



The effect of intra-uterine devices on the hematocrits of Montana women  
by Joan Finn McCracken

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Nursing  
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Abstract:

One hundred women between the ages of fifteen and forty-four who were using an intra-uterine device (IUD) were studied to examine their hematocrit levels before or at the time of the IUD insertion and six months to a year following the procedure. These women were clients of a non-profit family planning clinic located in Montana who were not directed to take iron supplements during the interim.

An archival search was done at the largest of these clinics where one hundred charts were selected by systematic sampling. Every third chart of a patient who had an IUD at least six months and who had two hematocrits obtained, one at the time of insertion and another a minimum of six months later were recorded. In addition, her age, parity, income level, zip code, and the type of IUD device was recorded.

In order to form comparison groups, a matching procedure was adopted to compare hematocrit levels at the same intervals for women on oral contraceptives and women using either no method or a barrier method of contraception. Variables that were matched were age, parity, and zip code which was used to indicate elevation.

A comparison was then made of the hematocrit levels in the three groups of women at the two time intervals using the Student's t-test. There was no significant difference at the end of 6 months in the hematocrits of women using oral contraceptives or a barrier or no method. Guidelines are suggested to monitor women choosing an IUD.

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HEMATOCRITS OF MONTANA WOMEN

by

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A thesis submitted in partial fulfillment  
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**ABSTRACT**

One hundred women between the ages of fifteen and forty-four who were using an intra-uterine device (IUD) were studied to examine their hematocrit levels before or at the time of the IUD insertion and six months to a year following the procedure. These women were clients of a non-profit family planning clinic located in Montana who were not directed to take iron supplements during the interim.

An archival search was done at the largest of these clinics where one hundred charts were selected by systematic sampling. Every third chart of a patient who had an IUD at least six months and who had two hematocrits obtained, one at the time of insertion and another a minimum of six months later were recorded. In addition, her age, parity, income level, zip code, and the type of IUD device was recorded.

In order to form comparison groups, a matching procedure was adopted to compare hematocrit levels at the same intervals for women on oral contraceptives and women using either no method or a barrier method of contraception. Variables that were matched were age, parity, and zip code which was used to indicate elevation.

A comparison was then made of the hematocrit levels in the three groups of women at the two time intervals using the Student's t-test. There was no significant difference at the end of 6 months in the hematocrits of women using oral contraceptives or a barrier or no method. Guidelines are suggested to monitor women choosing an IUD.

## INTRODUCTION

Each year approximately 1,500 of the 17,000 women utilizing one of the non-profit family planning clinics in Montana choose an intra-uterine device as a means of contraception (Montana State Department of Health and Environmental Science, 1978, 1979). As the other methods of contraception decline in favor, the intra-uterine device (IUD) becomes an attractive alternative since it has the second highest effectiveness rate (95 percent to 98 percent); requires little attention on the part of either the patient or her clinician (once inserted, a check for the string is all that is required to assure it remains in place to be effective); is relatively inexpensive (over three years time, it equals approximately 15 percent of the cost of oral contraceptives, 12 percent the cost of a diaphragm and spermicide); provides readily reversible fertility control (removal is simple and conception can take place immediately); and causes relatively few side effects which are usually reversible upon removal or treatment (Mishell, p. 43, 1975).

Since the sixteen family planning clinics in Montana utilize eighteen nurse practitioners and thirteen

registered nurses who are trained to evaluate and, in some cases, insert the IUD, the researcher questioned these clinicians concerning the criteria they use in determining the eligibility of the client to use an IUD. All clinics have a set of protocols from the Montana State Department of Health and Environmental Science; these clinics have additional standards and guidelines from Planned Parenthood Federation of America. Six clinics have additional standing orders developed and signed by a local physician who acts as the clinic medical director.

All protocols, standards and guidelines, and standing orders require that a hematocrit be done on all women on their initial visit and annual visit. Table I demonstrates the guidelines issued by the Center for Disease Control (CDC) and the United States Department of Health and Human Services (USDHHS), defining anemia by the level of hematocrits adjusted for age and altitude, (Nutrition Surveillance Series, CDC, 1975). However, thirteen of the sixteen clinics interviewed used levels anywhere from 35 to 40, below which a client is considered anemic.

Of the sixteen nurse practitioners interviewed, sixteen said that they would not insert an IUD at the time

TABLE I

Center for Disease Control Standards for Anemia in Women  
(Anemia is defined as any value less than the following  
standards.)

|                  | Altitude, Feet |           |           |
|------------------|----------------|-----------|-----------|
|                  | 0-2499         | 2500-4999 | 5000-7499 |
| Hemoglobin, Mg % | 12 gms         | 12.2 gms  | 12.4 gms  |
| Hematocrit, %    | 37%            | 38%       | 38%       |

the client appeared if she was considered anemic, according to the definition of anemia in their protocols. Fifteen of the sixteen said that they would refrain from inserting an IUD if the hematocrit was at a level one or two percentage points above their anemia level, as it was felt that anyone who was borderline anemic would have a propensity for anemia and that the IUD was not a good choice. Eight of the sixteen said that they would advise the client to take iron supplements or to increase the iron in her diet and return for a repeat hematocrit. If her hematocrit had risen above the established level, she would be scheduled for an IUD insertion. Three of the nurse practitioners said they would refer the patient to a private physician and let him make the decision about her contraceptive choice. One nurse practitioner said that she would consider the distance the client had to travel, and if it was far, she would insert the IUD, providing the client's hematocrit was not more than two percentage points below the level of anemia as defined by her clinic. The client would be advised to take iron supplements and return for a repeat hematocrit. If that initial hematocrit was more than two percentage points below the anemia level, she would refer the client to a private

physician for an anemia workup and would withhold the IUD.

The registered nurses who work in these clinics usually do the initial history and lab work and then refer to a clinician for the physical assessment and IUD insertion. These nurses were also interviewed about how they would handle clients who were considered anemic or borderline anemic and who requested an IUD. Of the ten nurses interviewed, six said that they would tell the client that she was an inappropriate candidate for an IUD and help them make another choice of a contraceptive; the other four said they would note the hematocrit on the chart, list LOW HEMATOCRIT as a problem and refer the client to the clinician for a physical assessment. The disposition of these clients was not addressed in this research.

From these brief interviews, it became apparent that some nurse practitioners and some nurses believe that the hematocrit level of an IUD client will drop and, therefore, deny the IUD as an option to a client with a low hematocrit. It was the intent of this research to discover whether IUD's do indeed cause a reduction in the hematocrit levels of enough clients to justify "low hematocrit" as a contraindication for this method. Since

all of the family planning clinics are situated in areas where they serve rural women, it is important to have not only safe protocols but also those that take into consideration long travel distances.

## REVIEW OF LITERATURE

The literature pertaining to the relationship of IUD's to hematocrit has approached the topic from several perspectives: 1. measurement of menstrual blood loss, 2. menstrual blood loss as a causative factor in anemia, and 3. menstrual blood loss with intra-uterine devices. Although many of the initial studies concerning the volume of menstrual flow were done nearly fifty years ago, only the studies done in the last twenty years were reviewed. The results of the early studies were summarized in a very complete study made in Sweden (Hallberg, 1966).

In this 1966 study, a Swedish team did extensive research to study the variation of the menstrual blood loss at various ages in a large series selected at random, and also tried to establish the upper normal limit of the menstrual blood loss (Hallberg, 1966). In 1963, two members of this same group (Hallberg and Nilsson, 1963) after surveying early studies that tried to determine menstrual blood loss, decided that there was a real need for a simple and reliable method to perform this task. An attempt to get a quantitative collection of menstrual blood was made by the simultaneous use of tampons and sanitary napkins, since in previous studies only one or

the other was measured (Barer, 1936; Baldwin, 1961). The determinations were made by extracting the tampons and napkins for 20 hours with a sodium hydroxide solution which is capable of dissolving even old dried blood, thus, converting all heme chromogens to alkaline hematine which can then be determined spectrophotometrically (Rankin, 1962). To establish the accuracy of their method, they measured the menstrual blood loss in two healthy women during twelve consecutive menstrual periods. At the same time, the menstrual blood was collected from a woman who was given a radio-active isotope of iron:  $\text{Fe}^{59}$ . By measuring the iron activity found in her menstrual blood, they were able to determine the accuracy of their study. For all three women, known amounts of whole blood were drawn and applied to tampons and napkins and the same extraction procedure applied. By measuring the amounts of alkaline hematine in the known amounts and comparing it to what was extracted from the collected tampons and napkins, they were able to measure the volume of menstrual blood.

Although that particular study is only peripherally related to the focus of this paper, it is a foundation for many of the other studies done in which menstrual blood loss was to be measured and was the beginning of much

research conducted by this Swedish team. One of the most important of their works was the 1966 study in which 476 women were selected at random by stratified sampling from the population in a large city and were grouped by age into six groups. The mean value of the menstrual blood loss was  $43.4 \pm 2.3$  milliliters with no great differences in amount of blood lost between different ages, except in the 15-year old group which had the smallest and in the 50-year old group which had the highest mean value of menstrual blood loss. All women in the study were considered healthy and normal; otherwise, they were eliminated from the study.

In an attempt to define the limits of normality of the menstrual blood loss, a study was made of subjects fulfilling certain criteria of "normality." The subjects had to have a hemoglobin concentration of at least 80 micrograms hemoglobin per 100 milliliters plasma and a mean corpuscular hemoglobin concentration of at least 30 percent. The value arrived at was 76.4 milliliters as the upper normal limit of the menstrual blood loss, and this is consistent with the finding of an increased frequency of iron deficiency in subjects with menstrual blood loss in the ranges 61 to 80 milliliters and above 80

milliliters (Wintrobe, 1961).

Another aspect of this part of Hallberg's research was menstrual blood loss in relation to the subject's own judgement. The frequency of subjects who considered their menstrual blood loss scanty decreased with an increasing blood loss, while the reverse was found for those with a heavy blood loss. It was remarkable, however, that in the group with a blood loss exceeding 80 milliliters, 37 percent considered their menstrual blood loss moderate and even four percent considered it even scanty. In the group with a menstrual blood loss of less than 20 milliliters, however, 14 percent considered their menstrual blood loss heavy. It is important to keep this in mind when IUD's are looked at, because so many of the studies have been subjective and have used only the woman's information that she is having heavy bleeding with the IUD.

There have been several studies whose purpose was the investigation of menstrual blood loss with IUD's. Because excessive menstrual loss is an important cause of iron-deficiency anemia (Jacobs, 1976), researchers have been interested in finding the causes of this excessive bleeding.

Nine years ago, a study was done which indicated

there was a relationship between IUD's and blood loss (Tietze, 1970). However, no measure of the hematocrit level of the IUD user was taken. Therefore, it can not be determined from this study whether there was a drop in the hematocrit level of individuals using IUD's. Secondly, the IUD's were of a different type (Birnberg Bow, Lippes Loop, Dalkon Shield) than the one in most current use (Copper 7). It is known that the most common ones in use now cause less blood loss (Hefnawi, 1974).

Several studies have shown that the amount of blood lost in each menstrual cycle is significantly increased in women wearing an IUD compared with controls (Israel, 1974). In a normal cycle, about 35 milliliters of blood is lost, according to Israel, but in women wearing a coil or loop, about 70 to 80 milliliters of blood is lost. In those wearing a Copper T which is most like the Copper 7, 50 to 60 milliliters is lost per cycle. One team of investigators studied blood loss in 750 women before and after insertion of copper IUD's; thus, each woman served as her own control. The mean increase in menstrual blood loss after one year was 65 percent in nulliparous women and 91 percent among parous women. In these women, however, there was no significant change in hemoglobin

concentration, serum iron, and total iron-binding capacity between control values and those for six and twelve months after IUD insertion. Thus, despite the increased amount of blood lost in each menstrual flow following insertion, the incidence of overt iron deficiency anemia was not significantly increased in this population (Liedholm, 1974). However, nothing in this research led one to believe that the question was asked whether the woman took supplemental iron on her own.

In 1974, Israel studied 227 woman who had IUD's inserted at the Family Planning Clinics of Los Angeles County and were grouped by the type of IUD: Dalkon Shield, Copper T, and Lippes Loop (Israel, 1974). Subjects were not matched in IUD group, but all subjects were between the ages of 18 and 44 and had a parity of one to seven. A peripheral blood sample was taken before the study began, and then all women were asked to collect their used napkins and tampons for one cycle. Peripheral blood was measured for hemoglobin, and the menstrual blood loss was determined by the Hallberg and Nilsson method.

Since preinsertion menses were not quantitated in the subjects under study, menstrual blood loss from 19 menstrual cycles of eight normal women, who were not using

contraceptives of any type, were analyzed. Using these cycles as controls as well as using results from previous menstrual blood loss research, the menses of the IUD group were compared to the control cycles. A value of 35.3 milliliters was accordingly used as control blood loss for this study.

The mean menstrual blood loss for the three types of IUD's was as follows:

| TYPE OF DEVICE | MONTHS POST-INSERTION |      |      |
|----------------|-----------------------|------|------|
|                | 6                     | 12   | 18   |
| Lippes Loop    | 75.0                  | 56.5 | 63.7 |
| Dalkon Shield  | 60.4                  | 74.7 | 65.6 |
| Copper T       | 54.5                  | 55.2 | 49.8 |

This post-insertion group lacks control (pre-IUD) hemoglobin values. Only a future investigation designed to collect pre-insertion menstrual blood loss, hemoglobin and serum iron levels, followed by IUD insertion and subsequent follow-up can determine the incidence of anemia that develops with continued IUD use. Even without such a study, the results of this study show that women using any of the IUD's bleed more than women who do not use this method and that the Copper device caused less bleeding.

In 1976, 279 women using three different types of

IUD's (Lippes D, Dalkon Shield, and Copper 7) were studied serially by objective methods for menstrual blood loss (Guillebaud, 1976). All the women had a minimum of two cycles following delivery, abortion, cessation of lactation, or previous pill or IUD use. All pads and tampons used for two further menstrual cycles before and for 12 cycles after insertion were collected, and blood loss was measured using the Hallberg-Nilsson technique. Mean menstrual blood loss increased in all three devices. The amount of loss, the percentage of women losing more than 80 milliliters, the decline in hemoglobin concentration, and the incidence of anemia during the 12 cycles following insertion were all greater among users of the Lippes Loop than of the Copper 7 with generally intermediate values for the Dalkon Shield users. The mean increase in blood loss was 18 milliliters for the Copper 7 users who had previously been pregnant and 19 milliliters for the nulliparous users. All women taking part in this study were healthy, married, and from Great Britain, and obviously highly motivated as demonstrated by their remaining in the study for at least 14 menstrual cycles.

A summary of these studies indicate that there is a precise method to determine the menstrual blood loss of

women, in particular those women using IUD's. Although women using IUD's do have an increased blood loss, those women using Copper 7's have the least problem. Despite the increased menstrual blood loss, the incidence of overt or covert iron deficiency anemia was not significantly increased. In this study, although menstrual blood loss was not measured, the hematocrits of each woman were compared before and after insertion to see if the same results were obtained. For a small subgroup, hemoglobins were also examined before insertion and after insertion to see if those results were similar.

## PURPOSE

From these brief interviews it became apparent that some nurse practitioners and some nurses believe that the hematocrit level of an IUD client will drop and, therefore, deny the IUD as an option to a client with a hematocrit that is low in their estimation. It was the intent of this research to discover whether IUD's do, indeed, cause a reduction in the hematocrit levels of clients to justify "low hematocrit" as a contraindication for this method. Since all of the family planning clinics are situated in areas where they serve rural women who may have to travel far distances, it is very important to know this information so that a realistic appraisal of the IUD as a choice can be made and so that no woman is denied her preferred method once she arrives at the clinic, unless it is medically indicated.

## METHOD

An archival search was done at the largest of the Montana clinics, Planned Parenthood of Billings, where one hundred charts were selected by systematic sampling. Every third chart of a client who had had an intra-uterine device at least six months and who had had two hematocrits obtained, one at the time of insertion and another a minimum of six months later, was recorded. In addition, her age, parity, income level, ZIP code (which would indicate elevation), and the type of intra-uterine device were recorded.

The criteria for selecting clients were as follows:

1. No use of hormonal contraceptives or IUD's during the three months previous to the initial hematocrit.
2. More than 60 days postpartum or postabortum.
3. No contraindications for the use of the selected method selected.
4. Women with hemoglobin values less than 11.9 percent or hematocrits less than 33. As the World Health Organization recommends, women of reproductive age with a hemoglobin value of less than 12 grams percent or a hematocrit value of less than 33 were considered anemic. Those women were excluded and referred for further study

and treatment.

5. No use of any medication during the observation period that might affect the hemoglobin or iron levels.

6. Informed consent. All clients who had blood drawn for hemoglobins were informed of the study's purpose and of the participation that was being requested.

In order to form comparison groups, a matching procedure was adopted to compare hematocrit levels at the same intervals for women on oral contraceptives and women using no method or a barrier method for contraception. In this way, each woman acted as her own control, and variables were also matched for age, parity, ZIP code, and income level.

The levels of hematocrit were determined at admission and at a later interval of at least six months and no more than nine months. The blood samples were obtained at different times of the day by different technicians, but using the same method (Appendix A).

Ten women of each group also had blood drawn for hemoglobin determinations at the same interval as the hematocrits were obtained. The total sample consisted of 300 women, 100 who had IUD's, 100 who used oral contraceptives, and 100 who used no method or a barrier

method.

A comparison was then made of the hematocrit levels in the three groups of women at the two time intervals using the Student's t-test. The Student's t-test was also applied to the three sub-groups who had hemoglobin determinations.

## RESULTS

Of the 100 charts of IUD clients selected by systematic sampling, 72 had a repeat hematocrit obtained during the sixth month post IUD insertion, 19 during the seventh month, and nine during the eighth month. Of the 100 charts of oral contraceptive users, a repeat hematocrit was obtained during the sixth month for 67 women, during the seventh month for 11 women, and during the eighth month for 22 women. Of the group that used no method or a barrier method, 86 had a repeat hematocrit during the sixth month, 12 during the seventh month, and two during the eighth month. It was impossible to match the interval exactly when the other variables were used (see Table II).

Group 1: IUD users--The mean and standard error (SE) of the hematocrit values for the 100 IUD users are presented in Table III. There was not any statistically significant difference between the control values and those obtained after a 68 month interlude ( $P < .05$ ). The range of difference was +6.

Group 2: Oral contraceptive users--The mean and standard error (SE) of the hematocrit values for the 100 oral contraceptive users are presented in Table IV. There

TABLE II

## Characteristics of Women in Study

| Characteristics        | Number | Percentage | Total |
|------------------------|--------|------------|-------|
| Age                    |        |            | 300   |
| 15-19 years            | 84     | 28%        |       |
| 20-24 years            | 129    | 43%        |       |
| 25-29 years            | 63     | 21%        |       |
| 30-34 years            | 21     | 7%         |       |
| 35-39 years            | 3      | 1%         |       |
| Number of Pregnancies  |        |            | 300   |
| 0                      | 18     | 6%         |       |
| 1-2                    | 192    | 64%        |       |
| 3-4                    | 84     | 28%        |       |
| 5-6                    | 0      | 0%         |       |
| 7-8                    | 6      | 2%         |       |
| Elevation of Residence |        |            | 300   |
| 2000-3000 feet         | 12     | 4%         |       |
| 3000-4000 feet         | 213    | 71%        |       |
| 4000-5000 feet         | 33     | 11%        |       |
| 5000-6000 feet         | 42     | 14%        |       |

TABLE III

Change in Mean Hematocrit in Women Who Used an IUD Six to Nine Months (N=100)

|                 | Pre-insertion | Post-insertion<br>6-9 Months |
|-----------------|---------------|------------------------------|
| Mean Hematocrit | 42.45         | 42.73                        |
| Standard Error  | 2.7           | 3.3                          |
| Range           | 38-46         | 36-49                        |

TABLE IV

Change in Mean Hematocrit in Women Who Used Oral  
Contraceptives (OC) Six to Nine Months (N=100)

|                 | Pre-OC Use | Post-OC Use<br>6-9 Months |
|-----------------|------------|---------------------------|
| Mean Hematocrit | 41.48      | 42.48                     |
| Standard Error  | 2.81       | 4.40                      |
| Range           | 35-47      | 33-50                     |

was not any statistically significant difference between the control values and those obtained after a 68 month interlude ( $P < .05$ ). The range of difference was from +5 to -4.

Group 3: Barrier method or no method--The mean and standard error of the hematocrit values for the 100 women who used no method or a barrier method of contraception are presented in Table V. There was not any statistically significant difference between the control values and those obtained after a 68 month interlude ( $P < .05$ ). The range of difference was  $\pm 5$ .

Ten women from each group who had hemoglobins determined had a three month interlude to see if the IUD had any effect on the oxygen-carrying capacity of the erythrocytes. Of the 10 clients in each group, the number of clients who returned at the end of three months for a second hematocrit determination was seven for IUD users, eight for oral contraceptive users, and seven for barrier or no method users. The mean and standard error of the hemoglobin values for the 22 clients completing the three month study are presented in Table VI. There was not any statistically significant difference between the control values and those obtained after three months in any of the

TABLE V

Change in Mean Hematocrit in Women Who Used No Method or a Barrier Method Six to Nine Months (N=100)

|                 | 0 Months | 6-9 Months |
|-----------------|----------|------------|
| Mean Hematocrit | 42.44    | 42.74      |
| Standard Error  | 2.72     | 3.13       |
| Range           | 37-50    | 34-50      |

TABLE VI

Change in Mean Hemoglobin in Women Who Used or Did Not Use  
a Method of Contraception During a Three Month Period

|                                       | 0 Month | 3 Months |
|---------------------------------------|---------|----------|
| <b>IUD Users</b>                      |         |          |
| Number in study                       | 10      | 7        |
| Mean hemoglobin                       | 14.7gm  | 14.2gm   |
| Standard error                        | .4      | .2       |
| <b>Oral Contraceptive Users</b>       |         |          |
| Number in study                       | 10      | 8        |
| Mean hemoglobin                       | 14.2gm  | 14.7gm   |
| Standard error                        | .9      | .5       |
| <b>Barrier Method Users/No Method</b> |         |          |
| Number in study                       | 10      | 7        |
| Mean hemoglobin                       | 13.8    | 14.2     |
| Standard error                        | .3      | .4       |

three groups. However, there was a rather wide range in the IUD group where the greatest increase in hemoglobin value was 0.6 grams, and the greatest decrease was one gram. In all but two oral contraceptive users, hemoglobin values increased but not significantly. The two users who had a drop in hemoglobin decreased 0.2 grams and 0.4 grams. For those women who used a barrier method or no method, the range of change was from an increase of 0.5 to a decrease of 0.4 grams.

## DISCUSSION

The results of the present study indicate that there was no significant difference in the hematocrit levels of IUD users or oral contraceptive users. With the IUD, patients with a diminution in the hematocrit levels were more frequent. Conversely, the oral contraceptives had a beneficial effect, increasing the hematocrit levels over a six to nine month period.

Since this was a retrospective study and women with what are considered to be low hematocrits have been denied IUD's, this study was unable to observe the effects of IUD's on women who were borderline anemic or anemic. Seven women who had a beginning hematocrit level of 38 were in the study for IUD users. Three women experienced an increase in hematocrits, two a decrease, and two no change. This correlates with the general ratio illustrated in Table VII. Based on this information, it could be assumed that a certain percentage of IUD users with any level of hematocrit will experience a decrease in hematocrits, and a certain percentage will experience an increase.

It is important to note, however, that the largest decrease in a single hematocrit did occur in an IUD user.

TABLE VII

Comparative Effect of IUD's, Oral Contraceptives, and No Method on Hematocrits of Users (N=100)

| Method               | Number<br>Increase | Number<br>Decrease | No Change |
|----------------------|--------------------|--------------------|-----------|
| IUD's                | 36                 | 45                 | 19        |
| Oral Contraceptive   | 64                 | 25                 | 11        |
| Barrier Or No Method | 50                 | 31                 | 19        |

a drop of six in hematocrit and one gram in hemoglobin. This is very definitely of significance to that individual, and her continued use of the IUD would have to be evaluated.

The study does have certain implications for family planning clinics in general, for Montana family planning clinics in particular. The chance of the hematocrit decreasing in an IUD user is not much greater than that of a woman who uses no method or a barrier method. Therefore, it may be unrealistic to have a protocol that lists low hematocrit as contraindication. Certainly any woman who already is anemic and has a hematocrit of less than 37 should be evaluated before an IUD is inserted, and hematocrits should be obtained monthly to monitor her course.

It seems reasonable that a protocol could be developed that would put more of an emphasis on monitoring a woman who had an IUD, rather than excluding all women who desire an IUD but who are predicted to become anemic because of a low hematocrit. The following guidelines are suggested:

1. All women who desire an IUD must have a hematocrit of 37 at the time of insertion. This is in

accordance with guidelines published by USDHHS.

2. If there are no other medical contraindications, an IUD may be inserted, and the client should be instructed to call or check back to her clinic if her bleeding seems heavier than a normal period or if she bleeds between periods.

3. If a woman does call or check back to the clinic, a hematocrit will be obtained. If there is a decrease, the woman will be asked to return each month to see if the drop in hematocrit is temporary or progressing. At that time, diet and iron supplements should be discussed. If her hematocrit should continue to drop and she becomes anemic, then another type of IUD could be tried or the IUD removed. She could be counseled about another type of contraception at that time. In this way, although certain women would be required to return monthly for monitoring, more than half of the women desiring an IUD would find this method successful. The women who had no problems with a change in period would be required to make only one return trip to the clinic for an initial IUD check.

Planned Parenthood Federation of America listed in its 1980 year-end report that 10 percent of all

contraceptive patients desired an IUD.

In 1980 in Montana, 20,851 different women were seen in family planning clinics (Statistics from MSDHES, 1980). Only 1,178 (5.6 percent) of these women were found to be anemic with a hematocrit below 37. Of the 20,851 women desiring contraception, only 1,303 (6.2 percent) obtained an IUD.

In 1980 at the family planning clinic in Billings--Planned Parenthood of Billings, Inc., 5,579 women were seen. Only 338 (six percent) of these women were found to be anemic with a hematocrit below 37. Of the 5,579 women desiring contraception, 446 (eight percent) obtained an IUD. This is still below the national figure of 10 percent who selected an IUD (Planned Parenthood Federation of America, Year-end Report, 1980).

No statistics are available on the number of women who desired an IUD but were denied one because of a hematocrit which was translated as borderline low. It is predicted that if Montana followed the national average, 2,085 women would have received IUD's, and in Billings, 557 women would have obtained them. Since no IUD's were inserted in Montana women with a hematocrit of less than 38, it is possible that this is why Montana women have a

lower rate of IUD use than women nationally. Of course, it was impossible to discover what was an acceptable hematocrit level in every area of the country. It would require further research to learn this, but it is certainly a fact that Montana family planning clinics are more conservative than is, perhaps, necessary in this one particular area of family planning.

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## APPENDICES

Appendix A

Protocol for Obtaining Blood for Microhematocrit.

Hematocrit

At the present time, the blood tests most frequently utilized to identify individuals with potential iron deficiency anemia are the hemoglobin and microhematocrit. Ideally, both hemoglobin and hematocrit determinations should be performed, because they are not completely interchangeable in identifying anemia. In addition, the screening levels of the two measurements yield different percentages of anemic people. However, most public health clinics usually employ only one method. The microhematocrit for anemia screening is desired here.

**A. Techniques for Microhematocrit****1. Principle**

The hematocrit is the volume of packed red blood cells, expressed as a percentage of the volume of whole blood in a sample. It has approximately a 3:1 relationship to the hemoglobin concentration ( $\text{Hematocrit} = 3 * \text{Hemoglobin} = 1$ ).

**2. Equipment**

- a. Capillary hematocrit tubes, glass, heparinized.
  - b. Clay sealant material for capillary tubes.
  - c. Microhematocrit centrifuge.
  - d. Hematocrit reader.
  - e. Fingerstick equipment.
  - f. Capillary tube rack.
3. Procedure-Fingerstick
- a. Clean the middle finger or ring finger or patient's hand by rubbing with an alcohol swab. Allow the area to dry. Turn the patient's hand palm upward.
  - b. If you are right-handed, use thumb and forefinger of your left hand to grip the patient's finger. Make a quick, but firm jab with the lancet to the fleshy part of the fingertip (be prepared for a sudden instinctive withdrawal movement by the patient).
  - c. If necessary, use a gentle "milking" motion of your fingers to stimulate the flow of blood. Do not squeeze the tip of the

finger, as this will cause tissue juices to be mixed with blood and introduce error. If puncture is deep enough, adequate blood flow should result with minimum pressure or milking.

- d. Using a dry gauze swab, wipe away the first two drops of blood.
- e. Touch the capillary tube to the drop of blood. Tilt the tube down to help the flow of blood into the tube. Allow the tube to fill about  $2/3$ 's to  $3/4$ 's full of blood, disregarding the black line. Fill two capillary tubes in this manner. Use the second capillary tube as a check on the first answer, especially if one tube is hemolyzed (plasma will be red, because the red blood cells have been broken down) or if tube packs on a slant and is hard to read.
- f. Do not use the reader in the centrifuge. Although it is accurate if used properly, it is very easy to make an error. Use the

hematocrit reader card.

- g. You must read the hematocrit reader card straight on. Reading the card from an angle will give a false reading (parallax error).
- h. The tube must be perpendicular to the base line. Tubes at any other angle will give a false reading.

Appendix B

Informed Consent for Anemia Study

Informed Consent For Anemia Study

I agree to participate in this study which is to evaluate changes in the iron levels in my blood during a three month period. I know that I am a part of a small group of a larger group, that my group will have blood drawn from my arm whereas the other group will just have the routine finger sticks. My participation involves my allowing my blood to be drawn during the first visit and at the end of three months. I know that having my blood drawn at the time of the first visit is routine for this clinic, but that I would not have to have this done at the end of three months. I know that there is a risk of bruising, a hematoma forming, and that the venipuncture is uncomfortable, but I have been assured that everything possible will be done to make the procedure safe and with as little discomfort as possible. I know that my blood samples will be marked by a number only and will be sent to Deaconess Hospital for an examination of the iron-carrying ability of my red cells, and that the results will be made known to me. I also know that my name will not be used at any time, and that all information pertaining to me as an individual will remain confidential. I understand that there will be no additional cost to me.

Name \_\_\_\_\_

Witness \_\_\_\_\_

Date \_\_\_\_\_

Appendix C

Letter of Permission to Use Client Records of  
Planned Parenthood

2722 Montana Avenue  
Billings, Montana, 59101  
December 1, 1980

To Whom It Will Concern:

We are pleased that one of your students is willing to look at the problem of the relationship of hematocrits with intrauterine devices. We will cooperate with the student in every way and make our records available to her. It is agreed that all records will remain confidential and that no client's name will be used in this study. All consent forms will remain in our safe as long as the clients records remain on our premises according to the laws of the State of Montana.

We also are interested in a copy of the study once it is complete.

Sincerely,

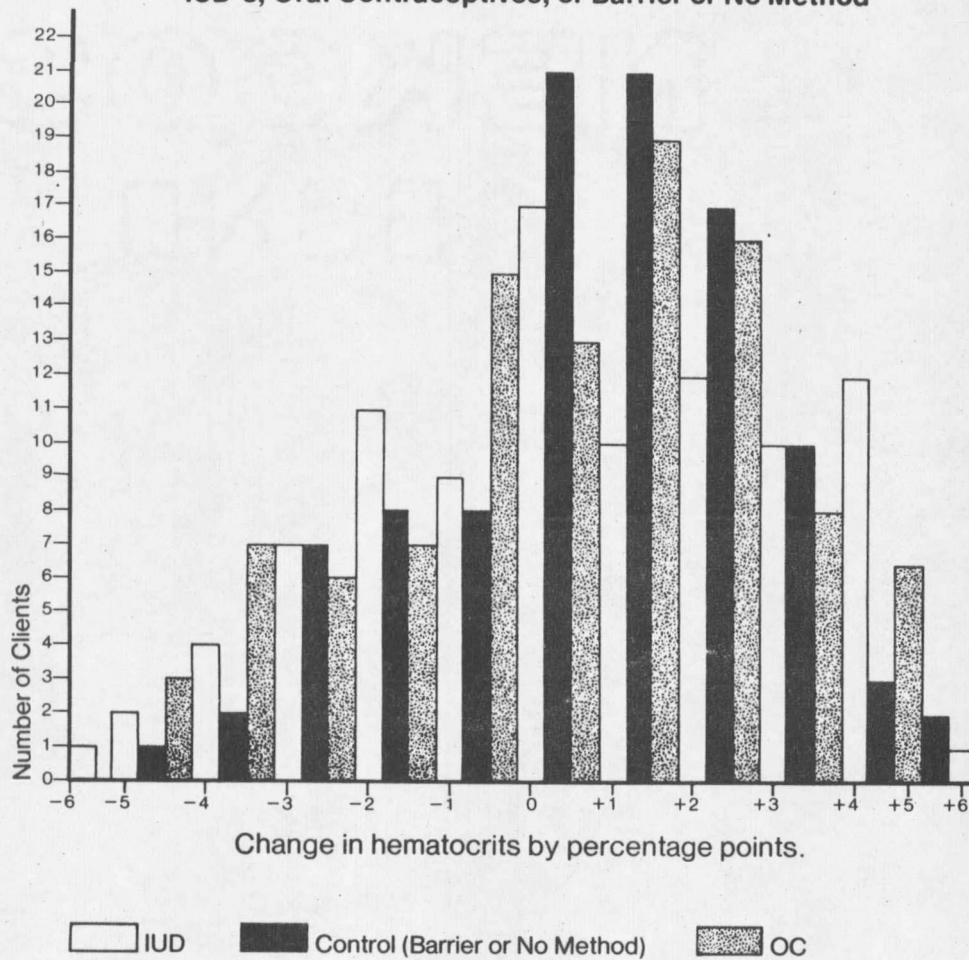
*Barbara Turner*

Barbara Turner  
Administrative Assistant  
Planned Parenthood of Billings, Inc.

## Appendix D

Graph of Comparison of Changes in Hematocrits of Women  
Using IUD'S, Oral Contraceptives, or Barrier or No Method

**Comparison of Changes in Hematocrits of Women Using IUD's, Oral Contraceptives, or Barrier or No Method**



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