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AN EVALUATION OF THE EFFECTIVENESS OF STUDYING ONE'S PHYSIOLOGICAL REACTIONS TO SURGICAL SCENES AS A PREPARATION OF MEDICAL STUDENTS TO SURGICAL EXPERIENCES

By

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ABSTRACT

AN EVALUATION OF THE EFFECTIVENESS OF STUDYING ONE'S PHYSIOLOGICAL REACTIONS TO SURGICAL SCENES AS A PREPARATION OF MEDICAL STUDENTS TO SURGICAL EXPERIENCES

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Coppola and Cochran (1979) reported that medical students were apprehensive about surgical procedures and that some students had strong physiological and psychological reactions to observing operations. Their study provided the impetus for this research which exposed medical students to a series of vignettes showing surgical operations and interpersonal stress situations that occur in the operating room while at the same time student's heart rate, respiration and sweat rate were recorded. This information, together with a video recording of the student's face and reflected image of each vignette, was replayed in the presence of a person who was trained to review such material using the inquirer role of the Interpersonal Recall (IPR) method developed by Kagan (1975). Forty-eight students from a college of allopathic medicine and a college of osteopathic medicine volunteered to participate in the project during Summer 1979. The students

were matched according to training, experience in surgery and the type of medical course. Twenty-four pairs were randomly assigned to either treatment or control group. The treatment group were given two two-hour sessions in which they were exposed to the procedures outlined above. Between sessions students were encouraged to write a "theory of self" in light of what they discovered about themselves during the treatment process. Both treatment and control group pairs then observed a surgical operation at local hospitals. Upon conclusion of the operation each student was asked to complete a questionnaire which purported to assess the apprehension of the student to surgical procedures (ASPQ Form c) as well as a test assessing learning in the operating room (Operating Room Experience). It was hypothesized that the treatment group would be less anxious about the experience in the operating room than would be the control group who were not treated. Further, it was hypothesized that the treatment group would perform better on a test designed to assess learning in the operating room, than would the control group. Neither hypothesis was supported.

A replication of the study is recommended. In such a study attention needs to be given to the selection of students who have not had any surgical experience as well as the developing of a more realistic vignettes. More treatment time is also desirable.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

INTRODUCTION

Purpose

The purpose of this study was to assess the effectiveness of one aspect of the Interpersonal Recall (I.P.R.) method, as developed by Kagan (1979), for enabling medical students to learn from their surgical clerkship more effectively and with less stress.

Definition of Terms

Interpersonal Process Recall is a videotape stimulated recall method used on it to facilitate understanding for the medical students of their physiological and interpersonal responses to surgical scenes.

Physiological reactions include the recorded heart rate, electrical skin conductance and respiration rate of medical students.

Surgical vignettes are videotaped scenes of actual operations and of roleplayed interpersonal stress situations which could occur in the operating room. The interpersonal vignettes are often exaggerated for effect.

Delimitations

1. The study used volunteers which may have limited the generalizability of the results (Tuckman, 1972). It was not possible to demand participation and even if it were, problems associated with compulsory compliance of students could have resulted.

2. Practical and technical consideration precluded the monitoring of the students' physiological responses in the operating room.

3. Simultaneous scheduling of operations made it impossible for the author to be present at every operation. Another male doctoral student substituted for the author when this was necessary. To minimize variance in interpersonal interaction the author and the male doctoral student used a standardized procedure in meeting and monitoring students throughout the operating room.

4. Limitations of time and money prevented the making of better quality vignettes with a greater variety of operations. Those students who operated the equipment in the laboratory and those who acted as inquirers were paid for their services by funds from a National Institute of Mental Health Grant (N.I.M.H.)*

5. No attempt was made to follow up students to see how many actually chose additional surgical clerkship or entered surgery as a career.

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*Grant #5T24NH15473-02

Basic Assumptions

I. It is desirable to reduce medical students' anxiety about surgery and interpersonal stress that occurs in the operating room.

II. The Operating Room Experience (O.R.E.) questionnaire accurately measured what students observed and learned in the operating room.

III. The Apprehension to Surgical Procedures Questionnaire (A.S.P.Q. Form c) accurately measured students' anxiety towards surgical stimuli immediately following the operation.

IV. Medical students at Michigan State University were relatively typical of medical students throughout the United States of America.

Incidence of the Problem

The impetus for this research into the process of learning of medical students during surgery came from a study performed by Coppola and Cochran (1979) and in discussions between the author with Coppola and Kagan, they noticed, over a period of time, that medical students tend to be frightened by, or apprehensive about observing, assisting at, or performing surgical procedures. It occurred to them that such strong physiological and psychological reactions of students to operations might seriously affect the process of learning in surgery and have far-reaching effects beyond the clerkship as well. A questionnaire was developed which

consisted of open-ended questions about reactions of students to observing or assisting at operations and also included a checklist of surgical stimuli (Appendix A). When administered to 72 students in the surgical clerkship, it was found that 30% indicated they had experienced some sensitivity to surgical procedures and up to 64% indicated they were bothered by certain common stimuli during surgical procedures. Responses were compared before and after clerkship, and they indicated that the experience of clerkship itself did not greatly alter these initial reactions. The percentages indicated greater sensitivity and reactions to specific stimuli remained the same.

Using these preliminary results and an analogous argument that the army doesn't send fresh recruits into battle without previous training, Coppola and Cochran suggested that some type of training program be developed. Kagan and his colleagues, under sponsorship of the National Institute of Mental Health (N.I.M.H. 5T24NH 15473-02), were experimenting with procedures which appeared to have potential to become the program suggested by the conclusions of Coppola and Cochran.

The Need

It seemed that, given the observations of Coppola, Cochran and current research conducted by Kagan, that a fertile field of investigation was present, but it was assumed that previous work by medical educators would have explored this area thoroughly. However, after an extensive

computer-based search of related literature, using the Medical Literature Analysis and Retrieval System (MEDLARS) and the Educational Resources Information Center (ERIC), it was found that no research had been published in this area. Apart from knowing that some discussion and preparation takes place in medical schools on sterile procedures in the operating room, it would seem that the surgical clerkship was generally a "sink or swim" experience for medical students. There appeared to be no formalized preparation but, moreover, few avenues existed in which students might have discussed and explored their unique emotional and psychological responses to what was a daunting experience.

Apart from examining the difficulties in learning that students could experience when confronted with adverse reactions to surgical stimuli, there seemed to be a more general philosophic need in conducting this research. Eron (1958) suggested that medical students tend to increase in cynicism and decrease in humanitarianism during their medical school training. Earlier, Eron (1955) commented on an important adjustment between pre-clinical and clinical years. In earlier phases students concentrated on rote mastery of the inanimate sciences and then they were confronted with patients who could not be neatly classified as in textbooks. This was especially true in surgery. Corroborative findings have been reported by Christie and Merton (1958) and Gordon and Mensh (1962). It would seem

that medical school still promoted a removed, almost rarified environment for learning and that there was a slow erosion of humanistic values. A feasible reason for such changes in attitudes could have been that little was done in the way of training medical students to communicate their feelings and emotions. It was to this problem that the study addressed itself in general and to the feelings that surgical operations elicited specifically.

Funkenstein (1961) in a study of 44 Harvard College students who abandoned medical careers found that, apart from the inability to make high grades, there was a significant number of students who were concerned over the non-humanitarian attitudes of physicians. Funkenstein quoted the students as saying, "Physicians are just scientists without real interest in people"; "the doctor is just a person who treats isolated parts, like the heart or lungs"; "the doctors are coldly scientific." The same students were appalled at the interns and residents whom they described by using the following words: "only interested in science"; "they are cold and cynical and make jokes about patients"; "they depersonalize patients"; "medical school is four years divorced from the humanities." Again, it seemed appropriate to say that there could have been a significant number of sensitive and talented students who didn't pursue medicine as a profession because of an unfavorable attitude towards physicians. There seemed to be a need for students to have an opportunity to express

some of these negative feelings as well as to share with another sensitive and skilled person what the medical profession means to them. They needed to be able to express their reactions to surgery which has been described by Mueller (1976) as "the ultimate audio visual aid to learning since it provides experience for problem solving, self learning, critical thinking and the ability to deal with reasonably objective data."

The need to humanize medical interaction in general, and to sensitize students to surgical procedures specifically, posed yet another problem. What kind of model could have been used to achieve this outlined need? The Interpersonal Process Recall (I.P.R.) method as developed by Kagan (1975) could be a method to meet these needs. Kagan, at Michigan State University, in conjunction with the College of Human Medicine, has developed a course designed to facilitate interpersonal relationships and skills of medical students. This is achieved by a series of films and a series of vignettes in which actors simulate a variety of emotional reactions and students are encouraged to respond to the vignettes. Videotape feedback, using a recall method, also enables students to learn about their interpersonal interactions.

In this study it was necessary to construct specific vignettes of surgical procedures and also to create interpersonal vignettes of operating room situations. These interpersonal vignettes, it was hoped, would have enabled

students to particularize to the surgical experience more readily than they would have been able to do through the use of vignettes depicting general interpersonal situations. In order to provide more feedback for the students, their ongoing physiology (heart rate, respiration and electrical skin conductance) was monitored while they watched the vignettes. It was hoped this extra information about their own bodily reactions to surgical stimuli and interpersonal encounters would help them in understanding more about themslves as well as promote a sensitivity towards patients and the staff in the operating room.

In summary, the study developed out of a need to help medical students deal more effectively with their reactions to surgical procedures, in the hope that learning about surgical procedures would have then increased, In addition it was assumed that any effort which "humanized" medical interaction would have helped in attracting to medicine sensitive and talented students that otherwise might not have contemplated medicine or surgery. The Interpersonal Process Recall method which was developed by Kagan was chosen as the procedure which seemed best fitted to the needs and purpose of this study.

Hypotheses

It was expected that medical students who were exposed to the surgical vignettes and the I.P.R. process would have been more sensitized to the experience of the

operating room when compared to another group of students who were now exposed to this treatment procedure. Consequently, it was hypothesized that the treatment group would perform better on a test devised to assess learning in the operating room than would a similar group of students who were not treated.

Theory

This study was based on four theoretical constructs. The first is the nature of anxiety. The second is the relationship between learning and anxiety. The third is the basic nature of the act of surgery from a societal position. Finally, the theoretical basis for using a method of sensitization rather than a desensitization method to lower anxiety is presented.

Studies of the nature of anxiety have long occupied psychological thought. Darwin (1872) reasoned that the nature of fear reactions was shaped through a process of natural selection, and he described typical fear responses such as palpitation of the heart, muscular tension, erection of the hair, increased perspiration, changes in the quality of the voice, dilation of the pupils and dryness of the mouth. Furthermore he categorized fear reactions on a continuum from mere surprise to an extreme degree of panic or terror. Freud (1894), undoubtedly contributed much to our understanding of anxiety when he conceptualized anxiety neurosis as a discrete clinical syndrome to be differentiated from neurasthenia.

Shifting his emphasis from viewing anxiety as the cause of repression rather than the consequence of it, Freud (1927) wrote:

> One might say then, that symptoms are created in order to avoid the development of anxiety, but such a formulation does not go below the surface. It is more accurate to say that symptoms are created in order to avoid the danger situation in which anxiety sounds the alarm. (p. 86)

Freud (1933) conceptualized fear and anxiety as a universally experienced, unpleasant, emotional state. Anxiety was distinguished from other emotions such as anger or depression by a combination of phenomenological and physiological qualities which gave it a "character of unpleasure" (Freud, 1936, p. 69). It should be noted that Freud was particularly interested in identifying the sources of stressful stimulation that evoked anxiety reactions and with clarifying the effects of anxiety on symptom formation and behavior. Horney (1939) viewed anxiety as an emotional response to danger as in fear. Anxiety was different from fear in that anxiety was characterized by diffuseness and uncertainty. Horney made much of the concept of anxiety and, whereas Freud claimed dream analysis was the "via regia" to understanding unconscious processes, she claimed that the same may be said of the analysis of manifest anxiety. May (1977) surveyed the incidence of anxiety in contemporary literature, music, art and religion, as well as psychiatry, psychoanalysis and psychology, and concluded that anxiety

was a pervasive and central problem and issue in all these endeavors. Tillich (1965) pushed further into the philosophical realm in defining anxiety. Using concepts developed by Heiddegger (1962), Tillich sharply distinguished between fear and anxiety and claimed that man's anxiety is a fundamental quality of his being. Furthermore he affirmed that while neurotic anxiety could be removed by psychotherapy through the healing of inner conflicts, man's basic anxiety was beyond being removed by the power of psychotherapy since it was occasioned by the unchangeable structure of human finitude. Man was confronted by his own "non-being." Tillich viewed anxiety as the state in which a being was aware of its possible non-being.

Wachtel (1977), departing from the orthodox Freudian and neo-Freudian position on anxiety, capitalized more on the work of Alexander and French (1946) and Dollard and Miller (1950). Wachtel believed that exposure to cues that provoke anxiety enabled the person to understand the problem of intellectual and emotional insight. Reduction in anxiety enabled the person to verbalize about inclinations that they otherwise might have been too frightened to acknowledge. He continued:

> Whether further change will follow this reduction in anxiety depends on whether he merely emits words or whether he produces a complex of anxiety provoking cues . . . Thus it is easy to verbalize 'significant things' but fruitless unless the other cues to which anxiety is attached are produced along with the verbal cues. Anxiety is strongly attached to complex configuration cues

> in which verbal, affective, cognitive and motoric elements are all prominent.

Arnold (1960) supported the idea of appraisal of stimuli which is a cognitive process of considerable complexity and abstractness. It would seem from his following comment that appraisal of stimuli is almost as direct as sense perception. Arnold (1960) stated:

> As soon as we intuitively judge that something is threatening we feel repelled from it and we feel urged to avoid it. The intuitive approach of the situation initiates an action tendency that is felt as an emotional expression in various bodily changes and that eventually may lead to overt action. (p. 177)

Grinker and Spiegel (1945), in their field study of combat neuroses, claimed that threat was not only linked to longstanding intrapsychic tensions and their relationship to the combat situation, but also in the case of a flier, "the very thing he loved and depends upon for safety--his airplane"(p. 33). Lazarus (1966) illustrated the role of appraisal in the production and reduction of threat and stress reactions. He concluded that the same stimulus film will or will not produce stress reactions depending on how it is interpreted. Bandura (1969) highlighted the same observation. He stated:

> The overall evidence would seem to indicate that emotional behavior may be controlled by two different stimulus sources. One is the emotional arousal, self generated by symbolic activities in the form of emotion-provoking thoughts about frightening or pleasurable events. The second is the response evoked directly by the conditioned aversive stimuli. The former component would be readily acceptable to extinction through cognitive restructuring of probable response consequences,

> whereas the elimination of the latter component may require repeated nonreinforced exposure to threatening events either directly or vicariously. (p. 304)

Ellis (1962) based his rational emotive therapy on the idea that the individual belief system, or appraisal system is the crucial factor in the reaction of the individual to the event. Ellis found the original of this concept in Epicletus who wrote: "Men are disturbed not by things but by the views which they take of them" (p. 54). In this study, anxiety is conceptualized in the following terms: Anxiety is a complex comprehensive amalgam of the intrapsychic perceptions, thoughts and feelings of the individual as well as the psychobiological response processes that mediate between stressful stimuli and emotional responses of that individual.

It has long been recognized that there is a relationship between anxiety and learning performance. Early studies on test anxiety were conducted at Yale University (Mandler and Sarason, 1952; Sarason, Mandler and Craighill, 1952). Iowa studies investigated the effects of individual differences in emotionally based drive (anxiety) on the learning process (Spence and Farber, 1953; Taylor and Spence, 1952). Spielberger (1966) compared the performance of high-anxiety and low-anxiety college students in laboratory and real-life learning tasks. The five related experiments were concerned with the influence of anxiety on learning, concept formation and academic achievement. The results indicated that performance of high-anxiety

subjects was found to be superior to that of low-anxiety subjects for tasks in which there was small risk in making errors. Performance of these high-anxiety subjects was inferior for tasks which elicited a larger number of errors. A follow-up study to evaluate the long-term effects of anxiety on academic performance indicated that the percentage of academic failures was nearly four times as great for able students with high anxiety as it was for low-anxiety students of comparable ability. Spielberger also found that performance on serial rote learning of high-anxiety subjects was inferior to that of low-anxiety subjects early in learning and superior later in learning. Mueller (1976), in a series of free recall experiments, supported the hypothesis that high-anxiety subjects would behave more as if they had encoded stimuli more restrictively than would low-anxiety subjects.

Evidence supports the idea that students with high test anxiety have a proneness to emit self centered interfering responses when confronted with evaluative conditions (Liebert and Morris, 1967; Watson and Friend, 1969). Self referenced comments such as: "I am stupid," and "Maybe I won't pass" might interfere considerably with the learning task.

Other studies in medical education have shown that the relationship between anxiety and learning exists also with medical students (Barret and White, 1969; Rothom and Flowers, 1970; Weinstein and Gippie, 1974). It should not

be inferred from these studies that anxiety is detrimental to learning. Albert and Haber (1960) have redefined a unidimensional construct of anxiety into two modes--anxiety which facilitates or enhances learning and anxiety that debilitates or impedes learning.

What is the relationship between aggression and the act of surgery? Is there some intrinsic, innate, aversive reaction to cutting the body, to bloody anatomy being exposed, to the smell of cauterization of flesh and other surgical procedures, or is the aversive reaction due to the meaning that the individual's belief system imposes? Does anxiety manifest itself because of the stimuli themselves or does it result from the intrapsychic tensions and threat that occur in one's unconscious processes? In part the response to these questions might be answered by reference to the nature of human aggression.

Surgery is an aggressive act. Aggressive in the sense that it indicates movement towards another. Movement is applied forwards, inwards, and outwards. Freud (1923) postulated the dichotomous concepts of life instinct (eros) and death instinct (thanatos). This became the central factor around which he developed ideas about aggression. Freud's basic assumption remained constant throughout his work--that man was under the sway of an impulse to destroy himself or others and that he could do little to escape this tragic alternative. It follows that from this idea of the death instinct, aggression was not

essentially a reaction to stimuli but "a constantly flowing impulse rooted in the constitution of the human organism" (Fromm, 1973). Brill (1949) further suggested that sublimation is bound up with vocational choice and consequently he stated that, from a psychoanalytical perspective, an individual's sadistic impulses may be satisfied by such activity as surgery or butchery. Lorenz (1966), in his controversial work on the nature of aggression, maintained that aggression is an instinct fed by an ever-flowing fountain of energy and not necessarily the result of a reaction to outer stimuli. Lorenz's model on aggression, like Freud's model, has been called a hydraulic model. Further, Lorenz claimed that aggression is in the service of life, that it serves the survival of the individual and the species. Fromm (1973) pointed out that both Freud and Lorenz seem to be opposed since Freud's aggression theory serves death whereas Lorenz's theory serves life. However, Lorenz ultimately arrived at the same position as did Freud in that man is driven by innate force to destroy. Evans (1975) pointed out that the message of aggression is "natural" and is interpreted to mean "good." Indeed Lorenz (1966) did state that aggression can be good in specific circumstances. In the context of surgery, even though the act is aggressive, the motive that is attached to it is, of course, one of goodness.

Montagu (1968), an anthropologist, opposed the instinctivist view by stating: "The notable thing about human behavior is that it is learned. Everything a human being does as such he has had to learn from other human beings . . . . The fact is that, with the exception of the instinctoid reactions of infants to sudden withdrawals of support and to loud noises, the human being is entirely instinctless." Fromm (1973), reviewing the neurophysiological evidence, claimed that the instinctivistic-hydraulic interpretation does not fit well in the model of brain-functioning as known by most neuroscientists (Berkowitz, 1967; Mark and Ervin, 1970; Moyer, 1968).

In this study surgery is viewed as a learned skill which is at once aggressive and healing. By accepting this definition of surgery, it is possible to acknowledge that the aggressiveness of the act itself is channelled into a constructive outcome. Failure to accept the aggressive nature of surgery limits the wide range of individual responses to the surgical act. It is feasible to accept that these responses to surgical stimuli are at the same time, learned and natural aversive reactions. The task now is to investigate some methods that would help lower the anxiety that is elicited from surgery.

Traditionally, systematic densitization procedures as developed by Wolpe (1961) have been used to lower anxiety of people experiencing difficulties in coping with stimuli that threaten them. Originally the method was

based on studies conducted by Masserman (1946) who developed procedures for studying experimental neurosis in cats. The systematic desensitization procedure was outlined by Wolpe (1976) as follows:

1. Training in deep muscle relaxation.
2. The establishment of the use of a scale of subjective anxiety.
3. Construction of anxiety hierarchies.
4. Counterposing relaxation and anxiety-evoking stimuli from the hierarchies. (p. 224)

Evidence was impressive for the efficiency of this method of desensitization (Cooke, 1966; Davidson, 1968; Marks, 1969; Paul, 1966; Lo Piccolo, 1969; Ritter, 1968; Sherman, 1972).

While the experimental evidence supports the systematic desensitization technique, there is a strong element of the therapist or experimenter being in control of the learning and the patient or subject being the recipient of the technique. There is yet another factor that relates more specifically to this study. It is preferable to have medical students "desensitized" to surgical stimuli or should they be "sensitized" to the whole surgical experience? The term "sensitized" is used here in the sense of the ability to express both cognitively and emotionally the impact of the procedure upon oneself without denying the anxiety or threat that might be occurring.

Kagan (1975) has developed a method of influencing human interaction (I.P.R.). Although the method was originally designed for use by counselors, psychiatrists and other mental health workers, it has had immediate appeal in undergraduate medical education (Jason, Kagan, Werner, Elstein and Thomas, 1971; Werner and Schneider, 1974). I.P.R. makes use of the recall method which is facilitated by an inquirer who treats the participants with dignity and respect, in keeping with the concepts of positive regard and warmth found in the work of Rogers (1951). Kagan (1979) found that the basic discovery was not just the value of videotape playback but "the unique combination of the human role and technology." The basic interpersonal theory of I.P.R. is similar to the theory of neurosis developed by Horney (1945).

Kagan (1975) defines the basic human interpersonal fears as:

> I will hurt you.
> You will hurt me.
> I will engulf you.
> You will engulf me. (p. 101)

These fears are viewed as basic fantasies which hinder people in achieving real and genuine human interaction.

It is interesting to note that Coppola and Gonnela (1968) stated certain objectives that they thought medical students should achieve during surgical clerkship. These objectives were:

1. to have the students understand the tentative nature of the scientific conclusion.
2. to diminish their dependence on the teacher as a purveyor of "truth."
3. to encourage students to develop critical thinking and draw their own conclusions from data available to them.
4. to emphasize the active nature of the learning process.
5. to foster mutual esteem between students and teachers.
6. to encourage students to assume the responsibility for their own education. (p. 205)

Many of these objectives towards learning are also to be found in the I.P.R. method of training. In a later study, Coppola and Gonnela (1972) based their program on Rogers (1951, 1969). The study showed that medical students who were allowed to take control of their own learning in student-centered groups learned as well as students lectured by a teacher. The authors affirmed content learning would not be impaired by such a student-centered method.

Desensitization of anxiety inhibits the awareness of stimuli, whereas a process of sensitization encourages the individual to acknowledge and deal with the anxiety of the impact of stimuli and events. It would seem that the latter process would be more helpful in developing within students an awareness of their own interpersonal and physiological reactions. In this study, using the I.P.R. method of Kagan (1975) seemed likely to be a process of sensitization where students could, through skillful inquiring into their

physiological and psychological reactions, learn about their responses to surgical stimuli and other interpersonal events.

In summary, the theoretical basis for this study rests on the understanding of anxiety about surgical events. This anxiety is both a learned and a natural aversive response. It is asserted that anxiety interferes with the learning process and that sensitization towards the aggressiveness of the surgical act, stimuli and interpersonal events can be achieved by the utilization of the I.P.R. method

Overview

In Chapter II the literature most relevant to the history of surgery and attitudes of medical students to surgery is surveyed. The relationship between anxiety and the autonomic nervous system is examined. Then the relationship between audio visual stimulus and anxiety is explored. Methodology, instrumentation, procedures, analysis techniques and research hypotheses are described in Chapter III. The results of the study with appropriate statistical analyses are given in Chapter IV. Finally, in Chapter V, the conclusions and implications of the study are discussed.

CHAPTER II

REVIEW OF LITERATURE

This chapter contains a brief review of the development of surgery as an integral part of medicine. Then the literature of attitudes of medical students towards surgery is reviewed. A review of literature of the autonomic nervous system and its relationship to anxiety follows next. Finally, the relationship between audiovisual stimulus material and anxiety is examined.

Historical Preamble

The role of the surgeon has become a vital part of modern medicine. Surgery, in a practical manner, integrates such areas of medicine as physiology and biochemistry, microbiology and immunology along with anatomy. Cheever (1889) claimed, "I believe that we are warranted in saying that the future of surgery is without limit." However, surgeons and surgery did not always enjoy such an honorable place or such an expanding future in the history of medicine. The neolithic surgeon had no knowledge of pathology and not much idea of anatomy. His instruments were crude but his ideas were sound. Surgery was for him, as it is still today, an attack on disease. Prior to the nineteenth

century surgery was a poorly respected profession. It was a queer muddle of demonology, tribal ritual and social necessity. Professionally, the surgeon was regarded as inferior to his associates, the physician and the apothecary. He was a man of little education, learned his trade by apprenticeship alone and was dubiously associated with the barber.

Reflections on the history of surgery graphically portray the nature of the surgeon's calling--the pain he inflicted and the aura of death that surrounded him and the operating theater which resembled nothing more than a torture chamber (Graham, 1939; Cartwright, 1967; Mead, 1968).

Before surgery could take its place in medical science, there were at least three major problems to be overcome. There was a need for regular systematic education, the eliminating of the actual pain of the operation and the lowering of the mortality rate. Coppola (1971) names some innovators whose work extends back hundreds of years but who were instrumental in contributing to the solution of these pressing problems--Abroise Pare (1510-1590), a military surgeon who replaced cauterization with boiling oil by the ligature--Andrae Vesalius (1510-1564), a surgeon and anatomist who, by direct observation and dissection of the human body, challenged the erroneous teachings of the Roman physician, Galen, that had been in vogue for 700 years--William Harvey (1578-1657), physician and anatomist,

who discovered the circulation of the blood--Giovanni Morgani (1682-1771), who single-handedly founded the field of pathological anatomy--Louis Pasteur (1822-1895), who discovered that bacteria are a cause of infectious disease--Joseph Lister (1827-1912), the discoverer of antisepsis--John Hunter (1728-1793), who did much to raise surgery from an empirical art to a science by examining the relationship of anatomy and physiology to surgery--his pupil, Philip Syng Physick, who has been viewed as the Father of American Surgery (Cartwright, 1967). The list of scientists is an exhaustive one. Gone are the days when the surgeon stood in the center of the public auditorium with his assistants who were instructed to hold down the fully conscious patient when he struggled.

Today the surgeon commands a wide range of medical technology. At once the surgeon is revered and feared. Selzer (1974), speaking of the ritual of surgery, describes it as "murderous, painful, healing, and full of love." However, there still lingers the vestiges of the past when flesh was butchered in stinking hospitals by ignorant hacks.

Medical Students and Surgery

Gough (1975) surveyed medical students and practitioners about their likes and dislikes and found that surgery consistently ranked low in the career preferences of University of California medical students. In the article Gough presents an argument that choice of a specialty is a significant issue in medical practice and

should therefore be as significant an issue in medical education. After reviewing documents, setting out the expectations of students for clerkships, Mueller (1975) concluded that clerkships define student learning objectives as well as providing an encyclopedia of diseases that demand the performing of surgery. Few clerkships define their program in a broad context of student needs and student learning objectives. Finally, clerkships do not seem to be designed to permit the student to fulfill his own surgical education needs in the light of subsequent or current career choices. Furthermore, he supported the idea that surgery provides a unique experience for problem definition, problem solving, self-learning, critical thinking ability and the ability to deal with reasonably firm objective data. Mueller encouraged medical education to enable the teaching of surgical expertise to become of minor importance and to focus upon surgery becoming a universal learning experience. Hutchins (1964), in a longitudinal study, found clear evidence that career choice patterns of medical students are quite changeable and that these patterns of changes have been dramatic over the years. He suggested that research needs to be done to differentiate groups with stable and with changing career choices so that it is possible to gain insight into the reasons for these changes. Chapman (1975) claimed that approximately two-thirds of students have well fixed career designs and that the remaining one-third are more fluid in their decision making processes.

Some reports of investigations into the psychological aspects of decision making for specialty selection are available. Bruhn and Parsons (1964), when viewing the choices of medical students towards specialties, found that students had the following view of the surgeon as: "dominating and arrogant, aggressive, full of energy and mainly concerned with his own prestige" (p. 43).

Zimit and Held (1975) found that surgery was perceived as less socially attractive by medical students. Also in their study, the whole of the student group consistently ranked the surgeon least in similarity to self. Even those students in the surgery group described themselves very differently from the way they described a typical surgeon. Earlier work by Eron (1955) discovered that students in psychiatry had significantly greater anxiety than those students interested in internal medicine, pediatrics or surgery. Livingston and Zimet (1965) studied the attitudes of freshman, sophomore, junior and senior classes of medical students. In their analysis it appeared that students favoring a psychiatry specialty had a greater level of overt death anxiety than did students opting for a surgery specialty. Also their findings revealed that the psychiatry students were lower in the measures on the authoritarianism scale than were surgery students. Spivey (1975) claimed that specialty selection involves a complex interaction of personal, professional and societal factors about which little is known. It seems

that, for the above factors (and perhaps others not presented in the literature) selection of surgery as a career is a low priority for a large percentage of medical students.

Lucas, Ledgerwood and Walt (1973) stressed the need for students to be more involved in the treatment of trauma since, in 1971 alone, 115,000 deaths and 11,200,000 disabling injuries at a projected cost of 29.5 billion dollars occurred in the United States of America. The authors proposed, at Wayne State University in Michigan, a program for students to be educated in trauma. There were three objectives for the program--cognitive, psychomotor and affective. Focusing upon the affective objectives, they stated:

> The prime affective trait for the surgical clerk to achieve is coolness in the face of potential disaster. We have observed that often the first instinct of the novice student faced with a badly mutilated patient is to seek an excuse to remove himself from the immediate vicinity of the patient. Alternatively losing all perspective and the ability to devise a logical plan to treatment, he may stand by helplessly. Such students can be trained to react appropriately to threatening situations. (p. 552)

Lucas et al. quoted other affective objectives for the student:

> A preparedness to assume responsibility, to follow his patient's clinical course meticulously, to establish communications with the patient's family and, where necessary, with social and rehabilitative services, to cultivate intellectual curiosity, to keep careful case notes, to develop acute sensitivity to the toll taken of our society by alcohol, drugs and firearms. (p. 552)

The authors claimed that the affective domain is difficult to teach and evaluate. They stressed the importance of the surgeon as a role model--as one to build confidence in the insecure student by assuring him that his anxieties are natural. However, Lucas et al. (1973) claimed that misdirected sympathy sometimes delays or is substituted for painful but essential therapy. One interesting development is that the authors used videotape recorders in the emergency room with subsequent playback of critical incidents being made. This enabled the student to observe his own actions or those of other more active participants and to improve subsequent performances. They stated that such videotape recordings would be a valuable asset not only in teaching objectives but also in evaluating the student's performance and that a variety of psychomotor skills could be analyzed. Furthermore, they stressed the importance of the instructor in interpersonal relationships. They used an example of kidney transplants when the kidneys are taken from accident victims. Here, learning how to establish a warm relationship with the family is especially important.

Physiological Correlates of Anxiety

The psychophysiology of anxiety seems centrally related to action in the autonomic nervous system. All anxiety reactions are mediated through this system. The following description of autonomic function draws heavily on the work of Lester (1974).

The autonomic nervous system consists of two parts, the sympathetic (thoracicolumbar) and parasympathetic (craniosorcral) divisions. The sympathetic system uses both acetylcholine and noradrenalin as neural transmitters. The parasympathetic system uses only acetylcholine. Sympathetic excitation has the following effect on the human body: arteries contract and relax such that blood is diverted from the digestive system to the somatic muscles in order to fuel their activity; heart rate and blood pressure rise; breathing increases and the bronchial tubes to the lungs dilate; sweating increases to cool the body; sphincters contract to shut off digestion and digestive contractions of the stomach and intestine cease. In contrast, the parasympathetic system slows heart rate and respiration; diverts blood from the somatic muscles to the digestive system; increases digestive processes and inhibits sweating. Izard (1972), commenting on the parasympathetic system being merely segmental in character, stated that it is under less direct and immediate influence of the central nervous system. He further commented that this would mean that emotions involving predominantly the sympathetic system, such as fear, might be expected to respond more readily to a brain function like cognition than would an emotion such as distress which involves the parasympathetic system. Clinical evidence indicates that fear-related emotional disturbances such as anxieties and phobias yield more readily to relationship or cognitive

psychotherapy than do distress-related disorders such as depression. Gellhorn and Loofbourrow (1963) noted that all emotions are not necessarily identified with the two systems. They suggested that the fundamental emotion of anger involves both sympathetic and parasympathetic activity. Izard (1972) also stated that joy is most probably another emotion involving both systems. The net effect of these coordinated actions of the two systems enables the organism to defend itself or to attack the threatening agent with increased vigor while continuing the gastrointestinal business of digestion. Anthropologically it is interesting to speculate whether, during the evolutionary process, this harmonious working of the two systems was present when the organism had to defend itself at eating time.

Gellhorn (1970) achieved an even broader framework for the differentiation of emotions which are called the ergotropic and the trophotropic neurophysiological system. The ergotropic system mediates the more energetic and the organism-environment interactions. In general, frequent and strong stimuli are more likely to evoke ergotropic reactions. The trophotropic system handles such functions that are concerned with comfort, feeding, sex and recuperation of the organism. This system responds to weaker, lower-frequency stimulation. Izard (1972) predicted that these two concepts should be the best framework for structuring

empirical investigations because of their utility and accurate reflection of bodily reactions.

Levitt (1967) concluded from his research that anxiety indices were primarily sympathetic reactions. In that same article he acknowledged: "Few people need experimental investigation or a learned text to be aware that the experience of strong emotion like anxiety, anger or sexual excitement has marked physiological accompaniments" (p. 91). A note of caution is made here. It should not be inferred from such studies that an oversimplified relationship exists between physiology and anxiety. Other studies reviewed by Martin (1961) showed that systolic blood pressure and heart rate increased with fear or anxiety. Work by Zimmerman (1968) demonstrated that light sleepers showed more anxiety and conflict on personality tests. Furthermore, he found that high anxiety subjects (light sleepers) scored higher on the sympathetic indices of heart rate, respiration rate and skin potential reactivity. However, none of the groups was significantly different. Another study by Bauman and Straughton (1969) found that base skin resistance was a useful index of the anxiety state induced by an electric shock. Brandt and Fenz (1969) selected a group of subjects whose autonomic arousal scale scores were higher than their muscle tension scale scores and a second group with the opposite relationship between these scale scores. Measures in the research were skin resistance, heart rate, frontalis electromyograph (E.M.G.)

and eyeblink. They found consistent, though not always significant, differences between the two groups on all measures. They also stated that individuals show idiosyncratic patterns of physiological activity in response to stress and that the autonomic and muscle tension scales provide some basis for predicting types of physiological response patterns. These idiosyncratic patterns have been found to be reliable over time and independent of the type of stress to which the individual is subjected (Lacey, 1959; Lacey and Lacey, 1958). The issue of response specificity in psychophysiological research is a difficult problem to surmount if significant data is to be achieved on any single physiological variable. Goldstein (1976) pointed out that some people respond only in one particular physiological modality. Goldstein claimed that there is an inherent difficulty involved in relying on physiological variables in evaluating openness and closedness to environmental stimuli. A study conducted by Shipman, Heath and Oken (1970) ignored this variable and, on the basis of their data, formulated personality characteristics of each of the autonomic specificity groups to determine whether particular response modalities were related to personality variables. The study claimed that subjects with high palmar sweating tended to be slow-moving and used suppression to handle fear and showed little attention to the opposite sex. In relationship to anxiety those subjects with high heart rate were characterized as being

disorganized and having high anxiety. Still other subjects with these frontalis muscles showed a tendency towards depression.

The relationship between anxiety and physiological responses is complex. Hodges (1976) commented on the common sensical reaction: "Of course my physiological processes and my feelings of anxiety go together." He claimed that such a statement "proves to be a simplistic assumption bearing little relation to the complexity of psychophysiological relationships" (p. 191). This present review testifies to that complex relationship.

Audiovisual Stimuli and Anxiety

Berlyne (1960) observed both experimentally and anecdotally that, contrary to psychoanalytic and behavioristic psychology, people often seek out arousing stimulus situations. Klausner (1966) cited examples of stimulus seeking behavior as rollercoaster riding and skydiving, while Boyanowsky (1977) claimed that horror and disaster movies such as "The Exorcist" and "Earthquake" are often attended by individuals who experience high degrees of anxiety in anticipation of and fear during the film. Early pilot studies, clinical reports and experiences of a few other experimenters highlight the fact that properly selected motion picture films could have high emotional impact upon subjects and could serve as stressor films (Aas, 1958; Nowlis, 1953; Schwartz, 1956).

Experimental research with films was accomplished by Lazarus, Speisman, Mordkoff and Davison (1962). In the study it was demonstrated that watching a silent motion picture produced marked threat reactions and physiological stress reactions which were defined as reports of disturbed affect and elevated skin conductance and heart rate respectively. The threat-films showed a series of crude surgical operations on the male genitals (subincision) of adolescents as performed by Australian Aborigines. During scenes of threatening events including pain and genital mutilation there was a sharp rise in all response indicators of threat, while in those scenes showing relatively non-threatening activities, the indications declined towards non-threat levels. In a further study by Speisman, Lazarus, Mordkoff and Davison (1964) the authors reasoned that if threat and physiological stress reactors depend on the appraisal of threat, and if beliefs about the harm produced by the stimulus events could be altered or attention shifted away from the harmful features, these reactions would be eliminated or reduced. The first sound track was called "Trauma" because the emphasis was placed on the harmful features such as pain, mutilation and danger of disease. A second was called "Denial" because its theme was mainly that the operation did not produce harm. Finally, the third sound track was called "Intellectualization" because of the detached viewpoint presented in the film. The results of the study indicated that the

"Trauma" track condition significantly elevated the disturbance above that produced by the silent film. Both the other tracks significantly reduced the disturbance. Results also reflected that the two sound tracks' effectiveness in reducing threat depended on the personality disposition of the subjects. Lazarus and Alfert (1964) in a follow-up study, showed the "Denial" conditions "short circuited" the threat involved in the film. Wehmer (1966) induced anxiety by means of the same film of Aboriginal pubescent boys and the subjects viewing the film showed a decrease in plasma 17 hydroxycorticosteroids (17-OH-CS), in heart rate and in self-reported negative emotions. Another similar study by Brady (1970) showed similar results and supported Gellhorn's (1965) position that anxiety involves both the trophotropic and ergotropic systems.

A study by Birnbaum (1964) also offered some findings relevant to the anticipatory aspects of threat. Birnbaum produced stress and threat reactions in subjects by having them watch a motion picture film portraying a series of shop accidents. In the film one of the workers has the tips of his fingers sliced off; in another film, a worker loses his finger; and finally, a board propelled by a circular saw is thrust through the victim's mid section, killing him. Using a flashback technique in the film enables subjects to anticipate the impending disaster. Observation of skin conductance and heart rate during this period displayed a dramatic increase. At the point of

actual confrontation there was a further rise in physiological stress indicators. However, Birnbaum commented that the bulk of the reaction occurred during the anticipatory period. He further stated that it is not the presence on the screen of horrible accidents but the expectation of seeing them that accounted for the reaction. Lazarus (1966), commenting on the study of Birnbaum, tentatively claimed that, an alternative explanation for a drop in physiological functioning which was observed in heart rate and skin conductance, might reflect different psychological or physiological ways of coping rather than a reduction in threat itself.

Another study on the effect of psychophysiological reactions of male and female subjects to varying camera distances, panning shots, tracking shots and zooming shots. The results indicated that film elements do influence the viewer's psychophysiological reactions, such as galvanic skin response and respiration rate, but these production techniques do not affect perception of a film's story. Also Smeltzer found that gender and film-viewing experience has little effect on a viewer's psychophysical reactions. Miller (1968), in a study designed to test whether film motion can, of itself, produce an audience response as measured by the galvanic skin response (G.S.R.), found that there were trends on G.S.R. measures that indicate motion groups did score higher than other still-picture groups or

the mixed groups. No significant results were found relating to retention and attitude measures.

Little research is available on the use of films in surgery for training medical students. However, a study by Melamed and Sielgel (1975) had a group of sixty children about to undergo elective surgery for hernias, tonsils or urinary, genital tract difficulties shown, on hospital admission, either a relevant peer modeling film of a child being hospitalized and receiving surgery or an unrelated control film. Both groups received extensive preparation by the hospital staff. Measures of the state of anxiety including self report, behavioral observation and Palmar Sweat Index revealed a significant reduction in anxiety in preoperative (night before) and postoperative (3 to 4 weeks after surgery) examination. Parents of the children reported a significant posthospital increment in the frequency of behavioral problems in children who had not seen the modeling film. The film did not show any scenes of actual surgery. It concentrated on familiarizing the child with preoperative and postoperative care.

Archer, Fiester, Kagan, Rate, Spierling and Van Noord (1972) utilizing the Interpersonal Process Recall method explored the use of physiological feedback as a part of videotaped feedback. In the first phase of the research a graphic representation of a subject's eccrine sweat rate was videotaped with one camera, while another camera simultaneously videotaped the subject's face and torso.

Recall was then conducted with a split-screen replay of these two recordings. A cardiac measure was added to the process to provide a comparison of the two different physiological feedbacks. The research supported the hypothesis that a combination of heart rate and sweat rate can indicate both emotional arousal and suppression of awareness. Most of the forty subjects tended to exhibit general patterns of rapid increases and decreases in sweat rate activity and that these changes accompanied rapid shifts in increased openness as well as lack of openness in dealing with specific subsections of each of the emotionally laden film vignettes. However, this "volatile" physiological pattern was not observed in all subjects. The use of a trained inquirer to whom a subject could tell his thoughts and feelings proved to be helpful in facilitating learning for the subject about his emotional responses to a variety of vignettes.

The present study utilized this approach and was incorporated into existing work being conducted by Kagan (1979) under sponsorship of the National Institute of Mental Health (N.I.M.H.) described in Chapter I.

Summary and Conclusions

Surgery is viewed as a profession which struggled for acceptance into the medical profession. From a harsh and brutal beginning it has now achieved high status. However, ambiguity towards surgery is reflected not only in the

words used to describe it, such as: "aggressive," "murderous," "healing" and "full of love," but in the attitudes of medical students towards surgery. The surgeon is perceived as aggressive and arrogant and surgery itself as less socially desirable than other areas of specialization. The choice of a specialty involves a complexity of personal, professional and societal factors. Affective education in surgery is not considered to deserve much attention although reference is made to the influence of the role model of the surgeon for medical students.

Anxiety and emotional responses are seen as impacting upon the sympathetic and parasympathetic nervous systems and consequently, causing a variety of bodily reactions. The literature review testifies to the complexity of identifying specific emotions with either system. Most research indicates the simultaneous function of what Gellhorn (1965) calls the ergotropic or trophotropic systems but for specific emotions, there is a predominance of either one of the systems.

Films and audiovisual stimuli have been used in understanding the nature of anxiety responses. Results of these studies indicate that not only is the appraisal of threat by an individual important but so also is an individual's anticipatory responses of being involved in a potentially threatening situation. Other studies displayed physiological responses of subjects to film technique such as camera distances, tracking and zoom shots and

film motion. Reference was made to the use of a film modeling preparation of a young child who is undergoing surgery. Results indicated that children who saw this film and who were also being subjected to surgery displayed significant reduction in anxiety measures as well as in behavioral problems than did those children who did not see the film.

An extensive review of the literature revealed little information on the appropriateness of studying one's own physiological responses to surgical stimuli as a method of sensitizing one's anxiety as elicited by such stimuli and interpersonal events. It is hoped that, if anxiety towards such events is reduced, then the ability of students to increase their learning about surgical procedures will be increased. The review of the literature did, however, expose in a number of studies, the relationship of anxiety and physiological responses as well as setting the context of the present study amidst current attitudes of medical students towards surgery and the status of surgery in medicine. The review also focused upon the studies that examined the relationship between audiovisual stimulus and anxiety reactions. A study by Archer et al (1972) provided a model for incorporating physiological feedback into the present study. This model was modified by current research being undertaken by Kagan (1979) who was sponsored by the National Institute of Mental Health (N.I.M.H.).

It is therefore proposed that a study which is designed to sensitize medical students to their anxiety will increase their learning ability in surgery. The basic method is to have students study their own physiological responses to filmed surgical situations.

CHAPTER III

METHODOLOGY

Sample

A letter inviting students to volunteer for this project was circulated to all first and second year students in the College of Human Medicine and the College of Osteopathic Medicine at Michigan State University (Appendix E). The letter outlined, in general terms, the project and gave a tentative time commitment that students could expect to give over the summer period of 1979. Permission to conduct the experiment was obtained from the University Committee on the Use of Human Subjects in Research. Twenty-four students (12 males, 12 females) volunteered from the College of Osteopathy, while twenty-four students (11 males, 13 females) volunteered from the College of Human Medicine. Of the twenty-four Human Medicine students, there were 8 males and 6 females from Track One and 3 males and 7 females from Track Two.* The ages ranged between 22 years and 41 years with the modal

*Track One designates students who undertake a curriculum of more traditional medical education. Track Two designates students who undertake a curriculum based on a small group and individual learning approach with a minimum of lectures.

ages being 25 and 26. Students were matched according to year of training, experience in surgery and whether they were Track One or Track Two students. This information was supplied on the application form (Appendix C). Difficulty was encountered in obtaining pairs of students with the same type of experience or exposure to surgery as one another. This was due to at least two major causes. Students had failed to declare fully their surgical experience on the initial application form or they had observed a number of surgical operations just prior to undertaking the present study. Where there was difficulty in matching two students, the author consulted with Dr. Edward Coppola, Professor in Surgery at Michigan State University, who evaluated the comparability in surgical experience. Within each pair, students were then randomly allocated to either treatment or control groups by the tossing of a coin.

Procedure

The procedure was divided into two distinct phases. Phase One dealt with the treatment procedures while Phase Two was focused upon the operating room experience of the students.

Phase One

Twenty-four students who had been assigned to the treatment group were scheduled by the author and secretarial helpers for two treatment sessions each of

two hours' duration. Usually, there was a space of one week between the initial training period and the second one. However, six students, because of scheduling problems, could not achieve this time lapse between treatments.

When a student arrived, he or she was met by one of two inquirers who has been trained for a minimum of thirty hours in the I.P.R. method. The student was asked to sit in a chair in the laboratory room which was kept at a temperature between 72^{o} and 74^{o} F. Two disposable electrodes were attached to both wrists after the area was rubbed with a swab of cotton soaked in rubbing alcohol. These electrodes were connected to an A.K.C. tachograph, Grass Model 7P4D. The electrical signal was amplified by a Grass Model 7DAE DE amplifier and recorded by one pen on a four channel Grass Model 7WC8PA strip chart recorder, speed at 100 mm per second.

Two re-usable Beckman electrodes were attached to the student--one to the hypothenar eminence of the left hand after it was rubbed with a swab of cotton soaked in rubbing alcohol. The other electrode was located about an inch and a half above the wrist. A paste (Redux conductive cell manufactured by Parke-Davis) was placed on the electrodes so to facilitate conducture. The electrodes which were used to measure skin conductance were then connected to a Hagfors bridge (a constant voltage bridge) which in turn was connected to a Grass Model 7P4D, low level D.C. pre-amplifier. Finally, the signal was amplified by a

Grass D.C. amplifier Model 7DAE and recorded on one channel of a four channel Grass strip chart recorder Model 7WC8PA at a paper speed of 100 mm per second.

Respiration was measured by a strain gauge (a volumetric pressure transducer-Grass instrument) placed around the student's lower chest. Breathing was recorded on the Grass strip chart recorder at a paper speed of 100 mm per minute. A small plastic clip with conductance paste on it was placed on the student's ear, after the ear had been rubbed with a swab of cotton soaked in rubbing alcohol. This served as a ground for the electrical current.

The purpose of each electrode was explained as it was attached to the student. After the calibration of baseline (resting level) was made, the subject was shown, on the first treatment time series, one of the vignettes. These were played on a Sony videocassette recorder and viewed on a Sony color monitor.

Figure 3.1 describes the set up of the laboratory and positioning of equipment and personnel.

At the conclusion of the vignettes, the inquirer helped the student remove the electrodes while the equipment operator brought in the videotape and the printout of the individual physiological responses. On the videotape there was a composite picture which consisted of the face of the student, the recording of his or her heart rate, skin conductance and respiration as well as a reflected image of the vignette that was being watched. This enabled

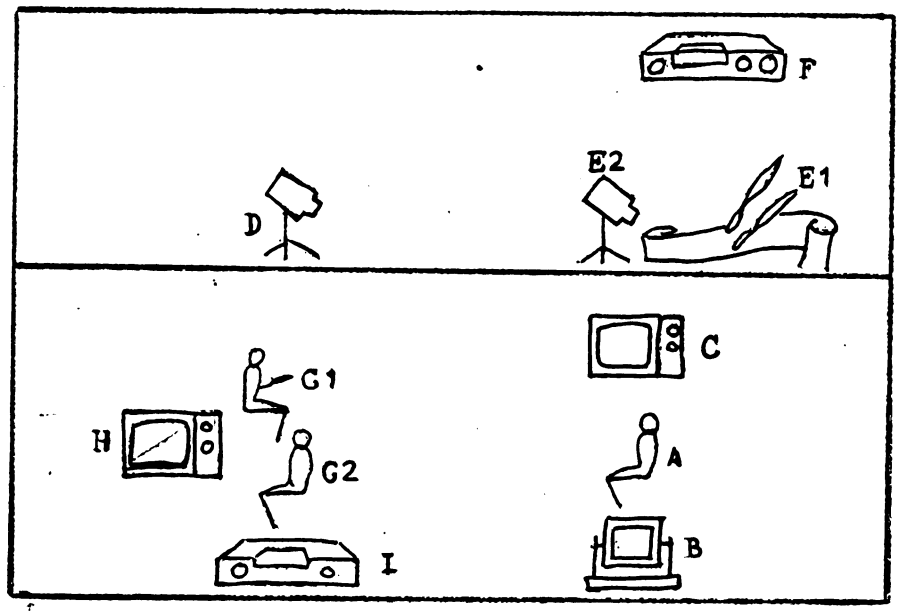

Figure 3.1.--Floor Plan of I.P.R. Suite

Key: A. Subject seated here.

B. Mirror reflecting Vignette on C.

C. Video color monitor.

D. Camera videotaping A and B behind one-way mirror.

E.1 Grass model 7WC8PA strip chart recorder.

2 Camera videotaping physiological printout.

F. Video Recorder and special effects generator.

G.1 Inquirer.

2 Subject seated after viewing vignettes.

H. Split Screen Monitor.

I. Cassette Recorder.

the student to actually recall the thoughts, feelings, ideas and fantasies which he or she had just experienced. The student was video-recorded on one-half inch Ampex equipment. The equipment operator marked the beginning and end of each vignette and the thirty-second rest period between vignettes.

The inquirers discussed their role in the recall which was basically to facilitate the student's learning about their self and their emotional and physiological reactions as well as to develop a sharper perception of the actual surgical procedure. The student was encouraged to respond to anything that he or she remembered or considered to be of interest during the replaying of the videotape. A permissive, supportive and encouraging environment was created by the inquirer so that the students felt free to discuss their recalled ideas, thought, feelings and attitudes towards each vignette. These recall sessions were also audio-taped and this, together with a paper setting out some leading questions and the student's physiological printout, provided data for the student to write a "theory of self" (Appendix F). This "theory of self" was requested from all students, to be written out between sessions in the hope that such reflection would promote more personal growth and development--students completed and handed in their "theories." The whole treatment was repeated in the second treatment session. However,

in this treatment session, the second package of vignettes were used (Appendix D).

Phase Two

Prior to scheduling students, it was necessary to attend to the following details:

1. Secure the assistance of surgeons who would allow students to observe their operations and who were willing to evaluate the students' performances.

2. Seek the permission of the Senior Nurse in Charge of the operating room at each participating hospital and notify her of scheduling changes and adjustments.

3, Ascertain the dates and times of the operations from the surgeons' secretaries.

4. Seek the permission of the patients for students to observe their operations. In all cases this was conducted by the surgeon who was operating.

5. Secure use of a quiet area of the hospital library for students to complete their tests and questionnaires in.

6. Instruct both the treatment and control group students to arrive at the hospital forty-five minutes prior to the scheduled start of the operation. Many changes were necessary at this point in order to accommodate successfully, the variety of scheduling needs of surgeons, nurses, and students.

When the two students arrived at the hospital they were given the following information:

1. Name of the surgeon who would be operating.

2. Description of the type of dress needed for the operating room.

3. Task description while being in the operating room: "To observe the surgical procedures."

4. Information about sterile areas to be avoided in the operating room.

5. Students were also instructed that, if they felt nauseous or ill at any stage, they were to notify the writer or the circulating nurse by signaling to either one for assistance. Students were also told that if they left the operating room they could return if they wished to, after they had recovered.

6. Upon completion of the operation or at the conclusion of one and a half hours, whichever came first, students were told they would leave the operating room, change clothes and proceed to the library to complete two questionnaires. Care was taken not to use the word "test," so as not to create unnecessary anxiety prior to the surgical experience.

One and a half hours were chosen as a suitable time for observation. It insured that students would not be unduly fatigued. In ten situations operations were shorter than the allotted time, and six were longer. When operations went beyond one and a half hours students were asked whether they wished to continue observing. If they did, the questionnaires were given before fatigue factors began to display themselves. In one case students returned to the operating room after completing the questionnaires because of their interest in the particular surgical procedure.

While being in the operating room, students were placed in positions where they could observe the operation from the best possible viewpoint. They were also given freedom to move around the operating room to secure better observational positions when their views were obstructed by the surgeon or the assistants.

The teaching approach of the surgeons varied. Two surgeons gave detailed descriptions of the procedures while the remaining four surgeons gave only outlines of the procedures. If the anesthesiologist or nurse volunteered any information about the procedure, it was insured that both students received the same information. The two students observed independently of each other.

After observing the surgical procedure, the two students and the author left the operating room and, after changing, went directly to the library. Any discussion about the details of the operation was discouraged at this time. In the library the students were handed the O.R.E., Form A and the A.S.P.Q., Form C and asked to complete them in that order.

The completed O.R.E., Form A was placed in an envelope and given to the surgeon for evaluation. The surgeon returned the forms in a stamped, self-addressed envelope. The A.S.P.Q., Form C was handed to the author. Students who were in the control group were invited to view the vignettes and experience procedures similar to those of the treatment group as described in Phase One.

Anxiety Measures

The measurement of anxiety associated with students' reactions to specific stimuli in the operating room was measured by the Apprehension to Surgical Procedures Questionnaire (A.S.P.Q.), Form C, developed by Coppola and

Cochran (1979). This form was adapted from two previous questionnaires, A.S.P.Q., Form A and A.S.P.Q., Form B which were given to medical students during their surgical clerkships to ascertain their reactions to specific stimuli in the operating room. The A.S.P.Q., Form C (Appendix B) elicited two specific types of information. It required the medical student to identify any unpleasant physiological or emotional reaction that he or she might have experienced in the operating room. It also required the student to identify specific stimuli that they were either physically or emotionally sensitive towards while they were in the operating room. Students were asked to circle one of the following categories: "didn't bother me," "bothered me a little," "bothered me a lot," "does not apply," for each of forty-two specific stimuli items.

An overall anxiety score for each student was computed by the following method:

A. Allocation of score for each item.

Category	Score
Does not apply	0
Didn't bother me	1
Bothered me a little	2
Bothered me a lot	3

B. Each item was totaled, so that a total score was obtained for each student.

C. The above score was divided by the total maximum score of applicable items: i.e., if there were 25 items applicable, then the individual's score was divided by 75 (25 x 3).

D. The resulting score was assumed to be an index of that student's reactions towards the operation he viewed.

The information elicited by the initial question inquiring about unpleasant physiological or emotional responses is referred to in the discussion and is summarized in Appendix C. Since there is no previous research in this area, it was not possible to use a more standardized test and consequently the questionnaire suffers from lack of reliability and validity data.

Learning Measures

Assessing the learning of medical students in the operating room is a complicated procedure since every operation is different. However, a test was devised by Coppola, Embleton and Cochran (1979) to assess the observational skills of the medical student during an operation. The test called the Operating Room Experience (O.R.E.) asked fifteen questions of the student who observed the operation (Appendix C). All of the questions except one required the student to write in his or her answers with only one question (Item Ten) being multiple choice in nature. Student pairs were given as much time as they needed to complete the O.R.E. and it was administered after the operation in the libraries of the two hospitals. The questionnaires, upon completion, were placed in an envelope and sent to the surgeon who performed the operation that the student observed. The surgeon was instructed to evaluate, in his opinion, which student performed better on the test. After assessing the test, the surgeons returned their evaluations and the test papers to the research team.

No names were placed on the test papers. Each student was assigned a number. The evaluations of the surgeons were given a numerical value. A grade of one was given to the student who performed better on the test while a grade of zero was given to the student who did less well. In situations in which surgeons could not decide which student performed better on the test another surgeon was asked to give a second opinion. When neither surgeon could decide between the students' responses, each student was allocated a rating of .5.

There was no research literature that could be found in helping to develop a test such as the O.R.E. and the test reflected the opinion of what the authors considered to be reasonable observations and information that a student could be able to observe and recall during and after an operation.

Stimulus Vignettes

Previous work conducted by Lazarus and Alfert (1964), Davison (1968), Birnbaum (1964), Nomikos, Opton, Averill and Lazarus (1968) and Wehmer (1966) had used films to study psychophysiological reactions to threat and stress. Kagan (1979) described the type of affect stimulus or stimulus vignettes that had been used in the teaching of I.P.R. He stated:

> In numerous I.P.R. sessions we observed that people feared behaviors which, in all likelihood, they would never be subject to. Clients often fear, for instance, that if they told their counselor or psychotherapist the truth about themselves, the counselor would walk out of the room in disgust.
>
> Teachers often fantasized that if they gave up too much control in the classroom chaos would follow. Medical students often feared being discredited or even mocked by patients because of their age and fallibility. . . . These interpersonal nightmares were often examined during recall sessions if the student was introspective enough and the counselor in the videotape interview stimulated the nightmare sufficiently, but it seemed to us that it might be possible to create a more reliable way of helping people face their interpersonal fears. It occurred to us that if we film actors looking at the camera lens (so the resultant image looks directly at the viewer) and portraying one of the more universal nightmares it might help students discuss and understand their interpersonal behaviors. A series of filmed vignettes were made. These were to be used for a wide range of subjects, so actors were instructed to portray the various types of affect with varying degrees of intensity but to avoid words which would give them a role or too specific a story. (p. 12)

In making the specific vignettes for this study there was need not only to create some of the worst interpersonal nightmares that a medical student might face in the operating room, but also to show stimulus vignettes of operations which focused upon blood, organs, use of surgical instruments and incisions. Appendix D gives a description of each vignette and the actual words spoken by the actors who played various medical roles in the vignettes designed to display some possible interpersonal nightmares of medical students.

Prior to making the vignettes, patients' permission was needed (Appendix C). In this study, the surgeon whose operation was being filmed obtained his patient's permission to be filmed. A sony color videocamera and videocassette recorder was used to videotape the operations. It was necessary to observe all sterile procedures with this equipment entering the operating room. This required the equipment to be sterilzied by wiping an antiseptic solution over all exposed surfaces of it.

Difficulties were experienced in achieving genuine color reproduction because of high intensity lights being used in the operating room. Special lights were used in videotaping operations. Nine hours of operations were videotaped and an edited videotape of twenty minutes displaying a resection aneurysm of the thoracic aorta was also included in the original "work tapes" from which the final vignettes were edited. Editing was completed on a Sony 2850 U matic videocassette recorder supplied by the Department of Osteopathic Medicine at Michigan State University.

Several actors were hired to play a variety of roles of doctors, nurses and a patient. Altogether ten interpersonal vignettes were produced. These showed a variety of situations such as a scrub nurse saying: "Now you've contaminated yourself. Don't touch anything. Stand there and don't move. Don't they teach you medical students anything?" And a surgeon saying, angrily: "Will you

hold still. I can't see what I'm doing. God damn it!" These ten vignettes were randomly sequenced into the other surgical vignettes and were divided into two packages of videotapes, each of sixteen vignettes with a space of thirty seconds between each vignette. The control of each vignette is described in more detail in Appendix D. Each package of vignettes is introduced by Dr. Norman Kagan, Professor of the Counseling and Personnel Department of the College of Education at Michigan State University. In the introduction, Dr. Kagan encourages students to become involved in the vignettes and to imagine that they are actually present in each case.

Design

This two-phase study was predictive in nature. In order to answer whether the treatment group would experience lower anxiety and higher learning than would the control group, the following design was diagrammed in Figure 3.2.

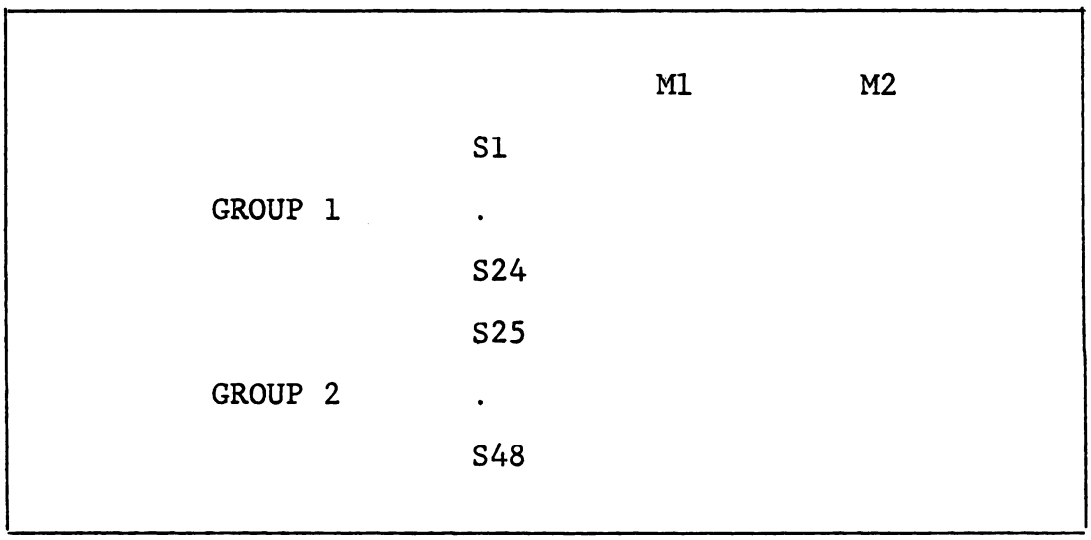

Figure 3.2.--Design Diagram for Anova

Where: S = Subject

Group 1 = Treatment

Group 2 = Control

M1 = Scores on O.R.E. test

M2 = Anxiety Score on A.S.P.Q., Form C

Experimental Hypotheses

I. The treatment group and the control group will not differ on their scores of performance in observing surgical procedures as measured by the Operating Room Experience (O.R.E.) test.

II. The treatment group will not differ from the control group in anxiety to surgical stimuli as measured by the Apprehension to Surgical Procedures Questionnaire, Form C.

Summary

Forty-eight students from the College of Oesteopathic Medicine and the College of Human Medicine were randomly allocated to treatment and control groups after being matched with regards to surgical experience, year of medicine and subsequent type of program. Twenty-four members of the treatment group were given four hours of viewing surgical vignettes and interpersonal interactions (in two by two hour segments) during which their heart rate, respiration and electrical skin conductance were monitored. Each subject was recalled using the I.P.R. method. The matched pairs from the treatment and control groups then observed an operation and were tested on their learning (O.R.E., Form A) and their anxiety level was ascertained by completion of a questionnaire (A.S.P.Q., Form C). Learning was assessed by the surgeon who compared the two responses. A two-way analysis of variance design was planned.

CHAPTER IV

ANALYSIS OF DATA

In this chapter the results of the study are presented. The data gathered are presented in descriptive form (Figure 4.1). The hypotheses are examined in light of the statistical analysis. Next, information gathered from the Apprehension to Surgical Procedures Questionnaire is given in rank order for the treatment and control groups (Figure 4.2). Individual responses and some trends in the data are examined and discussed.

Inspection of the means and standard deviations indicates that no significant difference existed between the two groups. Therefore the following null hypotheses cannot be refuted.

Hypothesis 1: The treatment group will not differ from the control group on scores of performance in observing surgical procedure as measured by the Operating Room Experience (O.R.E.) test.

Hypothesis 2: The treatment group will not differ from the control group in anxiety to surgical stimuli as measured by the Apprehension to Surgical Procedures Questionnaire, Form C.

A closer inspection of the data with reference to responses to the A.S.P.Q., Form C, revealed that the two

Table 4.1.--Descriptive Statistics for Surgical Test and Anxiety Questionnaire

	M1		M2	
	Mean	Standard Deviation	Mean	Standard Deviation
GROUP A	.5	.49	.43	.06
GROUP B	.5	.49	.41	.07

A = Treatment Group
B = Control Group
M1 = Operating Room Experience Test
M2 = Apprehension to Surgical Procedures Questionnaire

groups had similar fears concerning surgical stimuli. Table 4.2 displays the rank ordering of stimuli.

Cutting, incision and the helplessness of the patient are anxieties that both groups of students rate as high in their hierarchies of anxieties towards surgical stimuli. Analysis of individual items found that the treatment group expressed more anxiety about mutilation, retracting, touching organs, insertion of the urethral catheter, and the patient vomiting or retching, numerically more often than did the control group. None of these differences was statistically significant. However, they do show a trend towards the treatment group's being more apprehensive about the more invasive aspects of surgery than was the

Table 4.2.--Rank Ordering of Apprehension to Surgical Stimuli

GROUP A		GROUP B	
Rank	Description	Rank	Description
1	cutting	1	cutting
2	incision	2	incision
3	helplessness of patient	3	helplessness of patient
4	seeing patient under general anesthesia	4	unconsciousness of patient
5	unconsciousness of patient	5	blood
6	blood	6	seeing patient under general anesthesia
7	noise and sounds	7	cauterization
8	cauterization	8	intubation
9	mutilation	9	presence of I.V.'s
10	retracting	10	needles

Where Group A = Treatment Group
Group B = Control Group

control group. Students were asked, while they were in the operating room, whether they had any unpleasant physiological or emotional reaction to the experience. Thirteen subjects in the treatment group expressed some reaction while twelve subjects in the control group reported that certain aspects of the surgery concerned them. Appendix G summarized the individual responses of the subjects.

Summary

The results of the two research hypotheses were presented in this chapter. The first hypothesis, that the treatment group and control group will not differ on their

scores of performance in observing surgical procedures as measured by the Operating Room Experience (O.R.E.) test was supported. The second hypothesis, that the treatment group will not differ from the control group in anxiety to surgical stimuli as measured by the Apprehension to Surgical Procedures Questionnaire (A.S.P.Q.), Form C was also supported. These conclusions were based upon inspection of the means and standard deviations in each case. The means indicated that no significant difference could be expected between the groups for either hypothesis. Rank ordering of both groups' reactions to surgical stimuli displayed that they experienced similar anxieties about being exposed to a variety of stimuli in the Operating Room. Examination of individual items suggested that the treatment group exhibited more anxiety with regards to invasive surgical procedures, but that the differences here too were clearly statistically non-significant. Individual reactions are summarized in Appendix G.

CHAPTER V

SUMMARY, CONCLUSIONS, DISCUSSION, AND IMPLICATIONS

The observations of Coppola and Cochran (1979) that at least thirty percent of medical students to some extent were distressed by surgical procedures served as the starting point for the present study. This study attempted to help medical students learn more from surgical procedures by sensitizing them to their own reactions to surgery. This sensitization was to be achieved by showing them vignettes of surgical operations and interpersonal situations that might occur in the operating room. As the student watched the vignettes a videotape recording was made, using split screen technology, of the student, the vignette being viewed and the printout of the student's heart rate, respiration and skin conductance. Reactions and responses of the student were inquired about by a person trained in the inquirer role using the Interpersonal Process Recall (I.P.R.) method developed by Kagan (1975). The study was based on several theoretical constructs of Freud (1927), Horney (1939), and Wachtel (1977). Anxiety was viewed as a complex amalgam of the intrapsychic perceptions, thoughts and feelings of the individual as well as the psychobiological response processes that mediate between stressful

stimuli and emotional responses of the individual. Such universal threat and anxiety have strong autonomic effects upon the individual's bodily functioning as well as on learning. Mandler and Sarason (1952) and Spielberger (1966) provided the basic studies on learning and anxiety and enabled the prediction to be made that learning in the operating room would be greater in the group whose anxiety level had been lowered by a sensitization process than it would be in a group who did not undergo such an experience. It was also predicted that the group experiencing the sensitization approach using the I.P.R. method would be less anxious towards surgical procedures and stimuli.

During the summer of 1979 forty-eight student volunteers from the College of Human Medicine and the College of Osteopathic Medicine at Michigan State University were matched with regards to year of medical training, the specific type of training they received and their experience with surgical procedures. The students were then randomly assigned to treatment or control groups. A series of thirty-two vignettes depicting surgical procedures and interpersonal situations designed to involve the student were shown to the treatment group of twenty-four over a period of two sessions, each of two hours duration. The students' skin conductance, heart rate and respiration were recorded on videotape in order to provide feedback to subjects about their bodily reactions to surgical stimuli and interpersonal interactions. The method of recall is

described by Kagan (1975). Both groups then experienced an actual surgical procedure at a hospital for approximately one and a half hours. At the conclusion of each operation, subjects were evaluated on two tests. The Operating Room Experience test (Coppola, Embelton, and Cochran, 1979) is purported to measure how well each student learned in the operating room while the Apprehension to Surgical Procedures Questionnaire (Coppola and Cochran, 1979) was designed to assess the anxiety level of students towards specific surgical stimuli.

The results of the study indicated that there was no difference between the groups on learning performance or the anxiety measure. The analysis of data was by visual inspection of the means and standard deviation of the scores of both groups.

Conclusions

1. There is no significant difference between treatment and control groups in learning about surgical procedures as measured by the Operating Room Experience (O.R.E.) test.

2. There is no significant difference between treatment and control groups in anxiety towards surgical stimuli as measured by the Apprehension to Surgical Procedures Questionnaire (A.S.P.Q.), Form C.

3. The data collected from subjects' responses on A.S.P.Q., Form C, suggest that:

(i) The two groups displayed, by ranking of stimuli, that they are disturbed by similar stimuli in the operating room.

(ii) Fifty percent of the total number of subjects reported that they had experienced some unpleasant physiological reaction to the surgical procedure they observed.

Discussion

It should be affirmed at the beginning of the discussion that the study suffered from a scarcity of previous research and, consequently, there were few guidelines on which to develop ideas, especially with reference to measurement devices. The discussion that follows is focused upon some of the problems and concerns that were encountered in the study, in an attempt to understand the possible meanings of the non-significant results. Four areas are discussed: (i) the treatment factor; (ii) the operating room experience; (iii) instrumentation and measurement; and (iv) sampling procedures and subjects' responses.

One of the first areas of concern is the impact of the treatment upon the subjects. The studies of Freud (1927, 1933) and Horney (1945) conceptualize the pervasiveness of anxiety, while Wachtel (1977) and Lazarus (1966) focus upon the way in which cues and stimuli and the appraisal of such affect anxiety. Given these studies, it could be maintained that a treatment of four hours of sensitization to

anxiety-provoking stimuli and one and a half hours of exposure in the operating room was insufficient to effect such basic and aversive reactions to surgical stimuli and the whole nature of surgery which is viewed as an aggressive act. Previous studies using the I.P.R. method have found significant differences between treatment and control groups, but usually in counselor training programs of at least 20 hours and more often 50 hours duration.

However, given the type of attitudes and reactions that were to be affected in this research, it is entirely feasible that such a time exposure is too limited. However, once more time is required, more financial support is needed in order to acquire the services of skilled inquirers and operators of equipment and a greater commitment by the students who are already engaged in a time-consuming program.

The novelty of this study using surgical stimuli and interpersonal stress events in surgery evoked other forms of anxiety which were not necessarily the major interpersonal fears and anxieties that are experienced in human interaction as defined by Kagan (1975). There is a trend from the data collected from subjects' responses on A.S.P.Q., Form C, that the treatment group may have been more apprehensive towards the invasive aspects of surgery than was the control group.

It is possible that the treatment approach increased the anxieties of the treatment group. Whereas, in

desensitization, techniques such as those demonstrated by Wolpe (1961, 1976) and Paul (1966) inhibit the anxiety, the sensitization process used in this study is based on the awareness of the subject's fears and fantasies towards surgical stimuli and interpersonal events such that these fears and fantasies are able to be understood and no longer feared. It is indeed possible that treatment subjects in this study, being aware of their anxiety, manifested this anxiety in a variety of bodily reactions which actually inhibited their observation skills and cognitive functioning.

The inhibition of observational skills and cognitive functioning was not reflected in the scores of the treatment group when compared to the control group. Another phenomena may have been present. Students in the treatment group could have been at various stages of sensitization towards surgical stimuli and interpersonal stress events. Some of the students' anxiety may well have been increased and performance on cognitive tasks would have been less than that of students whose anxiety was lowered by the treatment process. Within the treatment process itself, various levels of anxiety may have been reached. Perhaps a necessary stage towards humanization of one's attitudes towards surgery required an individual to experience anxiety which, on a short term basis, could be dehabilitating especially on performance tests.

One major difficulty in developing the treatment method was the creation of life-like vignettes. Considerable difficulty was experienced in obtaining the colors of vignettes to reflect accurately the variety of colors experienced in the operating room. This difficulty in obtaining good color reproduction was in part due to the lighting of the operating room as well as to a lack of money which, if available, would have secured better equipment and more highly skilled personnel. A number of students expressed disappointment that the vignettes themselves were not life-like enough. Another concern was that they were too short and did not allow sufficient time for students to orientate themselves to the particular part of the anatomy where the operation was being performed. Still other students commented that the emotional tone and intensity of the actors did not convey accurately the way that such a situation would be handled in the operating room. Even though research cited previously that films could have high emotional impact (Aas, 1958; Nowlis, 1953; Schwartz, 1956), it is debatable that, in this particular study, actual viewing of the surgical vignettes even approximated the observing of a surgical procedure in an operating room where a different world of sights, sounds, smells, and human interaction is found. If this assumption is correct, then it would seem that some other method needs to be developed if sensitization to surgical stimuli is to be considered as a useful approach in preparing medical

students for surgery. One such approach could be to use the training method that Lucas, Ledgerwood and Walt (1973) used at Wayne State University where medical students are videotaped in the emergency room. A similar procedure could be used with students in the operating room and play-back could be used after the experience using the I.P.R. method.

One of the greatest difficulties in the study was the subjects' observing the surgical procedure. Apart from the need to keep the observations of the paired students independent, there were twenty-five out of forty-eight students who experienced unpleasant physiological reactions. Of that number, eight students from the treatment group and five students from the control group had to leave the operating room because of such strong physiological reactions that, in each case, they claimed feeling as if they would faint or vomit. All thirteen students returned to the operating room after they were sufficiently relaxed. A variety of reactions of students to the surgical operations is presented in Appendix G. Several students, apart from describing their physiological responses, mentioned the invasiveness of surgical procedures, the crudeness of techniques, and identification with the patient. Observations of the students during the time in the operating room seemed to indicate that students experienced an increased degree of anxiety prior to the commencement of surgery and during the initial incision. Such observations tend to

support the study of appraisal and anticipatory aspects of threat as conducted by Lazarus, Speisman, Mordkoff and Davison (1962), Birnbaum (1964) and Speisman, Lazarus, Mordkoff and Davison (1964). Based on these observations, there is little doubt that the "in vivo" exposure increased anxiety much more than did watching the surgical vignettes. This observation supports the work of Cooke (1966), Ritter (1968), and Sherman (1972), who found that "in vivo" exposure was a superior technique to laboratory desensitization because of its realistic setting and ability to elicit more directly the anxiety associated with the stimuli.

It should be noted that, once the initial incision was made and the surgeon had entered the body, it seemed that the subject's anxiety appeared to be less apprehensive. This phenomena was also reported by observers during the recall session. The vignettes that anticipated surgery or the actual incision seemed to promote more anxious responses. Reviewing the physiological printouts of the subjects' heart rates, respiration and skin conductance during these vignettes, it seemed that the activity of these functions was highest at those times of incision or anticipation of surgery. When the surgeon was probing and exploring the body, the physiological activity seemed to decrease. Similar observations and patterns were discovered in current research by Embelton, Kagan, Coppola, and Cochran (1979). One further observation during the operating room experience of the study is noteworthy.

Students seemed to be more distressed by operations that involved the face, the nose, or ears rather than other parts of the body. One interpretation of such reactions is that these specific stimuli are more visually accessible and, perhaps, even more prized than other parts of the body, hence anxiety was heightened. The same reactions were noted for masectomies and operations or procedures in the genital region.

Instrumentation and measurement in this study posed difficulties. It was hypothesized that if students had lower anxiety they would achieve better on a performance test than would those whose anxiety had not been lowered. Since this study represents a new avenue of investigation, no previous tests could be found. The use of other tests might have provided some degree of reliability and validity which was not present in the measurements used (O.R.E., Form A, and A.S.P.Q., Form C). Perhaps, rather than assessing anxiety and performance, it could have been more appropriate to assess self and interpersonal awareness in the operating room. It is possible that the treatment highlighted awareness of self and others but the study assessed only cognitive performance and anxiety elicited by stimuli. Several subjects in the treatment group questioned the validity of testing them on cognitive details and observations, claiming that we "taught" them to be sensitive to their own bodies and physiological responses. The treatment might have been powerful in increasing

personal and interpersonal awareness but did nothing to lower one's anxiety responses or increase one's cognitive performance.

Another defect of the O.R.E., Form A test was the lack of multiple-choice items. This made it necessary for students to write their observations and responses to the questions. Consequently, those students who possessed better written expression could be seen to be performing at a higher level than those who wrote down the barest minimum in their responses to each question.

A major difficulty in the research was that of maintaining equal surgical experience between matched pairs of subjects. Previous exposure to surgery seemed to enhance the students' ability to perform better on the test, since they were more alert and looked for and understood surgical procedures and preparations. Four students were inappropriately paired on the surgical experience dimension. One student in the treatment group and one in the control group had failed to define their surgical experience fully on the original application form. The other two were in the control group and had experienced several operations prior to starting the study and after being selected for the study. This study sought students who had no previous experience in surgery. Over seventy-five percent of students had experienced surgical procedures of some description prior to the commencement of the study.

Anxiety manifested itself in a variety of physiological responses--in the tendency to look away from the operating field and in "nervous" talk before the operation. These responses were equally distributed between treatment and control groups, except for the physiological responses which seemed to be more acute with the treatment group subjects. Such a trend could indicate that sensitization to one's own physiology was at least occurring in some students. However, the manifesting of anxiety in the operating room could have another source not previously discussed. Observations of surgical procedures could be more anxiety provoking for some subjects than actual involvement. Perhaps merely observing creates feelings of helplessness and impotence in some students. This anxiety might be sufficiently discharged by the performance of some surgical task. Once the student begins to perform a task, however, it is possible to postulate that performance anxiety manifests itself, especially if the student is being evaluated by the surgeon or his peers. In part, the O.R.E., Form A test could have promoted academic performance anxiety on the part of some students. Again, observation would indicate this type of anxiety present. About sixty percent of students expressed a desire to know their "grade" on the test while at the same time offered reasons for not achieving to the best of their ability.

Implications for Future Research

The inconclusiveness of the results indicates that a replication of the study is needed. However, before a replication is undertaken there are several suggestions that can be made in order to improve the overall design of the study. The sample needs to consist of students who have not had surgical experience. The vignettes need to be more realistic in color reproduction and in the expression of the actors, and the time exposure for each needs to be longer, with perhaps more graphic surgical operations such as those on hands and eyes and amputations included. The information recorded on the physiological indices should be kept for examination, and this might provide useful data with regards to responses to specific vignettes. The students need to be exposed to a wider variety of surgical procedures and assessed at the conclusion of each one. If it was possible for students to "scrub-in" on each surgical case, rather than merely to observe, then the immediacy of the event might produce more dramatic responses and enable the two groups to be more clearly defined. It is important that research time and effort be spent on developing a new research instrument which explores the individual's self and interpersonal awareness to surgical procedures. The existing tests used in the study need further refinement. A replicated study could assess an individual's self and interpersonal awareness more accurately. It would seem that little can be

gained at this time by exploring the relationship between anxiety towards surgical procedures and performance in learning about those procedures.

This study did not affirm the value of studying one's own physiology or the whole process of sensitization using I.P.R. One area of research could be the comparing of the process of sensitization as opposed to the process of desensitization. Still another area of investigation could be the comparing of the I.P.R. process using the subject's physiological reactions and using the I.P.R. process without any current physiological feedback. Yet another area is the use of the videotape in the operating room and playback using the I.P.R. method of supervision. Throughout this study it was felt that more treatment time was necessary in order to successfully affect any change in a student's reactions to these universal fears and anxieties associated with surgery. All these studies require effective outcome measures, and it is to this task that future research must direct itself if significant results are to be obtained.

Still another area of research that has grown out of the study is the examination of the physiological responses of surgeons in an attempt to discover whether they differ physiologically from other medical specialists. Perhaps this might promote further investigation of personality characteristics of surgeons in various specialties. This area could provide useful information and test the

stereotypic responses of students towards surgeons, as well as to help us understand the characteristics of successful surgeons.

Physiological data of students could be used much more in future research. In this study the students' physiological printout was given to the students. If this information was kept, a more detailed analysis of individual vignettes could be studied. It might be possible to identify emerging, common patterns of students' physiological activity as they responded to vignettes of either an interpersonal or surgical focus.

Present work being conducted by Cochran (1979) involves the teaching of students about surgical practices and what to observe as well as displaying ways to overcome physiological reactions in the operating room. Such an approach could be added to the existing treatment method and might increase the power of the treatment effect.

At the time of writing this research a replication of the study is being undertaken by Russell Hogan under the supervision of Dr. Kagan, in the Department of Counseling, Personnel Services and Educational Psychology, Michigan State University. No results of the study are as yet available.

The study did not demonstrate the value of medical students studying their own physiological reactions. However, neither did the study investigate a "sleeper" effect. Medical students who participated in the treatment

group might at some future time be better able to cope with interpersonal and physiological stress situations in the operating room. This type of delayed effect in learning can be seen to some extent in the comments of students in their theory of self (Appendix F) which they were asked to write after the first treatment.

This study has been highly exploratory in nature. More research in this area of medical interaction is certainly needed to answer the basic questions which stimulated this study.

APPENDICES

APPENDIX A

ASPQ - FORM C

APPENDIX A

Number _____

ASPQ - FORM C

1. While you were in the OR, did you have an unpleasant physiological or emotional reaction to the experience?

   _____ YES Go to No. 2

   _____ NO Go to Page 2 of this questionnaire.

2. Describe the reaction(s) that you had.

3. What specific sights, sounds, or events made you feel that way?

The purpose of this questionnaire is to identify things that you were sensitive to while you were in the Operating Room. This sensitivity may have manifested itself by a physical or emotional response. Using the rating scale, check the box which best represents how much you were bothered by each stimulus. There are some stimuli below which you may not have encountered during this operation. If that is the case, please check "did not apply".

		didn't bother me	bothered me a little	bothered me a lot	does not apply
1.	sewing	☐	☐	☐	☐
2.	cutting	☐	☐	☐	☐
3.	shaving	☐	☐	☐	☐
4.	applying bandages	☐	☐	☐	☐
5.	cauterization	☐	☐	☐	☐
6.	expression of pain	☐	☐	☐	☐
7.	wearing scrub suit	☐	☐	☐	☐
8.	intubation	☐	☐	☐	☐
9.	unconsciousness of pt.	☐	☐	☐	☐
10.	insertion of IV	☐	☐	☐	☐
11.	death of a young patient	☐	☐	☐	☐
12.	nakedness	☐	☐	☐	☐
13.	prepping the skin	☐	☐	☐	☐
14.	blood transfusion	☐	☐	☐	☐
15.	mutilation	☐	☐	☐	☐
16.	smell	☐	☐	☐	☐
17.	surgical instruments	☐	☐	☐	☐

		didn't bother me	bothered me a little	bothered me a lot	does not apply
18.	amputation	☐	☐	☐	☐
19.	removing bandages	☐	☐	☐	☐
20.	surgeon's expression of anger	☐	☐	☐	☐
21.	monitors	☐	☐	☐	☐
22.	touching organs	☐	☐	☐	☐
23.	noise or sounds	☐	☐	☐	☐
24.	death of terminally ill pt.	☐	☐	☐	☐
25.	presence of IVs	☐	☐	☐	☐
26.	needles	☐	☐	☐	☐
27.	scrubbing	☐	☐	☐	☐
28.	surgeon making disparaging remarks	☐	☐	☐	☐
29.	incision	☐	☐	☐	☐
30.	blood	☐	☐	☐	☐
31.	retracting	☐	☐	☐	☐
32.	pt. vomiting or retching	☐	☐	☐	☐
33.	induction of anesthesia	☐	☐	☐	☐
34.	helplessness of pt.	☐	☐	☐	☐
35.	pus	☐	☐	☐	☐
36.	seeing pt. under general anesthesia	☐	☐	☐	☐
37.	injections	☐	☐	☐	☐
38.	death of chronically ill patient	☐	☐	☐	☐

		didn't bother me	bothered me a little	bothered me a lot	does not apply
39.	insertion of urethral catheter	☐	☐	☐	☐
40.	tremor of surgeon's hands	☐	☐	☐	☐
41.	wearing sterile gown/ gloves	☐	☐	☐	☐
42.	death of elderly pt.	☐	☐	☐	☐

APPENDIX B

OPERATING ROOM EXPERIENCE

APPENDIX B

Number _____

OPERATING ROOM EXPERIENCE

Complete the following questionnaire based on your observations in the Operating Room. Please do not discuss any of these questions with any other students who are participating in the project. Results of the test are for research purposes only.

1. Approximate age of the patient. _____

2. Sex of patient FEMALE MALE

3. Skin colour of patient _____

4. What type of operation did you you observe? (If you do not know the scientific name, describe in your own words).

5. Name in order of occurrence, the procedures done to the patient from the time of entry into the OR until the incision was made.

6. Was an endotracheal tube used?

7. Where was the incision made?

8. What was the length of the incision?

9. What anatomical parts were exposed during the operation?

10. Which of the following instruments were used during the operation? (Circle)

A.	scalpel	G.	Metzenbaum scissors
B.	clips	H.	double forceps
C.	Kelly's clamp	I.	tonsil suction
D.	self-retaining retractor	J.	extractor
		K.	Bovie
E.	Cochran's catheter	L.	Deaver retractor
F.	right-angle clamp		

11. Was blood transfusion necessary? YES NO

If yes, how many units? _____

12. List as many steps in sterile techniques that you observed before and during the operation.

13. Were there any unexpected findings during the operation?

14. Were there any complications during the operation?

15. How many people assisted A) in the Operating Room_____

B) at the Operating Table_____

APPENDIX C

PERMIT TO PHOTOGRAPH

APPENDIX C

401 WEST GREENLAWN, LANSING, MICHIGAN 48910 (517) 371-2121

INGHAM
MEDICAL
CENTER

PERMIT TO PHOTOGRAPH

I, _____, a patient at Ingham Medical Center, Lansing, Michigan, do hereby consent to permit the said institution or its appointed representatives to make photographs of my person, or videotape with sound recording.

I, _____, parent or legal guardian of _____, a patient at Ingham Medical Center, Lansing, Michigan, do hereby consent to permit the said institution or its appointed representatives to make photographs of my child or ward, or videotape with sound recording.

I consent to this photographic/recording procedure, with the full knowledge that the institution is empowered to utilize this material for the purposes of public dissemination in connection with public relations, news interests, and/or medical education purposes.

I further release said institution from any and/or all liability that might be incurred through utilization of said photographs, or videotape with sound recording.

Signed _____

_____
(address)

Date _____ _____

Witness _____

APPENDIX D

SURGICAL VIGNETTES

APPENDIX D

SURGICAL VIGNETTES FIRST PACKAGE

Introduction:	Dr. Norman Kagan
Vignette One:	Operation in progress (buttocks)
Vignette Two:	Operation in progress (buttocks)
Vignette Three:	Resection aneurysm of thoracic aorta.
Vignette Four:	"Now you've contaminated yourself. Don't touch anything. Stand there and don't move. Don't they teach you medical students anything?"
Vignette Five:	Inserting indotracheal tube.
Vignette Six:	Preparing breast for needle.
Vignette Seven:	"Will you hold still? I can't see what I'm doing. God damn it."
Vignette Eight:	Resection aneurysm of thoracic aorta.
Vignette Nine:	Operation in progress.
Vignette Ten:	"Oh you really thought it went well . . . so that was your opinion. Who do you think you are? This was your first time in the operating room. What a nerve."
Vignette Eleven:	Operation in progress.
Vignette Twelve:	Kidney transplant.
Vignette Thirteen:	Sutering
Vignette Fourteen:	"How long will it take for the operation, Doctor? When will I know the results?"
Vignette Fifteen:	"I'm sorry, he died before we could begin to operate. I'd like you to go with me to tell the family."
Vignette Sixteen:	Incision.

SURGICAL VIGNETTES SECOND PACKAGE

Introduction:	Dr. Norman Kagan
Vignette One:	Operation in progress (buttocks)
Vignette Two:	Operation in progress (thyroidectomy)
Vignette Three:	Resection aneurysm of thoracic aorta.
Vignette Four:	Inserting catheter.
Vignette Five:	"That surgeon is a son of a bitch. He treats you like shit. The way he snaps his fingers and gives orders. I hate his guts. Wouldn't you agree?
Vignette Six:	Needle inserted into chest.
Vignette Seven:	Preparing the patient.
Vignette Eight:	"This time dear don't lower your hands below the table."
Vignette Nine:	Incision
Vignette Ten:	"Well what do you think this is? You think that's the pancreas?" (Laughter)
Vignette Eleven:	Operation in progress
Vignette Twelve:	Resection aneurysm of thoracic aorta.
Vignette Thirteen:	"Well folks, are we ready? Oh you're the student. Well, sweet young thing, you think you're up to this?"
Vignette Fourteen:	Suturing
Vignette Fifteen:	"You did really well for your first time. Are you glad it's over?"
Vignette Sixteen:	Incision.

APPENDIX E

MEMORANDUM - APPLICATION

APPENDIX E

MICHIGAN STATE UNIVERSITY

Department of Surgery . B437 Clinical Center
(517) 353-8730 East Lansing - Michigan - 48824

3 May 1979

M E M O R A N D U M

TO: FIRST AND SECOND YEAR STUDENTS IN MEDICINE AND OSTEOPATHY

FROM: Edward D. Coppola, M.D. and Norman Kagan, Ph.D.

In the hope of improving the surgical experience for medical students, we intend to offer, over the summer period, a unique and exciting opportunity for students to prepare for their surgical clerkships or preceptorships. Basically this preparatory learning experience will require the following time commitment sometime between 11 June and 18 August:

A. Approximately four hours of viewing surgical films and then reviewing and recalling a videotape of your reactions to the films.

B. Approximately two hours of actual surgical experience in the operating room at Ingham Medical Hospital.

In both situations, ongoing psychophysiological responses will be monitored. At the conclusion of the surgical operation a short questionnaire will be given.

If you are interested, please fill out the following information and return the completed form to:

EDWARD D. COPPOLA, M.D.
B437 CLINICAL CENTER
DEPARTMENT OF SURGERY
MSU CAMPUS

By 11 MAY 1979 Phone 355-5450

(please print) PRE-SURGERY EDUCATION PROJECT

A. NAME: AGE: MALE/FEMALE
B. ADDRESS: ZIP CODE:
PHONE #:

C. PLEASE CIRCLE YEAR AND PROGRAM

FIRST YEAR SECOND YEAR MEDICINE OSTEOPATHY

D. PREVIOUS HOSPITAL AND MEDICAL EXPERIENCE

1. Self as patient in surgery
2. Assistant in operating theater
3. Assistant in childbirth
4. Had close relative of immediate family involved in a significant period of hospitalization
5. One or both parents are medical practitioners
6. Assistant in helping patients in hospital after surgical operation
7. Other previous clinical medical or surgical experience - please describe:

MY BEST TIMES DAILY (8:00 a.m. - 8:00 p.m.) BETWEEN 11 JUNE AND 18 AUGUST ARE:

(specify times) SUNDAY MONDAY TUESDAY WEDNESDAY

THURSDAY FRIDAY SATURDAY

RETURN: EDWARD D. COPPOLA, M.D.
B437 Clinical Center
Department of Surgery
MSU Campus BY MAY 11TH

APPENDIX F

QUESTIONNAIRE

APPENDIX F

MICHIGAN STATE UNIVERSITY

College of Education . Department of Counselling
Personnel Services and Educational Psychology
East Lansing - Michigan - 48824

MEMORANDUM

TO: Participating Students

FROM: Norman Kagan, Ph.D.
Professor

Thank you for coming over. We hope that these sessions will be worth the time you put into them. As I mentioned to you, we are trying to determine if the experience is useful enough to be made a regular part of the curriculum and if so, what format is most effective.

At this point can you give us any suggestions for improving the session?

How could it have been made more useful to you?

Were there any parts which were especially helpful?

Were there any parts which were not helpful?

After you have experienced each lab session we would like you to review the experience and write a theory about your own unique patterns. Did any of the vignettes especially "get to you"? Did you find yourself blocking out, attempting not to hear any of the messages? Did any of the messages sadden you? Did any of them make you angry? Most important, do you see any pattern in the types of reactions you were having? Some thoughts which might help structure your work are: What was your immediate reaction to each vignette? At what point in each vignette did you come to a decision or develop an emotional reaction? What did you do during the brief rest period after each vignette? Did you react differently to pleasurable than to unpleasurable vignettes?

Would you take a few minutes to write any patterns you observe about your own behaviors (the above list is only suggestive of a possible place to begin). I would be most grateful if you could leave me a copy of your "self-theory," but I certainly will understand if you prefer not to share your self-theory statement. If you'd like to get together to discuss any of your observations about yourself, please do not hesitate to contact me at the office (355-3271) or at my home (332-7880).

THEORY OF SELF

The following reports are samples of the "theory of self" that the treatment group students were encouraged to write between recall sessions.

STUDENT COMMENTS:

The response pattern which I consider significant is the one I get (or got) after each vignette where I was reprimanded. After vignette four, which I concluded was a reprimand by a nurse, there is a deep breathing by me. This is a manifestation of anger, I believe. In any case I was angry at the nurse. However, my anger was less than that after vignette seven. In vignette seven I felt I was being reprimanded by a physician, or surgeon, which was more of stronger caution words than those by the nurse. I felt more threatened and anxious from the doctor's reprimand than from the nurse's. Hence my response, the deep breathing takes a longer time to come and when it comes, it is even deeper.

On the vignettes in which an operation was in progress, I watched with appreciation and admiration. Since this is what I kind of anticipated, responses were not very significantly different from the normal, if any.

My response to the above request may be a little irrelevant; however I find it very significant in terms of my own developing attitude. My self-theory hovers around inter-personal relationships.

I find myself sandwiched between the apparently covert professional and personal antagonistic attitudes of the doctors (surgeons) and the nurses. Each one of them is trying to draw me into the conflict and onto his side, more so the nurse. The doctor seems not to care much whether I am on his side or not, maybe he is assured by my aspirant profession. The nurse on the other hand does so because she may be feeling that at this stage in my training I could understand and accept her position so as to minimize this apparent antagonism in future. Since she feels in a weaker position, she is amenable to recruiting to her side for support. Again she is caught up in a dilemma since I feel there is an underlying wish by her to revenge and I am the most vulnerable at this stage.

For my own safety then I choose to remain a little ambiguous as far as she is concerned.

Vignette 1-3:
- I believe I did experience a slight shock at first - it's been about a year since I've seen any surgery.
Vignette 4:
I felt bothered by this one; in particular the lack of understanding.

Vignette 6:

I thought a mastectomy was going to be performed and for some reason I didn't want to see it.

Vignette 7:

What an asshole!

Vignette 10:

Ho-Hum, another day in the life of a greenhorn med-student!

Vignette 17:

I was thinking of what to say - this is a tough one. I don't like to give false hopes but too much bad news might even be worse.

Vignette 15:

This one brought back some bad memories; I'm trying to figure out how to handle these particular situations.

1. I notice that I "got used" to watching the scenes - the last ones didn't disturb me as much as the first ones.
2. Also, the scenes I thought were disgusting (like the suturing and the older woman bitching out the person for venturing an opinion on the operation - #10) <u>didn't</u> register as much of an emotional response <u>or</u>, apparently, of a physiological response, as did others.
3. Got <u>very</u> anxious during the rest periods - they were so long - and usually I'm very patient! That surprised me. I think it's because I didn't know what to expect, and I was afraid of what I'd see. The scenes were nowhere

as bad as they could have been, and didn't bother me much at all. See, I'm anxious about surgery - I don't like the idea of it at all. But I believe I can go through it now. Doesn't seem to be so bad after all, and that feels good!

In general, I was very interested in the surgical vignettes. I viewed them as if they were an educational situation. Since I am currently interested in going into a field of surgery they were most interesting.

During various "communication" vignettes I really found myself as the one being spoken (or yelled at) to. Many of these situations were quite plausible. I felt some frustration in "goofing up" when I had "contaminated myself" or was not "holding still". I do have some fears related to these situations when and if they arise but by becoming involved, as I have viewing these 14 vignettes I felt better prepared to face the eventual reality.

Regarding the patient asking me how long will the operation take and how long for results, I believed I could respond to this patient in a reassuring manner. I have a feeling for what he is going through and would do my best to help alleviate his anxieties, etc.

Regarding the patient dying prior to surgery, I found this the most distressing for me. How would I react, what will I say etc. to the family - how will they react to me? It

may be a dilemma that will solve itself only when the situation arises - this vignette has at least presented me to an eventual situation and I have taken thought to it.

I've had experience as a cardiac catheterization technician, which is an OR procedure. Though I have apprehensions about surgery, it was a realization that I am familiar and competent in a number of areas the vignettes touched on (e.g. suturing, betadine scrub, inserting endo tracheal tube). Those vignettes gave me a feeling of "I remember that" and re-established some feelings of confidence.

Two patterns emerged in my talks with the facilitator. The first one is a longstanding technocrat-humanist issue. It is much easier for me to get involved in the technical procedure when I'm not confronted with the identity of the patient. Vignettes showing surgical areas elicited an interest in the procedure. When I have time to reflect on the person involved and the ramifications of surgery for that helpless person, I begin to have trouble. This is a struggle for me in medicine in general - I want to maintain my humanism while being competent. Surgery is the epitomy of this struggle because the patient is anesthesized and it's easy to become a technician when I had a well defined responsibility in these situations, I could have a

role in the procedure which was important to helping that person; competence was helping the person and the issue resolves. As a medical student, I am mostly an observer. This gives me time to think about the patient and the ramifications of surgery - sweaty palms, warm flushes, etc.

Powerlessness was an emotion I felt in vignette 7 and 15. Powerlessness as a medical student to yell back at a surgeon, or to say anything which won't endanger your position as being there to learn. Powerlessness is #15 to say "no - I'm not comfortable with that", or "I would like a choice". Some of the dynamics of being a female medical student are inherent in this issue for me. "Typical male surgeon" yelling at me, and me $\bar{c}$ no recourse. When talking to the facilitator it felt to me like a man yelling something at me on the street, and my not being able to say anything appropriate enough back.

Also, incisions bother me. The thought of an amputation, trauma surgery - my greatest fears regarding surgery. The wholeness and sanctity of the individual seem to be important to me. I think that's why I am especially struck by incisions, etc.

One consistent pattern that developed throughout the tapes were my reactions to the "first cut" in any surgical procedure. I felt uneasy, and this was expressed in the physiological parameters measured. This occurred during

either this final prep or the actual initial cut. The reason for this remains obscure as I can't think of any personal past experience for this emotional reaction. Part of it may be culturally induced but more likely it is just the thought of creating a wound in a once whole part even though rationally you know it is for the patient's good. It is interesting to note that at times even in a highly refined technical procedure like surgery the emotional components are competing with the rational components in my early learning stages in medicine.

It was also interesting to note my physiological reactions to the scenes where either the nurse or doctor was yelling or putting me down. Here even though I reacted physiologically, I didn't feel a response emotionally, so in this case my rational component was able to keep in check the underlying emotional component.

The one in which they were preparing the breast for a needle startled me. I thought when I first viewed it that the betadine was blood from her neck.

At the beginning of each the sudden beginning of the film startled me somewhat, and I am sensitive to unexpected noises and I jump rather easily when exposed to them. Sometime when anticipating them I do as well. I think I reached my decision or found my opinion of each near the

end of or just after they had finished. During the rest I took a deep breath and relaxed.

The only pattern that changes is the G.S.R. and I feel that again due to the sudden noise and also to my attempt to remain still that it steadily increased.

Between the vignettes I find myself doing a sort of self-relaxation so as to prepare myself for the next one. I do this in real life when under stress and in anxiety - provoking situation. I am more bothered by confrontation situations than by anything that I might see (e.g. intestines, blood, etc.).

APPENDIX G

SUMMARY OF TREATMENT AND CONTROL GROUP REACTIONS TO SURGERY

APPENDIX G

SUMMARY OF TREATMENT GROUP REACTIONS TO SURGERY

(Question 2 A.S.P.Q. Form C - Appendix A)

Note: Number after comment is the code number of students.

Describe the reaction(s) that you had.

- Pre-syncope (#30)

- Mostly feeling of uneasiness or anxiety at moments - mainly from events listed on following page.
  The patient being complete under - feeling nothing now - but kept thinking how she would feel this afternoon and in the following week.
  Felt anxious about how long she was open - almost like everything would dry up or go stale.
  People walking in and out of rooms, doors open, felt like everything was pouring into her open abdomen (#24)

- Weak, cold sweat, and short of breath (#38)

- Began to feel light headed - Fought the feeling for several minutes -
  A weakness in my upper arms spread down to hands and legs - felt a little shaky and like I might black out - skin felt cold and clammy (#18)

- Warm, sweaty, nauseated (#28)

- Light headed, nausea, sweating (#44)

- Frustration: Not close enough, couldn't see enough, wasn't a real learning operation - merely exploratory
  Satisfaction: With surgeon's skill and help
  With anesthesiologist
  Anxiety: (Slight) during the four questions surgeon made (#16)

- Couldn't watch incisions - looked other way - same with injections into ear canal - same with cutting out tonsil

Bothered somewhat by what looked to me like rough handling of unconscious patient (#12)

- I felt a touch of fear and felt quite lonely. Like I was suffering a fear all alone and that the OR staff was in an entirely different world. I imagined myself as the patient and thought I would feel lonely.

- My feeling that surgeons were incredibly highly skilled people was shot down considerably. I don't feel like I would trust myself to a surgeon as completely as I might have earlier. The anesthesiologist and surgeon seemed quite human - and therefore fallible. Again - this made me feel more alone (#26)

- Difficulty breathing when I turned my head (for instance, to see who was coming in the door) and the mask became tighter
  Rush of disorientation and disbelief when someone who was out of my line of vision poured some water just as the surgeon first put his hands into the patient's abdominal cavity (#34)

- I felt very apprehensive for the patient - in addition, as the surgeon progressed I became so engrossed in what was happening that I forgot that there was a person lying on the table (#42)

- As I was standing very close to the operating table, I became overly concerned that I would have a physiological reaction and fall into the table and I felt it was necessary to walk out for a few minutes (#40)

- Reaction of identification with patient and his procedure, having been through similar surgery in 1965 - could "feel" the before and after pain
  A momentary feeling of queasiness when fellow student had to leave - passed quickly and curiosity continued (#8)

What specific sights, sounds or events made you feel that way?

- Suture needle not penetrating connective tissue smoothly and inverting inner breast tissue through incision (#30)

- None specific (#38)

- Not sure - just before it happened I had thought how well I was doing - should have concentrated on what I was seeing, and not thought at all about how it felt, I guess! (#18)

- Hard to say - it wasn't the incision, blood, dissection, etc. - probably more worrying on my part that it would

happen. As soon as I left for 5 minutes and came back I was fine for the rest of the operation (#28)

- Non specific - except for I.V. injections (#44)

- Frustration from not being close enough, couldn't see enough, and didn't feel it was a real learning operation - merely exploratory. Satisfaction from the surgeon's skill and help and the anesthesiologist. Anxiety from the four questions that the surgeon asked (#16)

- Hypodermic, as big as patient.
  Sound of instrument against tympanic membrane (maybe bone).
  Watching scalpel cut out tonsil.
  Blood on boy's face, instruments in mouth and throat (#12)

- The casualness of the OR people, laughing and joking, etc. seemed sacrilegious - or insensitive to the fear in the patient (or the fear I would have felt if I were a patient)
  The grossness or crudeness of the surgical procedure where they were breaking cartilage out of septum (#26)

- I don't think it was due to the surgery - but I had a very hard time breathing through the face masks and head/face masks covering my beard (#2)

- The apprehension was when they first wheeled him into the OR, and began to start the various central and peripheral IV lines on him (#42)

- Nothing specific - it was the importance or the realization of a life and death process occurring (#40)

SUMMARY OF CONTROL GROUP REACTIONS TO SURGERY

Describe the reaction(s) that you had.

- In the beginning, I felt sick to my stomach. I felt this when entering the surgical corridor and before entering the surgical suite. When I saw surgery was not as bloody as I expected, I felt fine (#23)

- After about 40 minutes I became rather light headed and slightly nauseated (#17)

- Emotionally I felt that it was unpleasant to watch someone being cut into. I imagined feeling pain as the initial incision was being made. Putting on the mask was terrifying at first - I thought I couldn't breathe (#37)

- Slight sweating phenomenon near the beginning of the procedure - it lasted about 2 minutes and quickly passed (#41)

- I felt sad when I learned that the operation was merely paliative and not curative - the knowledge that the operation would make him more comfortable but that the cancer would eventually kill him anyway was hard for me to take (#19)

- Anxiety when the surgeon makes his first cut
  Annoyance at the superficial conversation going on during the operation
  Frustration because I could not see as much as I would like to (#5)

- Light headedness - no nausea - gradual weakening while standing - going to knees
  Increasing loss of peripheral vision (tunnel vision) (#25)

- Felt uneasy - new outfit, new situation
  Felt intellectually unprepared for type surgery and questions and this added emotional uneasiness
  Surgery itself didn't bother me - fascinating - general experience was very positive - Surgeon (Meinke) was very pleasant and seemed thorough and competent (#15)

- Got very hot (#11)

- The mask made me feel uncomfortable, it was oppressive - difficult to breathe (#3)

- It was all very fascinating! A couple of things bothered me slightly (see pages 2 & 3), but I had no unpleasant reactions (#33)

- At the very beginning of the operation I was surprised that the patient was not completely under
  It bothered me that he was completely cognizant of the people and things that were going on around him.
  I tried to put myself in his position and I really felt sorry for him (#31)

- I became very warm and began to perspire some (especially my forehead), and momentarily somewhat light headed (#7)

- Sore back (#39)

What specific sights, sounds, or events made you feel that way?

- Thinking of seeing surgery made me feel this way - Perhaps, the fear of seeing someone die - I noticed when I saw that the surgery was not life threatening, I felt better (#23)

- I don't know exactly - The smell of blood and of the cauterizer burning had something to do with it. Also the knowledge that here was a living person I had just seen smiling and talking, whose chest now rose and fell only in cynchrony with a machine, and who was being cut and pushed and pulled as though inanimate (#17)

- The initial incision and the parting of the cutaneous layers (#37)

- I don't believe that anything specific precipitated the event - I was observing the procedure and started thinking about the fact that a human being was being cut open and I was actually observing the inside of his body! Presently, the sweating, sort of a flush began and then quickly passed within 2 minutes.
  Note that this reaction wasn't terribly uncomfortable but, on the other hand, I would have rather not had it happen, since it did distract me (#41)

- The knowledge that the operation would make him more comfortable but that the cancer would eventually kill him anyway was hard for me to take (#19)

- The initial cut when the unbroken skin is broken has a disturbing effect. The blood, and underlying tissue surface where previously there was no injury - it reminds me of the damage and pain the surgery must cause in order to correct the malady (#5)

- Surgery itself was not unpleasant - but standing for a time with no breakfast contributed to my weakness - eventually had to leave the room (#25)

- Distracted by people coming in and out of OR. Anticipating having to intubate person myself - also identified with patient unconscious being worked on by unknown (practically) people. Also anticipated being on surgical clerkship (#15)

- The mask made me very warm - at times though, because of previous unpleasant reactions to similar situations, it was difficult for me to discern whether it was indeed the mask improved the situation a bit (#11)

- Nothing in particular - just watching him as he lay there looking around (#31)

- I'm not sure, but it occurred after the cyst had been removed and the blood vessels had been cauterized so that the incision was virtually completely dry (i.e., no blood and nothing more than a large 5 x 3 cm hole) - the only feeling I can identify at that time (other than the above noted physiological response) was the incision (or "hole") seemed very artificial (not real). My speculation is that when the blood was there and flowing, it appeared very real to me; but the strangeness and novelty of looking into a "clean" hole down to the bone without any blood was very striking (and I choose that word - striking - because in no way was I consciously [intellectually] uncomfortable - I still was very interested and wanted to continue watching - there was no nausea) (#7)

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