DIFFERENCES IN THE STRESS RESPONSE OF INFANTS PRODUCED BY INTRAVENOUS INSERTION WHEN PARENTS ARE PRESENT OR ABSENT

by

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j.a.b.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

TABLE PAGE

CHAPTER I

INTRODUCTION

Health care professionals and the general public widely accept the fact that children can suffer emotional trauma during a hospital experience. This is especially true of children under four years of age. Infant and child have been used interchangeably, in the study, as in Webster's New Collegiate Dictionary (1973). The infant (0 - 24 months) is primarily dependent upon the parents to meet his needs for biological sustenance, affection, security, and protection. The infant is limited in his ability to comprehend reality, time, and the environment so he turns to his parents, particularly the primary caretaker, for comfort and reassurance whenever circumstances become threatening. It is theorized that if the infant finds love and security when he is in need, then he learns that his love and trust is justified. This promotes the development of confidence and the ability to form future positive social relationships. If during this period when the infant is so crucially dependent upon his parents or caregiver to provide order and security to his world, there is an enforced separation from the parents, then it is believed the infant may experience a failure in the trust relationship. It is postulated the infant perceives the parents to be all-powerful, yet during a separation, they fail to respond to his needs for love, security, and protection. The infant is not able to fully understand or to reason; therefore, the immediate reaction is theorized to be one of anger toward the parents who have failed to meet his needs and have betrayed his trust (Robertson, 1958). The infant's primary way to express anger is by crying. There also is an increase in physical

activity as the infant strives to pursue the parent who is leaving. This behavior of crying and searching is also referred to as "proximity-seeking" or "contact-maintaining" behavior (Ainsworth & Bell, 1970). If the separation becomes lengthy, the infant's response becomes one of despair followed by denial or detachment (Bowlby, 1973; Robertson, 1958). In short-term separations, lasting only a few minutes, long-term effects such as detachment are not observed. Instead, upon reunion with the parent, or mother, there is an increased intensity of "contact-maintaining" behavior such as crying and clinging. During this time the infant's play and exploration of the environment is significantly decreased. It is, therefore, suggested that the infant's learning is also diminished. Along with an increase in the "contact-maintaining" behaviors the infant will demonstrate an ambivalence toward the mother by an increase in "contact-resisting" behaviors such as ignoring, gaze aversion, or bodily turning away. It is theorized that the "contact-resisting" portion of the infant's behavior may be a primitive form of defense that precedes the formation of detachment (Ainsworth & Bell, 1970).

Due to the emotional trauma from separation experiences of two weeks or less, which is manifested in the form of an increased fear of strangers, sleep disturbances, and a prolonged need for continual proximity to the mother (Schaffer & Callender, 1959) widespread efforts have been made to change the traditional care system in hospitals to minimize the amount of separation from the parent (Bright, 1965). In some hospitals this has been accomplished by liberalizing visiting hours for parents, and in others the establishment of nursing units where the parents assume the major responsibility for

the care of the child (Dawson & Hardgrove, 1972). The acceptance of the need to avoid separating the parent and child is not generally applied to situations in which the child is subjected to painful, traumatic procedures such as lumbar punctures, intravenous insertions or burn dressings. This is, in fact, a controversial area (Bellack, 1974). Even some of the strongest proponents of the dangers inherent in the separation of the mother and child are firm in their resolution that parents should not be present when painful therapeutic and diagnostic procedures are done to the child (Brandt, Smith, Ashburn, & Graves, 1972; Prugh, 1967; Webb, 1966). Only a few authors speak of the benefits to the child that are derived from having a parent present during painful or highly stressful procedures (Ferry, 1977; Hartrich, 1956; Vernon, Foley, & Schulman, 1967). It is the purpose of the study to examine the effect of parental presence or absence on the stress levels experienced by 9 to 20- month-old infants when subjected to the specific painful procedure of intravenous insertion.

Review of the Literature

The review of the literature first addresses a consideration of the developmental factors affecting stress in a 9 to 20- month-old including the development of trust, person permanence, separation anxiety, and stranger anxiety. Consideration is then given to factors relating to parental presence, such as parent-care hospital practices, staff attitudes toward parental presence, and parental attitudes regarding remaining with their child throughout hospitalization. The varying emotional factors and the physiologic response that may or may not be seen in an infant's response to the stress of a painful invasive procedure in the

presence or absence of the parent is then examined. In conclusion, consideration is given to various factors affecting behavioral measures of stress in the infant.

Developmental Factors Affecting Stress

It is "believed to be essential for mental health that the infant and young child should experience a warm, intimate, and continuous relationship with his mother in which they both find satisfaction and enjoyment" (Bowlby, 1952, p. 11). An infant is totally dependent upon the parent to meet all his needs. It is a widely accepted theory that when the parent is astute, sensitive, and responsive to the infant's needs, a gradual trust relationship is built between the parent and infant. The infant looks to the parent, particularly the mother, for security, love, satisfaction, and protection. It is further believed the infant develops a secure feeling that the mother will protect him from all harm and will willingly meet his every need. The infant's love and attachment to this primary caretaker appears to be complete, all-encompassing, and intolerant of the substitution of another person in that role after the age of 6 to 8 months (Bowlby, 1973; Schaffer & Callender, 1959). Should the infant be separated from the mother during the early years of life when this close, intimate relationship is so vital to the infant's sense of security, it is theorized that a break occurs in the infant's trust relationship with the significant person in his life. It is believed that the infant needs his mother's close proximity as much as he needs food and is incapable of understanding her absence other than in terms of personal rejection typical of his egocentric level of development. Therefore, the infant feels that his

total trust is no longer justified and a sense of anxiety and insecurity is demonstrated in the infant, even after separations of only a few minutes, in the form of decreased interest in the environment, decreased playing, increased crying, at first increased searching for the mother, followed by a tendency to resist parental contact upon reunion (Ainsworth & Bell, 1970).

It is theorized that an infant develops an attachment for one specific person through the warm, intimate, trusting relationship with one primary caretaker (Bell, 1970). At about 1 to 3 months of age, it is believed, the infant develops the ability to discriminate closely between a preferred, attached person and a stranger (Fitzgerald, McKinney, & Strommen, 1977) and by 6 months of age begins to show a strong preference for the familiar and a fear of the unfamiliar person (Bowlby, 1973; Schaffer & Callender, 1959). This is the onset of the phase of stranger anxiety. The year-old infant's response to the mere presence of a stranger varies between cautiously staring, moving closer to mother, diminished play activity, to finally demonstrating a cautious interest and friendliness toward the stranger (Ainsworth, Bell, & Stayton, 1971; Fitzgerald et al., 1977). But as the stranger's proximity to the infant increases, the infant's response becomes more negative and becomes intensely negative when the infant is touched by the strange adult (Brooks & Lewis, 1976; Tennes & Lampl, 1964; Waters, Matas, & Sroufe, 1975).

To fully understand an infant's response to strangers and to maternal separation, it is necessary to examine the cognitive development of the infant. Piaget and Inhelder (1969) have theorized that at some point during the last half of the first year of life an infant

develops what is termed "object permanence," that is, the understanding that an object continues to exist when it is removed from the field of vision. Bell (1970) and Gouin-Décarie (1965) demonstrated that at about 9 months of age the infant develops an awareness of the mother's permanence and this occurs somewhat earlier than the development of object permanence. The ascription of permanence to a person or object is believed to be accompanied by an awareness that the person has an existence separate from the infant's (Ginsburg & Opper, 1969).

It is further postulated that it is this awareness of the mother's separateness coupled with the infant's possessive need for the mother's continuous love and security that leads to the typical separation anxiety response which is first seen in infants nearing the age of 9 months and peaking around 18 months (Tennes & Lampl, 1964). The typical response is one of protest or anger in which the infant cries vigorously and makes every effort available to him to return to the mother. During this time the infant fails to demonstrate any interest in playing or interacting in a constructive learning way with the environment. All energies are focused on regaining contact with the absent mother. If the separation is only of a few minutes duration, upon reunion, the infant will follow, cling to, or clutch the mother, or continue crying for a period longer than the actual separation. There is also an increased incidence of looking or turning away from the mother after the reunion, which is suggested to be the expression of ambivalent feelings which may precede detachment (Ainsworth & Bell, 1970). If the separation continues, it is postulated that the infant enters a stage of despair or hopelessness where he withdraws and becomes

apathetic as if mourning the loss of the mother. The final theorized stage is denial or detachment where the infant represses the feelings of despair and anger and appears to be adapting to the environmental situation. Maternal rejection ensues from the failure to meet the infant's needs (Bellack, 1974; Bowlby, 1973; Robertson, 1958).

Every child is affected to some degree by hospitalization. The strange surroundings are presumed to be perceived as threatening (Blom, 1958). It is believed that the severity of the emotional trauma and the infant's ability to cope with the threatening experiences depends upon whether or not separation from the mother can be avoided (Hartrick, 1956). Studies support the belief that the infant can cope with pain and fear of the unfamiliar if not also forced to cope with being separated from his parents. Presumably, this separation from the parents in a time of high stress intensifies the infant's anxiety and weakens his sense of security and trust in his parents (Cox & Campbell, 1968; Godfrey, 1955; Robertson, 1962).

Factors Affecting Parental Presence During Hospitalization and Treatment

Parental presence during hospitalization and treatment have been affected by hospital policies, the beliefs and attitudes of health care professionals, and the parents' attitude toward remaining with their child during hospitalization. Because of the widespread acceptance of the inherent dangers to a child's emotional and social well-being that result from separation from the primary caretaker or mother during hospitalization, there have been attempts to modify the traditional care system for children. In some hospitals this has meant a liberalizing of parent visitation rights, in others it has meant allowing an insis-

tent parent to stay in the hospital with his/her child while in other hospitals the parent has come to be seen as a member of the care team whose goal is to restore a child's physical health while avoiding any damage to his emotional and social development (Hardgrove & Dawson, 1972).

The varying degrees of efforts to increase parental involvement in the care of the child during hospitalization depend upon the importance that is ascribed to the child's emotional and social well-being and the strength of the belief that even brief separations from the primary caretaker can be traumatizing when it occurs in conjunction with a strange and threatening environment. At Hunterdon Medical Center in Flemington, New Jersey, parents have been encouraged to remain with their infants in the hospital and to assume a role of responsibility in helping their children to return to health. Parents have been encouraged to help the medical and nursing staff by being present and holding the child while injections have been given or examinations performed. They report that children who have had this close parent-child relationship maintained during hospitalization have exhibited minimal fears and behavior disruptions after discharge (Hunt & Trussell, 1955). However, during major painful procedures, the practice has been to ask the parents to leave the room. If the parents have specifically asked to remain with the child, it has been allowed (Morgan & Lloyd, 1955). No rationale was given for this latter policy nor conclusions drawn from the possible differences in the child's behavior with the parent present or absent.

And what is the emotional experience of the parents of a seriously ill child? When a child is hospitalized, parents have reported feeling

a strong need to love, reassure and protect the child from all harm while also feeling guilty for not having prevented the illness or injury that required the hospitalization. The parents can be made to feel even more inadequate by a hospital staff that appears efficient, competent and quite capable of meeting the child's needs without the help of the parents (Prugh, 1966; Robertson, 1958). The parent's guilt, anxiety and feelings of inadequacy can be diminished significantly by a hospital staff who acknowledge the parent's primary importance to the child and who seek to enlist the parent's support and help. A parent who is given the tangible task of reassuring the child and of interpreting the strange activities to him either by voice or by touch is often grateful for the opportunity to maintain his/her role as the source of love and security for his/her child (Bright, 1965; Hartrich, 1956, Robertson, 1958).

Many physicians and nurses express the belief that a child is more cooperative during a painful procedure when the parent is not present (Bellack, 1974; Robertson, 1958). Robertson admits to the truth of this assessment but points out that a child should not be expected to be docile and accepting of pain, restraint and physical intrusion. The healthier condition is for the child "to feel free to protest in her {the mother's} presence than to be quietly submissive in her absence" (Robertson, 1958, p. 65). The natural human physiologic reaction in the face of danger to the organism is one of "fight or flight". It is felt that if this response is repressed or denied, there can be detrimental physiologic changes in the body (Bahnson, 1974) as well as traumatizing effects to the child's developing ego (Freud, 1952). It may

also be that a child's distress is so great over being separated from his source of security, love, and protection that it is too painful for the staff to witness and allow themselves to acknowledge the full extent of the distress. At such times the staff can become less sensitive to the child's pain and "defensively ignore" a situation which they feel cannot be dealt with in a more constructive way (Robertson, 1958).

If the medical and nursing professions accept the fact that an infant suffers anxiety and possible emotional damage when separated from the primary caretaker, then it must also recognize that by refusing to allow parents to remain with their child during a painful procedure or treatment, the child's fears and anxiety are increased. We, thus, take the chance that our actions may leave the child "with a permanent fear of hospital-related experiences" (Bellack, 1974, p. 1494).

Admittedly, not all parents wish to remain with their child during painful procedures, and their wishes should be respected. A parent who cannot cope with the stress and anxiety of such a situation should not be made to feel inadequate or guilty. The parents' emotional needs must be given respect and consideration too. However, it may prove worthwhile to examine the potential benefits of supporting parents who feel capable of helping their children bear the stress of painful procedures (Bellack, 1974). Studies have demonstrated the benefits of parental presence while the child is hospitalized (Bowlby, 1973; Hunt & Trussel, 1955; Robertson, 1958) and during immunization injections (Ferry, 1977; Hallstrom, 1958). It is necessary and timely to examine the benefits of parental presence while the infant experiences more painful procedures.

Emotional Factors and the Physiologic Response to Stress

In order to complete the theoretical background for the study it is necessary to examine the major emotional factors which are involved in an infant's response to a painful procedure in a strange environment. In addition, the factors need to be examined for differences which might be attributed to the presence or absence of the parent during the procedure.

When an alert, responsive infant of 9 to 20 months is subjected to an invasive, painful procedure, such as an intravenous needle insertion, there is a response to pain. A fear response, which is generally defined as anxiety, toward the unknown procedure and toward being approached and touched by strangers is also expected. These two responses would be expected to be present to some degree in any infant irrespective of parental presence or absence. For the child whose parent does not remain by his side, one would also expect to see a fear response from the loss of the person who is responsible for his security, protection, and love. Further complicating the observation, one might expect the infant whose parent remains by his side might also feel secure enough to display an anger response toward being restrained and subjected to the procedure. The problem then becomes one of differentiating between these various emotional responses of pain, fear from variant sources, and anger.

First of all, it is necessary to delineate which emotions would be hypothesized to be present in the parent-present subjects. One would expect to observe expressions of pain from the procedure, fear of contact with potentially threatening strangers, and anger over loss of mobility and control; in fact, expression of anger might even be increased

as a result of the child possibly feeling safe enough to protest and resist while the parent is present. The infants in the parent-absent group would be hypothesized to experience all of these same emotions. The uniqueness of this group is that they would also be expected to be experiencing the fear associated with separation from the parent.

Various physiologic measures such as diastolic and systolic blood pressures, skin conductance, skin temperature, muscle tension, respiratory rate, cardiac output, finger tremor, salivary output, and heart rate have been studied to determine their value as measures of pain, fear, and anger. Martin (1961) reported in a paper that reviewed several research studies on the physiologic measures of stress that the general consensus was that since individuals exhibit different autonomic response patterns, it is difficult to show a significantly high correlation between the mean change scores of one autonomic response and another within the same individual. That is to say, that one individual may show a significant elevation in the systolic blood pressure in response to fear while showing an elevation, but a less significant one, in skin conductance. Even though the magnitude of change in the response pattern is not uniform for all individuals, the predicted direction of change in the physiologic measures is significantly similar when studying a group of individuals.

The physiologic measure that has been most often used and reported as an assessment of stress is heart rate. For the purposes of the study apical heart rate is the physiologic measure that will be used to assess the level of stress and, therefore, will be examined more closely here.

Four separate studies in a laboratory setting presented adult subjects with staged interactions designed to create fear and anger. The

subjects were interviewed and given questionnaires following the interactions to determine if anger and or fear had been generated. These studies found that the heart rate increased significantly in response to fear (Ax, 1953; Funkenstein, King, & Drollette, 1957; Lewinsohn, 1956; Schachter, 1957). The directional change of the heart rate during anger seems to be more controversial. Ax (1953) found that the heart rate decreased during anger while Funkenstein et al. (1957) and Schachter (1957) found that the heart rate increased but not significantly during anger. Schachter (1957) and Lewinsohn (1956) subjected adult subjects to quality of pain by using the cold pressor test. In both studies the heart rate appeared to decrease slightly or had no significant change. It is debatable whether inserting a foot or hand in ice water for 30 to 60 second periods is sufficient to create a pain stimulus similar to that of a needle being inserted into a vein.

Waters, Matas, & Sroufe (1975) conducted a longitudinal, cross-sectional study of 54 infants over a period of 4 months. The subjects ranged in age from 5 to 10 months at the beginning of the study and were 9 to 11 months upon completion. The purpose of the study was to reliably describe infants' behavioral responses to being approached by a stranger. The interactions with a stranger were videotaped and behaviorally coded according to positive, neutral, or negative responses. The heart rate of the subjects were measured by a cardiotachometer-dynograph. The subjects were classified as being either wary or non-wary upon first approach by a stranger. In both categories of subjects, the heart rate increased when the stranger reached for the infant and even more so when the stranger actually picked up the infant. The mean

heart rate increase was significantly higher for the wary as compared to the non-wary group. To rule out the potentially confounding effects of muscular activity upon the heart rate, a group of 20 subjects were studied while being reached for and picked up by the mother. None of these infants had a significant mean heart rate increase during reach or pick-up by the mother. This study did not specifically label fear as the emotional source of the behavioral and physiologic response of these infants to strangers.

Ferry (1977) studied 34 subjects, ages 1 and 2 years, during an immunization procedure. The subjects were divided into mother-present, mother-holding, and mother-absent groups. The subjects heart rate change scores were measured with a stethoscope by taking a baseline, injection, and 2 minute post-injection reading. The investigator found no significant difference between the baseline and 2 minute post-injection measure or between the mother-present and mother-holding groups. She did find a significant difference in the mean heart rate change score when comparing the mother-present, mother-holding groups to the mother-absent group ($p < .002$).

In light of these findings, and for the purposes of this study, the hypothesized expectation would be that the parent-absent subjects will have the greater mean increase in heart rate if they, in addition to the fear of being handled by strangers, are also responding to the added fear of being separated from the parent.

Infants between 9 and 20 months of age are generally unable to describe their emotions since their language development is so limited. Therefore, an observer is left with the difficult task of ascertaining

the meaning of a complex variety of observed behavioral responses. The difficulty of the task is compounded by the fact that individuals exhibit different behavioral response patterns (Martin, 1961). Therefore, any interpretation of behavioral responses in infants and toddlers is highly subjective and imprecise (Gouin-Décarie, 1974). A search of the literature failed to reveal a reliable behavioral tool for use in measuring a stress response in a child of this age. The three tools that were found in the literature (Glennon & Weisz, 1978; Kassowitz, 1958; Vernon et al., 1967) were rejected either on the basis of their inability to measure subtle changes in the infant's stress level at the distress end of the continuum or because of the heavy emphasis on observing body posturing which is likely to be restricted while the intravenous insertion is done.

Since crying is the primary mechanism for an infant to express distress, some investigators have used various quantifications of crying to measure the infant's stress level. Hallstrom (1968) used the intensity and duration of crying to measure stress in 31 infants, 6 weeks to 6 months of age, during an immunization injection. The infants were randomly assigned to being in either a mother-held or a tabled position during the injection. The cries were tape recorded and graphed by a sound meter. The mean cry intensity in the 10 seconds immediately following injection was significantly lower for the held group (72.5 squares/10 mm. graph) as compared to the tabled group (86.4 sq./10 mm.) ($p < .001$). The tabled infants were picked up and held 15 seconds after injection. The 50 second post-injection cry intensity reading failed to show any significant difference between those infants who had been tabled and

those who had been held continuously. When the intervening variables of age, sex, hunger, person administering injection, and prior crying or resting state were factored into the analysis, age and previous crying or resting state did not influence the overall outcome. It was found that females and younger males did have lower mean cry intensities if held, while older males had higher cry intensities whether held or tabled. Hunger also made the intensity of crying more similar for held or tabled groups. The person administering the injection, either a nurse or a medical student, had no effect on the relationship between the crying intensity of either the held or tabled infants, but the means in both groups were considerably lower in the groups where the more experienced nurse administered the injection as opposed to the less experienced medical student.

Ainsworth and Bell (1970) used frequency of crying as a measure of increased distress in 12-month-old subjects. Fifty-six infants were placed in a laboratory setting and exposed to eight increasingly upsetting episodes. The episodes each infant experienced included entering a strange room with the mother, playing with toys in the room in the mother's presence, having a stranger enter the room and approach the subject in the mother's presence, being in the room with the stranger as the mother exited, having the mother return to the room to be with the subject while the stranger exited, being left alone in the room, being alone in the room as the stranger re-entered, and experiencing a final return of the mother with the stranger leaving. A control group was not used in the study. Two observers recorded the infants' behavior, and a tape recorder measured the frequency of crying with an ordinal value

being assigned to each 15-second interval of crying within the 3-minute episodes. They found the infants did not cry when confronted with a stranger in the mother's presence ($p = .068$). The frequency of crying increased only when the mother left and decreased when she returned. The crying increased even more when the mother left a second time and did not diminish significantly when the stranger re-entered the room. Ainsworth and Bell concluded that the infant was responding to the mother's absence not just to being left alone.

It was then hypothesized, for the purpose of this study, that the duration of crying for the parent-absent subjects would be longer than for the parent-present subjects.

Some references are made in the literature that male infants respond more intensely to separation from the parent and females more intensely to approach and contact with a stranger (Fitzgerald et al., 1977; Tennes & Lampl, 1964). Another factor mentioned that may have an effect on the infant's response is the quality of the relationship between the mother and infant. Ainsworth, Bell, and Stayton (1971) found evidence of a relationship between a mother's sensitivity to her infant's needs and the infant's willingness to explore strange situations or to be separated. Although these factors would have been enlightening to explore, they were beyond the scope of the study.

Purpose of the Study

The purpose of the study was to investigate whether infants between 9 and 20 months of age whose parents remain with them during an intravenous insertion show less response to stress, as measured by the mean heart rate change and the duration of crying, than the children whose parents are not with them.

Hypotheses

1. Infants ages 9 to 20 months whose parents remain with them during an intravenous needle insertion for the purposes of administering intravenous fluids will have a significantly lower increase in apical pulse rate between a pre-procedure and a post-procedure measure than the subjects in the parent-absent control group.

2. Infants ages 9 to 20 months whose parents remain with them during an intravenous needle insertion for the purpose of administering intravenous fluids will have a significantly lower maximum apical pulse increase than the subjects in the parent-absent control group.

3. Infants ages 9 to 20 months whose parents remain with them during an intravenous needle insertion for the purpose of administering intravenous fluids will have a significantly shorter duration of crying than the subjects in the parent-absent control group.

CHAPTER II

METHODS

Setting and Subjects

The sample of the study was drawn from a population of patients admitted to a pediatric ward of a privately-owned hospital in a large metropolitan area of Oregon. The hospital offers service to persons from upper, middle, and lower income brackets. Those who met the following criteria were asked to participate in the study:

1. 9 to 20 months of age;
2. Experiencing an injury, acute illness, or surgery necessitating the insertion of an intravenous needle for the purpose of administering intravenous fluids or medication;
3. Alert and able to respond to the environment;
4. A parent present who would be willing, if chosen, to remain with the child during the intravenous needle insertion.

Patients with the following characteristics were excluded as potential subjects for the study:

1. Those suffering from an illness with complicating respiratory or cardiac problems such as pneumonia, congestive heart failure, or congenital heart disease because of the confounding effects upon the heart rate;
2. Those having had a venipuncture of any type within the previous six months;
3. Those with a parent unable to speak and/or understand English;
4. Those who had been given sedative medications within the previous 6 hours.

Of those families agreeing to participate in the study, the subjects were considered to be a convenience group sample. The original intent of the study was to use a minimum of 16 subjects. Because of constraints that limited the duration of data collection and the unexpectedly small number of patients who met the above criteria, only five patients were recruited as subjects. Infants were alternately assigned to either the control group or experimental group with a toss of the coin deciding to which group subject number one was assigned. In the experimental group the parent remained with the child. In the control group the parent did not remain with the child but was immediately reunited with the infant upon completion of the intravenous insertion.

Data Collection

Background data for the study was collected by the use of a questionnaire (Appendix C). The response to stress was measured by the apical pulse rate change, as recorded by the Park Heart Rate Monitor, from an immediately pre-procedure recording, to the maximum apical pulse recording, and a post-procedure recording, and by the duration of the crying as measured by a stop watch.

Measurement of the Independent Variable

The independent variable in the study was the presence or absence of the parent from the infant during the insertion of an intravenous needle. The parent was defined as either the mother, father, or primary caretaker. In the event that both parents were present with the infant in the experimental group, the parents were asked to decide between themselves which parent would remain with the infant. Only a parent who indicated a willingness to be present while the infant was subjected to an intra-

venous insertion was included in the study. It was recognized that by limiting the study to only parents who expressed a strength of sufficient magnitude to cope with watching their child be subjected to pain seriously limited the population to which the results of the study could be generalized. But it was precisely this population that the study addressed, not the parent population who state a preference not to remain with their child.

It was recognized that there were multiple intervening variables other than parental presence or absence that could significantly affect the results of the study. Some of these variables were:

1. The quality of the parent-child interaction during the intravenous insertion procedure; i.e., the degree of the parent's sensitivity to the child's needs, the parent's use of either physical or verbal contact to soothe the child, and the parent's ability to soothe the child;
2. the personal characteristics and skills of the personnel involved in the intravenous procedure; i.e., if attempts were made to prepare the parent for the procedure, if attempts were made to seek the parent's help, if guidance was given as to how best the parent might soothe the child, if the personnel were personable or unapproachable, if they were a familiar person to the child such as a floor nurse rather than a stranger assigned to an intravenous insertion team, or if they were highly skilled at inserting an intravenous needle or not;
3. the degree of discomfort and stress experienced by the child due to the unique experience of any one particular intravenous insertion; i.e., such as the site of needle insertion--a scalp

vein might have been more stressful than a foot insertion, the length of time needed to complete the procedure, and the amount of pain experienced due to the number of needle insertions necessary before a patent intravenous line was achieved.

It was beyond the scope of the study to closely examine these many variables or to make any attempt to control for them. It was also recognized that to assess some of these variables would be a highly subjective and imprecise task. Therefore, for the original purposes of the study, limited descriptive data were noted for each subject as to the location of the intravenous site; the number of needle insertions required before completion of the procedure; whether the person inserting the needle was a floor nurse or a member of an intravenous insertion team; whether or not pre-procedure teaching or preparation of the parent occurred; and whether the parent was in physical contact, verbal contact, or both with the child during the procedure. This information was gathered without knowing in advance whether or not it would be useful in trying to understand the statistical results of the study as originally designed. As it turned out, this descriptive data was the beginning framework needed for assessing such a small number of subjects in a case study method.

Measurement of the Dependent Variable

The dependent variable in the study was the child's response to stress. Stress, for the purposes of the study, was defined as the anxiety or fear that the 9 to 20-month-old experienced as a result of being subjected to the painful procedure of intravenous insertion and being touched by strangers. For the children in the control group, it was expected that they would also be dealing with separation anxiety because

the parent was not with them during the procedure. As outlined in the literature review, studies have shown that the physiologic reaction to fear or anxiety is an elevation in the apical pulse rate, with a behavioral response of increased intensity, frequency, and duration of crying. Therefore, for the purposes of the study, the measures that were used to determine the child's response to stress was the heart rate and the duration of crying. Two factors were of primary importance in deciding to use the heart rate as the physiologic measure. The first factor was the amount of supporting data that indicated this measure was a valid measure of fear (anxiety). The second factor was the need to use a non-invasive physiologic measure that would produce a minimal amount of stress in its use. The behavioral measure of the duration of crying was chosen because of the support found for it in the literature and because of the extremely young age of the subjects and the corresponding limits their lack of verbal skills place upon an investigator in attempting to verify the accuracy of other behavioral measures. It was recognized that the subject's personal temperament might affect the duration of crying, but it was the original intent that through the process of alternate assignment of subjects to either the control or experimental groups this factor would be as nearly controlled as was possible in a convenience sample of this size. Unfortunately, with the sample size diminished to five subjects, there was no way to control for the confounding effect of each infant's particular temperament.

The instrument used to collect the apical pulse rate was a Park Model 510-A Heart Rate Monitor. It was used with two lead surface electrodes that were placed on the infant's chest and taped in place

superior to the sternum and at the lower level of the heart just below the left nipple. The monitor counted the number of R waves and displayed the average per minute on the meter.

Duration of crying was measured from the point when the intravenous line had entered the vein, was deemed patent, and the tape-down process began until cessation of crying or a maximum of 10 minutes occurred. Measurement of this time period was done by use of a stop watch. All measurement readings were immediately recorded on the subject's data collection record (Appendix D).

Design and Procedure

The original design of the study used a pre-test, post-test control group design in which the independent variable of parental presence or absence during the intravenous insertion was assigned to the first subject by the toss of a coin and was alternated for all other subjects. This design was used in an attempt to determine the relationship between the infant's stress level and the parental presence or absence during the painful procedure. No attempt was made to measure the ability of the parent to cope with this procedure or to offer the infant emotional support.

The accessible population was identified by the pediatric ward personnel according to the gross criteria of: age, 9 to 20 months; condition, alert, responsive, and having no complicating respiratory or cardiac pathology; prescribed treatment, intravenous insertion; and accompanied by a parent or primary caretaker. The parents of the potential subjects were approached by the investigator, who was responsible for all data collection. The parents were asked if their child had had a previous experience of having his blood drawn with a needle or of having had an

intravenous infusion within the past 6 months. If the potential subject met the requirements for the study in those areas, the parent was given the information on the Informed Consent Form (Appendix A) and requested to participate in the study. Prior approval of each patient's physician was obtained on an individual basis using the Physician's Informed Consent Form (Appendix B). It was explained to the parent that at many hospitals it is the practice that parents are routinely requested to be separated from their child during an intravenous insertion. Within the past three years this hospital has attempted to alter that practice so that parents who wish to remain by their child's side may be allowed to do so as long as the parent's presence does not seriously interfere with the procedure. This philosophy has not altered the fact that if a particular staff member has strong feelings against parents being present when an intravenous needle is inserted, these staff members might routinely ask all parents to leave before an intravenous insertion is attempted. The problem was explained to the parents that at this point in time, we in the health professions lack data that will tell us if the infant is more or less anxious when the parent is present during the starting of an intravenous infusion. Therefore, we are establishing hospital practice in this specific area on the basis of personal preference or theoretical belief rather than on the basis of scientifically obtained data. Before we can ever hope to have uniformity in hospital practices that are in the best interests of the patient, family, and staff, we need to gather this kind of data. If consent was obtained, the subject was then assigned to either the control or the experimental group, and the consent forms were given a code number to insure anonymity.

Before the parent and infant were separated and before any portion of the intrusive intravenous procedure was started, the parents in both the experimental and control groups were given explicit directions for applying the external electrodes appropriately to their child's chest. This consisted of rubbing contact paste into the skin at the top of the sternum and just below the left nipple, placing the surface electrodes on top of the applied paste, securing these electrodes with porous tape, draping the wires over the shoulder, and taping them in place to minimize entanglement and movement artifact. Involving the parent in this aspect of the preparation was done to minimize contact between the observer and infant, thereby minimizing the physiologic and behavioral responses that might have resulted from contact with an additional strange person. It was recognized that there may have been an increase in apical pulse rate and/or crying due to the novel effects of placing the leads on the body. In the original design of the study, the effect should have been the same for subjects in both the control and experimental groups. However, because of the small number of subjects it was impossible to determine the value of this variance for a general population of infants within this age group.

The pre-test apical heart rate was recorded 5 minutes after the electrodes had been attached by the parent and before the infant had either been approached by the intravenous insertion team or before the parent had left his side. At this point the parent in the control group was asked to step outside the door while the procedure was done. The insertion of the intravenous needle proceeded according to normal hospital procedure with the independent variable of parental presence varying according to the experimental or control group. The investigator avoided giving the parent in the experimental group any guideline to follow as to how to comfort the infant. The interaction between parent, infant, and

staff was allowed to evolve naturally.

The monitor was observed throughout the procedure by the investigator to record the maximum apical pulse increase that occurred. Another recording of the apical pulse rate was made within 30 seconds of completion of the tape-down of the needle. For the infants in the control, parent-absent group, the parent and infant were reunited immediately prior to this final heart rate reading. The recording of the maximum apical pulse rate was taken to allow for the possibility that the final heart rate reading may have occurred at a point beyond when the maximum stress had been experienced and the infant was into a recovery phase.

Duration of crying was measured from the point when the intravenous line had entered the vein, was deemed patent, and the tape-down process begun until cessation of crying or a maximum period of 10 minutes occurred. Measurement of this time period was done by use of a stop watch. This data was recorded immediately by the investigator. The heart rate monitor electrodes were not removed until the measure of crying duration had been completed. The subjects were then handled according to normal hospital routine, except that the investigator was available to the parents to answer any question they might have had.

Analysis of Data

The original intent of the study was to examine the question whether infants whose parents remain with them during an intravenous insertion, as in the experimental group, would show less response to stress than the children whose parents did not remain with them, as in the control group. It was hypothesized that:

1. Infants ages 9 to 20 months whose parents remain with them during an intravenous needle insertion will have a significantly lower increase in apical pulse rate between a pre-procedure and a post-procedure measure than the subjects in the parent-absent control group.

2. Infants ages 9 to 20 months whose parents remain with them during an intravenous needle insertion will have a significantly lower maximum apical pulse increase than the subjects in the parent-absent control group.

3. Infants ages 9 to 20 months whose parents remain with them during an intravenous needle insertion will have a significantly shorter duration of crying than the subjects in the parent-absent control group.

The unusually small sample size of five made it impossible to use even a nonparametric statistical test to either support or refute these hypotheses. In an effort to examine the multiple variables involved in the process of an intravenous needle insertion on these five subjects and to examine the unique difficulties of doing clinical nursing research, it would be most appropriate that the findings be presented as case studies.

CHAPTER III

RESULTS AND DISCUSSION

The primary purpose of the study was to investigate whether infants between 9 and 20 months of age would show less response to stress, as measured by the mean heart rate change and the duration of crying during an intravenous needle insertion if their parents remained at their side as compared to infants whose parents did not remain with them. Three hypotheses were proposed as a means of testing this phenomenon. These hypotheses were:

Infants ages 9 to 20 months whose parents remain with them during an intravenous needle insertion will:

1. have a significantly lower increase in apical pulse rate between a pre-procedure and a post-procedure measure;

2. have a significantly lower maximum apical pulse increase and;

3. have a significantly shorter duration of crying as compared to the subjects in the parent-absent control group.

Sample

The subjects for the study were drawn from a population of infants admitted to a pediatric ward of a large metropolitan hospital in Oregon. During the observation period from July 26, 1981 through August 25, 1981 14 patients in the appropriate age group were admitted to the hospital. Of those 14, only five subjects met the specific criteria for the study. The small sample size was attributed to the fact that not all patients in this age group needed an intravenous infusion. Also, a number of infants were not available for the study because their intravenous infusions were started in the surgical suite where the parents were not able to be

present during the procedure. The remainder of the infants admitted during the study period had either had a recent venipuncture for laboratory work or for an intravenous infusion. It was decided prior to subject selection by the toss of a coin that subject number one would be in the experimental, parent-present group. Each subject thereafter would alternate between the control and experimental group. None of the families approached for participation in the study refused to participate.

Case Studies

The following is data that was gathered from observations during the procedure of intravenous insertion on the subjects and from discussions with the parents prior to the start of the procedure.

Subject #1. Subject number one was an 11-month-old white male who was admitted to the hospital for gastroenteritis. The infant was alert, playful, and cheerful upon admission to the hospital. Crying and avoidance of staff members was noted when he was supine in the crib or when touched by a staff member. The crying ceased immediately upon being allowed to sit, stand, or be held by his mother.

The infant was accompanied by his father and mother, who agreed to participate in the study, but who also expressed a strong preference to remain with the infant while the intravenous infusion was started. The mother expressed relief when told her son was to be in the experimental group. The parents decided between themselves that the mother would remain with the infant and also apply the surface heart monitor electrodes.

The explanation of how to apply the surface electrodes for the heart monitor did not need to be repeated nor demonstrated more than once. The application was resisted by the infant by pushing the mother's hands away and crying. The crying stopped within seconds once the electrodes were

taped in place. Five minutes elapsed between application of the electrodes and the recording of the pre-procedure apical pulse rate to minimize the confounding effect the application of the electrodes would have on this measure. During this 5 minute period the infant played with the toys in the crib. No attempt to reach for the electrode wires or to remove the electrodes was noted.

The pre-procedure heart rate was noted to be 115 beats per minute. This measure was taken while the infant was quietly held in the mother's arms and before he was approached for the intravenous procedure.

The infant had been on the pediatric unit 15 minutes prior to being approached for the start of the intravenous needle insertion. The nurses starting the intravenous infusion were members of the intravenous (IV) team and were strangers to the infant. Normally only one IV team member starts the infusion, but on this occasion the nurse starting the infusion was a new member of the team and was being supervised by a more experienced member.

The only pre-procedural teaching or preparation of the parent that was given by the IV team was to tell the mother where she could stand during the procedure. The site for the needle insertion was the left hand. One team member restrained the infant's hips and legs while the other team member inserted the needle. The mother positioned herself near the infant's head, leaning over the crib so that her face was close to his. She held his free hand, stroked his arm, face and head, and spoke in a soft voice saying, "It will be over in a minute," "You're a good boy," and "Mommy's right here."

The maximal pulse reading was 140 beats per minute, a 25 beat per minute increase from the pre-procedure reading of 115. This maximum

reading coincided with the insertion of the needle through the skin layers. The post-procedure heart rate measure was taken when the needle was taped into place. This reading was 125 beats per minute, a 10 beat per minute increase over the pre-procedure measure.

The heart rate was noted to be around 125 beats per minute throughout most of the procedure, including a point when the infant was observed to be flushed, diaphoretic, and crying loudly. The maximum heart rate reading did not coincide with a period of loud crying, nor did loud bursts of crying seem to coincide with changes in the heart rate.

The length of the procedure was timed from when the IV team nurse first started looking for a vein until the point when the needle was taped in place and the line was deemed patent. For this infant, the length of the procedure was 6 minutes. This time was more than likely lengthened somewhat by the inexperience of the nurse being oriented to starting intravenous infusions on infants and due to the teaching process that occurred between the two nurses. Only one needle insertion was necessary before the procedure was successfully completed.

The duration of crying was measured by a stop watch beginning when the intravenous needle was taped in place. This period was lengthened by an unsuccessful attempt to withdraw blood from the intravenous needle for a laboratory specimen and by a discussion as to whether the IV team would immediately restrain the child for the laboratory technician to make a second venipuncture to withdraw the necessary specimen. Once the investigator explained the need to measure the duration of crying without the confounding effects of a second procedure and assurance was made that the investigator would assist in restraining for the second procedure, the staff members willingly agreed to wait. They then turned to the

mother and advised her that she could pick up the infant if she wished. As soon as the mother placed the infant in a sitting position and held him against her shoulder, all crying ceased. The crying duration was 2 minutes 9 seconds.

Following the procedure the parents of the infant expressed gratitude for being allowed to remain with their son while the intravenous infusion was started.

Subject #2. Subject number two was an 11-month-old white female who was admitted to the hospital with a diagnosis of vomiting and dehydration secondary to a viral gastritis. This patient was accompanied by her mother who expressed a willingness to participate in the study and to remain with her child if necessary, but stated a preference to leave the room. Without manipulation or prior planning, this patient was scheduled to be a member of the parent-absent, control group since the toss of the coin had determined odd-numbered subjects would be in the experimental group while even-numbered subjects would be in the control group. It was decided to use this infant as a subject even though the mother's expression of a willingness to be present while preferring to be absent may have confounded the results in an indeterminable way.

This infant was restless and crying on admission and continued to be so even when held and rocked by the mother. Like Subject number one, the infant resisted having the mother apply the surface electrodes of the heart monitor by pushing the mother's hands away and crying during the process. The infant also seemed to ignore the presence of the electrodes and wires once they were taped in place.

Her pre-procedure heart rate was taken while the infant was supine in the crib with the mother leaning near her with a hand on the infant's

abdomen. The pre-procedure heart rate reading was 172 beats per minute. It is important to note here that the patient had been in the hospital 50 minutes prior to the starting of the intravenous insertion procedure. Eight minutes prior to being approached for the IV procedure she had also undergone an unsuccessful attempt at being catheterized for a sterile urine specimen.

An IV team nurse was responsible for starting the patient's intravenous infusion, and the floor nurse who had admitted the patient was responsible for restraining her. Neither staff member gave the mother any pre-procedural teaching or guidance other than to say that the patient would need an intravenous infusion. The mother left the room as the IV team nurse approached the infant.

The intravenous needle insertion took 5 minutes from the point of initially looking for a vein until a line was patent and tape-down began. It did require two needle insertions, the first in a hand and the second in the scalp, before a patent line was obtained.

The maximum apical pulse reading on this subject was placed at 200+. There was difficulty in determining this measure precisely because the scale on the monitor screen stopped at 200, yet the monitor needle over shot that point approximately the same distance as 8 beats per minute on the scale. Because any amount above 200 beats per minute would simply be conjecture, a rate of 200+ was used for the maximum apical pulse reading. This was a 28 beat per minute increase over the pre-procedure reading of 172. The post-procedure heart rate reading was 195, indicating a 23 beat per minute difference from pre-procedure to post-procedure.

The measure of duration of crying for the subject began with the tape-down process. The mother was reunited with the child within seconds

of the tape-down during a period when the IV team nurse was drawing blood from the intravenous line for a laboratory specimen. As with Subject number one, the additional time needed to withdraw this specimen added an indeterminate amount of time to the procedure. This factor aided in making the subject's intravenous needle insertion unique and different from any other subject's experience. The measure of crying duration on the subject was placed at 1 minute 58 seconds, but the endpoint was difficult to assess because the crying ceased when the mother was leaning over the infant and was speaking softly to her. However, once the mother was able to pick the infant up in her arms a short while later, the infant started crying again. This occurrence emphasized the highly subjective nature of defining the endpoint of crying since crying might end and then begin again after a period of calm.

Subject #3. Subject number three was a 9-month-old white male who had been born 2 months prematurely and had been hospitalized in a neonatal intensive care unit as a newborn. His natal history was uncomplicated except for low birth weight and a mild case of respiratory distress syndrome that never required treatment with a respirator. He was admitted to the hospital 54 minutes before the procedure with a diagnosis of gastroenteritis.

He was accompanied to the hospital by both his mother and father. The parents agreed to participate in the study and decided that the father, with a paramedic background, would be the one to remain with the infant during the procedure. These parents did not express a preference for whether or not they could be present or absent during the procedure.

The infant was irritable and crying prior to the procedure, even when held by his parents, with only brief periods of calm. He did not

resist application of the surface electrodes except with the continued crying. The pre-procedure heart rate was 115 beats per minute.

An IV team nurse assumed responsibility for starting the intravenous infusion. A laboratory technician assumed the role of the person who restrained the infant.

The father positioned himself near the infant's head and leaned over him while stroking the infant's head and holding his left hand. The father made audible clicking noises with his tongue to gain the infant's attention during the procedure. The father did not use any verbal expressions to comfort the infant until the procedure was completed.

The maximum apical pulse reading was 175 beats per minute, an increase of 60 beats per minute. At tape-down of the needle, the post-procedure heart rate was 140 beats per minute, a 25 beat per minute increase over the pre-procedure reading.

The left foot was the site of the intravenous needle insertion. The duration of the procedure took 5 and 1/2 minutes until the needle was taped down. There was an attempt to withdraw blood from the patent intravenous line. The attempt was unsuccessful and also interrupted the patent line. There was a 4 minute gap while the IV team nurse applied direct pressure to the intravenous needle site and waited for another IV team member to make another attempt at the needle insertion in the opposite foot. This second attempt took 7 minutes to complete. There was no pre-procedure teaching or preparation of the parent given before either attempt.

During the second attempt a maximum apical pulse reading of 188 was made and a post-procedure reading of 160 beats per minute was recorded.

No attempt was made to use the second intravenous line to get a laboratory specimen.

The duration of crying was measured from tape-down of the second needle insertion until cessation of crying. It lasted 2 minutes 57 seconds. The infant did not stop crying following the procedure even though the father held him. When the mother entered the room at the completion of the procedure, the father handed the infant to the mother, and the crying diminished shortly thereafter.

The results of this case study were particularly difficult to assess for two reasons. Firstly, this 2-month-premature infant may very well have been at a developmental level of a 7-month-old. If so, he may or may not have been capable of responding to separation anxiety or of finding relief from not being separated from the parent. Tennes and Lampl (1964) state they found the mean, median, and mode of the beginning of separation anxiety to be about 8 months of age with the most intense reactions occurring from 13 to 18 months of age.

The second confusing aspect of this case study is the fact that the infant underwent two separate intravenous insertions with a 4 minute respite between them. Whatever potential this time lapse had for affecting the measures of heart rate and crying duration will never be known. But it certainly made this subject's experience different from those experienced by the other subjects, and makes the heart rate measures of the second procedure and the duration of crying of little value.

Subject #4. Subject number four was an 11-month-old white female who was admitted to the hospital for removal of a foreign body in the esophagus. The infant was accompanied to the hospital by her mother who

agreed to allow her child to participate in the study, but stated she preferred to remain with her daughter. When told her daughter was in the parent-absent control group, she reluctantly agreed to leave the room during the procedure.

The mother applied the surface electrodes to the subject's chest. The subject cried and pushed the electrodes away, as did the previous 11-month-old subjects, until the mother had them taped in place. After that, the infant appeared to completely ignore their presence. The pre-procedure heart rate measure was 160 and was taken while the infant was quiet in her mother's arms.

An IV team nurse approached the infant to start the intravenous infusion 15 minutes after admission to the hospital. No pre-procedure teaching of the mother was given, except to explain that there was an order for an intravenous infusion to be started. The mother left the room as the IV team nurse approached the infant. The staff nurse who was responsible for admitting the infant to the hospital assumed responsibility for restraining the infant during the procedure.

A maximum apical pulse reading of 200+ was noted. This was a 40+ beat per minute increase over the pre-procedure recording, and it coincided with the left arm being stretched and pulled before the needle was inserted into the left hand. At tape-down of the needle, the post-procedure heart rate was 198 beats per minute, a 38 beat per minute increase over the pre-procedure measure.

The procedure took 4 minutes to complete and required one needle insertion before a patent line was obtained. No attempt was made to withdraw a laboratory blood specimen from the intravenous needle.

The mother was brought back into the room as soon as the tape-down process began. She hesitated in approaching the infant as the nurses were on either side of the infant. After a lengthy pause, she reached out to touch her daughter's head with one hand and spoke the infant's name. The infant immediately turned her head toward the mother, but the crying continued until the tape-down process was completely finished and the flow rate adjusted. At that point the staff nurse told the mother she could pick up the child if she wished. As soon as the child was in the mother's arms, the crying ceased after a duration of 1 minute 38 seconds.

This case study was the one with the fewest confounding intervening variables and was the only intravenous insertion procedure out of the five that consisted solely of an intravenous needle insertion. The procedural experience of this subject was the type that was desired for all the subjects so that a commonality of experience could be used as a basis for assessing the significance of heart rate changes and duration of crying. The fact that only one of the five subjects experienced an uncomplicated intravenous needle insertion procedure emphasizes the difficulty of conducting clinical nursing research.

Subject #5. Subject number five was a 19-month-old white female who was admitted to the hospital with the diagnosis of possible meningococcemia. The patient was alert and responsive and did not cry except when moved due to muscular discomfort. She occasionally cried when disturbed for her vital signs during the admission procedure. She was accompanied by her mother who voiced a strong preference to remain during the intravenous insertion procedure, if at all possible. The infant, by virtue of being an odd-numbered subject was placed in the parent-present, experimental group.

The infant did not cry as her mother applied the surface electrodes but did pick them up to look at them before her mother had them securely taped in place. The arm movements made toward the electrodes and wires were resistive at first until her mother let her look at them and explained that they would not hurt. The subject also seemed to quickly ignore the electrodes once they were taped in place. The pre-procedure heart rate recording was 140 beats per minute and was taken as the subject was supine, lying quietly in the crib.

The infant had been in the hospital 16 minutes prior to being approached for the intravenous needle insertion by an IV team nurse. The staff nurse who admitted the infant assisted in restraining the subject during the procedure. No pre-procedure preparation was given to the mother other than to explain that the infant would be getting an intravenous infusion. The nurses did converse with the mother before, during, and after the procedure in a relaxed, open manner.

The mother leaned over the child and touched her chest and head while talking to her intermittently during the needle insertion. The mother did not hold the child's free right hand or arm, and the subject was noted to be sucking the right thumb before, during, and immediately following the needle insertion.

The subject's maximum and post-procedure heart rate measures were both 152 beats per minute, a 12 beat per minute increase over the pre-procedure measure. The maximum heart rate increase was reached prior to the actual needle insertion.

The procedure for this subject required only one needle insertion and 2 minutes to complete. The needle was placed in the left hand. A laboratory blood specimen was withdrawn successfully from the intravenous

experimental subjects were perhaps influenced by the attitudes and feelings of the parents who knew prior to this reading whether or not they would be remaining with their child.

In Figure 1 it would appear that the maximum pulse acceleration increased more sharply for the control subjects than for the experimental subjects except for Subject number three. Subject number three's plotted heart rate changes, for his first needle insertion, did not approximate either those of the control or experimental group. Without a larger sample size to compare with, it is impossible to know whether or not this subject's scores were part of a normal distribution or truly deviant. One wonders if this subject's younger gestational age and neonatal intensive care unit experience had an effect on this physiologic response.

In Table 1 the mean change scores of the heart rate readings are given for the total experimental group, the experimental group excluding the premature subject, and the control group. The most that can be said for the heart rate values is that they are in the direction predicted by hypotheses 1 and 2. Nevertheless, hypotheses 1 and 2 could neither be accepted nor rejected because significantly lower heart rate change scores for the experimental groups could not be shown.

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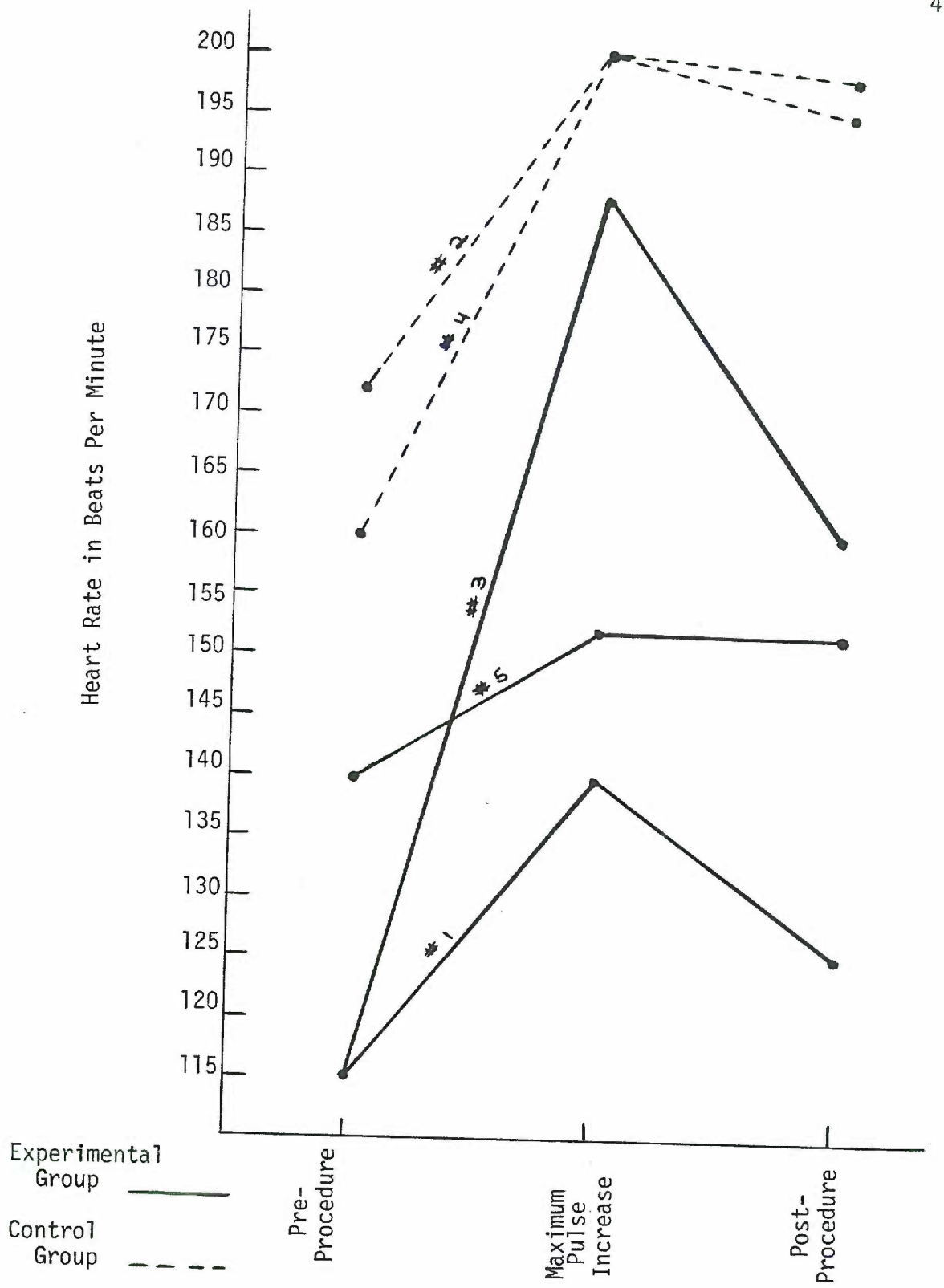

Figure 1. The pre-procedure, maximum pulse increase and post-procedure heart rates of the control and experimental subjects.

Table 1.

Mean Heart Rate Change Scores and Crying Duration of Control and Experimental Groups With and Without Premature Subject

Group	Mean change score between pre- and post-procedure	Mean change score between pre- and maximum pulse increase	Mean Duration Crying
Experimental with Premature Subject	22.3	33.3	1:62
Experimental without Premature Subject	11	18.5	1:16
Control	30.5	34	1:48

Duration of Crying

The figures for the mean duration of crying, as seen in Table 2, are not in the direction predicted by hypothesis 3. Not only are the differences in the mean crying times not able to be tested for significance; but as mentioned in the case studies, the reliability of this measure is in serious doubt. The 4 minute lapse between the first and second attempts to insert the intravenous needle on Subject number 3 makes one wonder if the duration of crying time measured once a patent line was obtained was perhaps measuring a second intravenous needle insertion experience as opposed to one single experience. If Subject number three is not used in the calculation of crying duration, then the change scores are in the

direction predicted by hypothesis 3. With Subject number two the duration of crying time measure was taken at the point when the subject stopped crying while her mother leaned over her in the crib. Yet when the mother picked her up a few seconds later, the infant began crying again. The endpoint of this measure, although anticipated to be readily identifiable, was instead less definite and open to subjective interpretation. Perhaps it would have been more objective to assess the subjects' crying by using a recorder to measure the actual intensity of the cry at the point of needle insertion as in Hallstrom's (1974) study.

Discussion of Findings Related to Intervening Variables

Once the study was underway, it became readily apparent that the multiplicity of the intervening variables would make the attempt to examine the significance of parental presence or absence on the stress level of the infant extremely difficult to interpret. Perhaps if the number of subjects had been large enough, a factor analysis could have been used to examine the significance of some of these variables.

Demographic

The subjects were similar in race and in their degree of illness. The one subject admitted for surgery was also experiencing a febrile viral illness. They were also similar in the length of time they had been in the hospital prior to the procedure. Every subject had the intravenous needle insertion done within an hour after admission. None of the subjects had a recent previous experience of a venipuncture.

The subjects all fell into the age range of 9 to 20 months. But Subject number three, with a gestational age of 7 months, may or may not have been functioning at a similar developmental level as the other subjects. Subject number five, being 8 to 10 months older than the other

subjects was also noted to be more verbally skilled and better able to understand verbal explanations than the other subjects. This may have changed the way she perceived the painful experience and given her a wider variety of skills with which to cope than was available to the younger subjects.

Parental Attitudes

Three of the five subjects had parents who stated a strong preference for remaining with their child. Two of these parent-infant dyads were assigned to the experimental group. It is quite possible the parent's strong wish to support the child through the painful, stressful experience had an influence on the infant's level of anxiety both before and throughout the procedure. This, of course, cannot be supported with the limited data that was collected in the study.

The one mother who agreed to be present if necessary, but who preferred to be absent, was also noted to be more anxious than the other infants' parents. The admitting physician commented on this mother's high anxiety level and need for calming reassurance from the nursing staff. Her infant was in the parent absent, control group. This infant also had the highest heart rate measures at all three points of measurement. One wonders what effect the mother's attitude had upon this infant's cardiac response.

The parents varied minimally in the means they used to comfort their infants. Four of the five parents used both physical and verbal measures to comfort the infants throughout the procedure. The one father who used only physical means of comforting added verbal attempts to comfort once the procedure was completed. This father also had a medical background. One wonders if there was a tendency to identify with the medical

staff that interferred with his fathering role; or could he, as a father, have been more hesitant to use verbal attempts to comfort than the mothers in the study?

Subject's State of Arousal

It would seem to be apparent that a subject that was highly aroused and upset would be less able to be comforted by a parent's presence and more easily stressed by a painful intrusive procedure. Two subjects were restlessly fretting upon admission. Three of the subjects were not crying unless disturbed by the admitting staff. One of the two tearful subjects had been subjected to a bladder catheterization immediately prior to the intravenous procedure. This latter subject was the one with the highest heart rate measures. One has to strongly suspect that the subject's prior state of arousal had an important effect upon these measures. The arousal state may have been independently acting upon the stress response or interacting with the variables of a highly anxious, absent mother.

Personnel's Attributes

In all cases, it was the members of the IV (intravenous) team who were involved in starting the intravenous infusion on the subjects. Even though all these team members are skilled at starting intravenous infusions, some were more highly skilled than others. They were assisted in restraining the infants by a variety of persons, but mostly by the staff nurse who had just admitted the subject. Due to the short time lapse between admission and the beginning of the intravenous infusion, all of these nurses were strangers to the infants.

There was a noticeable absence of pre-procedure explanations or teaching of the parent in regard to the actual intravenous insertion

procedure in all cases. Yet in some instances an atmosphere of warmth, friendliness, and acceptance was generated by the nurses. This appeared to be used in lieu of pre-procedural teaching as a means of establishing cooperation and trust. The effect this had upon the parent's ability to comfort or upon the subject's response is not verifiable in the study. However, Bellack (1974) reported that in her experience, children's behavior was affected by their perception of the parent's trust in the nursing staff.

Procedure Differences

The case study descriptions emphasized the differences in the procedures that each of these subjects experienced. Four of the five procedures were lengthened by varying amounts of time due to attempts to withdraw blood for a laboratory specimen from the intravenous line. This factor made the duration of crying, as measured from tape-down of the needle to cessation of crying, less useful as a measure of stress due to parental absence. For these four subjects, the intravenous procedure and need to be restrained was not completed once the needle was taped in place, and the ability of the parent to provide the close contact comfort of holding the infant to their chest was also delayed.

The actual length of the procedure from when the IV nurse began looking for an appropriate vein until the needle was taped in place also varied considerably, from a low of 2 minutes to a high of 6 minutes. For two of the five subjects there was also the added stress of having the skin pierced twice before a patent intravenous line was obtained.

The primary site of the needle insertions was in the hand with the staff inquiring before using a hand for the venipuncture if it was a hand

that the infant used for sucking a finger or a thumb. If it was, an alternate site was chosen. One infant had the foot used as the needle insertion site, and one the scalp. These two latter subjects did happen to have high maximum apical pulse scores, but it is not possible to even imply a correlation between this physiological response and the location of the intravenous needle site from the limited findings in the study.

CHAPTER IV

Summary Conclusions and Recommendations

Summary

The purpose of the study was to investigate whether infants between 9 and 20 months of age whose parents remain with them during an intravenous insertion show less response to stress, as measured by the mean heart rate change and the duration of crying, than infants whose parents are not with them. The results of the study were inconclusive due to the unexpectedly small sample size of five. The heart rate changes of the infants in the experimental, parent-present group were in the direction predicted, but the small sample size made it impossible to attempt to establish any statistical significance to these findings. The duration of crying was even more confusing in its outcome. When all subjects' responses were included in the calculations, the duration of crying was longer for the parent-present, experimental subjects. The direction reversed once an infant of 7 months gestational age was eliminated from the calculations. However, the duration of crying was felt to be unreliable and too highly subjective to be a valid measure of the infant's stress level.

The results of this study were also difficult to assess due to the large number of intervening variables that obscured the specific effect that the parental presence or absence might have had upon the infant. The subject's developmental level and skills and state of arousal along with the parent's strong preferences for remaining with their child were three of the significant intervening variables. Others were the differences in the actual procedures that were introduced as a result of attempting to use the intravenous line for withdrawing a blood specimen and the degree

to which an atmosphere of warmth, friendliness, and trust was established between the staff and the parents. The most interesting finding was that three of the five parents who were approached to participate in the study expressed strong feelings about preferring to remain with their infant during a stressful procedure.

Conclusions

The sample size of the study was limited by time constraints on the observation period and by the low numbers of subjects that met the stringent criteria of the study. The limitations of the small sample size and inability to use randomization for group assignment have made it impossible to generalize the results of the study or to draw significant conclusions. The following conclusions refer to the study population but address some of the arguments given for why parents should not be allowed to remain with their infants during a painful procedure.

1. The majority of parents in the study expressed a strong preference to remain with their child during the intravenous needle insertion.

2. The parents who remained with their infants during the intravenous needle insertion did not appear to be upset by the experience. Therefore, it cannot simply be assumed that such an experience is too painful for the parents to withstand.

3. The parents who remained with their infants during the intravenous needle insertion all made efforts to comfort and distract their infant rather than attempting to halt the infant's tears and resistance.

4. None of the infants exhibited contact-resisting behaviors toward the parents either during the procedure or upon its completion. Crying ceased immediately upon being held close to the mother's chest in all cases. This fact makes it difficult to assume that these infants

perceived the parent's presence during the procedure as a betrayal and a failure to protect them against the assault.

5. None of the infants were more resistive to the procedure in the presence of the parent than were the subjects whose parents were absent. Therefore, one cannot conclude that infants are more cooperative in the absence of the parents.

6. Parental presence in this group of subjects did not lengthen the duration of the procedure nor require more needle insertions before a patent line was obtained. The scores were identical in both instances for the control and experimental groups.

Recommendations for Practice

1. Parents should be given the choice of whether they will remain with their infant during the start of an intravenous infusion. It is presumptuous for the staff to decide for the parent whether or not the parent is capable of coping with such an experience.

2. An attempt to seek the parent's trust and cooperation should be made prior to beginning a painful procedure. This may be accomplished through parent-teaching or through the establishment of a warm, friendly atmosphere.

3. Parents may benefit by being advised as to how they can best comfort their infant during a painful procedure. Parents tend to wait for permission from the nursing staff before always responding to their child's needs in a hospital setting. It is the nursing staff's responsibility to reinforce the importance of the parent as the child's primary source of comfort and protection.

Recommendations for Research

1. This study needs to be replicated in the future with the following changes: it would be advisable to have an extended period of many months to collect the data so that an adequate number of subjects could be obtained; a large number of subjects is vital to being able to factor out the multiple intervening variables encountered in such a study; a heart rate monitor that produces a graphic print out would be needed to increase the objectivity of the physiological measure for stress; instead of measuring the duration of crying, it would be more appropriate to measure the intensity of the cry for a 10 to 20 second period following needle insertion.

2. A recording of the length of all intravenous procedures and the number of needle insertions that are required to obtain a patent line on the pediatric patients in any hospital setting could readily be done to assess whether parental presence or absence makes the procedure more lengthy and painful for a child.

3. In this hospital setting it would be advisable for the laboratory personnel and the IV team members to investigate the policy of attempting to withdraw a blood specimen from an intravenous needle insertion site. The theory is to decrease the number of venipunctures needed by a child. What the staff needs to know is whether, in fact, these attempts are successful; and if not, was the patency of the intravenous line compromised. The numbers could possibly show that a significant number of subjects have to experience more venipunctures rather than less if the loss of the patent intravenous line occurs as a result of this practice. No one wishes to subject a child to more physical assault than is absolutely necessary. But hospital practices of all types, including this

one, need to be based on scientifically supported research rather than on personal beliefs.

4. Future studies need to be done that examine parental and staff attitudes, stress levels, and coping abilities in relation to parental presence during painful procedures to the infant. Our goal is to minimize the infant's distress, but it cannot be done without considering the other participants that are involved.

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APPENDICES

APPENDIX A

INFORMED CONSENT FORM

OFFICE OF THE
ASSOCIATE DEAN
FOR ACADEMIC AFFAIRS
SCHOOL OF NURSING

Area Code 503 225-7893

UNIVERSITY OF OREGON

HEALTH SCIENCES CENTER

Portland, Oregon 97201

Code Number:_____

INFORMED CONSENT FORM

I,_____, herewith agree to allow my
(First Name) (Middle Name) (Last Name)
child_____ , to serve as a subject in
(First Name) (Middle Name) (Last Name)
the investigation named "Differences in the Stress Response of Infants Produced by Intravenous Insertion when Parents are Present or Absent" by Joyce A. Boles, R.N., B.S., under the supervision of Wilma E. Peterson, R.N., Ph.D. The investigation aims at determining whether an infant experiences less stress or anxiety if the parent is allowed to remain with him/her during the insertion of an intravenous (IV) needle.

I will be expected to complete one questionnaire for background data. My child will be assigned to either a control group, in which I will not be present with my child during the insertion of the intravenous needle, or to an experimental group, in which I will be with my child during this procedure. I understand that it is presently the practice of this hospital to allow parents to be present during such a procedure. But for the purposes of this study, one-half of the parents will be requested to accompany and one-half be requested to be absent from their child while the intravenous needle is inserted for the purpose of obtaining scientifically supported data that either supports or refutes this practice.

The research procedures to which my child will be subjected are to have his/her heart rate recorded by use of skin electrodes attached to a battery-operated screen and to have the length of time it takes him/her

to calm following the procedure timed by use of a stop watch. These specific procedures have been chosen to avoid causing any undue pain or stress to my child. These two measures will be made just before the procedure for inserting the intravenous needle and immediately after the procedure is completed. The time needed to obtain these measures will be approximately 6 minutes in total.

There are no expected risks from this study, but it is expected that my child may cry when having the heart rate monitor electrodes taped onto his/her chest. I understand I will be given instructions on how to apply the contact paste and electrodes to my child's skin and then will tape them in place myself. These procedures are not painful and the contact paste is non-allergenic. Nevertheless, a young child may resist any contact with an unknown object. The electrodes will be removed as soon as a measure of crying duration has been completed. These electrodes are used only for the purposes of this research study and are not a normal part of the intravenous procedure.

Joyce A. Boles, R.N., the investigator of this study, has offered to answer any question I might have. My participation in this study will help nurses learn more about the stress response of a child during a painful procedure and whether this stress can be lessened by the presence of the parent so that improved, individualized nursing care of the child can be given.

The information obtained will be kept confidential. Neither my nor my child's name will appear on any records other than the Informed Consent Form, and anonymity will be insured by the use of code numbers.

I understand I may refuse to participate or withdraw from this study at any time without affecting my relationship with, or treatment at Sacred

Heart Hospital.

It is not the policy of the Department of Health and Human Services, or any other agency funding the research project in which you are participating, to compensate or provide medical treatment for human subjects in the event the research results in physical injury. The Oregon Health Sciences University, as an agency of the State, is covered by the State Liability Fund. If you suffer any injury from the research project, compensation would be available to you only if you establish that the injury occurred through the fault of the Center, its officers or employees. If you have further questions, please call Dr. Michael Baird, M.D., at (503) 225-8014.

I have read the foregoing and agree to participate in this study.

Date:_____ Parent's signature_____

Witness' signature_____

APPENDIX B

PHYSICIAN'S INFORMED CONSENT FORM

OFFICE OF THE
ASSOCIATE DEAN
FOR ACADEMIC AFFAIRS
SCHOOL OF NURSING

62

Area Code 503 225-7893

UNIVERSITY OF OREGON

Portland, Oregon 97201

HEALTH SCIENCES CENTER

Code Number:_____

PHYSICIAN'S INFORMED CONSENT FORM

I,_____, herewith agree to allow my patient,
(First Name) (Middle Name) (Last Name)

_____, to serve as a subject in the inves-
(First Name) (Middle Name) (Last Name)
tigation named "Differences in the Stress Response of Infants Produced by Intravenous Insertion when Parents are Present or Absent" by Joyce A. Boles, R.N., B.S., under the supervision of Wilma E. Peterson, R.N., Ph.D. The investigation aims at determining whether an infant experiences less stress or anxiety if the parent is allowed to remain with him/her during the insertion of an intravenous needle.

The child will be assigned to either a control group, in which the parent will not be present with the child during the insertion of the intravenous needle, or to an experimental group, in which the parent will be with the child during the procedure. I understand that for the purposes of this study, one-half of the parents will be allowed to accompany their child while one-half will be requested to be separated from their child while the intravenous needle is inserted. The procedures to which the child will be subjected are to have his/her heart rate monitored by use of surface electrodes attached to a battery-operated monitor and to have the length of time it takes him/her to calm following the procedure timed by the use of a stop watch. These specific procedures have been chosen to avoid causing any undue pain or stress to the child. These two measures will be made just before the procedure for inserting the intravenous needle and immediately after the procedure is completed. The time

required to obtain these measures will be approximately 6 minutes in total.

There are no expected risks from this study, but it is expected that the child may cry when having the heart rate monitor electrodes taped onto his/her chest. I understand that the parent will be given instructions on how to apply the contact paste and electrodes to the child's chest and then will be supervised while they are taped in place. These procedures are not painful, and the contact paste is non-allergenic. Nevertheless, a young child may resist any contact with an unknown object. The electrodes will be removed as soon as the measure of crying duration has been completed following completion of the IV insertion.

Joyce A. Boles, R.N., the investigator of this study, has offered to answer any questions I might have. My participation in this study will help nurses learn more about the stress response of a child during a painful procedure and whether this stress can be lessened by the presence of the parent so that improved, individualized nursing care of the child can be given.

The information obtained in this study will be kept confidential. Neither my nor my patient's name will appear on any records other than the Informed Consent Form, and anonymity will be insured by the use of code numbers. I understand that I may refuse to participate or to allow my patient to participate in this study at any time.

I have read the foregoing and agree to allow my patient to participate in this study.

Date:_____ Physician's signature_____

Witness' signature_____

APPENDIX C

BACKGROUND DATA SHEET

Code No._____

Date:_____

APPENDIX C

BACKGROUND DATA SHEET

A. Child's Birthdate:_____

B. Child's Sex:_____

C. Reason child needs IV: Please check one.

Injury_____

Illness_____

Surgery_____

D. Relationship to child: Please check one.

Father_____

Mother_____

Primary Caretaker_____

APPENDIX D

DATA COLLECTION RECORD

Code No._____

Date:_____

APPENDIX D

DATA COLLECTION RECORD

Pre-Procedure Apical Pulse Reading_____

Maximum Apical Pulse Reading_____

Post-Procedure Apical Pulse Reading_____

Duration of crying following procedure_____

Personnel inserting IV: IV Team_____

Floor Nurse_____

Location of IV site: Scalp_____

Hand_____

Arm_____

Foot_____

Number of needle insertions before procedure completed_____

Pre-procedure teaching or preparation of parent given by staff: Yes_____

No_____

Parent-Child Interaction: Physical Contact_____

Verbal Contact_____

Physical & Verbal Contact_____

ABSTRACT

AN ABSTRACT OF THE THESIS OF

JOYCE A. BOLES

For the MASTER OF NURSING

Date of Receiving this Degree: June 11, 1982

Title: DIFFERENCES IN THE STRESS RESPONSE OF INFANTS PRODUCED BY INTRAVENOUS INSERTION WHEN PARENTS ARE PRESENT OR ABSENT

Approved: _____
Wilma E. Peterson, Ph.D., Thesis Advisor

It is generally believed that the infant is in danger of experiencing emotional trauma when separated from the parent and placed in a strange, fearful environment. Even so, it is often the practice for parents to be asked to leave the room when a child is subjected to a painful procedure in the hospital setting. The study examined the hypothesis that infants between 9 to 20 months of age, whose parents remain with them, experience less stress during an intravenous needle insertion than do the infants whose parents are not with them.

A pre-test, post-test control group design quasi-experiment with alternate group assignment was used to study 5 subjects, ages 9 to 20 months, both male and female, who were patients in a pediatric ward of a privately-owned metropolitan hospital. The response to stress was examined by measuring the change scores between a pre- and post-procedure recording of the apical pulse rate, the change scores between the pre-procedure and the maximum apical pulse recording, and the duration of crying following completion of the procedure. A case study presentation was used to examine the findings of the study. The results were inconclusive as the sample

size was too small to determine the statistical significance of the measures.

Conclusions were drawn and recommendations for further study made.