A Study of Postpartum Uterine Massage

Beverly Eugenia Blake

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A STUDY OF POSTPARTUM UTERINE MASSAGE

by

Beverly Eugenia Blake

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

June 1963
I certify that I have read this thesis and that in my opinion it is adequate, in scope and quality, as a thesis for the degree of Master of Science.

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CHAPTER I

INTRODUCTION TO THE STUDY

Much progress has been made in the area of maternal mortality throughout the centuries. The common causes of maternal death are hemorrhage, toxemias of pregnancy, and puerperal infection. During the seventeenth, eighteenth, and nineteenth centuries puerperal fever was the leading cause of death. Following this toxemia was the leading cause of death until 1957, when it was noted that this might not continue to be true. For

According to the official classification, only the direct cause of death is considered, even though the predisposing cause may be an important factor. . . . Hemorrhage is often a predisposing factor, and in this manner its toll in maternal mortality probably exceeds all other causes combined.1

Before 1957, Melody,2 Russell,3 Weeke,4 and Randall5 indicated that hemorrhage was the outstanding cause of death and morbidity. Recently


Eastman has classified hemorrhage as the first among the three chief causes of maternal mortality. See Figure I.\textsuperscript{6} Hemorrhage is also a contributing factor to other causes of death and morbidity such as infections\textsuperscript{7,8} and blood transfusion reactions.\textsuperscript{9,10} Since hemorrhage is such an important cause of maternal death, any nursing procedure which might lessen hemorrhage would also be important. This study is concerned with uterine massage during the immediate postpartum period and its possible value in reducing blood loss which in turn would lessen mortality and morbidity.

I. THE PROBLEM

Need for the Study

The preservation of life and strength through the prevention of blood loss and hemorrhage is of prime importance for the maternity patient. During the first three stages of labor the doctor and nurse share this responsibility for the patient. Often after delivery, the


\textsuperscript{7}Ibid., p. 995.

\textsuperscript{8}James Knight Ogley, "Puerperal Hemorrhage--Is the Present Mortality Rate Unnecessarily High?" \textit{New York State Journal of Medicine}, 48:55-58, January 1, 1943.

\textsuperscript{9}Bernard D. Hirsh, "3,000 Die Yearly From Blood Transfusions... And the Physician Could be Blamed," \textit{New Medical Material}, 3:73, September, 1961.

FIGURE 1

THE RELATIVE FREQUENCY OF THE THREE MOST COMMON CAUSES OF MATERNAL DEATH
full responsibility of the patient's care is left to the nurse. Nurses have been observed in various hospitals using different procedures in assuming this responsibility for the patient. These different procedures have included holding the fundus of the uterus for the first hour following delivery, checking and massaging the uterus every fifteen minutes. In some instances the uterus was not checked at all. The procedure used by the nurses is often determined by the amount of time available for patient care. Since no scientific basis for these procedures could be found, there was a need to study these procedures to find out which is most effective in reducing the loss of blood cells as a factor in the preservation of life and strength of the maternity patient. A study of these procedures would also establish the best nursing procedure for the care of the maternity patient during the immediate postpartum period.

Purpose of the Study

It is the purpose of this study to find out if continuous external holding of the uterus, massage of the uterus, or no uterine massage is the best nursing procedure for the reduction of blood loss during the first hour after leaving the delivery room.

Statement of the Problem

This study is to determine if there is a significant difference in the amount of postpartum bleeding between two methods of uterine massage and no uterine massage.
Hypothesis

The holding of the uterus for the first hour after leaving the delivery room will lessen postpartum bleeding.

Methodology

The experimental method, with parallel groups technique and a single variable was chosen for this study. The variable that was studied is uterine massage.

Patients were selected from St. Bernardine's Hospital, San Bernardino, California, and divided into three experimental groups. The groups used were: Group A, external holding of the uterus; Group B, gentle intermittent massage of the uterus; Group C, no manual manipulation of the uterus. These experimental groups were evaluated in respect to volume of red cells lost. This was calculated by doing a pack cell volume or hematocrit determination on the measured blood loss during the first hour after leaving the delivery room.

A pilot study was conducted to determine the simplest and most accurate method of measuring blood loss and to familiarize the nursing personnel and the researcher with the skills and techniques needed for this study.

Definition of Terms

For the purpose of this study, the following definitions were used:

Normal patient. The normal patient is one who comes from the delivery room with no known obstetrical complications.
Immediate postpartum period. The immediate postpartum period refers to the first hour after the patient leaves the delivery room.

Blood loss. The blood loss (lochia) refers to the discharge from the uterus of blood, mucous, and tissue during the first hour after the patient leaves the delivery room.\(^9\)

Measurement of blood loss. The amount of blood loss is calculated in terms of red cell mass loss by using the following formula:

\[
\text{Hematocrit} \times \text{Volume} = \text{Red Cell Mass Loss (RCML)}\]

External holding of the uterus. When holding the uterus, the left hand was placed flat over the abdomen with the fingers directed under the symphysis to prevent the fundus from entering the pelvis. The fundus was then held firmly between the forefingers and the thumb of the right hand. This was constant for one hour except for a short period every fifteen minutes during the time the patient's blood pressure and pulse were taken.

Intermittent massage of the uterus. The uterus was massaged every fifteen minutes for the first hour after leaving the delivery room.

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\(^{11}\) This formula is needed to change the percent of red cells lost to cc. of red cells lost, since the packed cell volume or hematocrit reading is the percentage of whole blood volume occupied by the red cells after centrifuging.
When massaging the uterus, the left hand was placed flat over the abdomen with the fingers directed under the symphysis to prevent the fundus from entering the pelvis. The fundus was then picked up and gently squeezed with the right hand until the uterus was firmly contracted.

No manual manipulation of the uterus. The uterus was not massaged, compressed, or manipulated in any way during the first hour after leaving the delivery room. At the end of the hour the uterus was massaged to express any accumulated blood.

Limitations

The patients of this study were limited to eighty-four patients selected from one hundred nineteen deliveries at St. Bernardine's Hospital from January 25, 1963 to March 2, 1963.

Normal obstetric patients were studied so that all patients with complications such as those known to have hemorrhaged prior to the immediate postpartum period, those with a diagnosis of a fibrinopenemia in pregnancy, placenta previa or abruptio, cesarean section, poly-hydramnios, and multiple pregnancy, were excluded from the study.

The length of time each patient is in the delivery room following the delivery of the infant was recognized as a limitation of this study.

Assumptions

For the purpose of this study the following assumptions were made:

1. The nurses in the hospital followed instructions in performing and recording the procedures accurately.
2. The oxytocic given in the delivery room would benefit each patient equally.

3. The characteristics of the groups and the noncontrolled variables such as episiotomy bleeding, predelivery hemoglobin and other factors which relate to the health of the patient would be equal for each group.

II. SUMMARY

Since the prevention of blood loss and postpartum hemorrhage is important to the maternity patient there was a need to study the method most effective in reducing the amount of bleeding during the immediate postpartum period.

The experimental method was used to find out if externally holding the uterus or gentle periodic uterine massage is the most effective procedure compared with no uterine massage for the normal patient in the reducing of postpartum bleeding during the first hour after leaving the delivery room for the maternity patient.

The study was composed of eighty-four patients selected from one hundred nineteen deliveries at St. Bernardine's Hospital, San Bernardino, California.
CHAPTER II

REVIEW OF LITERATURE

A survey was made of the literature pertaining to (1) the problem of postpartum hemorrhage, (2) methods of measuring blood loss, (3) the importance of the immediate postpartum period, (4) blood loss during the immediate postpartum period, and (5) the effect of uterine massage in the immediate postpartum period.

I. THE PROBLEM OF POSTPARTUM HEMORRHAGE

Postpartum hemorrhage is defined in literature as bleeding from the birth canal in excess of 500-600 cc. during the first twenty-four hours. It is recognized that postpartum hemorrhage is the most common cause of blood loss in obstetrics as well as the chief cause of maternal death.

Postpartum hemorrhage is a fairly common complication of labor and delivery. Fitzpatrick and Eastman in reference to bleeding of 500 cc. or more state,

Bleeding of this degree occurs in every 20-30 cases despite the most skilled care. Hemorrhages of 1,000 cc. and over are encountered once in about every 75 cases, while blood losses of even 1,500 cc. and 2,000 cc. are encountered now and then.\(^\text{12}\)

---

The most current incidence is recorded by Eastman as follows:

Postpartum hemorrhage...is of frequent occurrence and is observed in about 10 percent of all deliveries if an accurate measurement of blood loss is made at every delivery. Larger hemorrhages are less common, the average figures from a number of reports ranging as follows:

- 600 ml. or more in 5 to 6 percent;
- 1,000 ml. or more in 1.5 percent;
- 1,500 ml. or more in 0.3 percent, or once in about 335 deliveries; and
- 2,000 ml. or more in 0.07 percent or once in about 1,400 deliveries.

Pastore found that the incidence of infection during the puerperium increases with an increase in blood loss as a result of studying 1,431 cases from May 1, 1935, to February 1, 1936. Bickerstaff in his study of 2,018 multiparas found that with a blood loss of 500 cc. or more in delivery, two to ten times the rate of febrility was demonstrated than with lesser amounts of bleeding. He also found that blood loss within normal ranges was not demonstrably related to febrility. Douglas and Davis in their analysis of 1,000 cases found this to be true also.

The causes of postpartum hemorrhage as stated in literature are first, uterine atony; second, lacerations; and third, retained placental

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fragments. Qugley\(^{17}\) felt that many fatalities from puerperal hemorrhage might have been prevented had the attendant used the knowledge and facilities available today in the hospital. Some authorities believe that all of these are preventable and controllable. Especially is this true of certain predisposing factors such as operative delivery, deep ether anesthesia, prolonged labor with maternal exhaustion, and mismanagement of the third stage of labor.

The studies of Pastore,\(^{18}\) Reich,\(^{19}\) Boer,\(^{20}\) and others indicate that excessive bleeding is more common after operative delivery than after spontaneous termination of labor. Levinson\(^{21}\) maintained from a study of 3,869 cases that low forceps delivery did not add to the number who had postpartum hemorrhage. Moller\(^{22}\) included induced labor and precipitate labor (less than two hours) in his list of factors predisposing

17 James Knight Qugley, "Puerperal Hemorrhage--Is the Present Mortality Rate Unnecessarily High?" New York State Journal of Medicine, 48:55-58, January 1, 1948.


to hemorrhage but does not have statistical evidence for the inclusion of these. Anderson\(^{23}\) states that sudden emptying of the uterus contributes to uterine atony and this in turn contributes to postpartum hemorrhage. While prolonged general anesthesia, particularly ether anesthesia is an important factor in the production of postpartum hemorrhage, the effect of other anesthetic methods or hemorrhage still need analysis.\(^{24,25,26}\)

The management of the third stage of labor is another important factor in the control of hemorrhage. According to Eastman\(^{27}\) and others, the most common way of mismanaging the third stage of labor is to try to hurry it by constant kneading and squeezing of a uterus that is already contracted, thus causing interference with the physiological mechanism of uterine contraction and placental detachment. This can also be true in prolonged labor where there is maternal exhaustion. In such cases the uterus is affected by the general fatigue and does not contract satisfactorily.

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24 Pastore, loc. cit.

25 Levinson and Kawabe, loc. cit.


27 Eastman and Hellman, op. cit., p. 997.
Noncontrollable factors which may be classified as predisposing factors to postpartum hemorrhage are age, race, parity, size of infant, and overdistention of the uterus. Dodge and Brown \(^28\) found in their study of the primigravida that certain complications, such as postpartum hemorrhage, seem to have a definite correlation with age and show a higher incidence at both extremes of the reproductive life. Rowe \(^29\) noted that the incidence of postpartum hemorrhage was increased in patients over 40 years of age. Pastore \(^30\) stated that age affected blood loss during delivery. On the other hand, Calkins \(^31\) and Benny \(^32\) both stated that the age of the mother has little or no effect on blood loss during the third stage of labor in their study.

Peckham and Kuder \(^33\) in their study of 19,290 consecutively delivered women found that hemorrhage occurred relatively more often in the white than in the colored women of the series and was encountered more


\(^{29}\) Rowe, loc. cit.

\(^{30}\) Pastore, loc. cit.


frequently in primiparas. Denny and others\textsuperscript{34} in studying 3,000 consecutive spontaneous deliveries found that the blood loss and incidence of postpartum hemorrhage in primiparas was greater than in multiparas with one to four children, but that hemorrhage was greatest in multiparas with more than four children. Miller\textsuperscript{35} in his analysis of 563 deliveries of grand multiparas, para VI and over, found that postpartum hemorrhage occurred slightly more frequently than in other studies, but the average blood loss was lower.

Calkins\textsuperscript{36} found that there was direct proportion which is definite but not large between the length of infant and the blood loss. Perkham and Kuder\textsuperscript{37} found in their study that oversized children seem to predispose the patient to excessive bleeding after delivery. Reich\textsuperscript{38} found that if the infant weighed less than five pounds the occurrence of hemorrhage was 1 in 21, whereas with a large nine-pound infant it was 1 in 4. He also found that overdistention of the uterus caused by multiple pregnancy and polyhydramnios increased hemorrhage. Peckham\textsuperscript{39} and Anderson\textsuperscript{40} agreed

\textsuperscript{34}Denny and Wild, \textit{loc. cit.}


\textsuperscript{36}Calkins, \textit{loc. cit.}

\textsuperscript{37}Peckham and Kuder, \textit{loc. cit.}


\textsuperscript{39}Peckham and Kuder, \textit{loc. cit.}

\textsuperscript{40}Anderson, \textit{loc. cit.}
with Reich, but deSoer \(^{41}\) in his study of 2,444 successive vaginal deliveries concluded that the overdistention of the uterus as a factor in postpartum hemorrhage has been overemphasized.

II. METHODS OF MEASURING BLOOD LOSS

A need for an accurate knowledge of blood loss in normal obstetric cases has long been expressed in literature. There are four basic methods used in measuring blood loss, namely: visual estimations, volumetric or total volume of blood loss, gravimetric or total weight of blood loss, and colorimetric, which involves measuring the hemoglobin concentration of the blood loss, or its derivatives of the blood loss.

Pastore,\(^{42}\) Quigley,\(^{43}\) White,\(^{44}\) Dieckmann,\(^{45}\) and others found that estimates of blood loss are often inaccurate and misleading with a tendency to underestimate blood loss. Since visual estimates of blood

\(^{41}\) deSoer, loc. cit.


\(^{43}\) Quigley, loc. cit.


loss are inaccurate, Williams, Calkins, Pastore, Quigley, White, and Martin have used various pans and specifically designed apparatus for the collection and measurement of blood loss during the third stage of labor. These methods were of less certain value because of the immeasurable amount of amniotic fluid which they contain.

Various comments on the amount of hemorrhage, especially clotted mixture of blood and amniotic fluid in the suction bottle during cesarean section caused Dieckmann and Daily to use a modification of Gatch and Little's method by converting blood linen washings to acid hematin with 0.1 N hydrochloric acid and calculated blood loss by a formula. Odelli used this method in a study of episiotomy blood loss.

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47 Calkins, loc. cit.

48 Pastore, loc. cit.

49 Quigley, loc. cit.

50 White, loc. cit.


In 1950, Baker and Harrison \(^{55}\) studied the blood loss of twelve patients during delivery and their entire hospital stay using colorimetric hemoglobin determination methods as described by Harrison and Harrison. \(^{56}\) In 1959, Wilcox and others \(^{57}\) used a modification of the cyanmethemoglobin photometric method for determining loss of blood during cesarean section and Newton and Blackburn \(^{58}\) used the acid hematin photometric method in the study of blood loss following cesarean section. Newton and others \(^{59,60}\) used the acid hematin spectrophotometric method in the study of blood loss during and immediately after delivery and for forty-eight hours postpartum.

Colorimetric determinations of blood loss require that blood soaked linens be washed out in various solutions, which is time-consuming, but when components of blood must be measured from the total fluid of the blood, then it is more accurate than the gravimetric method or the volumetric method. A statistical comparison of the gravimetric and


\(^{59}\) Ibid.

colorimetric methods was done by Boronofsky\textsuperscript{61} in surgical procedures where blood loss would not be diluted in any way. He found that for all blood losses the colorimetric value, on the average, is close to 10 per cent less than the gravimetric value. With smaller blood losses the difference is quite negligible and even with high blood loss, the differences were not great.

No study was found using hematocrit determinations in calculating the red cells lost in external bleeding during the peripartum, since it was found that the hematocrit determination used in calculating the red cells lost has a higher precision than colorimetric methods.\textsuperscript{62}

III. THE IMMEDIATE POSTPARTUM PERIOD

In literature the "first postpartum hour" has been arbitrarily accepted as a very important period for the parturient woman. Rice\textsuperscript{63} in 1916 contended that a nurse should attend the patient constantly for one hour by keeping the uterus firmly contracted. In a recent textbook Fitzpatrick and Eastman stated that "the first hour following the delivery


is a most critical one for the mother. Douglas was the only one who recommended four hours as the most important postpartum period. Stepto and Johnson in their review of 37 cases of postpartum hemorrhage that occurred in 13,609 deliveries noted that in 29 cases the hemorrhage occurred within the first hour postpartum.

Some authorities have suggested that this first hour is so important that it should be termed the fourth stage of labor. This was first suggested by Harper in 1923, who urged that the period beginning with termination of the third stage and ending 12 or 18 hours later, with complete hemostasis established, be considered labor's fourth stage. Leff in 1939 suggested that the interval between the delivery of the placenta and the time the patient is ready for bed be designated as the fourth stage. Greenberg felt that the time interval as suggested by Leff was "too variable to be used as a time ordinate against which to plot vital physiologic events." However, Greenberg did maintain that

64 Fitzpatrick and Eastman, op. cit., p. 270.
The sequence of intrauterine events which transpire during the postplacental hour comprises a distinct physiologic and clinical entity. Their collective recognition as the 'fourth stage of labor' would help save the lives of those mothers who die of mishandled postplacental hemorrhage and spare the survivors the complications of sepsis and anemia that lie in its wake.  

Javert defined the immediate postpartum period as the interval after the expression of the placenta to a satisfactory reaction of the patient to the delivery, including a firmly contracted uterus without excessive bleeding. The duration used will vary from the usual hour, under normal conditions, to many hours when abnormal conditions occur. He further stated that this period has definite clinical, anatomic, physiologic and pathologic characteristics that justify its inclusion as a separate fourth stage in the definition of labor. Crowell agreed with Javert's definition of the fourth stage of labor.

IV. BLOOD LOSS IN THE IMMEDIATE POSTPARTUM PERIOD

Very little has been recorded in literature on the measurement of immediate postpartum blood loss or lochia. Deickmann and others were

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70 Ibid., pp. 746 and 749.
the first to discuss blood loss during the five to sixty minutes after the placenta had been expressed. In a study of 439 patients they found the average loss to be 73 ml., but the technic of measurement was not described. Robbe and Strom in their study of blood volume changes measured the external blood loss during the first two hours after delivery in grams of hemoglobin loss. For 27 cases they recorded the average as 19.4 grams.

Mamontov and Chernova, in Russia, measured blood loss by having the midwives collect the blood in a large receptacle and then pouring this into a measuring glass. The average blood loss for 3,243 parturients during the first two hours following normal delivery averaged 125 ml. and they proposed this as a physiological normal loss.

Newton and others measured blood loss for 100 patients using the acid-hematin spectrophotometric method. They found that the mean blood loss during the first hour following removal from the delivery table was 41 ml. for all patients. However, nine women lost more than 100 ml. of blood during this time.

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Newton and Bradford\(^77\) found in their study of 68 normal patients using the acid hematin spectrophotometric method, the mean blood loss for all patients from 1 to 24 hours after delivery was 84 cc. and 24 to 48 hours after delivery was 18 cc.

Newton and Blackburn\(^78\) studied blood loss following cesarean section by using the acid hematin photometric method. Blood loss was determined for 10 patients during the first hour after removal of the patient from the operating table, during the 2 to 24 hour postpartal period, and during subsequent 24 hour periods as long as the patient was hospitalized. The mean losses were found to be 28 cc. for the first hour, 53 cc. for the 2 to 24 hour period, 13 cc. for the 25 to 48 hour period, and considerably less for the subsequent 24 hour periods.

No study was found with adequate sampling to propose a physiological normal value of blood loss during the first hour following removal from the delivery table.

V. THE EFFECT OF UTERINE MASSAGE IN IMMEDIATE POSTPARTUM PERIOD

Through the years the value of uterine massage has been known.

Krusen said


\(^78\)Newton and Blackburn, loc. cit.
"... every physician knows the value of vigorous massage of the uterus for postpartum hemorrhage resulting from subinvolution. Even following normal delivery, it is advised that gentle kneading of the uterus be employed to aid involution of the uterus. 79

In 1916 Rice told of the treatment of the uterus in the immediate postpartum period by saying:

The nurse keeps the uterus firmly contracted for one hour. During this time she is instructed not to remove her hand from the fundus and to keep up firm contraction by gently massaging whenever the uterus relaxes. 80

Hornstein in 1922 suggested that after the expulsion of the placenta the fundus should be held down firmly for from thirty to forty-five minutes, and then left to its own resources for a probationary period of about ten minutes. At the end of the period the fundus should be compressed in Crede's fashion and if any clots or any appreciable quantity of blood is expressed it is a sign that the uterus is not yet capable of maintaining its retractability and needs to be supported for another period of ten to twenty minutes.

Stander in 1945 recommended that the uterus be checked immediately following the expulsion of the placenta to determine if it is


firmly contracted. If not firmly contracted the uterus should be massaged until it contracts and the hand kept constantly upon it so that the beginning relaxation will be detected and controlled. He indicated that providing there are no signs of relaxation during the first hour, there is no danger of relaxation and consequent hemorrhage.

In 1955 McNally reminded his readers that "when the uterus has been emptied it should not be forgotten. We make a plea to assistants and nurses once again to take up the lost art of gently massaging the uterus to keep it in a state of contraction." 83

More recently Posner 84 emphasized the value of the recovery room and said the condition of the fundus should be ascertained by massage, expression of clots, and observation of blood loss with the checking of blood pressure and pulse every fifteen minutes.

Fitzpatrick and Eastman in their text maintained that

The first hour following the delivery is a most critical one for the mother. It is at this time that postpartal hemorrhage is most likely to occur as the result of uterine relaxation. Thus, it is mandatory that the uterus be watched constantly throughout this period by a competent nurse who keeps her hand more or less constantly on the fundus and at the slightest of diminishing contraction massage it, to make sure that it does not relapse and balloon with blood. 85


and Eastman, op. cit., p. 270.
The value of lifting the uterus during massage is emphasized by Sandmire when he said that lifting the uterus out of the pelvis lowers the pressure in the uterine veins, thus decreasing the bleeding at the placental site.

Greenberg in his discussion of the fourth stage of labor said that vigorous uterine massage was unnecessary and may contribute to postpartum hemorrhage immediately after delivery. He said:

The clot that begins to form in the cavum of the uterus after the placenta is expelled partially or completely fills the uterus as it gradually relaxes and rises again. After a gradual rise at the end of one hour, the uterus is at, or slightly above or below, the level of the umbilicus. The tamponading hematoma of the postplacental period, which is as important a mass to the fourth stage of labor as the placenta is to the third, is the second line of defense against hemorrhage in the early postplacental period when the sinuses of the placental site are but freshly thrombosed, and the stage of fixed contraction has not yet been reached. The myometrial contractibility on the one hand and the stimulation by the pressure of the clot on the other, finally attain a state of equilibrium.

Two studies have been recorded on the physiology and contractibility of the uterus during the early puerperium. Shilko, Furlet, and Kalashnikov

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studied the nature of contractions of the uterine musculature by the method of external histography in 50 women whose labor presented no complication during the first two hours following detachment of the placenta. They found that after expulsion of the placenta the uterus continues periodical contractions and during the first two hours undergoes from 12 to 34 contractions, the duration being from 40 to 45 seconds. Hendricks, Thomas and Saameli studied uterine activity continuously throughout labor, delivery, and into the puerperium by recording pressure alterations transmitted through open-end fluid-filled catheters placed either within the uterine cavity or deep within the myometrium. They found that:

The initially high uterine activity present immediately after delivery of the baby diminishes smoothly and progressively during the first $1\frac{1}{2}$ to 2 hours postpartum, after which it eventually becomes quite stable. A fairly steady diminution in the frequency of contractions is observed regularly. The diminution in the intensity of contractions is less predictable.®

No study was found showing the effect of intermittent massage as compared with constant holding the fundus with massage as needed to maintain a firmly contracted uterus during the immediate postpartum period.

VI. SUMMARY

Postpartum hemorrhage was found to be the chief cause of maternal death and hemorrhage of some degree is seen in one out of ten deliveries.

The causes of postpartum hemorrhage are uterine atony, lacerations and retained placental fragments. There are many factors which contribute to postpartum hemorrhage; these include age, race, parity, size of infant, overdistention of the uterus, operative delivery, deep ether anesthesia, prolonged labor, and mismanagement of the third stage of labor.

The problems in measuring blood loss have stemmed from the inability to estimate blood loss accurately in obstetrics. Various methods have been used in the measurement of blood loss: pans and specifically designed apparatus, colorimetric hemoglobin determination, cyanmethemoglobin photometric, acid hematin photometric and acid hematin spectrophotometric. No study was found using the hematocrit determination in calculating the red cells lost in external bleeding during the puerperium.

The first hour following delivery is accepted as the critical period for the postpartum patient with some authors defining this as the fourth stage of labor.

A study on blood loss during the immediate postpartum period proposed that 125 ml. be considered the physiological normal value of blood loss for the first two hours following normal delivery. No study was found which proposed a physiological normal value of blood loss during the first hour after leaving the delivery table.

Through the years the value of uterine massage during the immediate postpartum period has been known. No study was found comparing the effect of intermittent uterine massage, the effect of constant holding the fundus with no uterine massage in maintaining a firmly contracted uterus during the immediate postpartum period.
CHAPTER III

METHOD OF PROCEDURE AND COLLECTION OF DATA

I. METHODOLOGY OF STUDY

The experimental method was used to determine if there was a significant difference in the amount of postpartum bleeding between two methods of uterine massage and no uterine massage. St. Bernardine's Hospital, San Bernardino, California, was used for this research project.

The parallel-group technique, with a single variable, was employed. Good and Scates define this technique thus:

The parallel-group procedure is an attempt to overcome the difficulties of the one-group technique, in that two or more groups, as nearly equivalent as possible, are employed at the same time. Under conditions controlled as carefully as possible, only a single factor or variable is manipulated or changed; the experimental factor is varied for one group (the experimental group), while the parallel group serves as the control for comparative purposes, undergoing customary (usual) or non-experimental conditions. If the investigator desires to vary more than one phase of the experimental factors, more than two equivalent or parallel groups are needed.90

Eighty-four women with no known obstetrical complications were selected. These were divided into three groups: two experimental groups and one control group. In experimental Group A, the uterus was continually held externally for one hour except while the patient's blood pressure was

being taken. In experimental Group B, the uterus was gently massaged intermittently every fifteen minutes for one hour. Group C composed the control group which consisted of no uterine massage.

The facilities of the Loma Linda Sanitarium and Hospital Clinical Laboratory were used by the researcher to do the hematocrit determination or pack cell volume on the blood loss. The hematocrites were done daily except on week-ends and when there was only one determination to be performed.

**Obtaining Permission and Cooperation to Conduct Study**

Permission to conduct the study at St. Bernardine's Hospital was obtained by a brief personal interview with the hospital administrator at which time she was given a letter of request and explanation of the project.

The cooperation of the staff nurses and obstetrical supervisor was obtained through personal conferences.

The obstetrical supervisor and staff nurses obtained the cooperation of the doctors except in the instance of one whose permission was obtained per telephone interview. Three doctors preferred not to have their patients included in the study.

Permission was obtained to use the facilities and supplies of the Loma Linda Sanitarium and Hospital Clinical Laboratory.

**Selection of Experimental Groups**

In order that the experimental groups and the control group might be as nearly equivalent as possible, eighty-four consecutive normal
patients were selected from one hundred and nineteen patients who
delivered between January 25, 1963 and March 2, 1963. The patients
whose doctors did not wish to participate in the study were excluded.

To assure an equal number of patients in the two experimental
groups and in the control group, systematic sampling was used. That
is, every third patient was used for each of the three groups. This
selection also facilitated the work of the nurses, in that every third
patient required the full attention of the nurse for one hour and the
others only required that the nurse check them every fifteen minutes.

Twenty-eight patients were selected for Group A. Seven of these
patients were excluded because instructions for holding the uterus were
not followed. Four additional patients could not be used because of
incomplete record of blood loss. Since the statistician excluded one
patient, sixteen patients composed Group A.

Group B was composed of twenty-two patients of the selected
twenty-eight. Those excluded were one patient in which instructions
for uterine massage were not followed, one patient having partial placenta
abruptio, and one patient having twins. Two others could not be used
because of incomplete records of blood loss. One patient was excluded
by the statistician as not being typical of the group.

Twenty-eight patients were selected for the control group. Two
were excluded because instructions for no massage were not followed and
one for having retained placenta tissue. Five patients could not be
included for lack of complete record of blood loss. One was excluded
by the statistician as not being typical of the group, so nineteen
patients composed Group C.
Instruction of Personnel

Explanation of the purpose and method of conducting the study was given to as many of the recovery room nurses as could be contacted personally. In addition, written instructions were supplied with each record sheet. These sheets were kept in the recovery room and systematically arranged so that every third patient would be included in experimental group A or B, or in the control group.

Development of the Record Sheet

Since many factors may affect the blood loss of a patient, the data sheet was devised for the recording of these factors as well as for comparing the characteristics of the experimental groups. This information was obtained from the patient's chart.

Notations were made of the pulse, blood pressure, and signs of hemorrhage and shock during the first hour after the patient left the delivery room.

Record of the measurement of blood loss was made by the researcher on a separate sheet.

Collection of Data

The nurses in the recovery room at St. Bernardine's Hospital collected a part of the data and recorded it on sheets especially prepared for that purpose. The researcher collected the data involving measurement of blood loss at Loma Linda Clinical Laboratory.

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91 See Appendix A, B, and C.
92 See Appendix D.
Procedure for Collecting Blood Loss

The blood loss for this first hour in recovery room was to be collected in an orthopedic bedpan lined with a plastic bag placed under the patient by the nurses. The idea of using a plastic bag was obtained from Wexter\textsuperscript{93} in his study of blood loss during vaginal surgery. Disposable plastic toilet bags were purchased for this purpose and covered the bedpan adequately. However, upon use this bedpan was found to be very uncomfortable for the patient. Therefore, twelve inch sponge rubber circles used in pillows were purchased and an inner circle was cut out to form a sponge rubber ring. The disposable plastic toilet bags fit very snugly over the sponge rubber ring making a unit for the collection of blood loss which was comfortable for the patient.

At the end of the hour, the nurses removed the bag, labeled it, and immediately refrigerated it in an ice chest.

Procedure and Criteria for Measuring Blood Loss

The researcher collected the bags of blood loss from the hospital daily except on week-ends or in instances when there was only one bag of blood loss. This did not in any way endanger the red cells as long as it was refrigerated.

At the laboratory the contents of the plastic bag were poured into a measuring flask and the total amount in cc. was noted. After mixing well, a 5cc. sample was pipetted from the total blood loss and the microhematocrit method was used in determining the hematocrit reading on this sample.

Since it was not known if the blood loss during this first hour was equal to whole blood, the amount of blood loss was calculated in terms of red cell volume of blood loss. Blood cells being the most important component of whole blood and the hematocrit being the most accurate and reproducible method of measurement, the blood loss was calculated using the following formula:

Hematocrit × Volume = Red Cell Mass Loss (RCML).

It was noted during the study that the blood collected did not clot; neither were there any large clots present for the normal patient. The two patients with large clots were one with retained placental tissue and one with an unrepaired laceration. This agrees with the observation of Barnes\(^4\) that postpartum blood of itself does not clot.

**Statistical Calculations for Comparing the Groups**

Statistical analysis was used in this study to determine if the samples studied were of the same or different universes and if the differences between the groups may have been due to chance and normal variation or some other factor, presumably the controlled variable or factor.

The "t" test which is the foundation which makes possible the comparison of small samples was used to determine the significant difference between Groups A and C, and Groups B and C. See Appendix E for formula used.\(^6\)


\(^{6}\)See Appendix E.
In each group there was one patient whose deviation from the mean of the group was sufficiently greater than the standard deviation of the group so that on the advice of the statistician that patient was dropped from the group as having too great a probability of not being typical of the group. The standard deviation was then recalculated for the reduced group.

Pilot Study

Fifteen patients were selected for the pilot study which was conducted from January 18, 1963 to January 24, 1963. The purpose of the pilot study was to familiarize the nursing personnel with the research project and the researcher with laboratory techniques and skills used in the determination of hematocrit values.

A scattergram was made to compare the total volume of blood loss with the volume of red cells lost for these fifteen patients. This was done to determine the relationship of two methods in measurement, anticipating that the easier method of total blood volume would be used rather than the red cells mass loss. The scattergram showed a positive correlation but since this sample was too small to draw conclusions, it was decided that this relationship would be determined at the end of the study by calculating the coefficient of correlation.

II. SUMMARY

The experimental method with two experimental groups and a control group was used in this study to determine if there was a significant difference between two methods of uterine massage and no uterine massage
in the prevention of blood loss and postpartum hemorrhage for the maternity patient. Group A was composed of sixteen patients in which the uterus was continually held externally for one hour except while the blood pressure was taken. Group B contained twenty-two patients and the uterus was gently massaged intermittently for one hour. Group C composed the control group of nineteen patients which consisted of no uterine massage to the uterus.

The criterion used in the measurement of blood loss was the volume of red cells lost calculated from hematocrit determinations on the total blood loss during the first hour after the patient left the delivery room.

A pilot study was conducted to compare two methods of measuring blood loss and to orientate the hospital personnel and researcher to the research project.

Record sheets were used to collect the data and were filled in by the nurses. The blood loss was calculated by the researcher.
CHAPTER IV

ANALYSIS AND INTERPRETATION OF DATA

The purpose of this study was to determine if there was a significant difference between two methods of uterine massage and a control group of no uterine massage in the amount of postpartum bleeding during the first hour after the patient left the delivery room. Analysis and interpretation of the three experimental groups was made by statistically comparing the blood loss for the two experimental groups with the control group. The data obtained on the record sheets were used in comparing and analyzing the characteristics of the groups. Two methods of measuring blood loss were correlated, since these data were available as a result of this study.

I. COMPARISON OF THE EXPERIMENTAL GROUPS

Group A, which was composed of sixteen patients whose uterus was externally held for one hour, showed a mean total volume blood loss of 36 cc. and a mean red cell mass loss of 8.69 cc. In experimental Group B, composed of twenty-two patients in which the uterus was massaged every fifteen minutes for the first hour after leaving the delivery room, there was a mean total volume blood loss of 56 cc. and a mean red cell mass loss of 8.89 cc. The third experimental group (Group C) contained nineteen patients upon which no uterine massage was performed for this hour with a mean total volume blood loss of 53 cc. and a mean red cell mass loss of 9.80 cc.
As can be seen by Table I there was a small difference between the mean red cell mass loss of Group A with C of 1.12 cc. and Group B with C of .91 cc. In determining if this difference is significant the standard deviation was calculated to show the scatter of the individual measurements around the mean of all the measures in each group. For Group A the standard deviation was 6.23 cc.; Groups B and C were 3.51 cc. and 5.65 cc. respectively.

The standard error was calculated to set up confidence limits based on the normal distribution curve to determine if these samples represent the same or different universes. If the standard error is great, it can be reduced by increasing the sample. The standard error for Groups A, B, and C respectively was 1.56 cc., 1.75 cc., and 1.29 cc.

The "t" value was calculated comparing Group A to Group C which was .52 and when entering the "t" table for 33 degrees of freedom the probability (P) of chance explaining the difference was 60 per cent and the P of the controlled factor explaining the difference was 40 per cent. In comparing Group B to C the "t" value was .61 and the P of chance explaining the difference was 54 per cent, whereas the P of the controlled variable explaining the difference was 46 per cent. Since there was no significant difference when Group A or B was compared with C, Groups A and B were not compared statistically. Therefore, it would seem that it cannot be shown which procedure of massage was more effective because these values of P suggest that either chance or the controlled factor or both explain the difference between the groups. Neither was it known what influence the uncontrolled factors such as the health of the mother may have on the amount of bleeding.
### Table: Total Volume of Blood Loss and Red Cell Mass Loss of Patients in Each Group

<table>
<thead>
<tr>
<th>GROUP A</th>
<th>GROUP B</th>
<th>GROUP C</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Patients</td>
<td>Mean</td>
<td>Total Mean</td>
</tr>
<tr>
<td>10.38</td>
<td>7.50</td>
<td>9.96</td>
</tr>
<tr>
<td>9.43</td>
<td>7.26</td>
<td>8.86</td>
</tr>
<tr>
<td>1.38</td>
<td>1.22</td>
<td>1.40</td>
</tr>
<tr>
<td>1.17</td>
<td>1.12</td>
<td>1.28</td>
</tr>
<tr>
<td>2.90</td>
<td>2.75</td>
<td>3.00</td>
</tr>
<tr>
<td>0.52</td>
<td>0.46</td>
<td>0.50</td>
</tr>
<tr>
<td>1.95</td>
<td>1.95</td>
<td>2.00</td>
</tr>
<tr>
<td>1.71</td>
<td>1.70</td>
<td>1.75</td>
</tr>
<tr>
<td>0.53</td>
<td>0.50</td>
<td>0.55</td>
</tr>
<tr>
<td>0.38</td>
<td>0.36</td>
<td>0.40</td>
</tr>
</tbody>
</table>

### Notes:

- Group A: The uterus was continuously held externally for one hour except while taking the blood pressure every fifteen minutes.
- Group B: The uterus was gently massaged every fifteen minutes for one hour.
- Group C: The uterus was not massaged except at the end of the hour when the uterus was gently massaged to express any accumulated blood.

# Total Volume Loss in cc.

<table>
<thead>
<tr>
<th>Pt.</th>
<th>Loss</th>
<th>Pt.</th>
<th>Loss</th>
<th>Pt.</th>
<th>Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>1.80</td>
<td>75</td>
<td>16.38</td>
<td>24</td>
<td>3.60</td>
</tr>
<tr>
<td>33</td>
<td>8.14</td>
<td>60</td>
<td>13.00</td>
<td>17</td>
<td>5.00</td>
</tr>
<tr>
<td>50</td>
<td>5.72</td>
<td>54</td>
<td>10.50</td>
<td>10</td>
<td>4.20</td>
</tr>
<tr>
<td>28</td>
<td>13.00</td>
<td>75</td>
<td>16.50</td>
<td>16</td>
<td>7.80</td>
</tr>
<tr>
<td>62</td>
<td>3.90</td>
<td>75</td>
<td>16.38</td>
<td>16</td>
<td>7.80</td>
</tr>
<tr>
<td>62</td>
<td>3.90</td>
<td>75</td>
<td>16.50</td>
<td>16</td>
<td>7.80</td>
</tr>
</tbody>
</table>
II. CHARACTERISTICS OF THE GROUP

In order to find out if patients in the experimental groups were equivalent in certain factors, a record was kept of the following: age, gravida, race, anesthesia, type of delivery, oxytocic, length of labor, and weight of infant.

A partial gross analysis was done to show that the sample size did not permit interpretation on the comparability of the groups. Neither was there evidence upon which to base an hypothesis.

Age. The distribution of age varied from eighteen to thirty-seven years in Group A, from nineteen to forty years in Group B, and from sixteen to forty-two years in Group C. Table II shows number, percentage, mean (average) red cell mass loss of patients by age in each group.

Gross analysis: There was no consistent increase or decrease of ECML when comparing the age of the patients for the three groups. In the age group 21-25, where there are six, five, and seven patients in each group, it would seem that Group A had less ECML than Group C. But the reverse would seem to be true in the age group 26-30 where patients in Group C had considerably less ECML than Groups B and A. Also for the age group of 31-35, Group B had less ECML than Groups A and C. The fact that all groups had less than ten patients within the group made mean values of little consequence.
<table>
<thead>
<tr>
<th>Age in Years</th>
<th>Group A *</th>
<th></th>
<th></th>
<th>Group B **</th>
<th></th>
<th></th>
<th>Group C ***</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>16-20</td>
<td>3</td>
<td>18.7</td>
<td>6.17</td>
<td>5</td>
<td>22.7</td>
<td>7.76</td>
<td>3</td>
<td>15.8</td>
</tr>
<tr>
<td>21-25</td>
<td>6</td>
<td>37.6</td>
<td>6.91</td>
<td>5</td>
<td>22.7</td>
<td>8.71</td>
<td>7</td>
<td>36.8</td>
</tr>
<tr>
<td>26-30</td>
<td>3</td>
<td>18.7</td>
<td>10.65</td>
<td>9</td>
<td>40.9</td>
<td>10.38</td>
<td>6</td>
<td>31.5</td>
</tr>
<tr>
<td>31-35</td>
<td>2</td>
<td>12.5</td>
<td>9.05</td>
<td>1</td>
<td>4.6</td>
<td>8.16</td>
<td>1</td>
<td>5.3</td>
</tr>
<tr>
<td>36-40</td>
<td>2</td>
<td>12.5</td>
<td>14.45</td>
<td>2</td>
<td>9.1</td>
<td>5.59</td>
<td>1</td>
<td>5.3</td>
</tr>
<tr>
<td>41-45</td>
<td>0</td>
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<td>0.00</td>
<td>0</td>
<td>0.0</td>
<td>0.00</td>
<td>1</td>
<td>5.3</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>16</strong></td>
<td><strong>100.0</strong></td>
<td><strong>8.68</strong></td>
<td><strong>22</strong></td>
<td><strong>100.0</strong></td>
<td><strong>8.89</strong></td>
<td><strong>19</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

* Group A, the uterus was continually held externally for one hour except while taking the blood pressure every fifteen minutes.
** Group B, the uterus was gently massaged every fifteen minutes for one hour.
*** Group C, the uterus was not massaged except at the end of the hour when the uterus was gently massaged to express any accumulated blood.
# Red cell mass loss in cc.
Gravida. There were three primigravidae and eleven multigravidae in Group A, three primigravidae and eighteen multigravidae in Group B, four primigravidae, fourteen multigravidae, and one grand multigravidae in Group C. The exact gravida figures are presented in Table III.

Gross analysis: There was no consistent increase or decrease of RCML when the gravida of the patients was compared for each of the three groups. There were three or four patients in each group for whom this was their first pregnancy. For these groups, Group B had slightly more RCML than Group A and Group C had considerably more. This is also true for those for whom it was their fourth pregnancy. However, in those who had their third pregnancy, Group B had the greatest RCML and Group A, which had more than twice the number of patients in it, had a lower mean RCML.

Race. All patients used in this study were of the white race so there was not variation in race for this study.

Anesthesia. Various anesthetics used were local, pudendal block, saddle block, and vinethene, given by open-drip method (similar to ether). In Group C approximately one-half of the patients had vinethene anesthesia and approximately half of the patients in Groups B and C had saddle block anesthesia. Table IV shows numbers, percentage, mean red cell mass loss of patients by anesthesia in each group.

Gross analysis: There was no consistent increase or decrease of RCML when one method of anesthesia was compared with another for each of the three groups. Eight patients in each group had vinethene anesthesia.
TABLE III
NUMBER, PERCENTAGE, MEAN RED CELL MASS LOSS
OF PATIENTS BY GRAVIDA IN EACH GROUP

<table>
<thead>
<tr>
<th>Gravida</th>
<th>GROUP A *</th>
<th></th>
<th>GROUP B **</th>
<th></th>
<th>GROUP C ***</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Per Cent</td>
<td>Mean RCML #</td>
<td>Number</td>
<td>Per Cent</td>
</tr>
<tr>
<td>1</td>
<td>3</td>
<td>18.7</td>
<td>6.17</td>
<td>3</td>
<td>13.6</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>6.3</td>
<td>1.54</td>
<td>10</td>
<td>45.5</td>
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<td>3</td>
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<td>7.47</td>
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<td>4</td>
<td>3</td>
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<td>19.97</td>
<td>1</td>
<td>9.1</td>
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<td>6</td>
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<td>0.00</td>
<td>0.00</td>
<td>1</td>
<td>4.6</td>
</tr>
<tr>
<td>7</td>
<td>0</td>
<td>0.00</td>
<td>0.00</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td>16</td>
<td>100.0</td>
<td>8.68</td>
<td>22</td>
<td>100.0</td>
</tr>
</tbody>
</table>

* Group A, the uterus was continually held externally for one hour except while taking the blood pressure every fifteen minutes.
** Group B, the uterus was gently massaged every fifteen minutes for one hour.
*** Group C, the uterus was not massaged except at the end of the hour when the uterus was gently massaged to express any accumulated blood.
# Red cell mass loss in cc.
### TABLE IV

**NUMBER, PERCENTAGE, MEAN RED CELL MASS LOSS OF PATIENTS BY ANESTHESIA IN EACH GROUP**

<table>
<thead>
<tr>
<th>Anesthesia</th>
<th>GROUP A *</th>
<th></th>
<th>GROUP B **</th>
<th></th>
<th>GROUP C ***</th>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Per Cent</td>
<td>Mean RCML #</td>
<td>Number</td>
<td>Per Cent</td>
<td>Mean RCML #</td>
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<tr>
<td>None</td>
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<tr>
<td>Local</td>
<td>0</td>
<td>00.0</td>
<td>0.00</td>
<td>1</td>
<td>4.6</td>
<td>10.20</td>
</tr>
<tr>
<td>Pudental</td>
<td>5</td>
<td>31.2</td>
<td>5.23</td>
<td>2</td>
<td>9.1</td>
<td>15.18</td>
</tr>
<tr>
<td>Saddle</td>
<td>2</td>
<td>12.6</td>
<td>5.25</td>
<td>11</td>
<td>50.0</td>
<td>7.42</td>
</tr>
<tr>
<td>Vinethene</td>
<td>8</td>
<td>50.0</td>
<td>11.70</td>
<td>3</td>
<td>36.3</td>
<td>9.13</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>16</strong></td>
<td><strong>100.0</strong></td>
<td><strong>8.68</strong></td>
<td><strong>22</strong></td>
<td><strong>100.0</strong></td>
<td><strong>8.89</strong></td>
</tr>
</tbody>
</table>

* Group A, the uterus was continually held externally for one hour except while taking the blood pressure every fifteen minutes.

** Group B, the uterus was gently massaged every fifteen minutes for one hour.

*** Group C, the uterus was not massaged except at the end of the hour when the uterus was gently massaged to express any accumulated blood.

# Red cell mass loss in cc.
Here Group A had the largest RCMG. With saddle block anesthesia Group B had less RCMG than Group C, and Group A did not have a comparable number of patients.

**Type of delivery.** As can be seen from Table V there were several different types of deliveries experienced by the patients in the experimental groups. One patient experienced a precipitous delivery without episiotomy or laceration and another a footling breech delivery in Group A. The greater per cent of patients in each group experienced either a spontaneous or low forceps delivery with either an episiotomy or laceration.

**Gross analysis.** There was no consistent increase or decrease of RCMG when the types of deliveries were compared for each of the three groups. Those experiencing spontaneous delivery with laceration or episiotomy were similar in Groups A and C, but not Group B since both number and mean RCMG was lower for Group B. Those patients in each group experiencing low forceps delivery with episiotomy increased respectively with Group A being the lowest; however, the number of patients was twice as great in Group B as in Group A or C.

**Oxytoxic.** All patients in each of the experimental groups received an oxytoxic in the delivery room before coming to the recovery room.

**Length of labor.** The length of labor as shown in Table VI ranged from one hour to twenty hours and ten minutes in Group A, from one hour and fifteen minutes to twenty hours and nineteen minutes for Group B, and from two hours and five minutes to sixteen hours and twenty-six minutes in Group C.
TABLE V
NUMBER, PERCENTAGE, MEAN RED CELL MASS LOSS OF PATIENTS
BY TYPE OF DELIVERY IN EACH GROUP

<table>
<thead>
<tr>
<th>Type of Delivery</th>
<th>GROUP A *</th>
<th></th>
<th>GROUP B **</th>
<th></th>
<th>GROUP C ***</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Per Cent</td>
<td>Mean RCML #</td>
<td>Number</td>
<td>Per Cent</td>
<td>Mean RCML #</td>
</tr>
<tr>
<td>Precipitatus</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>without lac. or</td>
<td>1</td>
<td>6.2</td>
<td>8.64</td>
<td>0</td>
<td>00.0</td>
<td>0.00</td>
</tr>
<tr>
<td>episiotomy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spontaneous</td>
<td>4</td>
<td>25.0</td>
<td>12.61</td>
<td>4</td>
<td>18.2</td>
<td>10.29</td>
</tr>
<tr>
<td>without lac. or</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>episiotomy</td>
<td>6</td>
<td>37.6</td>
<td>8.15</td>
<td>5</td>
<td>22.7</td>
<td>7.62</td>
</tr>
<tr>
<td>Spontaneous</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>with lac. or</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>episiotomy</td>
<td>6</td>
<td>37.6</td>
<td>8.15</td>
<td>5</td>
<td>22.7</td>
<td>7.62</td>
</tr>
<tr>
<td>Low forceps</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>without lac. or</td>
<td>0</td>
<td>00.0</td>
<td>0.00</td>
<td>1</td>
<td>4.5</td>
<td>6.12</td>
</tr>
<tr>
<td>episiotomy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low forceps</td>
<td>4</td>
<td>25.0</td>
<td>5.02</td>
<td>12</td>
<td>54.6</td>
<td>9.79</td>
</tr>
<tr>
<td>with episiotomy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breech with</td>
<td>1</td>
<td>6.2</td>
<td>10.88</td>
<td>0</td>
<td>00.0</td>
<td>0.00</td>
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<tr>
<td>episiotomy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td>16</td>
<td>100.0</td>
<td>8.68</td>
<td>22</td>
<td>100.0</td>
<td>8.89</td>
</tr>
</tbody>
</table>

* Group A, the uterus was continually held externally for one hour except while taking the blood pressure every fifteen minutes.
** Group B, the uterus was gently massaged every fifteen minutes for one hour.
*** Group C, the uterus was not massaged except at the end of the hour when the uterus was gently massaged to express any accumulated blood.

# Red cell mass loss in cc.
<table>
<thead>
<tr>
<th>Length of Labor (Hours)</th>
<th>GROUP A *</th>
<th></th>
<th></th>
<th>GROUP B **</th>
<th></th>
<th></th>
<th>GROUP C ***</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Per Cent</td>
<td>Mean RCML #</td>
<td>Number</td>
<td>Per Cent</td>
<td>Mean RCML #</td>
<td>Number</td>
<td>Per Cent</td>
<td>Mean RCML #</td>
</tr>
<tr>
<td>0 - 2</td>
<td>2</td>
<td>12.5</td>
<td>9.76</td>
<td>1</td>
<td>4.5</td>
<td>6.00</td>
<td>0</td>
<td>00.0</td>
<td>0.00</td>
</tr>
<tr>
<td>2.1-5</td>
<td>5</td>
<td>31.3</td>
<td>10.47</td>
<td>9</td>
<td>41.0</td>
<td>8.60</td>
<td>7</td>
<td>37.0</td>
<td>9.69</td>
</tr>
<tr>
<td>5.1-10</td>
<td>5</td>
<td>31.3</td>
<td>5.58</td>
<td>7</td>
<td>32.0</td>
<td>9.79</td>
<td>10</td>
<td>52.6</td>
<td>9.51</td>
</tr>
<tr>
<td>10.1-15</td>
<td>1</td>
<td>12.5</td>
<td>6.53</td>
<td>4</td>
<td>18.0</td>
<td>9.50</td>
<td>1</td>
<td>5.2</td>
<td>16.29</td>
</tr>
<tr>
<td>15.1-20</td>
<td>1</td>
<td>6.2</td>
<td>16.20</td>
<td>0</td>
<td>00.0</td>
<td>0.00</td>
<td>1</td>
<td>5.2</td>
<td>4.20</td>
</tr>
<tr>
<td>20.1-25</td>
<td>1</td>
<td>6.2</td>
<td>9.90</td>
<td>1</td>
<td>4.5</td>
<td>3.60</td>
<td>0</td>
<td>00.0</td>
<td>0.00</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td>16</td>
<td>100.0</td>
<td>8.68</td>
<td>22</td>
<td>100.0</td>
<td>8.89</td>
<td>19</td>
<td>100.0</td>
<td>9.80</td>
</tr>
</tbody>
</table>

* Group A, the uterus was continually held externally for one hour except while taking the blood pressure every fifteen minutes.
** Group B, the uterus was gently massaged every fifteen minutes for one hour.
*** Group C, the uterus was not massaged except at the end of the hour when the uterus was gently massaged to express any accumulated blood.

# Red cell mass loss in cc.
Gross analysis: The different lengths of labor did not proportionately increase or decrease the mean RCML. Those patients having labor from 2-5 hours in length in Group A had a greater RCML than either Groups B or C. Those having a 5-10 hour labor had a considerable lower RCML in Group A than Groups B and C. The number of patients in each group were not comparable nor of sufficient size to draw conclusions.

Weight of infant. The weight of the infant in Group A varied from five pounds, fifteen and one-half ounces to ten pounds, one-half ounce. In Group B the weight ranged from six pounds to ten pounds, eight ounces, and from five pounds to nine pounds, fourteen and one-half ounces in Group C. As can be seen by Table VII, the highest number of patients in each group gave birth to infants in the seven to eight pound range.

Gross analysis. There appeared a tendency for the RCML to be lowest for those having infants who weighed 7-8 pounds and this RCML increases with those having infants weighing less than and more than 7-8 pounds, except in Group B where those having infants weighing less than 7-8 pounds had a slightly less RCML. Therefore, the majority of patients having infants weighing between seven and eight pounds had the least RCML.

Concluding analysis and interpretation. Analysis shows that the three groups were often not equivalent and comparable in age, gravida, anesthesia, type of delivery, length of labor, and weight of infant. The three groups were equivalent in that all were of the white race and all received an oxytocic in the delivery room. The groups would probably have been more equivalent and comparable in these characteristics had the sample been larger.
Red cell mass loss in cc.

To express any accumulated blood.

Group C. The ureters were not massaged except at the end of the hour when the ureter was gently massaged. Every fifteen minutes.

Group B. The ureters were gently massaged every fifteen minutes for one hour.

Group A. The ureters were continuously held externally for one hour except while taking the blood pressure.

<table>
<thead>
<tr>
<th></th>
<th>19</th>
<th>689</th>
<th>22</th>
<th>689</th>
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<th>Tota</th>
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<td>9:00</td>
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<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>10 - 11</td>
</tr>
<tr>
<td>10:00</td>
<td>1</td>
<td>7.4</td>
<td>4.8</td>
<td>11.2</td>
<td>6.2</td>
<td>10 - 6</td>
</tr>
<tr>
<td>11:00</td>
<td>2</td>
<td>6.9</td>
<td>9.22</td>
<td>12.5</td>
<td>6.2</td>
<td>6 - 7</td>
</tr>
<tr>
<td>12:00</td>
<td>9</td>
<td>4.9</td>
<td>6.06</td>
<td>37.6</td>
<td>6.2</td>
<td>6 - 6</td>
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<tr>
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<td>8</td>
<td>6.2</td>
<td>9.00</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

By weight of inrants in each group.

Number, percentage, mean red cell mass loss or patients.

**TABLE VII**
This analysis might also be interpreted to show that in no one group was the RCML consistently less than in either of the other two groups.

As can be seen by the analysis of the characteristics and the results of the "t" test this sample was too small to provide adequate results upon which to draw accurate conclusions.

III. CORRELATION OF TWO METHODS OF MEASUREMENT

While it was not the purpose of this study to compare two methods of measurement of blood loss, as was previously indicated the pilot study did not reveal that one was clearly better than the other. Thus, records were kept on blood loss as measured by the total volume of blood loss and red cell mass loss. A coefficient of correlation was done using eighty-seven patients involved in this study. All patients, regardless of complications or uterine manipulation, which had a hematocrit reading and the total volume of blood loss recorded were used in this evaluation.

The coefficient of correlation (r) was calculated and found to be .80 which is a positive correlation. To determine the significance of this correlation, the "t" value was calculated as being 12.77 cc. and the P was over 99.99 per cent. This is interpreted to mean that there is less than one chance in ten thousand that the observed correlation is a chance phenomenon or that there is better than 9,999 chances out of ten thousand that there is a positive correlation.

It was concluded that for this study the measurement of red cells mass loss was of equal value with the total volume of blood loss in the
measurement of bleeding for the obstetrical patient in the first hour after leaving the delivery room.

It might also be noted that the mean volume of blood loss for these eighty-seven patients was 56 cc. for this first hour after the patient leaves the delivery room. When comparing this study with Monomtov and Chenova results of 125 cc. for the first two hours following normal delivery, it was noted that the mean blood loss for this study was less. The difference cannot be explained since it is not known if the patients in Monomtov and Chenova study received an oxytocic following delivery. There was also a difference in number of patients and the time element of these two studies.

IV. SUMMARY

1. The analysis of the characteristics showed that the three groups were often not equivalent or comparable in age, gravida, anesthesia, type of delivery, length of labor, and weight of infant. These three groups were equivalent in race and the oxytocic given in the delivery room.

2. Summary analysis of the characteristics showed:
   a. That there was no consistent increase or decrease of RCML when comparing the age of the patients for the three groups.
   b. That there was no consistent increase or decrease of RCML when the gravida of the patients was compared for each of the three groups.
   c. That there was no consistent increase or decrease of RCML when one method of anesthesia was compared with another for each of the three groups.
d. That there was no consistent increase or decrease in RCML when the type of deliveries were compared for the three groups.

e. That the different lengths of labor did not proportionately increase or decrease the mean RCML.

f. That the majority of patients having infants weighing between seven and eight pounds had the least RCML.

3. Analysis of the findings and statistical calculation of P suggested that either chance or the controlled factor or both explain the difference between the groups. The influence of the uncontrolled factors, such as the health of the mother, was not determined.

4. There was found to be a positive correlation between the total volume of blood loss and the red cell mass loss in the measurement of blood loss for the maternity patient in the immediate postpartum period.
CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The purpose of this study was to determine if there was a significant difference in the amount of postpartum bleeding between two methods of uterine massage and a control group. The experimental method with parallel groups technique and a single variable was used. The criterion used in determining the amount of bleeding was the volume of red cells lost.

In the review of literature postpartum hemorrhage was found to be the chief cause of maternal death. Many authorities felt that the first hour after delivery with uterine massage was an important element in the reduction of postpartum bleeding and hemorrhage. Since there was no scientific basis for uterine massage it was desirable to conduct this study.

The study was conducted at St. Bernardine's Hospital using three experimental groups. Group A was composed of sixteen patients whose uterus were externally held for one hour except when the blood pressure was taken. The uterus was gently massaged every fifteen minutes for twenty-two patients in Group B. Group C, the control group, was composed of nineteen patients whose uterus was not massaged.

The nurses recorded all data for the study on record sheets except for the measurement data of blood loss which was collected and calculated by the researcher.
The "t" test of significant difference was used for comparing the groups. The "t" value comparing Groups A and C was calculated to be .52 and the probability of chance explaining the difference was 60 per cent and the probability of the controlled factor explaining the difference was 40 per cent. The "t" value comparing Groups B and C was calculated to be .61 and the probability of chance explaining the difference was 54 per cent and the controlled variable explaining the difference was 46 per cent.

Since there was no significant difference when Group A or B was compared with C, Groups A and B were not compared statistically.

The analysis of the characteristics of the groups showed these groups comparable for race and oxytoxics given in the delivery room but often not comparable in age, gravida, anesthesia, type of delivery, length of labor, and weight of infant.

At the conclusion of this study data was available for the comparing of two methods of measuring blood loss for the postpartum patient. Since the total volume of blood loss was an easier obtainable measurement of blood loss, a coefficient of correlation was done between this and the method used in the study. The coefficient comparing these two methods of measurement showed a high positive correlation. The red cell mass loss in the measurement of blood loss was found to be of equal value to the total volume of blood loss for the measurement of bleeding in the immediate postpartum period.
II. CONCLUSIONS

The hypothesis states that the holding of the uterus for the first hour in the recovery room will lessen postpartum bleeding. The hypothesis was neither accepted nor rejected since the "t" value did not show a high percentage of chance explaining the difference between the three groups and neither did it show a high percentage of the controlled factor explaining the difference of the groups. Therefore, a larger sample is needed in drawing conclusions.

In view of the findings in this study it was further concluded that:

1. The external holding of the uterus or intermittent massage of the uterus during the first hour after the patient leaves the delivery room did not decrease the amount of postpartum bleeding significantly over no uterine massage for the normal obstetric patient. The results of the study may be attributed to the small sample or other noncontrollable factors.

2. The red cell mass loss in the measurement of blood loss in this study is of equal value to the total volume of blood loss for the measurement of postpartum bleeding during the first hour after the patient left the delivery room.

III. RECOMMENDATIONS

Based on the findings of this study the following recommendations were suggested for preserving the strength of maternity patients by the reduction of bleeding in the immediate postpartum period.
1. That another study be done with about 1,600 patients in each group in an attempt to determine if there is or is not a significant difference between two methods of uterine massage and no uterine massage for the normal patient.

2. That when repeating the study the total measured volume of blood loss be used as the method of measuring blood loss.

3. That since patients with obstetrical complication were excluded from this study, a study be made of the effect of uterine massage and/or no massage for the patient with obstetrical complication.
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The purpose of this study is to determine the effect of holding
the uterus on the prevention of excessive bleeding and blood loss
in the immediate postpartum period.

1. Permission has been obtained to do a research study.

2. When patient arrives in recovery room place a sponge rubber
ring covered with a plastic bag under patient.

3. HOLD THE UTERUS FOR ONE HOUR by placing left hand flat over
the abdomen with the fingers directed under the symphysis to
prevent the fundus from entering the pelvis. The fundus should
then be held firmly between the forefingers and thumb of the
right hand. This should be constant for one hour except during
the time that the blood pressure and pulse are taken every
fifteen minutes at which time it is released.

4. At the end of one hour, gently remove the sponge rubber ring
from under patient. Remove bag from ring confining all
contents expelled and seal bag.

5. Label bag containing the blood loss with patient's last name,
date and research number. Refrigerate bag.

6. Fill out attached sheet.

7. The SUCCESS and ACCURACY of this study depends upon your
complete cooperation, which is GREATLY APPRECIATED.

Thank you very much!

Beverly Blake, R.N.
APPENDIX B

INSTRUCTION SHEET FOR THE STUDY OF UTERINE MASSAGE

IN THE RECOVERY ROOM

RECOVERY ROOM NURSES

PURPOSE

The purpose of this study is to determine the effect of holding the uterus on the prevention of excessive bleeding and blood loss in the immediate postpartum period.

1. Permission has been obtained to do a research study.

2. When patient arrives in recovery room place a sponge rubber ring covered with a plastic bag under patient.

3. GENTLY MASSAGE UTERUS IMMEDIATELY AND EVERY FIFTEEN MINUTES FOR ONE HOUR. When massaging the uterus, the left hand is placed flat over the abdomen with the fingers directed under the symphysis to prevent the fundus from entering the pelvis. The fundus is then picked up and gently squeezed with the right hand until the uterus is firmly contracted.

4. At the end of one hour, gently remove the sponge rubber ring from under the patient. Remove bag from ring confining all contents expelled and seal bag.

5. Label bag containing the blood loss with patient's last name, date and research number. Refrigerate bag.

6. Fill out attached sheet.

7. The SUCCESS and ACCURACY of this study depends upon your complete cooperation, which is GREATLY APPRECIATED.

Thank you very much!

Beverly Blake, R.N.
APPENDIX C

Research Study No._____

INSTRUCTION SHEET FOR THE STUDY OF UTERINE MASSAGE

IN THE RECOVERY ROOM

RECOVERY ROOM NURSES

PURPOSE

The purpose of this study is to determine the effect of holding the uterus on the prevention of excessive bleeding and blood loss in the immediate postpartum period.

1. Permission has been obtained to do a research study.

2. When patient arrives in the recovery room place a sponge rubber ring covered with a plastic bag under patient.

3. DO NOT MASSAGE, COMPRESS OR MANIPULATE UTERUS FOR ONE HOUR. Observe patient for symptoms of shock, blood pressure and pulse every fifteen minutes and record on attached sheet. Notify nurse in charge immediately if any untoward symptoms.

4. At the end of one hour, gently MASSAGE UTERUS TO EXPRESS ANY CLOTS, and gently remove the sponge rubber ring from under the patient. Remove bag from ring confining all contents expelled and seal bag.

5. Label bag containing the blood loss with patient's last name, date and research number. Refrigerate bag.

6. Fill out attached sheet.

7. The SUCCESS and ACCURACY of this study depends upon your complete cooperation, which is GREATLY APPRECIATED.

Thank you very much!

Beverly Blake, R.N.
APPENDIX D

Research Study No.

RECORD SHEET FOR THE STUDY OF UTERINE MASSAGE IN THE RECOVERY ROOM

Date______ Last Name______________ Age____ Race____ Gravida____

Prenatal Information:
Nature of complications with this pregnancy or previous pregnancies

Labor and Delivery Information:
Anesthesia__________________________
Type of delivery__________________________
Placenta: Type__________________________ Complete
__________________________ Retained
__________________________ Fragments retained
Oxytocin__________________________ Time__________________________
Estimated blood loss during delivery__________________________
Total duration of labor__________________________
Complications of labor and delivery__________________________

Infant: Weight__________________________

Recovery Room Information:

<table>
<thead>
<tr>
<th>Time</th>
<th>B/P</th>
<th>Pulse</th>
<th>Check symptoms observed in patient:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td><em>Pallor</em></td>
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<tr>
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<td></td>
<td></td>
<td><em>Clammy skin</em></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td><em>Dilated pupils</em></td>
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<td></td>
<td><em>Air hunger</em></td>
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<td><em>Restlessness</em></td>
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<td></td>
<td></td>
<td><em>Anxiety</em></td>
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<tr>
<td></td>
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<td></td>
<td><em>Fainting</em></td>
</tr>
</tbody>
</table>

Medication:__________________________ Time__________________________

Treatment of uterus for one hour from__________________________ to__________________________

_ Uterus held
_ Uterus massaged every fifteen minutes
_ No uterine massage

Remarks__________________________

Signature of Nurse or Nurses:__________________________
APPENDIX E

STATISTICAL FORMULAS USED

Standard deviation. This measure of variation was used to show the scatter of the individual measurements around the mean or average ($\bar{x}$) of all the measures in each group. The standard deviation (S.D.) was calculated for each group using the following formula:

$$S.D. = \sqrt{\frac{\sum(x-\bar{x})^2}{N-1}}$$

Standard error. The standard error of the mean ($\bar{x}$) is a measure of sampling variation in means of repeated samples used in determining if the sample represents the same or different universes. The following formula was used in calculating the standard error (S.E.) for each group:

$$S.E. = \frac{S.D.}{\sqrt{N}}$$

"t" Test of Statistical Significance. The "t" test of significant difference between the groups was used to determine if chance and normal variation explained the difference or if another factor, presumably the controlled variable or factor, explained the difference.

The "t" distribution is the foundation which makes possible the modern comparison of small sample.

The "t" values comparing the groups were determined using the following formula:

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\left(\frac{S.D.}{N_1}\right)^2 + \left(\frac{S.D.}{N_2}\right)^2}}$$
In using the table of the distribution of "t" for certain probability levels, the degrees of freedom (n) were equal to $N_1 + N_2 - 2$.

**Coefficient of Correlation.** The coefficient of correlation was used in this study to determine the degree of relationship of the red cell mass loss and the total volume of blood loss. The following formula was used in calculating the coefficient of correlation ($r$) for all patients with measurement data of blood loss regardless of complications or uterine manipulation.

$$b = \frac{\sum xy}{\sum x^2}$$

$$b^1 = \frac{\sum y^2}{\sum xy}$$

$$r = \pm \sqrt{\frac{b}{b^1}}$$

The significance of the coefficient of correlation was determined by calculating the "t" value from the correlation coefficient by using the formula

$$t = r \sqrt{\frac{N-2}{1-r^2}}$$

and when entering the table of "t", the degrees of freedom are equal to $N-2$. 
A STUDY OF POSTPARTUM UTERINE MASSAGE

by

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An Abstract of a Thesis
in Partial Fulfillment of the Requirements
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ABSTRACT

The purpose of this study was to determine if there is a significant difference in the amount of postpartum bleeding between two methods of uterine massage and no uterine massage. The experimental method with parallel groups technique and a single variable was used. The criterion used in determining the amount of bleeding was the volume of red cells lost.

The study was conducted at St. Bernardine's Hospital using three experimental groups selected from one hundred and nineteen deliveries between January 25 and March 2, 1963. Group A was composed of sixteen patients whose uterus were externally held for one hour except when the blood pressure was taken. The uterus was gently massaged every fifteen minutes for twenty-two patients in Group B. Group C, the control group, was composed of nineteen patients whose uterus was not massaged.

The nurses collected and recorded all data for the study on record sheets but the measurement data of blood loss which was calculated by the researcher.

The analysis of the characteristics of the group showed these groups comparable for race and oxytoxics given in the delivery room but not as comparable in age, gravida, anesthesia, type of delivery, length of labor, and weight of infant.

The "t" test was used in determining the significance of the difference between two methods of uterine massage and no uterine massage. The "t" value did not show a high percentage of chance explaining the
difference between the three groups and neither did it show a high percentage of the controlled factor explaining the difference of the groups. Therefore, it was concluded that the external holding of the uterus or intermittent massage of the uterus during the first hour after leaving the delivery room did not decrease the amount of post-partum bleeding significantly over no uterine massage for the normal obstetric patients in this study. The conclusion may be attributed to the small sample or other non-controllable factors.

While it was not the purpose of this study to compare two methods for the measurement of blood loss, a correlation test of comparison was done. The red cell mass loss in the measurement of blood loss was found to be of equal value to the total volume of blood loss for the measurement of bleeding in the immediate postpartum period.

Based on the finding of this study it was recommended that another study be done with about 1,600 patients in each group using the total measured volume of blood loss in an attempt to determine if there is or is not a significant difference between two methods of uterine massage and no uterine massage for the normal and complicated obstetrical patient.