential scale consisted of fifty-three items. Each item consisted of a word with a rating scale beneath it. The rating scale used two adjectives, antonyms, at opposite ends of the scale with five intermediate points between them. The patient was given an opportunity to express his feelings about the given word in the context of the

*Appendix D

two given adjectives by checking at the point on the scale which he felt was most closely associated with the word. The adjective toward which the subject tended to move indicated the level of anxiety the patient was experiencing. One end of the scale was termed highly anxious and was worth seven points while the other end, the nonanxious, was worth one point. The sum of the points scored on the scales, comprised the patient's Anxiety Differential score. The higher the total number of points, the more anxious the patient was believed to be.

Heart Rate and Systolic Blood Pressure

The numerical figures assigned to each patient denoting his heart rate and systolic blood pressure were merely the scores attained through simple clinical methods. The number of heart beats palpated at the radial artery during a one minute period was designated his heart rate.

The systolic blood pressure was obtained with the use of an aneroid sphygmomanometer and stethoscope. These instruments were used to determine the systolic blood pressure, which is a measure of the contraction phase of the heart.⁴¹ To obtain the systolic blood pressure, the sphygmomanometer cuff is normally wrapped around the upper arm. The brachial artery is then occluded by increasing the pressure in the cuff to about 200 millimeters of mercury. A stethoscope is then placed on the skin surface directly on the brachial artery which becomes superficial at the antecubital space. When the pressure in the cuff is initially released, no sounds are heard, but as the cuff pressure continues to decrease, distinct beats become audible. The point on the manometer at which the first beat is heard is the systolic blood pressure.

⁴¹ Philip Bard, Medical Physiology (eleventh edition; St. Louis: C. V. Mosby Company, 1961), p. 40.

Eosinophil Count

The blood sample obtained from each patient was examined for the number of circulating eosinophils per cubic millimeters. The Pilot's method was used and is described in Appendix E.

Vomiting Activity

The incidence and frequency of vomiting by each patient during the two hour period immediately after surgery were noted by the nurses in the recovery room. The incidence of vomiting was determined by whether or not the patient had even one episode of retching or vomiting during the specified period. The total patient group was divided into "vomiting" and "non-vomiting" groups.

Of the patients who vomited, the number of episodes of retching or vomiting were counted. This constituted the frequency of vomiting.

All the anxiety measurements along with information taken from the patient's chart concerning name, age, sex and premedication were recorded on the "Data on Testing and Surgery Sheet". The type of anesthetic given was also recorded on the sheet.

In summary, the descriptive survey type of research was used to find out if patients who were anxious preoperatively had a higher incidence and/or frequency of vomiting after surgery. The blood pressure, heart rate and eosinophil counts were taken and the Anxiety Differential scale was given to twenty-nine selected patients before surgery to determine their anxiety levels. They then were observed in the recovery room for two hours after surgery for the incidence and frequency of vomiting. The method of scoring the measurements was described.

CHAPTER IV

PRESENTATION AND ANALYSIS OF THE DATA

Those data which were obtained to discover if there is a relationship between preoperative anxiety and postoperative vomiting are presented for analysis.

The degree of anxiety experienced by each patient was determined by measuring his preoperative systolic blood pressure, heart rate, eosinophil level and Anxiety Differential score. The data were analyzed by correlating the anxiety scores with the vomiting pattern and testing for significant differences of the means of the anxiety measures.

Information concerning the sex of the patients, the kinds of abdominal surgery performed and the medications given were noted and are presented.

I. DESCRIPTION OF SUBJECTS AND VARIABLES

Of the total of twenty-nine patients who were included in the study, twenty were women and nine were men. Their age ranged from twenty-one to sixty-nine years, with a mean of forty-five years. The age range was deliberately limited to patients who were between the ages of twenty and seventy years of age since it was necessary that all the subjects be alert and literate adults who could respond adequately on the Anxiety Differential scale.

Eleven patients (37.9 per cent) of the total group exhibited some degree of emetic symptoms during the two hour period immediately following surgery. The percentage of patients vomiting in studies reported in

literature ranged from nine per cent to 75 per cent.

The sex of the subjects, type of surgery, premedications and anesthetics administered as they related to the incidence of vomiting are tabulated on Table I. Similar to reported studies, the female group had a higher incidence of vomiting than the male group.

The patients were fairly well distributed among the five categories of abdominal surgeries: hysterectomy (6), other gynecological surgery (5), herniorrhaphy (7), cholecystectomy (6) and miscellaneous (5). The highest percentage of vomiting (60 per cent) occurred in the "other gynecologic surgery" group. Those categorized in the "miscellaneous group" had the lowest vomiting rate (20 per cent). *

The premedications given were of six kinds, including three pentobarbital sodium combinations. A total of twenty-two patients received pentobarbital sodium alone or in combination with other drugs. Of these, 40.9 per cent experienced some emetic symptoms. Of the total of eleven patients who vomited after surgery in this study, nine received pentobarbital sodium as a preoperative medication. Two of the four patients receiving secobarbital sodium preoperatively experienced postoperative vomiting. Of the three patients who received phenobarbital or diazepam (Valium), none experienced vomiting. Cyclopropane itself or in combination with other anesthetics was administered to twenty-three of the twenty-nine patients. Of these, eight or 34 per cent experienced postoperative vomiting. Nitrous oxide and fluothane combination, the only other anesthetic given produced a 50 per cent vomiting rate.

Of the eleven patients who vomited after surgery, nine vomited at least once during the first half hour. Six of the eleven patients vomited only once during the two hour period, while three vomited twice, and one each vomited four and five times. *

TABLE I
INCIDENCE OF VOMITING ACCORDING TO PROCEDURAL AND PATIENT CHARACTERISTICS

Factors	Vomited	Did not vomit	Total	Percentage vomiting
<u>Surgery, types of</u>				
Hysterectomy	2	4	6	33.3
Gynecologic	3	2	5	60.0
Herniorrhaphy	3	4	7	42.5
Cholecystectomy	2	4	6	33.3
Miscellaneous	1	4	5	20.0
<u>Premedications</u>				
Pentobarbital sodium	5	6	11	45.0
Pentobarbital sodium & Neperidine	3	5	8	37.5
Pentobarbital sodium & HNC	1	2	3	33.3
Secobarbital sodium & HNC	2	2	4	50.0
Diazepam	0	2	2	0
Phenobarbital	0	1	1	0
Pentobarbital - all combinations	9	13	22	40.9
<u>Anesthetics</u>				
C ₃ H ₆	4	9	13	30.7
C ₃ H ₆ - N ₂ O	2	3	5	40.0
C ₃ H ₆ - Penthrane	1	0	1	100.0
C ₃ H ₆ - N ₂ O - Penthrane	1	1	2	50.0
N ₂ O - fluothane	3	3	6	50.0
C ₃ H ₆ - N ₂ O - fluothane	0	2	2	0
C ₃ H ₆ - all combinations	8	15	23	34.0
<u>Sex</u>				
Male	3	6	9	33.3
Female	8	12	20	40.0

APPENDIX A

January 12, 1964

Mrs. Helen Austin
Director of Nursing Service
Loma Linda Sanitarium and Hospital
Loma Linda, California

Dear Mrs. Austin,

As part of the requirements for a master's degree in nursing at Loma Linda University, the graduate students conduct a research study into a problem concerning the improvement of patient care. Vomiting, which is a frequent aftermath of surgery, is a distressing problem not only to the patient, but to the medical and nursing staff. My research study is an investigation into the possible relationship which may exist between preoperative stress and postoperative vomiting.

With your permission, patients will be tested for stress on the evening before surgery, and again before their discharge from the hospital. The recovery room nurses will be asked to observe the vomiting activity of the selected patients and record their observations on a simple check sheet. I do not believe this will appreciably detract from the normal activity and time of the recovery room nursing staff. It is our desire that one hundred patients will constitute this study group, and it is estimated that it will require approximately ten weeks to obtain that number.

The executive committee has given me their permission to conduct this research study. May I have the permission and cooperation of nursing service in this study? The advisors to my study are: Miss Lucile Lewis, Dr. Deryck Kent, and Dr. Bernard Briggs. If you wish, at the conclusion of this study, a report of the findings will be sent to you.

Very sincerely,

Grace Emori

Because of the large number of factors involved with such a small number of subjects, further analysis was difficult and probably meaningless.

II. ANALYSIS OF THE DATA

The means and standard deviations of the preoperative systolic blood pressure, heart rate, eosinophil count and Anxiety Differential measures for the entire group were computed. The mean values and standard deviations for the vomiting and non-vomiting groups on each of these measures were calculated. The t test was run between the mean values of the vomiting and non-vomiting groups on each of the measures and correlations were computed between the anxiety measuring devices and the incidence of vomiting. Intercorrelations of all the measures of anxiety were also computed.

Analysis of Mean Values

On Table II, a comparison of the physiologic mean values of those scored by the patients in this study and accepted mean norms are shown.

TABLE II
COMPARISON OF PHYSIOLOGIC MEANS WITH NORMS

Physiologic Tests	Study Means	Accepted Norm
Systolic blood pressure	124 mm of mercury	120 mm of mercury
Heart Rate	72 beats per minute	72 beats per minute
Eosinophil count	244 mm ³	150-300 mm ³

The systolic blood pressure was only four millimeters of mercury above the accepted norm, while the mean heart rate of the study patients and the accepted norm was identical (72 beats per minute). The eosinophil

count of 244 per cubic millimeters fell within the accepted norm range.

The means and standard deviations of the anxiety scores of the total group as well as the scores of the vomiting and non-vomiting groups were computed and are found on Table III. The mean systolic blood pressures of the vomiting, non-vomiting and total groups were 124 millimeters of mercury. The standard deviations for the groups were 16, 19, and 18 respectively. The mean eosinophil counts for the vomiting and non-vomiting groups were 216 per cubic millimeters and 262 per cubic millimeters respectively, while the total mean score was 244 per cubic millimeters.

TABLE III
MEANS AND STANDARD DEVIATIONS FOR TOTAL AND SUBGROUPS

	Vomiting	Non-Vomiting	Total
Systolic Blood Pressure			
Mean	124	124	124
S.D.	16	19	18
Eosinophil Count			
Mean	216	262	244
S.D.	119	249	210
Anxiety Differential			
Mean	196	185	192
S.D.	13	28	21
Heart Rate			
Mean	75	77	76
S.D.	6.7	11	9

The standard deviations of the eosinophil counts showed the greatest variation. The standard deviations of the vomiting, non-vomiting and total groups were 119, 249, and 210 respectively. The mean heart rates for each group, vomiting, non-vomiting and total, were 75, 77, and 76 per minute and

the standard deviations were 6.7, 11, and 9 in that order. The mean scores achieved on the Anxiety Differential by the vomiting, non-vomiting and total groups respectively were 196, 185, and 192 and 13, 28, and 21 were their standard deviations.

The t tests calculated from the means of each of the anxiety measures for the vomiting and non-vomiting groups indicated that there was no significant difference between the two groups for any of the measures. The t value for the heart rate, systolic blood pressure, eosinophil count and Anxiety Differential was .17, 0, .007, and 1.4 respectively. These figures are noted on Table IV. It was felt that a five per cent level of significant difference was adequate for a study which used physiologic measures. While not significant at the five per cent level, the Anxiety Differential (t 1.4 with 27 d. f.) tended to suggest a difference.

TABLE IV
PROBABILITY OF SIGNIFICANCE OF ANXIETY SCORE MEANS
OF VOMITING AND NON-VOMITING GROUPS

	t-value	Significant at 5% level
Anxiety Differential	1.4	no
Heart Rate	.17	no
Systolic Blood Pressure	0	no
Eosinophil Count	.007	no

Analysis of Correlations

The heart rate, systolic blood pressure, eosinophil count and Anxiety Differential were correlated individually with the incidence and frequency of vomiting. It was hypothesized that the patients who scored

high on either the heart rate, systolic blood pressure, Anxiety Differential or low on the eosinophil count would have a higher incidence or frequency of vomiting than those whose scores were in the opposite direction. This did not prove to be so. With 27 degrees of freedom, the r must be .367 or greater to reach the five per cent level of significance. The correlation coefficients of each measure in relation to the incidence and frequency of vomiting are noted on Table V.

Systolic blood pressure. The correlation coefficients between the incidence of vomiting and preoperative systolic blood pressure was $-.00$ while the frequency of vomiting had a correlation coefficient of $.13$ with the blood pressure. These low correlation coefficients demonstrated that the preoperative systolic blood pressure of the patients in this study was a poor indicator of the incidence and frequency of vomiting that would be expected.

Heart rate. Correlation coefficients of $-.07$ and $.11$ was found as the relation between the incidence and frequency of vomiting respectively and the preoperative heart rate. These coefficients also were insignificant indicating that as the heart rate scores increased, there was no consistent pattern as to an increased or decreased incidence or frequency of vomiting.

Eosinophil count. The correlation coefficients of the incidence of vomiting and the eosinophil count was $-.10$. The frequency of vomiting and the eosinophil count was correlated at $-.01$. The low negative coefficients indicated that there was no association between a low eosinophil count and the incidence and frequency of postoperative vomiting.

Anxiety Differential. The relationship between the Anxiety Differential preoperative scores and the incidence and frequency of vomiting were correlated at $-.26$ and $-.10$ respectively. These negative coefficients indicated an inverse relationship between Anxiety Differential scores and the incidence and frequency of vomiting. These coefficients also were too small to be significant.

TABLE V
CORRELATION COEFFICIENTS OF ANXIETY SCORES AND VOMITING PATTERN

	Incidence	Frequency
Anxiety Differential	$-.26$	$-.10$
Heart Rate	$-.07$	$.11$
Systolic Blood Pressure	$-.00$	$.13$
Eosinophil Count	$-.10$	$-.01$

Degrees of freedom -27
Significant at 5% level -r of .367

Not only were the coefficient correlations found to be insignificant, four of the six correlations which were expected to be positively correlated with the incidence and frequency of vomiting did not show this relationship. Negative correlations on the order of $-.26$, $-.07$, and $-.00$ were found to express the relationship between the incidence of vomiting and the Anxiety Differential, heart rate, and systolic blood pressure. A coefficient of $-.10$ between the Anxiety Differential score and the frequency of vomiting was also contrary to the expected positive relationship. The negative correlation of $-.10$ and $-.01$ between the eosinophil count and the incidence and frequency of vomiting respectively,

and the .11 and .13 coefficients between the frequency of vomiting and the heart rate and systolic blood pressure demonstrated the expected directional relationship though not significant.

Intercorrelations of the four measures of anxiety showed no consistent pattern (see Table VI). The r between the blood pressure and heart rate, eosinophil count and Anxiety Differential score was .22, .18 and .17 respectively. The r between heart rate and the eosinophil count and Anxiety Differential was .02 and $-.07$ in that order. The coefficient correlation of the eosinophil count and the Anxiety Differential was $-.08$. While

TABLE VI
INTERCORRELATIONS OF ANXIETY MEASURES

	Systolic Blood Pressure	Heart Rate	Eosinophil Count	Anxiety Differential
Systolic Blood Pressure	--	.22	.18	.17
Heart Rate		--	.02	$-.07$
Eosinophil Count			--	$-.08$
Anxiety Differential				--

Degrees of freedom -27

Significant at 5% level - r of .367

the lack of significant correlation was consistent with the results of previous studies, it was disappointing that some degree of relationship was not demonstrated.

In summary, as the result of the analysis of the data, there was no evidence that preoperative anxiety as measured by the selected tests, was a contributing factor in the incidence and frequency of vomiting. The t test demonstrated that there was no significant difference between the scores attained by the vomiting and non-vomiting groups on any of the measures. The correlation coefficients between the incidence and frequency of vomiting and the anxiety measurement scores showed that there was little or no relationship.

CHAPTER V

DISCUSSION OF FINDINGS AND RECOMMENDATIONS

It was hypothesized that the higher the preoperative heart rate, systolic blood pressure and Anxiety Differential scores and lower the eosinophil count, the greater would be the chance of postoperative vomiting. Since there was evidence in literature that a high systolic blood pressure, heart rate and Anxiety Differential and low eosinophil count were indicative of anxiety, it was also hypothesized that the patients with high preoperative anxiety would have a greater chance of vomiting after surgery than the patients who were less anxious. Therefore, the two problems of primary concern in the analysis of the anxiety scores and their relationship to vomiting were: (1) was there a significant difference between the anxiety measurement means of the vomiting and non-vomiting groups and (2) was there a relationship between high anxiety tests scores and a high incidence or frequency of vomiting postoperatively?

The results indicated that the mean scores on the anxiety measuring devices between the vomiting and non-vomiting groups were not significantly different. Also, the correlation coefficients between the high systolic blood pressure, heart rate, Anxiety Differential and low eosinophil count with a high frequency of vomiting were low. Therefore the subhypotheses were rejected. The patients with higher preoperative systolic blood pressures, heart rates, and Anxiety Differential scores did not have a higher incidence or frequency of vomiting than those patients scoring low on these measures. Inversely, the patients having a

low number of circulating eosinophils did not have a higher incidence or frequency of vomiting than those with higher eosinophil counts.

Because high systolic blood pressure, heart rate and Anxiety Differential scores and low eosinophil count were equated with high anxiety, the main hypothesis that the higher the anxiety, the greater the chance of postoperative vomiting, must also be rejected.

Use of the systolic blood pressure, heart rate, eosinophil count and Anxiety Differential in previous studies as measuring devices for anxiety have been found to be moderately reliable. Also, there was evidence in the literature that postoperative vomiting was related to anxiety. If these tests did measure anxiety, why then did the scores not correlate with the expected incidence or frequency of postoperative vomiting? And, if the tests all measured anxiety, why then did they not consistently indicate the same degree of anxiety in all the tested patients?

Other studies have reported low statistically significant coefficients between the physiologic measures of anxiety. This has been explained on the belief that all people do not react to the same stimulus in the same manner. That is, a given anxiety stimulus may cause one person to develop tachycardia while another reacts by becoming restless. However, low correlation coefficients do not give reason for complete abandonment of these measures for estimating anxiety. Under certain circumstances not yet established, a correlation may become evident.

The large number of factors which have been found to contribute to the incidence of vomiting made the control of all of the variables difficult. In an attempt to control the major variables, only patients who were to undergo abdominal surgery other than gastric and intestinal surgery, with an estimated surgery length of no more than three hours were

selected for the study. Within the category of abdominal surgery were a variety of surgeries including herniorrhaphy, cholecystectomy, hysterectomy, gynecological, and other miscellaneous procedures. Each of these surgeries introduced new variables such as the types of premedications and anesthetics administered. The type of surgery and depth of anesthesia required for a smooth procedure often determines the premedication and anesthetic used. Also, there was greater handling of the viscera in certain types of surgery than in others, which may cause greater irritation of the gastrointestinal tract. These variables may have obscured the role of anxiety as a causative factor in the incidence and frequency of vomiting.

In using the four anxiety testing devices, it was originally planned to obtain both presurgical and postsurgical scores. The presurgical scores were to be taken at the time when the anxiety would be deemed the most severe and while testing was still feasible. The same tests were to be repeated postoperatively on the evening before the patient's discharge from the hospital. It was thought that this would be the most optimal time to obtain the patient's baseline score. The figure obtained by subtracting the presurgical score from the postsurgical score would be regarded as the index of the level of anxiety. This plan, however, did not materialize. Because patients were often discharged without sufficient notice to the investigator, not enough patients were retested to constitute an adequate sample. Therefore, the patient's anxiety level was determined by his preoperative scores alone. Because all patients do not have the same normal level on all the measurements, the presurgical score was probably not a true estimate of his anxiety level. The blood pressure measure was an example of this inaccuracy. Patients who may not have been anxious may have been rated excessively anxious due to a previously existing hypertensive state.

A more accurate indication of each patient's systolic blood pressure and heart rate perhaps could have been obtained by using the average value of a number of recordings which would be taken over a one or two hour period. However, the difficulty in using this method lay in the fact that the evening before surgery usually was a very busy period for the patients. Physical examinations, surgical preparation and visitors made great demands upon the patient's time. To expect to find a one or two hour period of the patient's time which would be devoted exclusively to testing would have been unrealistic.

Greater accuracy in obtaining the systolic blood pressure and heart rate should perhaps have been obtained with the use of more sophisticated instruments than auscultation of the brachial artery with a stethoscope and aneroid sphygmomanometer and palpation of the radial artery respectively. Polygraphs and electrocardiograms have been used in other studies to obtain the same measures, but the physical limitations of this study made the use of such instruments prohibitive.

The use of the eosinophil count as an anxiety measuring device raised some very definite problems. The level of circulating eosinophils depends to a large extent on a variety of conditions. Certain drugs such as epinephrine and insulin and certain physical conditions such as infections and allergies cause marked alterations of the eosinophil level. Although the patients were carefully evaluated prior to testing for anxiety, latent infections and allergies may have been undetected. Thus, an eosinopenia could have been attributed to the patient's anxiety state, while in actuality, it may have been the result of a physical condition.

The use of the eosinophil count also more than any other testing device reduced the number of patients who could be included in the study.

Since the eosinophil level was affected by so many factors, many patients who would otherwise have been eligible for study had to be eliminated.

Because of the cost of delegating the responsibility of eosinophil counts of the patients to the clinical laboratory would have been excessive, the investigator performed the test using the clinical laboratory equipment. This however, was extremely time consuming. Also, although the medical technicians were extremely helpful in teaching and supervising the investigator in the technique of counting eosinophils by the Pilot's method, the accuracy of counts performed by a novice was questionable.

In light of this discussion, the following recommendations were made. It was suggested:

1. That a study using the same methods not be attempted by a lone investigator.
2. That no more than one or two of the anxiety measuring devices be used at a time in a similar study attempted by one investigator.
3. That the eosinophil count not be used on ill patients to test anxiety since changes in the eosinophil count occur in the presence of many diseases and medications.
4. That a large group of patients be studied in a similar study.
5. That another study using other anxiety measuring devices be conducted.
6. That a similar study in which the observation period for vomiting be extended beyond two hours be conducted.
7. That a study using preoperative, postoperative and difference scores on the anxiety measures be conducted.

Undoubtedly there are many reasons why the results of the study did not meet expectations. Some were subtle, others were obvious flaws which

in retrospect become clearer. It is the belief of this investigator that one must begin somewhere in the search for what is true, and as the result of her mistakes and the above recommendations, it was hoped that further studies using refined methods would eventually clarify the relationship between preoperative anxiety and postoperative vomiting.

A discussion of the findings of the study and the methods used to gather them were presented to find out why the results of this study did not demonstrate a relationship between anxiety and postoperative vomiting. The large number of variables which obscured the role of anxiety in the incidence and frequency of vomiting and the difficulty of obtaining a true measurement of anxiety perhaps more than any other factors were responsible for the inconclusive findings.

CHAPTER VI

SUMMARY OF THE STUDY

Vomiting is a postoperative problem which is not only uncomfortable for the patient, but often complicates the course of recovery. Control or elimination of the problem must first be preceded by identification of its causes. Certain conditions and factors have been found to be associated with the incidence of vomiting after surgery. The type of surgery, sex and age of the patient, length of surgery, and premedication and anesthetic administered were given major consideration by previous investigators as contributing to postoperative vomiting. Emotional distress as a causative factor was given little consideration in all but one study reported in literature. This study, however, did not attempt to directly measure the amount of emotional distress being experienced by each patient. Rather it studied the effect of nursing intervention in the relief of preoperative emotional distress thus decreasing the incidence of vomiting. Various other studies gave slight mention of the possible role of anxiety in the incidence of postoperative vomiting, however, they did not give it direct study.

The problem of this study was to measure the anxiety level of patients scheduled for surgery and then observe their vomiting activities after surgery. It was hypothesized that patients with a high degree of anxiety would have a greater chance of vomiting after surgery than patients with a low degree of anxiety.

Systolic blood pressure, heart rate, eosinophil count and Anxiety Differential scale were selected as the measuring devices to determine

each patient's level of anxiety. Subhypotheses that the higher the pre-operative blood pressure, heart rate or Anxiety Differential, or lower the eosinophil count, the greater would be the chance of postoperative vomiting were made to support the main hypothesis.

On the evening before their surgery, the four anxiety measuring devices were administered to twenty-nine consenting adult patients who were scheduled for abdominal surgery, other than gastrointestinal surgery. Other criteria the patients were required to meet were: literacy, rationality, and freedom from infectious and endocrine disorders. These were necessary in order to control some of the major variables and insure proper functioning of the anxiety measures.

Each of the selected patients were observed for two hours immediately following surgery for incidence and frequency of vomiting.

These data were analyzed to find out if there was a relationship between anxiety and postoperative vomiting by computing the correlations on each of the anxiety scores with the incidence and frequency of vomiting. All the coefficients were found to be too small to be significant.

The t tests on the mean anxiety test scores of the vomiting and non-vomiting groups demonstrated that there was little difference between the scores attained by each group.

On the basis of the analysis of the findings, the patients who were more anxious did not have a higher incidence or frequency of vomiting. That is, high anxiety as measured by high systolic blood pressures, heart rates, Anxiety Differential scores, or low eosinophil counts were not associated with a higher incidence or frequency of vomiting.

The methods utilized in the study were discussed to discover why the findings were contrary to the expected. The major problems appeared

to be the difficulty in obtaining a true measurement of anxiety and the large number of uncontrolled variables.

Among others, it was recommended that the search for more evidence of the relationship between anxiety and postoperative vomiting be continued with refinements in the method of research.

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Amended
FEDERAL
CONDITIONS FOR
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APPENDIXES

APPENDIX A

January 12, 1964

Mrs. Helen Austin
Director of Nursing Service
Loma Linda Sanitarium and Hospital
Loma Linda, California

Dear Mrs. Austin,

As part of the requirements for a master's degree in nursing at Loma Linda University, the graduate students conduct a research study into a problem concerning the improvement of patient care. Vomiting, which is a frequent aftermath of surgery, is a distressing problem not only to the patient, but to the medical and nursing staff. My research study is an investigation into the possible relationship which may exist between preoperative stress and postoperative vomiting.

With your permission, patients will be tested for stress on the evening before surgery, and again before their discharge from the hospital. The recovery room nurses will be asked to observe the vomiting activity of the selected patients and record their observations on a simple check sheet. I do not believe this will appreciably detract from the normal activity and time of the recovery room nursing staff. It is our desire that one hundred patients will constitute this study group, and it is estimated that it will require approximately ten weeks to obtain that number.

The executive committee has given me their permission to conduct this research study. May I have the permission and cooperation of nursing service in this study? The advisors to my study are: Miss Lucile Lewis, Dr. Deryck Kent, and Dr. Bernard Briggs. If you wish, at the conclusion of this study, a report of the findings will be sent to you.

Very sincerely,

Grace Emori

APPENDIX B

Name _____

You are being asked to participate in a study of word meanings. The object of the study is to find out how you like to describe different kinds of persons and things.

On each of the following pages there will be a number of persons or things in the middle of the page. Under each of these there is a pair of adjectives. Here is an example.

MONEY

good _____:_____:_____:_____:_____:_____ bad

Each pair of adjectives forms a scale. By making a check-mark along the scale you can indicate what you associate with the particular kind of person or thing that is listed right above the scale. For example, if you feel that the thing or person named right above the scale is very closely associated with one end of the scale, you would place a check-mark as follows:

MONEY MONEY
good :_____:_____:_____:_____:_____ bad OR good _____:_____:_____:_____:_____:_____ bad

If you feel that the person or thing is quite closely related to one or the other end of the scale, you would place your check as follows:

MONEY MONEY
good _____: :_____:_____:_____:_____ bad good _____:_____:_____:_____:_____:_____ bad

If the thing or person seems only slightly related to one side as opposed to the other, you might check as follows:

MONEY MONEY
good _____:_____: :_____:_____:_____ bad OR good _____:_____:_____:_____:_____:_____ bad

If you considered both sides equally associated you would check the middle space on the scale

MONEY

good _____:_____:_____: :_____:_____:_____ bad

Remember: Never put more than one check-mark on any scale. And also be sure to check every item. If you feel that a pair of adjectives does not apply, or if you are undecided, place the check-mark in the center space. Do not leave the line blank.

Do not spend more than a few seconds marking each scale. Your first impression is what we would like to learn about.

-- NOW TURN THE PAGE AND BEGIN WORKING --

SCREW

loose _____ : _____ : _____ : _____ : _____ : _____ : _____ tight

DIRT

here _____ : _____ : _____ : _____ : _____ : _____ : _____ there

ME

clear _____ : _____ : _____ : _____ : _____ : _____ : _____ hazy

SWEAT

large _____ : _____ : _____ : _____ : _____ : _____ : _____ small

DIRT

deep _____ : _____ : _____ : _____ : _____ : _____ : _____ shallow

HANDS

wet _____ : _____ : _____ : _____ : _____ : _____ : _____ dry

CHURCH

tense _____ : _____ : _____ : _____ : _____ : _____ : _____ relaxed

MOVIES

loose _____ : _____ : _____ : _____ : _____ : _____ : _____ tight

MOTHER

strong _____ : _____ : _____ : _____ : _____ : _____ : _____ weak

DIRT

strong _____ : _____ : _____ : _____ : _____ : _____ : _____ weak

DREAMS

near _____ : _____ : _____ : _____ : _____ : _____ : _____ far

HANDS

good _____ : _____ : _____ : _____ : _____ : _____ : _____ bad

ME

calm _____ : _____ : _____ : _____ : _____ : _____ : _____ jittery

BREATHING

hot _____ : _____ : _____ : _____ : _____ : _____ : _____ cold

HANDS

tight _____ : _____ : _____ : _____ : _____ : _____ : _____ loose

ME

helpless _____ : _____ : _____ : _____ : _____ : _____ : _____ secure

FINGERS

tight _____ : _____ : _____ : _____ : _____ : _____ : _____ loose

MOVIES

cold _____ : _____ : _____ : _____ : _____ : _____ : _____ hot

SEX

active _____ : _____ : _____ : _____ : _____ : _____ : _____ passive

HEAT

far _____ : _____ : _____ : _____ : _____ : _____ : _____ near

MOTHER

loose _____ : _____ : _____ : _____ : _____ : _____ : _____ tight

SWEAT

weak _____ : _____ : _____ : _____ : _____ : _____ : _____ strong

BREATHING

clear _____ : _____ : _____ : _____ : _____ : _____ : _____ hazy

SCREW

strong _____ : _____ : _____ : _____ : _____ : _____ : _____ weak

HEAT

uneasy ___ : ___ : ___ : ___ : ___ : ___ : ___ still

LITTLE BOYS

safe ___ : ___ : ___ : ___ : ___ : ___ : ___ dangerous

CHURCH

far ___ : ___ : ___ : ___ : ___ : ___ : ___ near

SEX

near ___ : ___ : ___ : ___ : ___ : ___ : ___ far

FINGERS

straight ___ : ___ : ___ : ___ : ___ : ___ : ___ twisted

ME

dry ___ : ___ : ___ : ___ : ___ : ___ : ___ wet

GUT

tight ___ : ___ : ___ : ___ : ___ : ___ : ___ loose

FATHER

tense ___ : ___ : ___ : ___ : ___ : ___ : ___ relaxed

EYES

large ___ : ___ : ___ : ___ : ___ : ___ : ___ small

DREAMS

loose ___ : ___ : ___ : ___ : ___ : ___ : ___ tight

MOVIES

wet ___ : ___ : ___ : ___ : ___ : ___ : ___ dry

ME

worried ___ : ___ : ___ : ___ : ___ : ___ : ___ anxious

DREAMS

57

relaxed _____ : _____ : _____ : _____ : _____ : _____ : _____ restless

MOTHER

cold _____ : _____ : _____ : _____ : _____ : _____ : _____ hot

EYES

quiet _____ : _____ : _____ : _____ : _____ : _____ : _____ restless

TONGUE

large _____ : _____ : _____ : _____ : _____ : _____ : _____ small

YESTERDAY

tight _____ : _____ : _____ : _____ : _____ : _____ : _____ loose

TONGUE

sharp _____ : _____ : _____ : _____ : _____ : _____ : _____ blunt

TROUBLE

here _____ : _____ : _____ : _____ : _____ : _____ : _____ there

MY MIND

straight _____ : _____ : _____ : _____ : _____ : _____ : _____ curved

TODAY

curved _____ : _____ : _____ : _____ : _____ : _____ : _____ straight

GUT

empty _____ : _____ : _____ : _____ : _____ : _____ : _____ full

SCREW

nice _____ : _____ : _____ : _____ : _____ : _____ : _____ awful

MY MIND

loose _____ : _____ : _____ : _____ : _____ : _____ : _____ tight

SWEAT

near _____ : _____ : _____ : _____ : _____ : _____ : _____ far

GERMS

deep _____ : _____ : _____ : _____ : _____ : _____ : _____ shallow

BREATHING

careful _____ : _____ : _____ : _____ : _____ : _____ : _____ care free

FINGERS

stiff _____ : _____ : _____ : _____ : _____ : _____ : _____ relaxed

ME

frightened _____ : _____ : _____ : _____ : _____ : _____ : _____ fearless

APPENDIX C

DATA ON TESTING AND SURGERY

Name _____ Surgery _____
 Room number _____ _____
 Age _____ Date of Surgery _____
 Sex _____ Premedication _____

 Date Pre-test _____ Anesthetic _____

	Pre-test	Post-test	Difference
Alexander-Husek Scale			
Pulse Rate			
Blood Pressure			
Eosinophil Count			

APPENDIX D

OBSERVATIONS IN THE RECOVERY ROOM

Date _____

Name _____

Room Number _____

	episode 1	2	3	4	5	6
First $\frac{1}{2}$ hour						
Second $\frac{1}{2}$ hour						
Third $\frac{1}{2}$ hour						
Fourth $\frac{1}{2}$ hour						

Directions: In the appropriate square, for each complete episode write:

"v" if the patient retches or vomits.

Example: If the patient vomits for the first time during the second half hour after the discontinuation of the anesthetic, write "v" in the square under episode 1, second $\frac{1}{2}$ hour.

Definition: Vomiting:

The forceful expulsion of the gastrointestinal contents through the mouth. Including, retching, which is the labored rhythmic activity of the patient suggestive of vomiting, without producing gastrointestinal contents.

APPENDIX E

PILOT'S SOLUTION AND METHOD*

Pilot's Stain contains 50 milliliters of propylene glycol, 50 milliliters of distilled water, 10 milliliters of one per cent phloxine in water (stock solution) and 1 milliliter of ten per cent sodium carbonate in water (stock solution).

Pilot's Method of counting eosinophils is as follows: Fill two leucocyte pipets to 1 mark with blood. Fill to 11 mark with stain. Shake thirty seconds. Allow fifteen minutes for proper lysing. Shake pipet one more time for thirty seconds before filling chambers. Fill four chambers of Spencer's A/O hemocytometer with each pipet. Count all nine squares of each chamber. The average count per chamber times 11.1 equals the number of eosinophils per cubic millimeter.

*Martin L. Pilot, "Use of Base in Fluids for Counting Eosinophils," American Journal of Clinical Pathology, 20:870-871, Sept. 1950.

LOMA LINDA UNIVERSITY

Graduate School

A STUDY OF THE RELATIONSHIP BETWEEN PREOPERATIVE
ANXIETY AND POSTOPERATIVE VOMITING

by

Taye Grace Eaori

An Abstract of a Thesis
in Partial Fulfillment of the Requirements
for the Degree Master of Science
in the Field of Nursing

September 1965

ABSTRACT

The identification of anxiety as a causative factor in post-operative vomiting was the purpose of this study. It was hypothesized that the more anxiety a patient experienced before surgery, the greater would be his chances of vomiting immediately after surgery.

The establishment of an underlying basis and need for a study of the relationship of anxiety and postoperative vomiting were made through a review of literature. The factors which researchers believed were contributory to postoperative vomiting and the possible inclusion of anxiety as one of them were studied.

Three physiologic measures (systolic blood pressure, heart rate, and eosinophil count) and one psychologic measure (Anxiety Differential Scale) were selected to determine each patient's anxiety level. Sub-hypotheses that the higher the preoperative systolic blood pressure, heart rate, or Anxiety Differential score, or lower the eosinophil count, the greater would be the chances of postoperative vomiting were made to support the main hypothesis.

Twenty-nine patients between the ages of twenty and seventy years old undergoing abdominal surgery were selected for study. The anxiety measurements were administered on the evening before surgery. These same patients were observed in the recovery room for two hours immediately following surgery for the incidence and frequency of vomiting.

The scores on each of the measures were correlated with the incidence and frequency of vomiting. Correlation coefficients in the order of $-.100$, $-.07$, $-.10$ and $-.26$ of the relationship of the preoperative

systolic blood pressure, heart rate, eosinophil count and Anxiety Differential scores and the incidence of vomiting were found. In the same order, the anxiety measures and the frequency of vomiting coefficient correlations were .13, .11, -.01, and -.10. None of the correlation coefficients attained the .367 coefficient required to attain the five per cent level of significance.

The t tests of the mean anxiety scores to find out if there was a significant difference between the mean scores attained by the vomiting and non-vomiting groups indicated that there was little or no difference.

As the result of the findings of this study, the main subhypotheses were rejected. High preoperative systolic blood pressure, heart rate or Anxiety Differential score, or low eosinophil count were not associated with a higher incidence or frequency of postoperative vomiting.

Because the findings did not show a consistent pattern, the methods and problems of conducting the study were discussed. Difficulty in determining the true level of anxiety and the large number of uncontrolled variables were thought to be the major factors which made the findings inconclusive.