PSYCHIATRIC SYMPTOMATOLOGY AND MENORRHAGIA

Psychiatric morbidity and menstrual loss in women receiving endometrial

ablation for heavy periods

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submitted in accordance with the requirements for the degree of

Doctor of Medicine

University of London

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SUMMARY

Objective: To explore the relation between pre-operative psychiatric morbidity and actual menstrual loss, and psychiatric outcome after endometrial ablation for heavy periods.

Design: Prospective cohort.

Setting: Leeds General Infirmary.

Subjects: Women presenting consecutively in the gynaecology out-patient department awaiting endometrial ablation for heavy periods.

Main outcome measure: Psychiatric status at fifteen months post-operatively using the semi-structured interview, *Present State Examination.*

Results: 120 women were eligible for study. 12 declined and a further 16 did not proceed past the initial stages for a variety of reasons (including very low actual menstrual loss, organic pathology requiring alternative treatment and failed clinic attendance). 92 women received endometrial ablation and were followed up. 75 women agreed to collect menstrual sanitary towels and tampons. 49% had an actual loss of less than 80 millilitres (the cut-off recognised by gynaecologists as representing heavy loss). 24% had less than 40 millilitres. Of the original 108 women presenting, 58% had significant psychiatric morbidity. Most of this morbidity involved symptoms of depression and anxiety. Of seven women counselled from surgery because of low actual loss, 6 had significant psychiatric morbidity. Of the 14 women who were psychiatric 'cases' before *and* after operation 9 of them had actual losses that were less than 80 millilitres. Psychiatric morbidity fell post-operatively to 21.8%. When looking at different sub-groups, women with the best outcome (6% post-operative psychiatric morbidity) are those with genuine heavy loss and no pre-operative psychiatric morbidity. Those who fare worst (37% post-operative psychiatric morbidity) are women with pre-operative psychiatric morbidity and low actual menstrual loss.

Conclusions: Psychiatric status and actual menstrual loss should be considered when exploring the possibility of surgery for women with heavy periods.

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1 Introduction (continued)

4   Results (continued)

CHAPTER ONE - INTRODUCTION

Much has been written about the psychological life of women with excessive
menstruation, particularly in that group of women receiving hysterectomy. Less
work has been done with women receiving endometrial ablation. This study is
about the psychological morbidity of women receiving endometrial ablation, its
relation to reported and actual menstrual loss pre-operatively, and changes in
psychological morbidity post-operatively. To set the study in context I will discuss

- the factors at work in a woman's perception of her periods as heavy

- the psychological factors associated with heavy periods

- the psychological factors associated with hysterectomy

1.1 Definitions and the literature search

First, I will outline the ways in which this thesis uses particular terms. The terms
excessive menstruation and *heavy periods* are used to define menstrual loss which
is excessive in amount. These may be understood in two separate senses. The first
relates to *reported loss* and the second to *actual loss* and where necessary these
terms are specified and defined.

Dysfunctional uterine bleeding relates to a menstrual loss which is excessive and not caused by any identifiable pathological process (such as fibroids or carcinoma). It is therefore a diagnosis by exclusion.

In this thesis references were initially located by using a Medline search covering the years 1966 to January 1999.

The following Index Medicus terms were used:

Menorrhagia, uterine haemorrhage, hysterectomy, total abdominal hysterectomy, vaginal hysterectomy, laparoscopic hysterectomy, transcervical resection of the endometrium, endometrial ablation, dysfunctional uterine bleeding.

Clinical psychiatry, clinical psychology, psychological adaptation, mental disorders, neurotic disorders, psychology, psychiatry, attitude to health, patient satisfaction, mental health, quality of health care.

The above terms were also entered as textwords with the following additions:

Heavy periods, endometrial resection, resection, ablation.

Emotional, psychological, mental illness, mental, attitude, satisfaction, quality, emotion, psychiatric.

Published work before 1966 was located by checking citations in the identified papers. Papers have been referred to under the structured headings given in the index, and where they are peer reviewed research and of strong relevance to the thesis they are discussed in more depth.

1.2 Heavy Periods - Cultural Aspects

1.21 Heavy Periods - A Woman's Perception

A collaborative World Health Organisation (WHO) cross cultural study was performed by teams of researchers in ten countries between 1973 and 1982 (Snowden and Christian, 1983). It sought to gain quantitative and qualitative information about perceptions of menstrual bleeding from a variety of different cultures. There were 5,322 women resident in 14 socio-cultural groups in Egypt, India (Hindu High Caste, Hindu Low Caste), Indonesia (Javanese, Sudanese), Jamaica, Mexico, Pakistan (Punjab, Sind), Philippines, Republic of Korea, United Kingdom and Yugoslavia (Moslem and Non-Moslem).

When asked to define their periods as light, moderate or heavy 17% women described *light* periods, 64% *moderate* and 19% *heavy*. 54% of the women reporting *heavy* loss reported that they would prefer less. In general, a woman's perception of her own period (and how normal this was) was more likely to be related to her own past experiences than local norms (in terms of what other women in the locality were reporting).

1.22 Heavy Periods and Cultural Attitudes

Parlee (1976) believed that culturally accepted norms (such as the notion that the 28 day cycle is typically normal) affect reporting of and investigation of periods. Attention is drawn to a frequently negative view of periods, which is mirrored in our expressions such as: 'the red plague', 'the misery' and 'the curse'. Various cultures have described customs associated with menstruation which affirm their beliefs that menstruation is a negative event. For example, traditional Zulu women are discouraged from mixing with men during menstruation. It is thought that it may be dangerous to sick people and may pollute medicines. After menstruation is complete the hut is cleaned (Ngubane, 1977). In Lebanon, a menstruating woman should not enter a cemetery or mosque. She is also expected to avoid new-born children in the belief that she may cause harm to the child, the mother or her milk (Harfouche, 1965; Fuller, 1970). Certain American Indian tribeswomen avoided other people whilst menstruating, in the belief that they brought bad luck (Wright, 1920). Religious purification before certain types of worship was an essential part of ancient religion. For example, in Jewish orthodoxy, menstruating women were excluded from Temple worship (Sanders, 1993). Orthodox Jews observe laws of 'Family Purity' (taharat ha-mishpachah) which require the menstruating woman (niddah) to take a bath in mikveh ('living water' which is spring or rain water often with tap water added) a week after menstruation has stopped before resuming sexual relations with their partner (Unterman, 1981). Unlike the era of the Jerusalem Temple current Rabbis of the Talmud are more likely to explain the family purity laws not in terms of the impurity of the woman, but as necessary to prevent the husband taking his sexual relations with his wife for granted.

Conversely, many cultures believe that menstruation is necessary for good health (Scott, 1975) or a sign of good health (Snowden and Christian, 1983).

Christians and those expressing no religious belief are more likely to report heavy losses whilst Hindus (low and high caste) and Moslems are less likely to report heavy losses. Women believing that menstruation is a form of sickness (28% in the WHO survey) are more likely to perceive their periods to be heavy (Christian & Snowden, 1983). Cultural background may also affect women's perceptions of hysterectomy and response to it and this is dealt with under a later section.

Some authors have attempted to identify types of women who are more likely to complain of heavy periods. Levitt and Lubin (1967) found that there was a correlation between a tendency in women to complain of heavy periods and a negative or 'unwholesome' attitude to menstruation. The correlation is not large and relates to attitudes at the time of bleeding, which tends to undermine conclusions about the direction of the effect.

Snowden and Christian (1983) reported that across a range of cultures women were less likely to express their loss as heavy if they were illiterate, rural dwellers or women of low socio-economic status. Neither age nor parity appeared to have any particular association with reported loss in this study. A questionnaire study of fifty general practitioners in two British towns shows a widespread belief that women of South Asian descent with menorrhagia are less likely to consult their general practitioners than their caucasian counterparts (Chapple et al, 1998). It is postulated that this is partly because a female doctor is not accessible.

With respect to preparation for menarche, Golub and Catalano (1983) studied two groups of middle class suburban women (18-45 years old, five to thirty-three years after menarche) and did not find any association between

subsequent reporting of heavy periods and either anticipatory anxiety of menarche or lack of adequate preparation for menarche.

1.23 Heavy Periods and contraception

Many women are very aware of their menstrual pattern and notice increases in loss (Snowden and Christian, 1983). This awareness of previous loss appears to be relevant. In a study looking at the actual menstrual loss of 30 women on the oral contraceptive and comparing loss with 30 intra-uterine device users and 10 control women, the women's reports of change in loss bore little relation to actual loss. It was felt that this undermined the use of women's statements as a useful source of information about actual loss (Hefnawi et al, 1969). Unfortunately, the study does not go into much detail but shows that mean actual loss in thirty intra uterine device users was approximately three times greater than thirty oral contraceptive pill users in a randomly selected sample. This is supported by other work. Cole and colleagues (1971) studying 348 women found that the mean blood loss for women with the intrauterine device in situ was 56.3ml compared to the village population average of 37.5ml and an average for women on the contraceptive pill of 12.7ml.

Cooper and colleagues (1981) found that after sterilisation a woman was more likely to perceive her loss as heavier if she had been on the contraceptive pill pre-operatively and more likely to perceive her periods as lighter if she had used an intrauterine contraceptive device pre-operatively. Given the findings that loss is generally heavier when using the intrauterine device and lighter when using the contraceptive pill (Zadeh, 1967; Hefnawi et al, 1969; Cole, 1971), this implies that women use themselves as a baseline against which to judge the heaviness of loss.

This finding was confirmed by the World Health Organisation survey (Snowden & Christian, 1983). Women taking oral contraception are less likely to express their loss as heavy than women not using contraception. The intrauterine device for contraception was associated with more reports of heavy loss (Snowden and Christian, 1983). Women using injectable contraception were more likely to express the extremes of loss rather than calling their loss *moderate.*

1.3 Heavy Periods and Actual Loss

Whilst there is a recognition that there is a continuum in the amount of menstrual loss across society, there has also been a need for clinicians to delineate what is considered normal and what abnormal. One of the reasons for this is the dichotomised response that is offered of surgery versus no surgery. This calls for pragmatic ways of assessing loss. This has been done in a variety of ways. One may consider 'heavy' loss by making reference to outcomes such as anaemia. However, a particular loss causing anaemia in one woman may not in another. This is because of variations in factors such as total blood volume, the frequency of loss, body size and dietary intake. Another way of delineating abnormal loss is in terms of effects on the social or life consequences for the woman. The perception of the woman is relevant because it is this that is integrally related to her emotional response to the loss.

A more direct way of assessing loss is by measuring actual loss (Table 1). A distinction between actual and a woman's own perception of loss creates four clear groups which may best be summarised in a simple two by two table.

Table 1 — Relationships between reported loss and actual loss

		Actual Loss Heavy	
		Yes heavy	No
Perceived or reported	Yes heavy	A	b
Heavy Loss	No	C	d

Several workers have attempted to define what constitutes an actual heavy loss. In the main they have relied upon the interpretation of population studies which involve the measurement of actual menstrual loss. These are considered later. The establishment of a value of actual loss that is used as a reference point for 'normal', also then establishes a relationship between 'actual loss' and perceived or reported loss (Figure 1).

1.31 Means of Objective Assessment

In the past, various methods for measuring blood loss during menstruation have been devised. Workers have found that they are able to measure menstrual loss directly by collecting women's menstrual pads and tampons over a cycle. This gives an objective measurement of loss for that period. The two main approaches have involved either radioisotopic measurement (Baldwin et al, 1961; Matsumoto et al, 1962; Jacobs & Butler, 1965) or the less invasive colorimetric measurement (Reis & Chakmakjian, 1931; Hallberg, 1964a; Rybo, 1966; Elwood, 1968; Cole et al, 1971; Haynes, 1977; Chimbira et al, 1980; Fraser, 1984; Gannon et al, 1996).

1.311 Radioisotope Techniques

This involves the labelling of erythrocytes with radioactive iron (Baldwin et al, 1961) or chromium (Rankin et al, 1962; Matsumoto et al 1962; Jacobs and Butler, 1965). The blood is initially taken from a woman, labelled and then returned to the circulation before menstruation. The radioactivity is measured in the tampons and towels.

Baldwin and colleagues (1961) measured iron lost in the menstrual fluid and did this by using radioactive iron (Fe59) in the form of ferrous citrate which was injected 10-14 days prior to the anticipated period. When the pads and tampons were collected the iron was put into solution using hydrochloric acid and nitric acid, it was then boiled to dryness and hydrochloric acid added again to make a solution which was tested for radioactivity. In this way, calculations of blood loss could be made.

1.312 Colorimetric Estimation

One method frequently quoted was perfected by Hallberg and colleagues (1964a) used the Alkaline Haematinin method where haemoglobin is mixed with sodium hydroxide to produce alkaline haematinin which is a brown solution. For example, 5% sodium hydroxide is mixed with the towels and incubated for 48 hours. At the same time 0.1 millilitres of venous blood is mixed with 10ml of 5% sodium hydroxide. The optical density of the brown solution is measured at 541mμ wavelength. The menstrual loss is calculated using the formula

menstrual loss   =   optical density of menses x volume NaOH

optical density venous blood x 100

This method was also reported separately by Rybo (1966b).

The method used by Cole and colleagues (1971) involved soaking the towels overnight in distilled water and measuring the iron content by spectrophotometry after wringing them clean. The blood equivalent was calculated using the iron content of a venous sample from the same woman. A study assessing this method using pads treated with measured amounts of blood gave a

mean ratio of 'calculated' blood to known blood of 1.01 (Cheyne and Shepherd, 1970).

A method used by Elwood and colleagues (1968) was more complicated and involved several evaporations to dryness, with sequential addition of hydrochloric acid and nitric acid; hydrochloric acid again and then hydrochloric acid with water, citric acid, thioglycollic acid and ammonium hydroxide. The solution then had optical density readings at 520ì.

A simpler method has recently been developed where sanitary material is washed in a detergent in a known volume of water. The haemoglobin in the sample is measured after mixing with sodium carbonate (Gannon et al, 1996). This was well validated by using known quantities of expired blood (from the blood bank) on sanitary material with the technician blind to the quantities. It was found to be a very accurate method and was the method used in this study.

1.32 Actual Loss in Community Samples

In a Gothenburg population study, a menstrual loss of 80ml was found to be at the 90th centile. This figure has clinical meaning in terms of management because 67% of patients above it have evidence of iron deficiency anaemia (Hallberg et al, 1966b). As a result many subsequent workers have used 80ml as a cut off point for clinically relevant heavy loss. This Swedish study of 476 randomly selected women between the ages of 15 and 50 collected data on one period. The women were stratified according to age. 382 (80%) women had a loss of between 1-60ml, 38 (8%) women had a loss between 61-80ml and 54 (11%) women had a loss greater than 80ml. The mean from the total sample of 476 women was 43ml (Table 2) (Hallberg et al, 1966a; Rybo, 1966b).

Table 2 -   **Menstrual loss in a Swedish Population**

                (Hallberg, 1966a)

Age	15	23	30	40	45	50	total
mean millilitres	33.8	38.9	49.0	44.5	42.7	62.4	43.4

A study of 348 women between 17-45 in a Northumbrian mining village (Cole et al, 1971) found the mean loss over two menstrual cycles was 37.5ml.

1.33 Actual Loss in other populations

Janssen and colleagues (1997) studied menstrual loss in 117 healthy volunteers, using the alkaline haematin method. They compared loss with age, parity, body mass index and smoking habits and found no association except an increase in loss with increasing age. Jacobs and Butler (1965) studied 17 healthy volunteer midwives between the ages of 21 and 40, who had no history of gynaecological problems and a haemoglobin level of at least 12g/10dl. The mean loss in this group was 34.7 ml (range 3-87 millilitres). Since those women who would have had anaemia secondary to heavy periods were excluded women with persistently heavy loss would be under-represented in this group.

In an earlier study by Barer and Fowler (1936) women with a haemoglobin below 10.2g/10dl were excluded, leaving 100 normal women working

in hospital services between the ages of 15 and 43. The mean loss per cycle in this group of women was 51ml with a median of 36 millilitres (range 6-179ml). Fifty percent of subjects lost between 23-68ml.

137 women working in a Swedish factory had a mean loss of 34 millilitres (Hallberg et al, 1966b).

Other workers did not use haemoglobin as a means of excluding heavy loss but instead used women's descriptions of their loss. Baldwin and colleagues (1961) split twenty one volunteer nurses and technicians into two groups according to their subjective impression of their periods: *normal or less* and *heavy*. The *normal or less* group was calculated to have an average loss of 25ml (range 10-55ml) and the *heavy* group's average loss was 126ml (range 50-312).

In this country when a woman perceives that her periods are heavy she may present herself to a clinician. However, in general a gynaecologist will not arrange measurement of actual menstrual loss in routine clinical practice and will make an assessment largely on the basis of a history. A full blood count may be obtained but the decision about whether or not to consider a woman's loss as 'heavy' will inevitably make use of information about the reported length of the period, its frequency, the number of towels or tampons used and the subjective experience of the woman including the presence or extent of flooding or clots. The social and psychological impact of the woman's experiences may be considered. Since perceived loss may be influenced by psychological factors the ability to measure actual loss is useful. It adds a further dimension to our understanding of and assessment of the factors which both lead to women receiving treatment for *heavy periods* and to the gynaecological and psychological outcome of such treatment. These aspects will be considered in more detail in further sections.

1.34 Actual Loss and its relationship to other potential markers of heavy loss

Clearly there is a relationship between actual menstrual loss and other markers of menstrual loss which have been used. I will therefore examine the relationship of actual loss to anaemia, period length, menstrual protection and perceptions of loss. This will provide a clearer understanding of the usefulness of some of these methods when considering the evaluation of menstrual loss and particularly the estimation of actual loss.

1.341 Actual Loss and Anaemia

A group of 15 hospital patients (Jacobs & Butler, 1965) with anaemia of unknown origin (haemoglobin of less than 9g/10dl) and no obvious gynaecological pathology were found to have an average measured loss of 121.4ml. Removing one woman with a very high loss from this group still yielded an average of 85ml. They used a comparison population of 17 midwives (21-40 years old), with no history of gynaecological problems and a haemoglobin over 12g/dl, and the difference in blood loss was found to be very significant (p <0.0025). Interestingly, when iron treatment was instituted in the former group some women's loss increased.

Elwood et al (1968) carried out a community study of menstrual iron loss and its association with iron deficiency anaemia. In an area of Wales, 1005 women between the ages of 20 and 64 were screened after excluding pregnant women. A subgroup of 355 women aged between 20 and 39 was stratified by serum haemoglobin level. After measuring their loss using a colorimetric method of analysis they found a mean iron loss of 12.2mg. There was a significant negative correlation (-0.37) between haemoglobin level and menstrual loss.

In Hallberg's study of 137 women working in a factory only 7.3% women had a haemoglobin below 12g/10dl (Hallberg et al, 1966b). The loss of

these women had a mean of 58 millilitres compared to 34 millilitres for the whole population and 32.5ml for the non-anaemic women. However, several women with losses greater than 80 millilitres did not have a haemoglobin below 12g/10dl. It has been established that when sufficient blood is removed by phlebotomy there is a drop in *plasma iron* with an increase in *total iron binding capacity* and that these changes may be manifest before anaemia is induced (Conrad & Crosby, 1962). Hallberg and colleagues (1966b) showed plasma iron concentration dropped as menstrual loss increased and that this was statistically significant when levels dropped below 80 micrograms of iron per 100 millilitres plasma. In addition total iron binding capacity values are significantly raised above a menstrual loss of 60 ml (Hallberg et al, 1966b).

Chimbira and colleagues (1980) assessed 92 women in a gynaecology out-patient clinic over two consecutive periods. Whilst they found no overall correlation between haemoglobin and menstrual loss in a gynaecology out-patient population, 11 of the 14 women with iron deficiency anaemia had an average loss greater than 80ml over the two periods. The Barer and Fowler study (1936) was unable to find a correlation between blood loss and haemoglobin after excluding women with haemoglobin below 10.2g/10dl. Although any overall correlation between blood loss and haemoglobin may not be strong, evidence would suggest that at the 'heavy' end of blood loss the association is more robust (Chimbira et al, 1980). Zadeh and colleagues (1967) showed that having an intrauterine device in place was associated with a significant reduction in haemoglobin levels and that taking the pill appeared to protect against a fall in haemoglobin level.

1.342 Actual Loss and Period Length

89% of women in a gynaecology out-patient clinic study had a period length between 1 and 7 days (Chimbira et al, 1980). There is a relationship across different cultures between what women perceive as a heavy loss and the number of days they are bleeding (Snowden and Christian, 1983). Reports of short duration (1-3 days) were consistently associated with reported loss that was light, and those of long duration consistently associated with reported heavy loss. On the other hand when actual loss was considered, Rybo (1966) found that cycle length was not significantly associated with loss. Haynes and colleagues (1977) found no relation between duration and total menstrual blood loss in women with objectively heavy periods and this finding has been confirmed by others (Fraser, 1984). A large proportion of blood loss appears to occur within the first three days (Baldwin et al 1961; Haynes et al, 1977; Rybo, 1966). This is so whether or not women have subjectively heavy periods (Haynes et al;, 1977) or objectively heavy periods (Rybo, 1966). Women with an overall loss of more than 80ml lost 86% of the total in the first three days whilst women with a loss less than 80ml lost 92% in the first three days (Rybo, 1966). Other workers have found that median loss is very similar no matter what the duration of the period (Chimbira, 1980).

Furthermore, when women who perceive their loss as heavy, moderate or light are asked to make a prediction of the length of their next period some interesting findings emerge when the length of those predicted periods are actually measured (Snowden and Christian, 1983). 52% of women reporting heavy bleeding overestimate the length of their next period and 85% of women reporting light bleeding underestimate the length of their next period. It is clear from this that how women perceive their periods affects their expectations for the future and the way they report them.

Similar work looking at the length of periods (Peskin, 1968) found that there was consistency in the length of a series of cycles for women during adolescence, but when data was collected again in the same women in the region of 30 years of age the average length of period in adolescence was a poor predictor of length aged 30.

1.343 Actual Loss and the use of Menstrual Protection

Women using towels on their own are better able to estimate actual loss accurately than women using tampons (Hodges, 1985). Nevertheless the World Health Organisation cross cultural survey reported that the number of towels or tampons used was the measure most likely to be used by women to obtain a measure of the amount of blood being lost (Snowden and Christian, 1983). Women using tampons and towels together have significantly higher losses than other women (Hodges, 1985) but generally the correlation between actual loss and the number of pads or tampons used is not good (Chimbira, 1980; Hodges, 1985). This fact has been recognised by some gynaecologists when discussing assessment strategies (Rees, 1988). This poor correlation is because the amount of sanitary protection used is influenced by many factors other than actual loss. These include climate, body weight, degree of discomfort experienced and individual preferences. Other factors such as age (Chimbira, 1980; Hodges 1985) and status or social class (Barer and Fowler, 1936; Chimbira, 1980), availability of toilet facilities, levels of physical activity and alteration in bowel or urinary habit (Fraser, 1984) also affected numbers of sanitary towels used. With so many factors influencing the use of menstrual flow protection by women, it is not difficult to see why it is not necessarily a reliable predictor of actual loss.

1.344 Actual Loss and Perceptions of Loss

Whilst there is an overall correlation between subjective representation of loss and actual loss (Hallberg 1966a; Chimbira, 1980; Hodges, 1985), there is also considerable variability and studies measuring menstrual loss have found that actual loss is not reliably predicted from perceived loss (Chimbira et al, 1980; Fraser et al, 1984).

Haynes and colleagues (1977) found that 76% of the women who described heavy periods did have losses over 80ml. However, Hallberg and colleagues (1966a) found that 14% of those with losses below 20ml described it as a heavy loss and 40% of women with a loss above 80ml described it as moderate or light. Women describing their loss as normal (357 women) had an average loss of 38ml.

In the Chimbira (1980) sample, 34% of women describing their loss as light on a three point scale had a loss of over 80ml, and 48% of women describing their loss as heavy had a loss of under 80ml. There was a variable relationship between women's descriptions of loss and actual loss so that some women described very heavy loss with minimal actual loss, and vice versa. Fraser (1984) estimated that approximately 60% of women complaining of heavy periods in out-patients had losses less than 80ml. Other workers have found similar results (Cameron, 1988). This is very relevant given that most hysterectomies are performed for *reported* excessive menstruation (Grant & Hussein, 1984), and one of the most common operations for women of fertile age is hysterectomy (Dicker et al, 1982a).

1.35 Actual Loss and Individual Variability Versus Group Variability

Trezoar and colleagues (1967) found that only a minority of women had periods that were consistently the same length. Baldwin and colleagues' study (1961) of 21 nurses and technicians also found wide variation between periods. This has been explored further by Hallberg and Nilsson (1964b) who studied the loss of 12 student nurses over 12 periods. The mean loss was 28ml (range 5-87). The spread of change for each nurse over the 12 months varied between 9 millilitres and 61 millilitres. Analysis of variance showed significant differences between the nurses (p<0.001) but far less so between their own losses over the year. In a larger study of 137 women between 16 and 52, who had a mean loss of 34ml (Hallberg, 1966b), 117 women collected losses from two consecutive periods and it was found by analysis of variance that the differences between the periods of the same women were small and not statistically significant. In their Northumbrian population study Cole and colleagues (1971) found that 74.7% of women had 10ml or less of difference between two periods. However, Hodges (1985) found that 30% of the 119 women she studied had a difference of greater than 40 millilitres. Janssen and colleagues (1997) compared two consecutive periods in 117 healthy women and found a mean difference of only 2 millilitres (with 95% confidence intervals of -1.3 to 5.5 millilitres). Cole and colleagues (1971) showed that women with large losses were likely to have larger variability by volume than those with small losses. In general a woman's actual menstrual loss from period to period shows a consistent pattern.

1.36 Actual Loss, Marital Status and Parity

Barer and Fowler (1936) looked at the work done before 1936 and drew attention to major methodological problems in the 33 studies reviewed. They found that the average loss for unmarried women without anaemia was 53.0ml, and for married women without anaemia was 42.9ml. In this latter group the average loss for parous women was 48.2ml and for nulliparous women was 36.7ml. Rybo (1966a) (using a colorimetric analysis) confirmed that nulliparous women had a lower mean blood loss than parous women of the same age, and that the number of births and the age of menarche did not influence this finding. Some workers have found a relation with age (Matsumoto et al, 1962). Elwood and colleagues (1968) did not demonstrate a clear effect with age or parity.

Further studies have explored both age and parity together. Cole and colleagues (1971) found an increased loss with age and parity, but no effect of age within parity groups. They concluded that the rising trend in loss with age is secondary to the effect of a rise with increasing parity.

Hallberg's study (1966a) also looked at this and found that in the under twenty-five year old group, parous women had significantly heavier periods than nulliparous women ($p<0.01$) although the means were not high at 42ml and 27ml respectively. No significant findings were discovered between these two groups of women in other age bands.

1.37 Actual Loss and Other Factors

Cole (1971) found small effects of increasing loss with the height of the woman (correlation coefficient 0.15 [p0.05]) and the average weight of their babies (correlation coefficient 0.28 [$p<0.01$]). Chimbira (1980) found no correlation

between uterine weight or uterine surface area and menstrual loss in women who had received hysterectomy for heavy periods.

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1.4 Heavy Periods and Psychological Morbidity

1.41 Psychological symptoms and reported loss

Some earlier workers suggested (often with little concrete evidence) that menorrhagia could occur in the context of, or as a response to, stress (O'Neill, 1960). Rogers (1950) used emotive language by saying that menstrual problems could sometimes represent 'a psychic conflict sailing under a gynaecological flag'. Blaikley (1949) described it as 'psychogenic menorrhagia' and reported 9 women where emotional improvement apparently led to menstrual improvement.

A study by Sainsbury (1960) using a Personality Inventory developed at the Maudsley psychiatric hospital in London administered it to all women in any of the out-patient clinics of the general hospital in Chichester over a two month period. Women presenting with menorrhagia had significantly higher neuroticism scores and significantly lower extroversion scores than the mean of patients with illnesses judged to have no psychosomatic component.

Some studies have suggested that higher levels of anxiety are present in women who perceive their loss to be heavy (Crabbe, 1975; Paige, 1973). Ballinger (1975) found that women in the community were more likely to admit to recently heavier periods if they were 'probable Cases' on General Health Questionnaire [GHQ] (Goldberg, 1972). The World Health Organisation cross cultural survey of menstruation (Snowden and Christian, 1983) found that women who perceived

their periods as heavy were more likely to report negative mood changes during the period.

Byrne (1984) found 46% 'probable cases' in 211 women attending gynaecology out-patients and similar figures have been found by other authors (Worsley et al, 1977). More specifically, women presenting to out-patient clinics with menorrhagia have been found to have higher levels of psychiatric morbidity than other populations. Ballinger (1977) found that women attending gynaecology out-patient clinics were more likely to complain of abnormal menstrual bleeding if they were 'probable Cases' on GHQ. The GHQ was also used on 50 women presenting to the gynaecology clinic with menorrhagia by Greenberg (1983) who found that 62% were 'probable cases'.

1.42 Femininity and Reported Menstrual Loss

Hodges (1985) study of 401 women awaiting hysterectomy for heavy periods found no association between femininity scores (Bem, 1974) and perceptions of menstrual loss. However, the larger cross-cultural study of Snowden and Christian (1983) found that measures of femininity did correlate with perceptions of *heavy* loss as heavy. Other studies have reported a link between high ratings of 'femininity' and negative feelings about menstruation (Gough, 1975; Chernovetz et al, 1979). Gough's study (1975) also found that women who socialised less and were less 'modern' in their outlook were more likely to have high menstrual distress scores. There are some methodological issues to address in studies which use instruments which measure apparent 'modernity' since there are subjective elements to what constitutes a modern outlook, especially since what was considered 'modern' over twenty years ago clearly has doubtful validity now. There are similar difficulties defining or measuring 'femininity'.

1.5 Hysterectomy and Psychological Morbidity

1.51 Hysterectomy - Culture and attitudes

Some evidence suggests that socio-cultural background may affect a woman's chances of receiving a hysterectomy and responses to it.

A socially stratified cohort of 1,549 British women born in 1946 was followed up in a study supported by the Medical Research Council. By the age of 43 there was a very significant educational gradient in the hysterectomy rate, with the best educated women having a rate of 1% and the women with minimal school qualifications having rates of 12-15% (Kuh & Stirling, 1995).

There has been a converse finding in Finland where 8,663 women aged 35 and over underwent hysterectomy in 1988 (Luoto et al, 1997). There was a positive correlation between disposable family income and hysterectomy rates and this remained so even when adjusted for age, education, hospital catchment and occupational status. The authors hypothesise that private medicine trends, and high rates of myoma treatment in women with higher income are responsible.

One study of 152 women in Canada suggested that women of European origin were more likely to have difficult post-operative adjustment to hysterectomy than Canadian women (Lalinec-Michaud & Engelsmann, 1989). Other studies showed mixed findings when attempting to examine the relationship between hysterectomy rates and social and economic factors. Studies in England and Australia appear to show little correlation with social class (Vessey et al, 1992), income or education (MacLennan et al, 1993) whilst others in the United States (Kjerulff et al, 1993) and Australia (Schofield et al, 1991a; Dennerstein et al, 1993) found lower educational level and income was associated with higher rates of hysterectomy.

A public education campaign in a particular part of Switzerland was compared to other parts of Switzerland where the campaign was absent (Domenighetti et al, 1988). It provided accessible information about normal and abnormal aspects of the menstrual cycle and information about hysterectomy. Subsequently, there was a clear fall in the hysterectomy rate in the area with the campaign, compared to the area without. A study in the province of Saskatchewan set agreed guidelines for the use of hysterectomy resulting in a reduction in the use of the operation from 24% to 8% (Dyck et al, 1977). These studies show that large policy interventions can impact upon hysterectomy rates.

It is possible to hypothesise that different cultural attitudes may be impacting upon attributions and responses to heavy periods in a number of ways. This thesis does not seek to shine any further light on this area.

1.52 How common is hysterectomy

In the United States the most common operation for women of a fertile age is hysterectomy (Dicker et al, 1982a). Surveys in the United States suggest that over 30% of women in their 50's have had their uterus removed (Pokras & Hufnagel, 1987; Schofield et al, 1991) reaching 40% by age 64 (Kjerulff et al, 1993). The overall rate in 1987 was 6.6 per thousand women (Lepine et al, 1997). A New Zealand study reports a prevalence of nearly 30% by aged 40 (Macintosh, 1987).

In England and Wales 10% of women have had a hysterectomy by age 43 (Kuh and Stirling, 1995) and approximately 20% by 55 (Vessey et al, 1992). Earlier studies gave a similar figure with approximately 20% of women having had a hysterectomy by 65 years of age (Savage, 1983; Coulter et al, 1988).

One Oxford study which included 33 general practice surgeries and 18,754 referrals to hospital services over 6 months found that 13% of these were to gynaecology clinics (Coulter et al, 1991). Approximately 60% of those referred with the complaint of heavy periods had received a hysterectomy by 5 years later. Interestingly these did not appear to be women who had been high general practice attenders over the previous two years. About one third of women receiving hysterectomy do so because of abnormal menstrual bleeding without known organic cause (Lee et al, 1984; Vessey et al, 1992).

1.531 Hysterectomy and psychological morbidity - retrospective studies

Given that between a quarter and two fifths of women receiving hysterectomy will experience some complications of surgery (Dicker et al, 1982b) and approximately 9% of these are serious complications (Anderson et al, 1993), and also given that a significant proportion of women report symptoms which they feel have been exacerbated or created by hysterectomy itself (Schofield et al, 1991b), it is not unreasonable to ask if women suffer psychological consequences as a result. Early retrospective work suggested that hysterectomy put women at risk of psychiatric disorder. A review by Meikle (1977) looking at 21 studies found that 15 suggested adverse psychological reactions after hysterectomy and 6 reported its absence. Richards (1973) found that three years post-operatively women were more likely to have received a prescription for anti-depressants from their general practitioners (33%) than controls (7%), and suggested a 'post hysterectomy syndrome' with depression as a central feature when comparing women undergoing hysterectomy to a variety of other surgical procedures (Richards, 1974). Looking at post operative referrals to psychiatric services, Barker (1968) inferred that depression should be recognised as a 'major post operative complication'.

The conclusions drawn from much of this retrospective work have not been fully justified. One important methodological problem was the absence of information about the pre-operative psychiatric morbidity of the women being studied. Melody (1962) followed the post-operative course of 267 American women after total abdominal hysterectomy. Four per cent became depressed (by clinical interview diagnosis) in the three months after operation. A retrospective case note review noted that all eleven of these 4% of women had a depressive illness in the five years prior to operation demonstrating pre-existing psychiatric morbidity. This highlighted the need for prospective work in the area.

A Swedish study found that 50% of women presenting for hysterectomy had sought professional help for a psychiatric problem in the previous year (Helstrom et al, 1994). Conversely in a study of 33 general practice surgeries in Oxford only 15% of women referred to hospital because of gynaecological problems had consulted general practitioners in the previous year about gynaecological problems.

Several other studies looked retrospectively at women who had received hysterectomy (Hollender, 1960; Paterson and Craig, 1963; Bragg, 1965; Hampton and Tarnasky, 1974) but had a weak design primarily because they were retrospective, but also because of factors such as selection bias and inadequate measures of outcome.

1.532 Hysterectomy and psychological morbidity - prospective studies

Prospective studies, which have included pre-operative assessment, have clarified some of the misunderstandings. These studies found high rates of psychiatric morbidity pre-operatively and no post-operative increase (Hunter, 1974; Meikle et al, 1977; Martin et al, 1980; Coppen et al, 1981). Hodges (1989) found no

evidence to suggest that pre-operative psychiatric morbidity was associated with either normal actual loss or 'high' (defined as more than 120 millilitres in a cycle) actual loss in 210 women studied. Post-operative psychiatric status was not predicted by low pre-operative loss. In other words, women who were psychiatrically ill post-operatively were no more likely to have low pre-operative loss, than women who were psychiatrically well post-operatively. More recent work has examined the role of pre-operative psychiatric status when considering post-operative psychiatric morbidity. Older literature has looked at it in the context of adjustment to hysterectomy. Since the two are not mutually exclusive I will first look at some of the literature purporting to identify the negative psychological consequences of hysterectomy.

One prospective study (Martin et al, 1980) assessed 49 women before hysterectomy using a structured psychiatric interview and the Zung self rating depression scale. They suggested that 57% had a psychiatric diagnosis initially and 66% had one 12 months post-operatively. Whilst approximately half of those women with diagnoses had depressive disorders, the other half were described as having the somatisation disorder 'Briquets Syndrome' which at that time was considered to be a form of hysteria. The study felt that some women had been inappropriately referred for surgery and were there partly because of psychiatric disorder.

More recent prospective studies have been larger, and more thorough. Gath and colleagues demonstrated high levels of psychiatric morbidity pre-operatively (1982a; 1982b). One hundred and fifty eight women with menorrhagia of benign origin were followed up. The initial assessment was 4 weeks prior to hysterectomy with follow up interviews at 6 and 18 months post-operatively. Psychiatric 'caseness' was established using Present State Examination (Wing,

1974). Gath found that 58% of patients were psychiatric 'cases' before hysterectomy. Six months post-operatively this figure was 26% and at eighteen months 29%. Whilst still high post-operatively the figure had come down substantially. Ryan and colleagues (1989) who found similar high rates have replicated Gath's findings in Australia.

In Gath and Ryan's studies the high levels of pre-operative psychiatric morbidity drop substantially in the post-operative period but can remain more than double that of population levels. Whilst these and other studies (Wijma, 1984; Lalinec-Michaud & Engelsmann, 1984; 1988) have demonstrated the importance of pre-operative psychiatric status to psychiatric morbidity post-operatively, most of these studies have found pre-operative rates of psychological morbidity of 50% or over. However, a smaller study (56 women) in England found lower rates both pre-operatively (up to 27%) and post-operatively (7%) (Osborn and Gath, 1990). The same Oxford research group published work later and discussed possible mechanisms (Gath et al, 1995). They found that levels of psychiatric morbidity in women awaiting hysterectomy had dropped across three studies that spanned the years 1975-1990. In the first study the proportion of psychiatric cases pre-operatively was 58%. By the third study this had dropped dramatically to only 9%. Whilst possible methodological problems may have accounted for some of this difference, the authors rule this out. They suggest that a significant contribution arises from a change in the referral policies of general practitioners and gynaecologists. Family doctors had become more aware of the psychological contribution in women presenting with heavy periods. It may be that this effect is particularly strong in areas such as Oxfordshire where this type of research is well established (and results disseminated) over a period of years. Gath suggests that

Oxfordshire general practitioners may be screening out women with significant psychological problems.

Furthermore, experiences that are known to adversely impact upon psychological health may have a damaging effect on post-operative psychological state. For example, one study followed up 92 women who were recovering from hysterectomy and found that women who had either been raped or had incest experiences were more likely to be depressed in the first year after hysterectomy than those without such experiences (Wukasch, 1996). Unfortunately, pre-operative psychological status was not examined in this study. Similarly, some factors postulated as causes of poor post-operative psychological status such as ovarian failure (Khastgir & Studd, 1998) have not been shown to be so important because ovarian failure is exceptionally rare after abdominal hysterectomy with preserved ovaries (Coppen et al, 1981).

These studies make it clear that post-operative psychiatric status has a close association with pre-operative psychiatric status. However, no studies have yet been able to exclude the adverse effects of the hysterectomy as a factor in the production of raised post-operative psychiatric morbidity. The operation clearly has some effect. For example, women who have emergency hysterectomy are more likely to suffer depression after operation than those who have not (Lalinec-Michaud & Engelsmann, 1985). Similarly complications which arise from hysterectomy such as vault haematoma, urological injury (Drife, 1994) and injury to adjacent organs (Harris, 1997) may have psychological consequences. How much of the high post-operative psychiatric morbidity is secondary to the effects of the hysterectomy and how much is a reflection of the fact that this is a group of women with high psychiatric morbidity regardless of the heavy periods or treatment for it?

Much of this information lends support to the belief that awareness of psychological problems and screening for psychological morbidity are very relevant elements in the assessment of the complaint of heavy periods (Wright & Greenberg, 1995).

1.54 Hysterectomy, womanhood/femininity and post-operative psychological morbidity

Melody (1962) regarded hysterectomy as meaning 'ejection from the social milieu' in which the woman had previously functioned. Early studies suggested that the presence of the uterus is important to the self-image of the woman (Deutsch, 1942; Drellich & Bieber, 1958). Some younger women have an adverse reaction to the loss of child bearing capacity after hysterectomy (Kaltreider et al, 1979), but there is evidence to show that women who undergo hysterectomy before the age of 50 are more likely to be satisfied with the outcome (Schofield, 1991b).

Whilst it may be popularly perceived that hysterectomy damages feelings of womanhood or femininity, and may lead to psychological problems, the research evidence does not conclusively show this. One study (Wijma, 1984) sought to test the inference that women with high femininity scores are more likely to be damaged psychologically by hysterectomy. Wijma assessed 234 women awaiting hysterectomy using the Bem Sex Role Inventory (Bem, 1974) prospectively. No evidence was found for the notion that women with high femininity scores experienced more psychological problems after hysterectomy. Another study found no clear changes in feelings of femininity after hysterectomy (Gath et al, 1982b). Other workers have found no association between pre-operative femininity scores and psychiatric outcome after hysterectomy (Ryan et al, 1989). There is a central

difficulty with all studies of this nature that relates to the problem of defining and measuring the concept of 'femininity'.

1.55 Hysterectomy and Sexual Functioning

An early case report mentioned the preservation of sexual desire after hysterectomy (Blundell, 1829). Subsequent research suggests that this is so for many women (Gath et al, 1982; Nathorst-Boos et al, 1992). Overall, sexual functioning is reported to be negatively affected in from 10 to 44% of women (Huffman, 1950; Dodds et al, 1961; Patterson & Craig, 1963; Munday & Cox, 1967; Richards 1973; Dennerstein et al, 1977; Nathorst-Boos et al, 1992; Helstrom et al 1993). However, in a series of studies the minimum *improvement* in sexual functioning is 30% of women and in many studies it was considerably more (Munday and Cox, 1967; Dennerstein et al, 1977; Singh, 1983; Nathorst-Boos et al, 1992; Helstrom et al, 1993). Many studies do have methodological difficulties. For example, Dennerstein and colleagues (1977) found that in a group of 89 women who had received hysterectomy with bilateral salpingo-oophorectomy between 6 months and 5 years previously, 37% of them had problems with sexual relations post-operatively but 34% reported improvements and 29% reported no change. The reports of dyspareunia were increased in the women not prescribed oestrogens, but there was no clear increase in other types of sexual dysfunction in this group. The methodological problems included a response bias (only 89 woman took part out of the 321 initially invited to participate) The information about pre-operative attitudes was only collected retrospectively. This calls into question the influence that post-operative functioning may have on perceptions of pre-operative sexual functioning. Furthermore such a low response rate creates concern about systematic bias of some kind. For example are women with pre-operative fears

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about post-operative sexual functioning over-represented, given that this has been shown to be a predictor of post-operative sexual functioning (Lalinec-Michaud & Engelsmann, 1985) and would this therefore alter overall reports of post-operative sexual functioning. Munday and Cox (1967) had replies from questionnaires in 290 (72.5%) of a consecutive series of 400 women. 55.4% of respondents said that matters sexual remained unchanged, whilst 13.1% reported an improvement. 26.9% reported a deterioration. Jewett (1952) studied a group of women who had received total abdominal hysterectomy and found that 12% of women had some shortening of the vagina. The results are difficult to interpret from the tables presented but it appears that approximately half of these women developed post-operative dyspareunia. The dyspareunia rate from those without shortening is not accessible from the data presented in the paper which makes this finding difficult to interpret.

Some authors have suggested that total hysterectomy is more likely to damage sexual functioning (Kilkku, 1983; Kilkku et al, 1983) and reduce frequency of orgasm (Kilkku et al, 1983) than subtotal hysterectomy. The cervix has been suggested as an key mediator of pleasure (Sloan, 1978; Sakai et al, 1983). However, this is not clear cut. For example in the comparison of total and subtotal hysterectomy by Kilkku and colleagues (1983) there were more married women in the subtotal group. Helstrom and colleagues (1993) found that after subtotal hysterectomy, whilst 50% reported an improved sex life, 21% reported a deterioration. Nathorst-Boos and colleagues (1992) compared total and subtotal hysterectomy and found no difference between the two in terms of sexual functioning. Of all subjects 39% reported improved sex, 40% reported no change and, 21% reported deterioration. Subtotal hysterectomies carried a lower risk of complications such as urinary tract injuries, haematomas, wound infections

(Nathorst-Boos, 1992) and no vault granulations (Manyonda, 1990). Subtotal hysterectomies were more likely to improve deep dyspareunia present before operation (Kilkku, 1983) but total hysterectomy also improved dyspareunia.

Pre-operative psychiatric status has little influence on post-operative sexual functioning (Helstrom et al, 1994) with a better predictor being pre-operative sexual functioning (Helstrom et al, 1993) and the presence of pre-operative fears about changes in sexual function after operation (Lalinec-Michaud & Engelsmann, 1985).

Psychiatric outcome is no different whether or not the ovaries are removed during hysterectomy (Gath et al, 1982b) and some have suggested that their loss does not usually compromise sexual functioning (Munday and Cox, 1967; Utian, 1975). However other studies have found improved post-operative sexual functioning in terms of subjective experience and coital frequency if the ovaries are preserved (Nathorst-Boos & Von Shoutz, 1992).

1.56 Hysterectomy - What can be concluded?

Many studies have shown that women presenting with heavy periods for hysterectomy have high rates of psychological morbidity and this drops post-operatively, but remains considerably above population levels. There is also evidence that some women receiving hysterectomy in some situations will be affected psychologically by it. Similarly, many women will have improved quality of life after hysterectomy, with for example improved sexual functioning, whilst others will have a deterioration in sexual functioning. Once again, personal and operative factors have been shown to be relevant. The selection of women for

operative treatment therefore becomes very important, and the question about how the less invasive procedure of endometrial ablation impacts upon these variables becomes very pertinent.

In general, studies looking at satisfaction ratings for hysterectomy are good. One study of 193 women who had received hysterectomy in the previous 5 years showed 96% women feeling that they had received the right treatment (Schofield et al, 1991b) and another study of 678 women who had received hysterectomy in the previous 10 years reported that 84% were satisfied (Nathorst-Boos et al, 1992). Women who experienced marked disruption to their lives as a result of heavy periods (Schofield et al, 1991b) were more likely to report satisfaction. Similarly, the disappearance of heavy periods and pain were given as the reasons by women viewing surgery as a positive experience (Nathorst-Boos et al, 1992).

1.6 Endometrial ablation

In recent years the permanent removal of the endometrium has been advocated as a method of controlling menorrhagia in dysfunctional uterine bleeding and this method is rapidly becoming more popular. There are several techniques available to surgeons including laser ablation (Goldrath et al, 1981), rollerball diathermy (Vancaillie, 1989) and loop diathermy/electrocautery (DeCherney and Polan, 1983). Other techniques described include a thermal balloon technique (Singer et al, 1984; Vilos et al, 1996) radiofrequency induced thermal ablation (Phipps et al, 1990), microwave ablation (Sharp et al, 1995) but these are not currently widely

used. A national survey of complications suggests that the laser and rollerball techniques are safer than loop diathermy or combined loop and rollerball diathermy (Overton et al, 1997). In one randomised trial of 372 women, laser ablation using a neodymium yttrium aluminium garnet (Nd:YAG) laser, held no operative advantages over the more traditional resection technique (Bhattacharya et al, 1997).

The relative simplicity of the operation of endometrial ablation coupled with the relief of menorrhagia might lead us to expect there to be several psychological advantages when compared to hysterectomy. Firstly women often prefer it because it avoids major surgery and results in rapid return to normal daily living (Nagele et al, 1998). Secondly, endometrial ablation reliably reduces menstrual loss in 75-97% of women (Thijssen, 1997; Holt & Gillmer, 1995; Vilos et al, 1996; Baggish & Sze, 1996). The average reduction in amount of loss has been found to be more than ninety per cent (Cooper et al, 1992; Gannon et al, 1994). Questionnaire studies have been performed by several groups to assess outcome (O'Connor and Magos, 1996; Hunter and McClelland, 1998; Tsaltas et al, 1998) but in most studies like this only half to three quarters of women respond. One study with reasonable response rates followed up 78 women who had received endometrial ablation (Hunter and McClelland, 1998). They found that 13% had received hysterectomy 1-4 years later. 61 of the remaining 68 responded to a questionnaire, and of these, 90% of women felt there to be an improvement in their bleeding. 38% were amenorrhoeic and a further 52% had very light periods or spotting only. O'Connor and Magos (1996) followed 525 women for up to five years and found similar figures, with over 70% of women also indicating that menstrual pain is reduced. Just under ten percent of women required repeat endometrial ablation, and 9 percent underwent hysterectomy in five years follow

up. In other words, over four fifths of women avoid further surgical intervention after endometrial ablation. Other studies also confirm that success rates are at least 70% (Pyper & Haeri, 1991) and for most studies 90% or better in terms of achieving reduction of menstrual loss to normal or lower (DeCherney et al, 1987; Dwyer et al, 1993; Martyn & Allen, 1998) but that success rates decline with increasing length of follow-up (Martyn & Allen, 1998). Crosignani and colleagues (1997) report that their first 100 patients had a menorrhagia recurrence rate of 11%. One series of 372 women shows that within one year of surgery approximately 15-20% women go on to have further surgery, 5-15% undergoing hysterectomy (Bhattacharya et al, 1997). Another study of 525 women showed that by 5 years 9% had undergone hysterectomy and 9% had received repeat endometrial ablation (O'Connor & Magos, 1996). One study of 42 women with good follow up has a much higher rate of hysterectomy (35%) by 4 years (Unger & Meeks, 1996). However 79% of these had a structural abnormality (for example myoma, endometriosis and adenomyosis) which necessitated hysterectomy, and this highlights the need to select women very carefully for endometrial ablation, and adequately exclude organic pathology which will not be treated by endometrial ablation. Another study with 42 women receiving endometrial resection in Milan, Italy, had 10% women receiving hysterectomy by two years (Crosignani et al, 1997). Another series of 207 women receiving thermal ablation had a hysterectomy rate of 15% by 5 years (Davis et al, 1998). They showed that over half of these were to do with 'ablation failure', and demonstrated that in at least 7% of women there was focal or diffuse regeneration of endometrium. At least some of this regeneration will be related to selection protocols and the skills and thoroughness of the surgeons. This may partly explain rates of complete amenorrhoea varying from between 13% at four months post-operatively (Dwyer

et al, 1993) up to nearly 40% one year post-operatively (Hunter and McClelland, 1998) although comparison is difficult because the former study is prospective, the latter is not. There are also different lengths of follow up, differing drop out rates and use of menstrual categories. For example, one study had five categories for amenorrhoea, spotting, hyomenorrhoea, normal menstrual periods and recurrent menorrhagia (Crosignani et al, 1997) whilst another study had three categories namely amenorrhoea, hypomenorrhoea and 'unchanged' (Dwyer et al, 1993). However, when looking at success where the studies do discriminate between amenorrhoea and 'spotting' then results still vary between 59% with amenorrhoea or 'light staining' at one year (Hunter & McClelland, 1998) to 44% amenorrhoea or spotting at one year (Gannon et al, 1994), and 34% with amenorrhoea or 'spotting' at two years (Crosignani et al, 1997). Again, differences in length of follow up and drop out rates make comparison difficult.

A series of 372 women (Bhattacharya et al, 1997) showed that approximately 90% women were satisfied with their treatment whether they received laser ablation or traditional resection.

1.61 Comparison between endometrial ablation and hysterectomy

When compared to hysterectomy the operating time is shorter, hospital stay is shorter, recovery is quicker (Gannon et al, 1991; Garry et al, 1991; Dwyer et al, 1993; O'Connor et al, 1997; Crosignani et al, 1997). There is less time off work, a quicker return to daily activities and a quicker return to intercourse (Dwyer et al, 1993). Complications are significantly fewer than hysterectomy when compared in randomised controlled trials (Dwyer et al, 1993; O'Connor et al, 1997). Statistical differences have been seen with the total number of complications as well as

individual complications such as pyrexia, urinary retention, pelvic haematoma, wound infection, urinary infection and anaemia. One series showed rates of over 10% in these latter three complications after hysterectomy compared to 0% with endometrial resection (Dwyer et al, 1993). Other studies have shown lower rates of major complications when abdominal hysterectomy (2%) is compared to endometrial resection (0%) (Crosignani et al, 1997). As well as there being fewer complications, there are some complications of hysterectomy such as vault granulations (Manyonda et al, 1990) and vault haematoma (Crosignani et al, 1997) which do not occur with endometrial ablation. Conversely, some complications of endometrial ablation such as uterine perforation, heavy intrauterine bleeding (Erian and Goh, 1996) do not occur in hysterectomy. Endometrial ablation also carries a risk of complications from the use of the irrigation system that is required (Holt & Gillmer, 1995). These include circulatory overload and hyponatraemia. Concerns have been raised about the detection of endometrial cancer after endometrial ablation after single case reports (Copperman et al, 1993; Archer, 1998) although standard diagnostic procedures can still be used in cases of abnormal bleeding after endometrial ablation.

Furthermore, as Dwyer and colleagues (1993) point out, other factors such as continued need for cervical smears and uncertainty over menstrual bleeding occur with endometrial ablation. Endometrial ablation has been shown to be a relatively safe operation (Erian and Goh, 1996; Vercellini et al, 1998) with low levels of morbidity and mortality over all (Overton et al, 1997).

Endometrial ablation is also considerably cheaper (50-85%) in the short term (Goldfarb, 1990; Rutherford and Glass, 1990; Gannon et al, 1991; Sculpher et al, 1993) and a randomly allocated study of 204 women in Aberdeen by Alexander and colleagues (1996) found it to be cheaper by at least 20% by one

year both in terms of National Health Service costs and personal financial costs (Cameron et al, 1996). When women are followed up for 3 years, and the costs of re-operation (in failed initial endometrial ablation) are included, it is still approximately 70% cheaper (Sculpher, 1998).

In prospective studies, between 10% and 20% of women, closely followed up are not satisfied at one year after surgery (Gannon et al, 1994; O'Connor & Magos, 1996). Some of the dissatisfaction is undoubtedly to do with continued dysmenorrhoea (Dwyer et al, 1993). However, most women are very pleased with the outcome (Gannon et al, 1994; Gannon et al, 1996). The result of endometrial ablation is more likely to be satisfactory for women with high actual loss than for those with a normal or low menstrual blood loss on pre-operative objective testing (Gannon et al, 1996). This contributes to the generation of a hypothesis that the complaint of heavy periods may represent psychological morbidity in some cases, and that many of these women do not benefit from surgery.

In the randomised controlled trial between abdominal hysterectomy and endometrial resection of 197 women (Dwyer et al, 1993), the satisfaction ratings at four months were slightly higher in the hysterectomy group (94%) than the endometrial ablation group (85%). The dissatisfaction in the latter group was associated with uterine perforation, continued reported heavy bleeding and increased dysmenorrhea in some women. By contrast, a randomised controlled study of 202 women receiving either endometrial ablation or hysterectomy (abdominal or vaginal depending on surgeon preference) found no significant difference in satisfaction rates up to 2 years (median) later (O'Connor et al, 1997), and a study comparing abdominal hysterectomy with endometrial resection found a slightly higher satisfaction rating in the hysterectomy group but this was not statistically significant (Crosignani et al, 1997). Women clearly retain the option to

go on to have a repeat endometrial ablation or hysterectomy. A woman who is not satisfied with hysterectomy does not have this choice.

On the face of it, endometrial ablation may be expected to result in a better psychological outcome than hysterectomy. It is less invasive and has less complications. It is a less anxiety provoking procedure. It is less likely to have an adverse impact upon sexual functioning and feelings of womanhood, and it leaves the uterus and ovaries intact. However, randomised studies looking at psychological morbidity that compare hysterectomy with endometrial ablation, have not satisfactorily answered the question of psychological outcome (Dwyer et al, 1993; Alexander et al, 1996; Sculpher et al, 1996; Crosignani et al, 1993). Psychological instruments were used by some but psychological outcome was not the main thrust of the studies. One used an instrument that is used for screening or to monitor change in diagnosed anxiety and depression (Alexander et al, 1996).

Another used a measure of general functioning with a short mental health subscale (Sculpher et al, 1996). These psychological instruments are too superficial to make adequate conclusions about mental health.

The study by Crosignani and colleagues (1997) comparing abdominal hysterectomy with endometrial resection showed trends towards improved functioning in the hysterectomy group when using the short form (36 question) General Health Questionnaire, but there were few statistical significances and no pre-operative assessments or scores. Post-operative sexual satisfaction scores were equivalent for the two groups.

The study by Dwyer and colleagues (1993) which randomised between hysterectomy and endometrial electrocautery ablation found that significantly more women had high General Health Questionnaire (GHQ) scores (greater than 11 on the 60 question version of GHQ) after hysterectomy but this is difficult to interpret

because more women had high scores in the pre-operative group randomised to hysterectomy than the endometrial ablation group. Of the 97 women receiving hysterectomy, 43 (44%) scored more than 11 before surgery and 24 (25%) women 4 months afterwards. The respective figures for the 99 women receiving endometrial ablation were 34 (34%) and 8 (8%). This shows a 26% drop after endometrial ablation (95% confidence intervals 15%-37%) and an 18% drop after hysterectomy (95% confidence intervals 5%-31%) but there was a 10% difference already pre-operatively. Furthermore, even though there is an implication that after endometrial ablation there is a greater drop in morbidity than after hysterectomy the confidence intervals between the two treatment conditions show considerable overlap and the reported statistical analysis does not address the differences. Further studies may give us the answer with more confidence.

The literature to date has informed the development of this studies hypotheses. To summarise particular points of relevance:

- most series of women awaiting hysterectomy for reported heavy periods have high levels of psychological morbidity. Several methodologically sound studies have used Present State Examination to establish this using a prospective design. Present State Examination studies have not yet been done on similar series of women awaiting endometrial ablation.

- It is known that a proportion of women presenting for endometrial ablation have low actual menstrual loss. This work needs to be replicated to show that this is the case across centres.

- Studies have shown that after hysterectomy pre-operative psychological morbidity has dropped significantly, although not to reported population

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levels. Adequate studies have not yet been done to see whether this applies to women undergoing endometrial ablation.

- The relation between post-operative psychological morbidity and both pre-operative psychological morbidity and actual menstrual loss has never been studied in women awaiting endometrial ablation for dysfunctional uterine bleeding.

CHAPTER TWO - AIMS AND HYPOTHESES

2.1 Aims of the study

The purpose of the study was to explore the psychological morbidity of women before and one year after endometrial ablation for heavy periods. In particular I aimed to address the following questions:

(Pre-operative questions)

1. Do women being considered for endometrial ablation because of the complaint of heavy periods, have high psychological morbidity compared to community samples?

2. What is the prevalence of actual heavy loss amongst a population of women awaiting endometrial ablation for reported excessive menstrual bleeding?

3 Is there a relation between laboratory measurements of menstrual loss, and psychological morbidity in women awaiting endometrial ablation for heavy periods, such that women presenting with low menstrual loss have high levels of psychiatric morbidity?

(Post-operative questions)

4. What were the overall changes in psychological morbidity after endometrial ablation for dysfunctional uterine bleeding?

5. Is there a relation between actual loss and rates of improvement of psychological morbidity post-operatively?

2.2 Hypotheses

1. Women awaiting endometrial ablation for reported heavy periods have high rates of psychological morbidity.

2. Women presenting with reported heavy periods **and** low (or normal) menstrual loss pre-operatively have high levels of psychiatric morbidity.

3. Rates of psychological morbidity will drop post-operatively, in the total sample of women followed up after endometrial ablation for reported heavy menstrual loss.

4. Women with high actual menstrual loss and high pre-operative psychiatric morbidity will show significant improvements in post-operative psychological morbidity.

5. Women with low actual menstrual loss and high pre-operative psychiatric morbidity will have less improvement in post-operative psychiatric morbidity, than women with high actual loss and low pre-operative psychiatric morbidity.

CHAPTER THREE - METHODOLOGY

3.1 Setting

The study took place in Leeds, which is a city in the North of England with a population of approximately 750,000 people. The majority of people residing there are Caucasian, but there are also communities of Asian and Afro-Caribbean people. Ethnic minorities form less than 10% of the population. The Leeds Jarman index score is 11.1. This is very near the centre of the distribution and ranks 66th out of 100 Health Authorities in England and Wales. The study was based in the obstetric and gynaecology out-patient clinic at the Leeds General Infirmary, which serves the west half of the City and has an approximate catchment of 375,000 people.

The Leeds General Infirmary contains an academic department of Obstetrics and Gynaecology. I worked closely with this department and became involved in the 'Menorrhagia Unit' which was established around this study and a number of other studies, including research into the measurement of actual loss and trials of different endometrial ablation techniques. I became involved in a clinic that included gynaecologists and nurses that was established around the referral problem of heavy periods. It took direct referrals from general practitioners and from other departmental clinicians.

3.2 Subjects

3.21 Recruitment

Subjects were recruited over a period between October 1991 and January 1993. A consecutive series of women attending the menorrhagia clinic were given a leaflet explaining the study and asked if they would participate.

3.22 Inclusion criteria

Women who attended gynaecology out-patients were investigated for identifiable pathology. Those women reporting heavy periods who did not have identifiable organic pathology requiring a specific operation (e.g. hysterectomy for fibroids) were referred to the Menorrhagia Research Unit Clinic for investigation and treatment. There were no age restrictions.

Women who attended the Menorrhagia Research Unit clinic were offered participation in two studies. One of these was part of a wider study involving four centres (The General Infirmary at Leeds, St James's University Hospital in Leeds, St Luke's Hospital in Bradford and The Friarage Hospital in Northallerton) by Gannon and colleagues (1994, 1995). Endometrial ablation was not widely available at this time in Yorkshire and was only being offered through the menorrhagia research unit clinic. The study in question randomised between two differing techniques for performing endometrial ablation, one using a rollerball technique and the other using a loop diathermy technique. This gynaecological study involved 372 women in the four sites.

Women were also asked to consent to the study reported in this dissertation. This study recruited from only one of the four sites (the Menorrhagia Research Unit at Leeds General Infirmary) where I was based.

3.23 Exclusion criteria

Women were excluded if they were found to have specific organic pathology that accounted for their heavy periods. This included neoplasia, endometriosis or fibroids of 5 cm or greater. Women were excluded if gonadotrophin hormone assays were in the menopausal range or if thyroid stimulating hormone measurement revealed hypothroidism. There was no specific age exclusion.

Women with moderate to severe learning disabilities or organic mental health problems were excluded from the study because of concerns about adequate mental health assessment.

3.3 Gynaecological assessment

If the women accepted a place in the gynaecological study they received the following investigations at their first visit. These investigations were only relevant to the psychological study because they demonstrate a uniform approach to gynaecological treatment and systematic delineation of those women who would be excluded using the criteria described above:

• trans-vaginal ultrasound scan of the pelvis in order to exclude fibroids and ovarian abnormalities

•full blood count

•serum ferritin

•thyroid function tests

•follicular stimulating hormone (FSH) and luteinising hormone (LH) levels

The women received an examination of the pelvis and pipelle endometrial biopsy to further exclude endometrial or pelvic pathology as described in the exclusions section above. Each of the selected women had an histologically normal endometrium and a normal uterus (with the exception of very small fibroids), and were defined as suffering from dysfunctional uterine bleeding.

Women were requested to collect all the tampons and pads they used for one menstrual cycle. These were used to measure actual menstrual loss using an identical method to that used by Gannon et al (1996). This is a colorimetric analysis that has been found to be simple to perform, accurate and reliable. Collections were not made until at least 3 months after any dilatation and curettage and at least 2 months after any medical treatments (such as hormones) had been stopped. No treatments that might influence menstrual flow were allowed during collections.

All the women in the study had subjectively heavy periods but women were asked to fill in a pictorial blood loss chart as described by Higham and colleagues (1990) [see appendix 1]. Each chart contains written instructions and an example on its use. A series of boxes are available for women to score how many pads or tampons and they are given a pictorial choice of the amount of soiling of each. Women place a line in each box for each corresponding pad or tampon used. There are also boxes for different sizes of clots (using two differing coin sizes as examples of size). Lightly and moderately soiled tampons or towels scores 1 and 5 respectively. A heavily soiled tampon scores 10 and a heavily soiled pad scores 20. Small clots score 1 and larger clots (50 pence piece size) score 5. The total score is calculated for the whole period. The authors who designed this instrument have shown there to be a correlation of 0.74 between scores and actual menstrual loss (Higham et al, 1990). When a score of 100 was used as a cut off to

delineate heavy loss (as defined as a loss of 80 millilitres or more), the authors report that the instrument had a sensitivity of 86% and a specificity of 81%.

At a subsequent visit the result of actual loss estimation (from the collection of tampons and pads after the first visit) was discussed with each woman. If the loss was below 80ml they were told that their loss at that cycle was within normal limits. If below 40ml they were told that their menstrual loss was lower than average. The gynaecologist (Mr Michael Gannon [MG]) spent some time discussing the options in a non-directive way. All women with low actual loss were given the choice to repeat the actual loss measurement and to have further discussion of the options open to them. If women wished to proceed with operation despite normal or low actual menstrual loss they were allowed to do so, although an attempt was made to dissuade women who had low actual loss from doing so. All women proceeding were given an operation date and were randomised between standard electrosurgical endometrial ablation using loop or roller-ball electrode (as part of the separate study mentioned above).

Four months after operation the women were asked to collect all the tampons and pads they used for one menstrual cycle. These were used to measure actual menstrual loss in the same way as before.

At one year after operation the women were asked to collect all the tampons and pads they used for one menstrual cycle. These were used to measure actual menstrual loss in the same way as before.

3.4 Psychological assessment

3.41 Instruments

Psychiatric assessment for research purposes relies on the collection of information about beliefs, attitudes, emotions and behaviours. This thesis used several standardised instruments for the assessment of individuals.

3.411 Present State Examination (PSE)

Present State Examination was the main instrument used. This was developed by Wing and colleagues (1974). It is a semi-structured interview covering symptoms in the previous month, and behaviour during the interview. There are 140 items rated on a scale of up to four points. It can be performed with medical or psychiatric patients in different settings including hospital in-patient and out-patient departments. It is not thought to be useful for people with mental retardation or organic states and these groups were excluded from this study. Rules for making diagnoses have been built into a computer programme called CATEGO and it generates diagnoses which fit into the World Health Organisation International Classification of Diseases version eight. Wing and colleagues developed the concept of an index level of definition (ID). This is an eight point scale generated by CATEGO depending on the number of symptoms and their groupings. A level of five or above is designated as indicating a probable psychiatric diagnosis (referred to in this thesis as a 'case' or 'caseness'). This has been compared with independently rated clinical diagnosis made by a psychiatrist, and a 90% agreement has been found between CATEGO and clinician (Wing et al, 1978).

3.412 Montgomery & Asberg Depression rating Scale (MADRS)

The Montgomery and Asberg Depression Rating Scale (Montgomery & Asberg, 1979) is a semi-structured scale based upon interview and appearance. See Appendix 2. The instrument has been validated against established rating scales such as the Hamilton Rating Scale and has good inter-rater reliability (Montgomery & Asberg, 1979) and a maximum score of 60 equates to very severe depression. It has been widely used in other studies.

3.413 Clinical Anxiety Scale (CAS)

The Clinical Anxiety Scale (Snaith et al, 1982) is a semi-structured assessment instrument for the assessment of the present state of anxiety and shown in appendix 3.

3.414 Hospital Anxiety and Depression Scale (HAD Scale)

The Hospital Anxiety and Depression scale (Zigmond & Snaith, 1983) is a self report questionnaire shown in appendix 4. The authors report that a score above 11 on either subscale is the best cut-off to identify clinically rated anxiety or depression respectively, and that the subscales have good reliability, sensitivity and specificity.

3.415 The Irritability Depression and Anxiety Scale (IDA Scale)

The Outward Irritability subscale of the Irritability Depression and Anxiety Questionnaire (Snaith et al, 1978) is a self administered questionnaire shown in appendix 5. It is similar to the HAD Scale but has an irritability component that includes an Outward Irritability subscale and an Inward Irritability subscale. These have been tested for validity against clinical raters in four separate clinical

populations and the Outward Irritability subscale has shown high levels of correlation (Snaith & Taylor, 1985). The Inward Irritability subscale has not been found to be so robust, and after personal communication with its first author, Dr Philip Snaith, it was decided to use only the Outward Irritability subscale.

3.416 Visual Analogue Scale (VAS)

Visual analogue scales were used and are shown in appendix 6. These were adapted from scales developed by Aitken (1969) and involved 10 centimetre lines representing specific emotions or self attributions, which were labelled at each end of a continuum. Visual analogue scales were applied for feelings of self-consciousness, anger, depression, anxiety, self confidence, sexual attractiveness, womanhood, irritability and femininity. Women were not given definitions of what these things meant, but were specifically asked to answer based on what the words meant to them. They scored the items for their feelings over the previous week.

3.417 Libido scores

All women were asked 'has there been any change in your interest in sex?' If the response was that things were fine or adequate they were given a score of 0. If there was a marked loss of interest or performance they were scored as 1 and if there was an almost total or total loss of libido they were given a score of 2. Additional questions were used for clarification where necessary. They were asked to consider their feelings regardless of the presence or absence of a current sexual partner or partners. This then formed a libido score that ranged from 0-2.

3.42 Method of administration

After gynaecological organic pathology had been excluded a consecutive series of 120 of the remaining women were given an appointment in the same clinic. At this visit they were interviewed by me using the Present State Examination (Wing et al, 1974).

At this point they also filled in the HAD Scale, the Outward Irritability section of the IDA Scale and the Visual Analogue Scales. The MADRS and CAS were also administered by me.

One year after operation the women were seen again and were interviewed using the Present State Examination, the Montgomery and Asperg Depression Rating Scale and the Clinical Anxiety Scale. They once again filled in the Hospital Anxiety and Depression scale, the outward irritability section of the Irritability Depression and Anxiety scale and the Visual Analogue scales.

3.5 Researchers

I performed all the psychiatric interviews personally. This meant that pre-operative and post-operative assessments on each woman were done by the same person. Prior to the study I attended a five day course in the administration of the Present State Examination. The scores achieved for each woman were not analysed on the CATEGO computer programme to give final ratings until the whole cohort of women had been assessed. This was to avoid any potential rater bias from knowledge of previous results.

Endometrial ablation techniques were relatively new to Leeds and so it was decided to use surgeons who were experienced in the procedure during the

study to reduce any effects arising from inexperience (for example high rates of complications in the hands of an inexperienced or trainee surgeon). In practice this meant that most operations were performed by one experienced surgeon (MG).

3.6 Statistics

A sample size calculation was made prior to the study. There were no previous studies on the psychological morbidity in conjunction with endometrial ablation and so it was decided to use the predictions based upon the studies of hysterectomy. Figures from the psychological morbidity in the pre-operative and post-operative samples were used. In studies by Gath et al (1982a, 1982b) and Ryan et al (1989) there was a fall of psychological morbidity comparing pre-operative psychiatric status to 6 months after hysterectomy. In Gath's study this fall was from 58% with pre-operative psychiatric caseness to 26% psychiatric caseness post-operatively. The study by Ryan and colleagues (1989) showed similar figures. Some studies since then, including work from Gath's own team show differing figures (reported in the introduction) but at the time that this study was planned these were the most recent figures available. This 55% drop in psychiatric morbidity was used as a benchmark for initial sample size calculations. Calculation of sample size was made using the method described by Kirkwood (1988). Using standard conventions for setting limits of type one and type two errors, a power of 90% was set and this meant that it would be necessary to have a cohort of 48 women to show a drop in psychological morbidity of 55% at a level of statistical significance of 5%. Since there were no data on endometrial ablation at the time these calculations were made, and since this sample size was based on

hysterectomy research I decided to use a larger sample size than 48. I planned a cohort of 120 for safety reasons, in the knowledge that with even large drop-out rates and changes in expected morbidity because of the differences between hysterectomy and endometrial ablation, I would still be able to show differences statistically.

The statistics package used was SPSS for Windows version 6.0 (SPSS, 1993).

CHAPTER FOUR - RESULTS

4.1 Subjects

One hundred and twenty women presenting consecutively were offered entry into the study. Twelve declined. One hundred and eight women therefore entered into the study. 16 women did not proceed past the initial phase of the study for the following reasons.

5 women received hysterectomy before endometrial ablation was performed.

- One case was semi-urgent.

- In a second woman a large fibroid was discovered at examination which had been missed prior to entry into the study.

- 3 women requested and were given hysterectomy in preference to endometrial ablation.

4 women failed to attend clinic after the initial appointment. There was no actual menstrual loss data for any of these four women and none of them received surgery.

7 women withdrew from further clinic involvement after being told that their actual measured menstrual loss was normal or low. This group of women is discussed later.

Of the remaining 92 women, 5 who entered the study failed to attend for the second of the two psychological assessments (one year after operation) despite reminders and follow-up appointments. Eighty seven women therefore had full psychological

assessment before and after endometrial ablation for heavy periods. Whilst 75 of the original 108 women underwent estimation of actual menstrual loss on at least one occasion, only 63 of these women had full psychological data available before and after operation. This is expressed more clearly in Figure 2.

Some data is missing for some women, with for example some women declining to collect menstrual loss, some women not arriving for follow-up appointments and so on. This is shown in Figure 3.

4.2 Demography

This section reports the results for the 108 women who initially entered the study.

4.21 age

The 108 women ranged from age 26 to age 51 with a mean of 40 (standard deviation 5.3). The median age was 41 and the mode was 44.

4.22 marital status

81 (75%) women were married at the time of the first interview. 18 (16.7%) were divorced, 1 (0.9%) widowed, 2 (1.9%) were separated and three (2.8%) were single. Marital status was unknown in 3 (2.8%) women.

4.23 employment

42 (38.9%) women worked full time, 37 (34.3%) part time and 21 (19.5%) were not in paid employment. Six women (5.6%) were students. Employment status was unknown in 2 (1.9%) women.

4.24 contraception

At the time of presentation at the first research interview, 45 (41.7%) women indicated that their partner had undergone vasectomy and 28 (25.9%) women had undergone tubal ligation. Only 4 (3.8%) women said that they were on the oral contraceptive pill and 14 (13%) said that they relied mainly on barrier methods

such as the sheath and the cap. One (0.9%) woman had an intra-uterine device in situ and this was removed prior to endometrial ablation. 14 (13%) women indicated that they had not been using any contraceptive measures. In two (1.9%) women contraceptive method employed was not elucidated.

4.25 parity

Only 4 (3.7%) women had no children. The number of children born to the remaining women ranged from 1 to 9 with a mean of 2.31 (standard deviation 1.32), a median of 2 and a mode of 2. There were missing data in 3 (2.8%) women.

4.26 reported longevity of heavy periods

When asked how long they had been having heavy periods which caused them concern 69 (64%) women indicated problems for over two years, with 28 (26%) over 4 years. Only 3 (2.8%) said that their periods had been heavy for less than 6 months. Eight (7.4%) had had problems for 6-11 months and 21 (19.4%) for 12-23 months. The mean length of problems was 32 months (standard deviation 26 months) with a median of 24 months and a mode of 24 months.

4.27 haemoglobin

The haemoglobin measurements at initial clinic visit ranged from 8.7g/dl to 15.4g/dl with a mean of 12.8g/dl (standard deviation 1.4).

4.28 other data

65 (60.2%) women were non-smokers. Nine smoked less than ten cigarettes per day, 12 smoked 10-19 and 18 women smoked 20 or more cigarettes. In four (3.8%) women these data were unavailable.

4.29 menstrual characteristics

Women were asked what the shortest and longest cycles had been over the last six months and the mean for each respectively was 25 (range 14-34) to 29 (range 18-45) days. Similarly they were asked the shortest and longest number of days of bleeding during the last six months and the means respectively were 6 (range 2-14) to 8 (range 2-14) days.

4.3 Actual loss (measured menstrual loss)

Many women found the notion of collecting used pads and tampons distasteful. Some women declined either explicitly, or implicitly by not carrying out the collections. 70% (75/108) were happy to perform the necessary collections.

Of the 108 women, 75 (69.4%) agreed to and carried out actual menstrual loss estimations. This section relates to those 75 women (from the group of 108 women) who collected their actual menstrual loss. 49% (37) women had an actual loss below 80 millilitres (Table 3).

The women who had readings below 80ml (which is the accepted cut-off for heavy periods) were counselled by the gynaecologist. Seven women from the 75 women receiving actual loss estimations indicated a desire to have no operative

treatment. Tables 4 and 5 summarise the differences between these women and the remaining women.

Those women with low loss wishing to proceed with further investigation and treatment were offered a repeat menstrual loss measurement. 20 (59%) of the women accepted this offer and 14 declined. Of those declining 4 (29%) had a loss below 40ml and 7 (50%) had a loss below 60ml from their first and only measurement. All of these women wished to proceed with endometrial ablation despite counselling about the extent of their loss. Of the 20 women taking up the option of repeat measurement, 6 (30%) had a loss over 80ml on the second measurement. The remaining 14 (70%) women had a second loss estimation below 80ml, but nevertheless wished to proceed with endometrial ablation. Comparisons between women with and without loss over 80 ml are made in subsequent sections.

4.31 Actual loss and anaemia

Using a haemoglobin cut-off of 11.0g/dl as a definition of anaemia, there is an association between a loss of 80 millilitres or more and anaemia (Table 6). Of the eight women with a haemoglobin below 11.0g/dl, 7 had losses over 80 millilitres. The actual losses for these women were 64, 114, 121, 154, 177, 225, 676 and 808 millilitres in one menstrual cycle.

4.4 Reported loss versus actual loss

A comparison was made between Higham reported loss charts and actual measured loss for the same menstrual period. All women were referred to clinic because of reported heavy loss and it was clear that they all had some perception of an excessive menstrual loss. The Higham chart was completed by 66 women. The remaining women did not complete it. Higham and colleagues (1990) suggested that a threshold score of 100 or more is a good predictor of a loss of 80 ml or more (sensitivity 86%; specificity 81%).

Table 7 shows the relationship between actual measured loss and scores on the Higham self-rating loss charts. 53/66 (80%) women had a score of 100 or more which is purported to equate to a loss of 80ml or more. However, although only 55% of this group did have an actual loss of 80 millilitres or more. Of the 20% of women scoring less than 100, where the loss would be expected to be below 80 millilitres, 85% did have a loss less than 80 millilitres. Based on these results sensitivity is 94% and specificity is 31% for the Higham scores, using measured actual loss greater than 80 millilitres as the criterion of heavy loss and a score greater than or equal to 100 as the cut off. This is considerably worse than the specificity reported by Higham and colleagues (1990).

4.5 Pre-operative psychological morbidity

4.51 Present State Examination

Before endometrial ablation 63/108 (58%) women achieved probable 'caseness' (an index level of definition of 5 or above) on PSE. The PSE Catego programme

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produces classes, which are broadly similar to ICD-9 diagnoses and the computer

programme proffers suggested diagnoses. The sixty three women concerned fell

into the categories shown in Table 8. Of those women who were cases 81% were

suffering depressive states of various kinds, 11% were suffering from anxiety

disorders and the remaining 8% were from other diagnostic groups. Other

psychological instrument scores were compared for cases and non-cases.

4.52 Clinical Anxiety Scale

Using the cut off of 11 (Snaith et al, 1982) which has been shown to identify

moderate and severe anxiety 9 women scored more than 11. Comparing cases and

non-cases (as identified by PSE) the scores on the Clinical Anxiety Scale were

significantly different (Table 9) showing that PSE cases have higher levels of

anxiety. All these women were cases on PSE and this was statistically significant

$(chi^2=6.98 \ DF=1 \ p=0.0082;$ Table 10).

4.53 Montgomery Asberg Depression Rating Scale (MADRS)

Given that many of the cases identified by PSE had a depressive component I

expected MADRS scores to be different between cases and non-cases and this is

indeed so (table 9). The mean score for women who were not PSE cases was 7.00

and the mean for women who were cases was 13.65. The original Montgomery and

Asberg (1979) work does not include a cut off since it was designed to monitor

change over time or with treatment, and so I have not analysed the data

categorically.

4.54 Hospital Anxiety and Depression Scale

The HAD depression scores are significantly different between cases and non-cases (Table 9). They are higher for depression in PSE cases. This is very significant. The authors suggested cut off of 11 (Zigmond and Snaith, 1983) identifies 11 women and 10 (90.9%) of these are cases on PSE (chi^2=5.43 DF=1 p 0.0197; Table 11).

There is a significant difference (chi^2=4.98 DF=1 p 0.0278) in HAD anxiety scores between PSE cases and non-cases (Table 9). Non-cases have a mean score of 6.59 and cases have a mean score of 8.25. However, when the scale author's (Zigmond and Snaith, 1983) proposed cut off of 11 is used, the result is not significant with 16 out of 23 women (69.6%) above the cut off being PSE cases and 54.9% women below the cut off being cases (chi^2=1.59 DF=1 p=0.2071; Table 12).

4.55 Outward Irritability scores - IDA Scale

There are no significant differences between means in irritability scores between cases and non-cases (Table 9) or when using the suggested cut off (Table 13) of 6 (Snaith et al, 1978).

4.56 Visual analogue scales

There are significant differences between cases and non-cases on visual analogue scores (Table 14). Significances are high for the scales of *anxiety* (case mean 42, non-case mean 28; chi^2=7.48 DF=1 p=0.0074), *depression* (case mean 42, non-case mean 22; chi^2=12.43 DF=1 p=0.0006) and *irritability* (case mean 55, non-

case mean32; chi^2=17.63 DF=1 p=0.0001). There is a significant difference for the scale asking women about their feelings of *sexual attractiveness* over the last week (case mean 35, non-case mean 51; chi^2= 9.22 DF=1 p=0.0030) with women feeling less sexually attractive if they are 'cases' on PSE. There are trends (Table 14) with feelings of *womanhood*(chi^2=6.58 DF=1 p=0.0117) and *femininity*(chi^2=6.08 DF=1 p=0.0153) being better in PSE non-cases and *anger*(chi^2=5.13 DF=1 p=0.0257) and *self-consciousness*(chi^2=4.88 DF=1 p=0.0294) scores being higher in PSE cases. No significance arises on scores of *self confidence*.

4.57 Correlations between instruments

Pearson Correlation Coefficients were calculated using two tailed significance to test the relation between instruments testing for anxiety, depression and irritability. The instruments correlated with each other to varying degrees. The Montgomery Asberg Depression Rating Scale showed good correlation (r = 0.70) with the Depression component of the Hospital Anxiety and Depression Scale (HAD Scale). The Clinical Anxiety Scale correlated well (r = 0.61) with the Anxiety component of the HAD Scale.

The relevant visual analogue scale (VAS) scores for depression and anxiety correlated moderately well with the self-report questionnaires (HAD) for depression(r = 0.58) and anxiety(r = 0.54) respectively and also with the respective rater instruments: MADRS (r = 0.47) and CAS (r = 0.42).

The VAS irritability score has a low correlation of r=0.11 with the Outward Irritability component of the IDA.The irritability component of the IDA

Scale did not correlate with either the CAS($r = -0.01$), the MADRS ($r = 0.01$) or

the anxiety ($r = 0.05$) or depression ($r = 0.20$) component of the HAD scale.

4.6 Pre-operative psychological morbidity, actual loss and haemoglobin

4.61 Actual Loss in relation to PSE caseness

Seven women dropped out of the study after counselling by the gynaecologist (MG) because of low actual menstrual loss measurements. These women were not significantly different from other women in the study in terms of epidemiological factors such as age, parity or haemoglobin level (Table 4). Six (86%) of these seven women were 'cases' on PSE compared to 52% (35/68) of the remaining women (Chi^2=3.00 DF=1 p=0.0831). Scores on the HAD and MADRS were not significantly different (Table 5).

Altogether 75 women had their actual loss estimated. Table 15 shows pre-operative caseness (index level of definition of 5 or above) against broad groupings of actual loss. Table 16 shows the distribution of PSE 'cases' against smaller sub-divisions of loss.

Post-operative actual loss measurements were more difficult to obtain because of women's reluctance to make measurements when they had little or no loss, or when they desired to put their surgical experiences behind them. At 4 months post-operatively, 65 women (71%) had both pre-operative and post-operative measurements. The mean reduction in actual loss was 94%. Only two women had losses exceeding 40 millilitres, with losses of 95 millilitres and 138 millilitres (for comparison these women had pre-operative losses of 808 millilitres and 146 millilitres respectively). 48 women (52%) completed actual loss estimations at one year follow up. The average reduction in loss compared to pre-operative loss was 92%. Again, only two women had losses over 40 millilitres, the greatest loss being 84 millilitres.

4.62 Haemoglobin in relation to PSE caseness

In keeping with other studies exploring actual menstrual loss and its relation to anaemia a haemoglobin cut off of 11.00g/dl was chosen. A two by two table of PSE caseness by haemoglobin (using this cut off) shows there to be a significant association between anaemia and PSE status (Table 17). Women with anaemia (Hb<11.0) were less likely to be cases on PSE (chi^2= 6.61 DF=1 p=0.0101). This does not seem to be a spurious finding since the significance level increases with a drop in haemoglobin (for women below 10.5 the chi^2=7.08 DF=1 p=0.0078).

4.7 Characteristics of those entering study compared with those who completed study

The demographic characteristics for the whole cohort of 108 women where there was initial intention to treat were compared to the 92 women who proceeded to operation. Comparison was also made with the 63 women who had operation, attended pre and post-operative psychological assessment and in whom menstrual blood loss was measured. The results are shown in Tables 18, 19, and 20. Using chi-squared analysis no significant differences were found on any of these demographic variables.

Four women failed to attend clinic after the initial one or two appointments and therefore never received endometrial ablation or measurement of actual loss. For the completeness of the study I attempted to perform psychological assessment on these women with their consent. One woman achieved caseness both at the outset and also one year later, and was suffering from agoraphobia. One woman had little psychopathology either at outset or one year later. One woman only

received psychological assessment at outset and was within normal limits, and the fourth woman declined all psychological assessment having originally agreed to the study. In all then, 3 of these 4 women received initial psychological assessment and one of the three reached 'caseness'.

Five women from the 92 receiving surgery did not attend their post-operative psychological assessment despite several contacts by telephone (where possible) and by letter and several offers of further appointments. Two of these had also declined to perform menstrual blood loss measurements. All five had received pre-operative psychological assessment, and 3 out of the 5 (60%) were 'cases' using PSE with the remaining two having index level of definition at level 4 which is just subthreshold for 'caseness'. Two of these three had received actual menstrual loss estimations. One had an initial loss of 223 millilitres that reduced to 2 millilitres by four months after surgery. The second had an initial menstrual loss of 9 millilitres that reduced to nothing at four months after surgery.

4.8 Changes in psychological status after operation

4.81 Present State Examination

The overall changes in psychological morbidity after endometrial ablation were examined. Figure 4 shows the distribution of PSE index level of definition before and after endometrial ablation and includes the graph for a group of women in the community. There were 92 women who received endometrial ablation and of these 87 (94.6%) had interviews with the psychiatrist both before and at least one year after surgery. The initial interview took place an average of 13 weeks (standard

deviation=6 weeks) prior to surgery and the second interview took place an average of 64 weeks (standard deviation 17 weeks) after the date of surgery.

Figure 5 shows those women who were cases either before or after surgery (or both) and Table 21 indicates the diagnostic groups into which they fell. In 5 women the second PSE interview was missing. This left 87 women and 31 of these were non-cases before and after surgery. 14 women were cases pre-operatively and post-operatively. Five women became cases post-operatively who previously were not cases and 37 women lost their caseness post-operatively. Of these 37, 26 had had depressive disorders and 5 of them anxiety disorders. In an attempt to explore the relationship between actual loss, reported loss and caseness I examined reported and actual loss in the context of changes in caseness pre and post-operatively (Table 22 and 23). Women who have been 'cases' at some time during the study appear to be more likely (chi^2=4.88 DF=1 p=0.0271) to report heavy loss when they have an actual loss less than 'heavy' (i.e. less than 80 millilitres) when measured objectively (Table 23). Nearly 52% of them have a loss of less than 80 millilitres.

Comparing women who had never been cases with the others there was no significant differences using ANOVA analysis between them in terms of age, pre-operative cycle length, number of cigarettes smoked, parity or pre-operative haemoglobin. They had a higher mean actual menstrual loss of 128 millilitres compared to 107 millilitres, but this was not statistically significant (p=0.5476). There was no notable difference in their Higham Score of reported loss.

4.82 Changes in other psychological instruments (pre-operatively to post-operatively)

4.821 Clinical Anxiety Scale

Table 24 shows paired t tests for Clinical Anxiety Scale scores. This compares scores continuously. The reduction is highly significant (t value=5.09; p<0.001).

Scores may also be used dichotomously. Using the cut of 5, which identifies mild/moderate and severe anxiety (Snaith et al, 1982), 30 out of 87 (34.5%) women were identified pre-operatively. This fell to 18 women (20.7%) post-operatively, a reduction of 40% (chi^2= 18.8 DF=1 p= 0.00001). Of the 7 women scoring 11 or over (severe anxiety) pre-operatively, only 3 remain with scores over 11 post-operatively and there are no women with new scores over 11.

4.822 Montgomery Asberg Depression Rating Scale

Table 24 shows paired t tests comparing continuous scores for the Montgomery Asberg Depression Rating Scale. This represents a highly significant reduction (t value=6.53; p<0.001).

4.823 Hospital Anxiety and Depression Scale

Table 24 shows paired t tests which compare continuous scores for the Hospital Anxiety and Depression Scale (HAD Scale) depression and anxiety scales. Both are highly significant (depression t value=5.39 p<0.001; anxiety t value=3.09 p=0.003).

Zigmond and Snaith (1983) suggest two separate cut-offs. A cut off of 11 or above to generate a sample with few false positives and a cut off of 8 or above to have few false negatives. When comparing scores dichotomously for this more

inclusive second group, 38/86 (44.2%) women are identified on the anxiety scale and 19/86 (22.1%) on the depression scale. Post-operatively this falls to 28/87 (32.6%) for anxiety (chi^2=29.03 DF=1 p<0.00001) and to 10/86 (11.6%) for depression (chi^2=5.12 DF=1 p=0.0237).

4.824 Irritability Scores (IDA Scale)

Table 24 shows the paired t tests for the Outward Irritability scores before and after the operation (t value 2.15; p=0.035). When the authors proposed cut off was used there was a significant drop. 45 out of 85 (52.9%) women scored above the scale threshold pre-operatively and 32 (37.6%) women post-operatively (chi^2= 29.25 DF=1 p<0.0001).

4.825 Visual Analogue Scales

Table 25 shows paired t tests for visual analogue scales before and after endometrial ablation. All the scores improve but not all of the improvements reach statistical significance. There are very significant (p < 0.01) improvements in scores for feelings of womanhood, femininity and sexual attractiveness. There are improvements (between p 0.05 and p 0.01) in irritability and self confidence scores. Interestingly the improvement for depression only approaches significance (t value=1.71; p=0.09). However, if the sample is split into those with probable depression on the HAD scale then the difference is more apparent (women with scores above 8: t value 2.26 df=18, 2-tail significance 0.037; women with scores below 8: t value 0.74 df=66, 2 tail significance 0.459).

4.83 Changes in other measures

4.831 Libido scores

Comparison of the scores of libido using paired t tests showed very significant improvement (Table 25). The mean pre-operatively was 0.72 and post-operatively was 0.36.

More specifically whilst only 44.2% of women said that their libido was within normal limits pre-operatively, 72.1% of women did so post-operatively (Table 26). 29 women who admitted to difficulties in this area pre-operatively felt that things were normal post-operatively. Conversely only five women who said that things were normal pre-operatively declared difficulties post-operatively.

4.832 Subjective improvement scores for gynaecological symptoms and psychological symptoms

Post one year, when women were asked on a six point scale whether they felt that the operation had been successful in terms of their original gynaecological symptoms (i.e. the heavy periods) 73% (46) women with complete data said that the operation had been excellent or very good. 66.7% (42) women said that the operation had been excellent or very good from the point of view of their emotional well-being. The correlation between the two scales was 0.8632 (p <0.001)

PSE caseness was compared with subjective improvement ratings for psychological well-being and gynaecological symptoms. When comparing caseness post-operatively with improvement ratings from a psychological well-being point of view there is a very significant association (Table 27). Approximately 50% of those not satisfied were cases, compared to 20% of those who were satisfied. There was also significance when comparing post-operative caseness with

gynaecological improvement scores (Table 28) with approximately 50% not satisfied being cases and 20% of those satisfied being cases. There were no significances when comparing **pre**-operative caseness with either improvement scores for psychological well-being or gynaecological symptoms.

There were some interesting findings when looking at women who rated the period which was collected for the actual menstrual loss estimation as heavy (Tables 29 and 30). Women who rated them as heavy but had losses lower than 80 millilitres were less likely to do well in terms of their own improvement ratings post-operatively, both in terms of gynaecological symptom improvement rating and psychological improvement rating. The former approached significance ($0.1 < p > 0.05$) and the latter achieved significance ($0.05 < p > 0.01$).

These results should be treated with caution because this rating and PSE case status was only available for 63 of the 92 women receiving endometrial ablation.

4.84 Changes in PSE status and previous studies

Table 31 compares the PSE findings of this study with two previous studies examining PSE status before and after hysterectomy.

4.85 Changes in PSE status and associations with actual loss

Table 32 and 33 show pre and post-operative caseness on PSE when compared to actual loss estimations by group.

14 women were 'cases' before operation and remained cases post-operatively. 4 had a loss under 40ml (28.6%) and 9 (64.3%) had a loss under 80ml

and yet 10 out of 12 of those same women who had filled in a Higham chart (2 did not) scored over 100 which is the cut off implying a loss of 80ml or more. The remaining 2 had a Higham score of 63 and 97. Five of the 14 women who were 'cases' both pre-operatively and post-operatively had an actual loss of 80ml or more pre-operatively but all had a loss below 40ml at 4 months follow up, and three continued to have losses below 40 ml at the 1 year assessment (one woman did not repeat measurement at one year).

43 (57.3%) of the 75 women where actual loss was estimated had a loss below 80ml (Table 15). 26 of these (60.5%) were 'cases' compared to 15 (46.9%) of those with a loss of 80ml or over (chi^2=1.37 DF=1 p 0.2423).

29 women were never 'cases' (before or after surgery). 15 of these (51.7%) had a loss of 80ml or more compared to 36.6% (15/41) of those who were cases at some stage.

4.9 Summary of Results

- Actual loss estimations from the 69.4% women willing to collect menstrual material showed that 49% had an actual loss less than 80 millilitres which is an established cut off delineating 'heavy' loss for most women (section 4.3).

- Women with low loss were counselled by the gynaecologist and 7 of these women opted not to have surgery (section 4.3). The remaining 34 women opted to proceed with surgery. 20 of these 34 had repeat menstrual loss measurements, and 14 of these continued to have a loss below 80 millilitres. They never-the-less opted to proceed with surgery (section 4.3).

- Only eight women in the study had a haemoglobin level of 11.00 or below (section 4.32), and seven of these had actual menstrual losses of 80 millilitres or more (section 4.31).

- 80% of the 66 women who completed reported loss charts for the actual loss estimations scored over the 'heavy' loss cut off of 100. Only 55% of these women had losses which measured 80 millilitres or above (section 4.4).

- At attendance in clinic there were 108 women, and 58% (63/108) of these were probable 'cases' on Present State Examination (section 4.51). 81% of these were suffering depressive states of various kinds and 11% were suffering from anxiety disorders.

- Correlations between PSE and other instruments rating mental state either by self-report or semi-structured interview were good (section 4.57).

- Of the 7 women withdrawing from surgery because of low actual menstrual loss, 6 (86%) were 'cases' on PSE (section 4.61). Overall there was no clear statistical association between actual menstrual loss and PSE caseness (section 4.61).

- Women with anaemia are less likely to be PSE' cases' than other women (section 4.62).

- There are no apparent statistical differences between women who agreed to measure menstrual loss and those who did not (section 4.7).

- 92 women received endometrial ablation, and 87 (95%) of these received psychological assessment before and approximately one year after surgery. 31 women were not 'cases' either before or after surgery, 14 were 'cases' before and after surgery. 5 women became 'cases' post-operatively having not been previously. 37 women who had been 'cases pre-operatively were no longer 'cases' post-operatively (section 4.81).

- Sensitivity and specificity of the Higham charts for actual loss was 94% and 31% respectively. This was considerably worse than the findings from the study reporting on the use of this instrument (Higham et al, 1990).

- Reduction in psychological morbidity post-operatively is very significant when measuring by PSE or by Clinical Anxiety Scale (section 4.822), Montgomery-Asberg Depression Rating Scale (section 4.823), or the depression or anxiety subscales of the Hospital Anxiety and Depression Questionnaire (section 4.824). Visual analogue scales also showed improvement, and particularly in areas which are not measured by the other scales such as feelings of womanhood, femininity and sexual attractiveness (section 4.826). This is further confirmed by the very significant finding that normal libido is reported in 44% women pre-operatively and 72% women post-operatively (section 4,827).

- On a six point scale over two thirds of women rated the operation as excellent or very good both in terms of improvement in gynaecological symptoms and psychological symptoms (section 4.828). The improvement rating for psychological symptoms was significantly associated with post-operative PSE status, but not pre-operative status (section 4.828).

- Women who rated their periods as heavy on Higham scores but had losses lower than 80 millilitres were less likely to do well in terms of their own psychological symptom improvement rating ($0.05 < p > 0.01$) (section 4.828). Of the 14 women who were cases before and after operation, 10 of them reported heavy loss on Higham charts and 9 of them had actual losses of less than 80 millilitres (section 4.85).

- PSE findings from this study are similar to those found in previous studies exploring PSE status before and after hysterectomy for heavy periods (section 4.829).

CHAPTER 5 - TABLES

Tables 1 & 2 in text.

Table 3- Actual (measured menstrual loss measurements) of   women

receiving endometrial ablation (N=108)

	Number of women (%)	
	First measurement only	Maximum loss recorded from two measurements
Measurement refused or not completed	33	33
0-39 ml	22 (29%)	18 (24%)
40-79ml	21 (28%)	19 (25%)
80-808ml	32 (43%)	38 (51%)

Table 4 — Characteristics of women declining operation after they were informed of low measured menstrual blood loss (mbl), compared with women who had operation after measurement of menstrual blood loss.

	Women with low actual mbl declining operation (N=7)	Women receiving operation who had menstrual loss measured (N=68)	F	P value
Age *mean (s.d.)*	41.33 (6.20)	39.97 (5.27)	0.54	0.47
Parity *(median)*	2	2	1.38	0.24
Haemoglobin (g/dl) *Mean (s.d.)*	11.70 (4.44)	11.98 (3.39)	0.05	0.82
Measured menstrual blood loss (millilitres) *Mean (s.d.)*	19 (17)	108 (136)	3.72	0.06

Table 5 - Characteristics of women declining operation after they were informed of low measured menstrual blood loss (mbl), compared with women who had operation after measurement of menstrual blood loss.

	Women with low actual mbl declining operation (N=7)	Women receiving operation who had menstrual loss measured (N=68)	F	P value
HAD Anxiety Score	8.89 (3.82)	7.43 (3.82)	1.21	0.27
HAD Irritability Score	7.00 (2.06)	7.10 (9.84)	0.00	0.97
Montgomery Asperg Depression Score	10.68 (7.26)	13.11 (5.56)	0.95	0.33
Clinical Anxiety Scale Score	5.00 (2.06)	4.28 (3.89)	0.30	0.58

Table 6 – Women presenting with heavy periods for surgery. Actual loss in relation to anaemia (Hb<11.0g/dl) n=75

	Actual Menstrual Loss	
	Less than 80 millilitres	More than 80 millilitres
Haemoglobin level < 11.0g/dl	1	7
Haemoglobin level 11.0g/dl or more	42	25

$Chi^2=7.36$ DF=1 p=0.0067

Table 7 - Actual Loss and Higham Reported Loss Scores for the 66 women who completed measures

		MEASURED LOSS *Number of women*	
		Actual loss 80ml or more	Actual loss less than 80ml
HIGHAM SCORE	Score of 100 or more	29	24
	Score of 100 or less	2	11

Chi^2=6.48 DF=1 p=0.0109

sensitivity 94% (proportion of true positives correctly identified)

specificity 31% (proportion of true negatives correctly identified)

Table 8 — Present State Examination symptom categories of 108 women in sample

Diagnosis	Catego class	number	percentage of sample
Neurotic depression	N+	20	18.5
Anxiety state	A+	7	6.4
Retarded depression	R+	19	17.6
Possible bipolar illness (with mixed features)	M?	9	8.3
Obsessional neurosis	B+	0	0
Depression with some psychotic symptoms		3	2.8
Paranoid and psychotic symptoms		5	4.6
Caseness		63	58
No diagnosis		45	42
Total sample		108	100

Table 9 – Pre-operative psychological Instrument Scores - A Comparison of PSE Cases and Non-cases Using Analysis of Variance (N=108)

	Population mean (s.d.)	mean for PSE cases*	mean for PSE non-cases*	missing values	Chi^2 F value	significance (p value)
Clinical Anxiety Scale	4.34 (3.76)	5.56 (4.26)	2.61 (1.92)	2	18.4	0.0000
Montgomery Asberg Depression Scale	10.89 (7.14)	13.65 (6.78)	7.00 (5.75)	2	28.01	0.0000
HAD- Depression score	5.27 (3.83)	6.69 (3.98)	3.30 (2.56)	3	24.60	0.0000
HAD - Anxiety Score	7.55 (3.82)	8.25 (4.12)	6.59 (3.16)	3	4.98	0.0278
Outward Irritability score (IDA scale)	7.10 (9.42)	6.66 (2.34)	7.70 (14.37)	3	0.31	0.5761

PSE caseness defined by index level of definition of 5 or more.

Table 10 – Pre-operative PSE caseness and anxiety threshold scores using Clinical Anxiety Scale in those women completing both measures (N=106)

Numbers of women (row percentages)		PSE Index level definition	
		0-4	5 or more
Clinical	0-10	44	53
		(45.4%)	(54.6%)
Anxiety Scale			
	>11	0	9
Threshold		(0%)	(100%)

chi^2=6.98 DF=1 p= 0.0082

sensitivity 15% specificity 100%

Table 11 – Pre-operative PSE caseness and depression threshold scores using

Hospital Anxiety and Depression Scale [HAD (D) subscale] for women

completing both measures (N=105)

		Numbers of women (row percentages)	
		PSE Index level definition	
		0-4	5 or more
HAD	0-10	43	51
Depression		(45.7%)	(54.3%)
Subscale			
Threshold	>11	1	10
		(9.1%)	(90.9%)

Chi^2=5.43 DF=1 p 0.0197

sensitivity 16%, specificity 98%

Table 12 – Pre-operative PSE caseness and anxiety threshold scores using Hospital Anxiety and Depression Scale [HAD (A) subscale] inn women completing both measures (N=105)

		Numbers of women (row percentages)	
		PSE Index level definition	
		0-4	5 or more
HAD	0-10	37	45
Anxiety		(45.1%)	(54.9%)
Subscale			
Threshold	>11	7	16
		(30.4%)	(69.6%)

Chi^2=1.59 DF=1 p=0.2071

sensitivity 26%, specificity 84%

Table 13 – Pre-operative PSE caseness and Outward Irritability threshold scores using Irritability Depression and Anxiety Scale in women completing both measures (N=104)

		Numbers of women (row percentages)	
		PSE Index level Definition	
		0-4	5 or more
IDA Outward Irritability Subscale	0-5	23 (53.5%)	20 (46.5%)
Threshold	6 or more	23 (37.7%)	38 (62.3%)

Chi^2=2.54 DF=1 p=0.1105

Table 14 – Pre-operative psychological instrument scores - A comparison of PSE Cases and non-cases using analysis of variance (N=108)

Visual analogue scales	Population mean (s.d.)	mean for PSE cases	mean PSE non-cases	missing values	F value	significance (p value)
Anxiety	36 (28)	42 (29)	28 (24)	4	7.48	0.0074
Depression	34 (30)	42 (32)	22 (24)	3	12.43	0.0006
Irritability	45 (31)	55 (29)	32 (28)	3	17.63	0.0001
Feelings sexual attractiveness	41 (28)	35 (27)	51 (27)	5	9.22	0.0030
Feelings of womanhood	62 (29)	56 (27)	70 (29)	3	6.58	0.0117
Self consciousness	45 (32)	51 (32)	38 (30)	4	4.88	0.0294
Anger	37 (27)	42 (29)	30 (24)	4	5.13	0.0257
Feelings of femininity	55 (26)	50 (27)	62 (24)	4	6.08	0.0153
Self confidence	47 (27)	61 (28)	54 (26)	3	1.84	0.1783

Table 15 - Pre-operative PSE caseness by categories of actual loss in women with both measures (N=75)

Numbers of women (column percentages)	Measured menstrual loss		
	Less than 40ml	40-79ml	80+ml
PSE not 'case' pre-operatively	8 (36%)	9 (43%)	17 (53%)
PSE 'case' pre-operatively	14 (64%)	12 (57%)	15 (47%)
Total	22	21	32

Chi^2=1.55 DF=2 p=0.4607

Table 16 – Pre-operative PSE 'case' distribution by measured menstrual loss

(N=108)

	PSE	caseness	
Actual menstrual loss (first estimation)	not 'case'	'case'	percentage of these who are 'cases'
0-19ml	3	6	67%
20-39ml	5	8	52%
40-59ml	3	8	72%
60-79ml	6	4	40%
80-99ml	3	3	50%
100-119ml	2	0	0%
120ml+	12	12	59%
No estimation available	11	22	66%
Total Numbers	45	63	100% (n=108)

Table 17 - PSE caseness pre-operatively in association with anaemia

(Hb<11.0g/dl) n=98 (missing values 10)

	Pre-operative (PSE) caseness *(% shown are row percentages)*	
	Non-case	Case
Haemoglobin level < 11.0	9 (75%)	3 (25%)
Haemoglobin level 11.0 or more	31 (36%)	55 (64%)

$Chi^2=6.61$ DF=1   p=0.0101

Table 18 -   **Differences between main group and subgroups of women**

studied

		108 women initially entering study	92 women who proceeded to endometrial ablation	63 women with full menstrual and psychological data
Age (years)	range	26-51	26-51	26-49
	mean (s.d.)	40.1 (5.3)	39.8 (5.3)	39.4 (5.7)
	median	41	40	40
	mode	44	39	44
Parity	Median (range)	2 (0-9)	2 (0-9)	2 (0-7)
	mean (s.d.)	2.3 (1.3)	2.3 (1.3)	2.3 (1.1)
Haemoglobin (g/dl)	range	8.7-15.4	8.7-15.4	8.7-15.4
	mean (s.d.)	12.8 (1.4)	12.8 (1.4)	12.7 (1.4)
	median	13.1	13.1	13.1
	mode	13.3	13.3	12.6
	missing data	10 women	4	0

Table 19 - **Differences between main group and subgroups of women**

studied

		108 women initially entering study	92 women who proceeded to endometrial ablation	63 women with full menstrual and psychological data
Length of time with heavy periods (months)	under 1 year	11 (10.2%)	8 (8.7%)	4 (6.4%)
	12-23 months	21 (19.4%)	18 (19.6%)	13 (20.7%)
	24- 47months	41 (38%)	37 (38.1%)	27 (42.9%)
	> 47 months	28 (26%)	27 (29.4%)	19 (30.3%)
	Uncertain	7 (6.5%)	4 (4.4%)	0
Cigarettes smoked (number/day)	None	65 (60.2%)	56 (60.9%)	41 (65.1%)
	1-9	9 (8%)	8 (8.7%)	3 (4.8%)
	10-19	12 (11%)	11 (11.9%)	8 (12.6%)
	20+	18 (16.7%)	16 (17.5%)	11 (17.5%)
	unknown	4 (3.8%)	1 (1.1%)	0

Table 20 -   Differences between main group and subgroups of women

studied

	number (percentage)	108 women initially entering study	92 women who proceeded to endometrial ablation	63 women with full menstrual and psychological data
Marital status	married	81 (75%)	70 (76.1%)	52 (82.5%)
	divorced	18 (16.7%)	16 (17.4%)	9 (14.3%)
	separated	2 (1.9%)	1 (1.1%)	1 (1.6%)
	single	3 (2.8%)	3 (3.3%)	1 (1.6%)
	widowed	1 (0.9%)	1 (1.1%)	0
	unknown	3 (2.8%)	1 (1.1%)	0
Employment status	full time	42 (38.9%)	39 (42.4%)	26 (41.3%)
	part time	37 (34.3%)	33 (35.9%)	26 (41.3%)
	housewife	21 (19.5%)	15 (18.5%)	10 (15.9%)
	unemployed/student	6 (5.6%)	3 (3.3%)	1 (1.6%)
	unknown	2 (1.9%)	2 (2.2%)	0
Contraceptive method employed	vasectomy	45 (41.7%)	40 (43.5%)	29 (46.0%)
	tubal ligation	28 (25.9%)	25 (27.2%)	20 (31.7%)
	barrier	14 (13%)	12 (13.1%)	8 (12.7%)
	hormonal	4 (3.8%)	4 (4.4%)	2 (3.2%)
	intra-uterine device	1 (0.9%)	0	0
	none	14 (13%)	10 (10.9%)	4 (6.3%)
	undisclosed	3 (2.8%)	1 (1.1%)	0

Table 21   Diagnostic groups generated by Present State Examination before and after endometrial ablation in those women who received psychiatric evaluation both before and after surgery (N=87).

Diagnostic groups	Number of women	
	3 months before endometrial ablation	At least one year after endometrial ablation
Mixed affective features	7	3
Depression with retarded/paranoid or psychotic symptoms	22	8
Anxiety state	6	3
Neurotic depression	16	5
Total percentage of women affected within sample	51/87 (58.6%)	19/87 (21.8%)

Table 22 – Reported versus actual loss in women who were never cases (PSE index level of definition 5 or above) pre or post-operatively (N=26)

	Reported loss Higham Score (column percentages)	
	less than 100	greater than or equal to 100
Actual Loss less than 80 ml	4 (66.7%)	8 (40%)
greater than or equal to 80ml	2 (33.3%)	12 (60%)

Chi^2=1.32 DF= 1 p= 0.2504

Sensitivity 86%, specificity 33%

Table 23 – Reported versus actual loss in women who were cases (index level of definition of 5 or above) at some stage (pre or post-operatively) (N=37)

	Reported loss Higham Score (column percentages)	
	less than 100	greater than or equal to 100
Actual Loss less than 80 ml	6 (100%)	16 (51.6%)
greater than or equal to 80ml	0 (0%)	15 (48.4%)

Chi^2=4.88 DF=1 p= 0.0271

Sensitivity 100% specificity 19%

Table 24   Comparison of psychiatric instrument scores before

and   after   surgery in women completing each measure

(paired t tests)

Instrument	number of pairs	pre-operative mean	post-operative mean	paired differences	t value	2-tail significance
CAS	87	4.14	2.70	1.44	5.09	0.000
MADRS	87	10.72	6.02	4.70	6.53	0.000
HAD-Anxiety	86	7.17	6.09	1.08	3.09	0.003
HAD-Depression	86	5.01	2.85	2.16	5.39	0.000
IDA-Irritability	86	7.16	4.76	2.41	2.15	0.035

Table 25   Comparison   of   psychiatric   instrument   scores   before and after

surgery in women completing each measure

Visual Analogue Scales	number of pairs	pre-operative mean	post-operative mean	paired differences	t value	2-tail significance
Anger	86	36	30	5.69	3.29	0.088
Anxiety	85	34	32	1.82	0.58	0.566
Self-confidence	86	59	65	6.40	2.32	0.022
Depression	86	30	24	5.91	1.71	0.090
Femininity	84	54	66	11.61	3.51	0.001
Irritability	86	43	35	7.87	2.36	0.020
Sexual attractiveness	85	44	60	16.2	4.89	0.000
Self consciousness	85	43	37	5.93	1.60	0.144
Womanhood	85	62	75	13.1	3.99	0.000
Libido score	86	0.72	0.36	0.36	4.12	0.000

Table 26 - Libido pre-operatively and post-operatively in women completing

measures (n=86, 6 missing values)

| | | Post-operative libido | |
		Interest in sex normal	Marked or total loss of interest
Pre-operative libido	Interest in sex normal ·	33	5
	Marked or total loss of interest	29	19

$chi^2=7.36$ DF=1   p=0.0067

Table 27 - Women's subjective feelings about psychological improvement at 1 year follow up (six point scale from 0-5 with 4 being 'very good' and 5 being 'excellent') [n=92 women receiving endometrial resection]

| | | Caseness post-operatively | |
		no	yes
Psychological symptom improvement scores at one	0-3	15	13
year follow up	4-5 (excellent or very good)	55	9

$Chi^2=11.21$ DF=1 p=0.0008

Table 28 - Women's subjective feelings about gynaecological improvement at

1 year follow up (six point scale from 0-5 with 4 being 'very good' and 5

being 'excellent') [n=92 women receiving endometrial resection]

		Caseness post-operatively	
		no	yes
Gynaecological symptom improvement scores at one year follow up	0-3	12	10
	4-5 excellent or very good	58	12

Chi^2=7.37 DF=1 p=0.0066

Table 29 - Women who rated their periods as heavy (analysis of 50 women who rated their periods as heavy: score of 100 or more on Higham charts). Comparison of actual menstrual loss against subjective gynaecological symptom improvement ratings.

Actual menstrual Loss *(row percentage)*	*Subjective improvement rating for gynaecological symptoms* (excellent/very good)	
	0-3	4-5
Women with heavy reported loss rating *and* low/normal actual loss (< 80 millilitres)	8 (34.8 %)	15 (65.2%)
Women with heavy loss rating and high actual loss (80 millilitres or more)	4 (14.8%)	23 (85.2%)

Chi^2=2.71 DF=1 p=0.0994

Table 30 - Women who rated their periods as heavy (analysis of 50 women who rated their periods as heavy: score of 100 or more on Higham charts). Comparison of actual menstrual loss against subjective psychological symptom improvement ratings.

Actual menstrual Loss (row percentage)	Subjective improvement rating for psychological symptoms	
	0-3	(excellent/very good) 4-5
Women with heavy reported loss rating and low/normal actual loss (< 80 millilitres)	11 (47.8 %)	12 (52.2%)
Women with heavy reported loss rating and high actual loss (80 millilitres or more)	5 (18.5%)	22 (81.5%)

Chi^2=4.90 DF=1 p=0.0268

Table 31 — PSE caseness before and after endometrial ablation comparing studies using Present State Examination in hysterectomy patients

Percentage   of PSE   cases

	after endometrial ablation	after hysterectomy	
	this study	*Gath et al (1982a &1982b)*	*Ryan et al (1989)*
pre-operative	59	58	55
post-operative	22 (15 months)	29 (18 months)	32 (14 months)

Caseness is defined as index level of definition of 5 or above on PSE

Table 32 - Women with loss greater than 80ml - pre operative caseness and caseness at one year follow up (N=29).

	Pre-operative PSE 'case' (column percentages)		One year follow up PSE 'case'	
	yes	13 (44.8%)	yes	4 (30.8%)
			no	9 (69.2%)
	no	16 (55.2%)	yes	1 (6.3%)
			no	15 (93.8%)

$Chi^2=4.05$ DF=1 p=0.0441

Table 33 - Women with loss less than 80ml - preoperative caseness and caseness at one year follow up (N=40).

	Pre-operative PSE 'case' (column percentages)	One year follow up PSE 'case'	
	yes 23 (57.5%)	yes	9 (39.1%)
		no	14 (60.9%)
	no 17 (42.5%)	yes	3 (17.6%)
		no	14 (82.4%)

Chi^2=2.15 DF=1 p=0.1427

Table 34 - Women presenting for surgery with the complaint of heavy periods.

Actual loss, psychological morbidity and descriptions of outcome.

Actual heavy periods ($\geq$ 80ml)	Pre-operative psychological morbidity (PSE' case')	Percentage of significant psychological morbidity (PSE 'case') at one year after operation
Yes	Yes	31%
Yes	No	6%
No	Yes	39%
No	No	18%

CHAPTER SIX - FIGURES

Figure 1 - Potential Interactions between Actual, Perceived and Reported Menstrual Loss
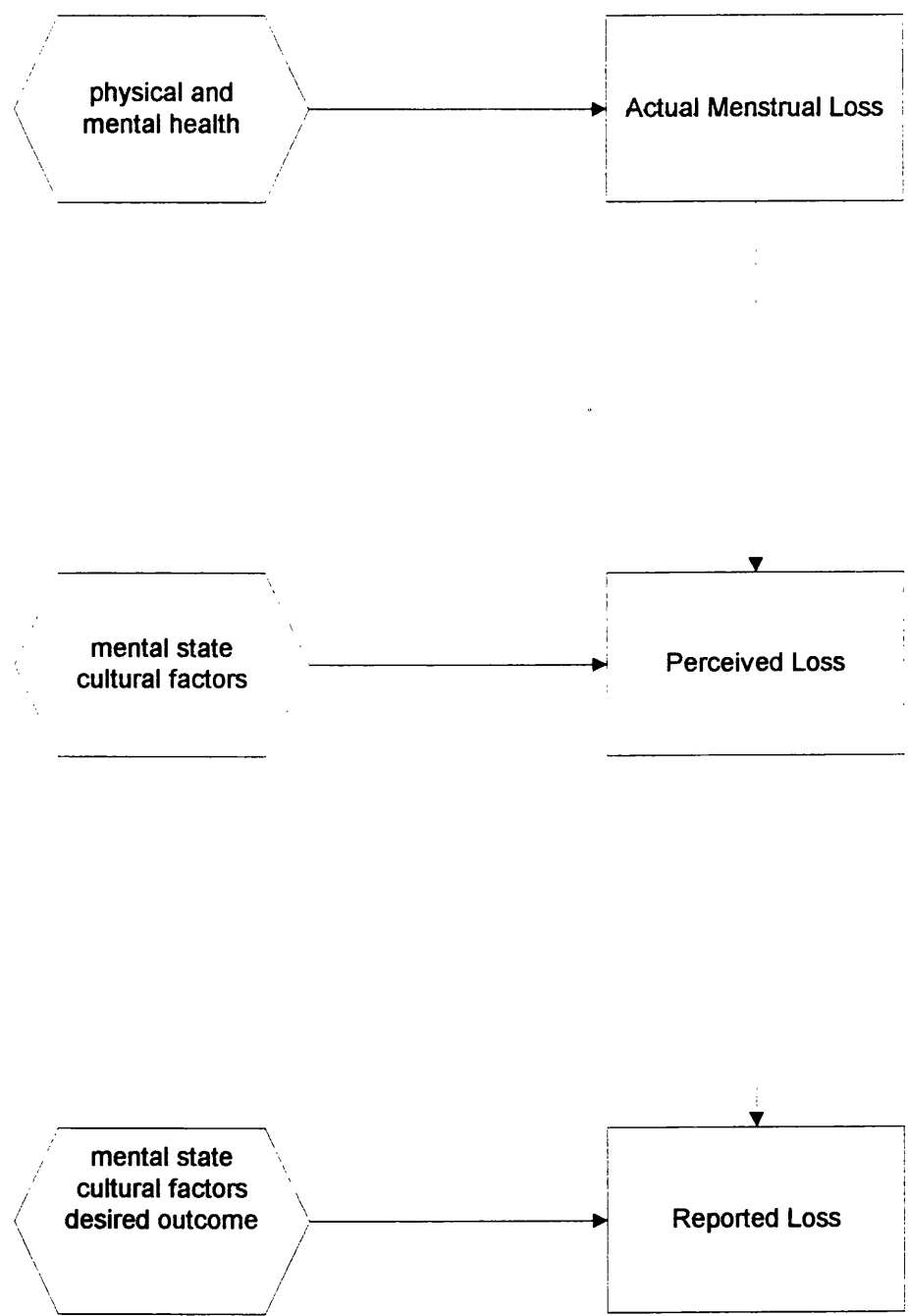
Figure 2 - Flow Chart Showing the Numbers of Women Participating at each Point in the Study

108 women
(75 of whom with actual loss measurements)

→ **4**
Non-attendance
(no surgery)

→ **5**
Hysterectomy
(no resection)

→ **7**
Low menstrual blood loss
(no surgery)

92
Endometrial ablation

5	**24**	**63**
No post-operative psychological data	Pre and post-operative psychological data, but no actual loss measurements	Pre and post-operative psychological data and actual loss measurements

123

Figure 3 – Numbers and percentages of women receiving endometrial ablation for which each piece of data is available

Data collected	Number of women (92)	Percentage
Pre-operative Present State Examination	92	100%
Pre-operative MADRS	92	100%
Pre-operative CAS	92	100%
Pre-operative HAD	92	100%
Pre-operative IDA	92	100%
Pre-operative VAS	92	100%
Higham scores for reported loss	69	75%
Pre-operative actual loss collections	68	74%
Post-operative Present State Examination	87	95%
Post-operative MADRS	87	95%
Post-operative CAS	87	95%
Post-operative HAD	86 (D) 87 (A)	93% 95%
Post-operative IDA	85	92%
Post-operative VAS	84-86	91-93%
Post-operative libido scores	86	93%

Figure 4   -   PRESENT STATE EXAMINATION
Pre and post-operatively with population data for comparison
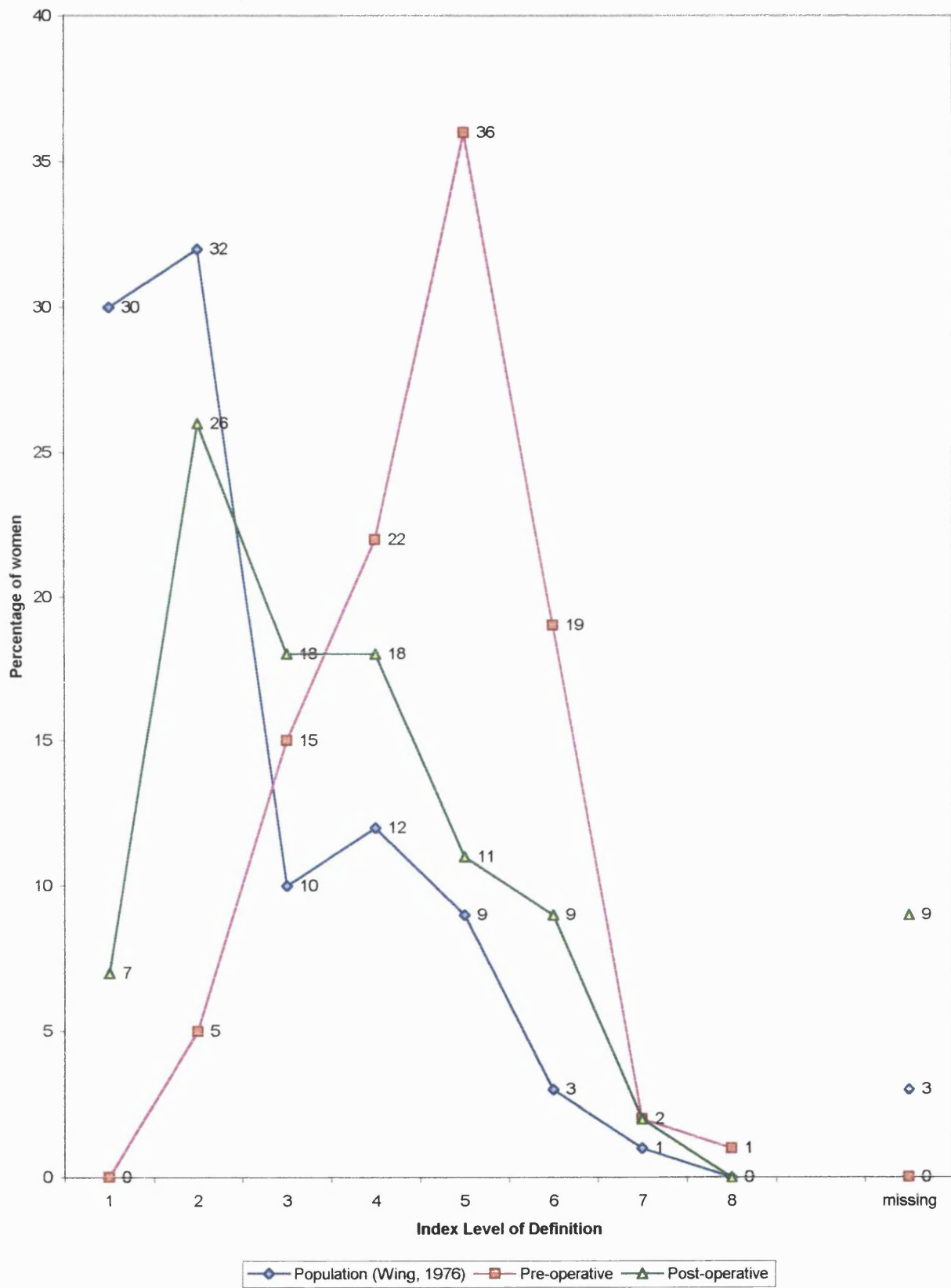
Figure 5 - Changes in PSE caseness before and after operation

Before Endometrial Ablation	After Endometrial Ablation
	Cases 14 (16.1%) *{27%}*
Cases, 51 (58.6%) *{55%}*	
	Non-cases 37 (42.5%) *{28%}*
	Cases 5 (5.7%) *{5%}*
Non cases 36 (41.3%) *{45%}*	
	Non-cases 31 (35.6%) *{40%}*

{Ryan et al, 1989 percentages studying hysterectomy patients, shown for illustrative purposes}

CHAPTER 7 - DISCUSSION

7.1 Methodology

7.11 Avoiding bias

A number of design features were built into the study in an attempt to avoid bias. The use of one main surgeon and one main psychiatrist carries with it advantages and disadvantages. Since several different surgeons may make differential rates of surgical complication more likely, it was felt that using mainly one surgeon meant that complication rates would be constant. This, of course, opens the study to the risk of that single surgeon having a low level of competence which may have impacted upon results, but previous work by this surgeon (MG) reporting a published series of endometrial ablations (Gannon et al, 1994) showed there to be a low level of complication and a success rate at least equivalent to other reported series (Overton et al, 1997).

I was the single psychiatric researcher. This meant that rater bias could be a problem although it reduced the risk of very different rating scores being created by different raters being used at different points in the study (e.g. one rater pre-operatively and one rater post-operatively). It carried a risk in that there was a clear reliance on the ability of the researcher concerned. Two measures were taken to mitigate against this. Firstly, I attended a one week training course on the administration of the Present State Examination (Wing, 1974). Part of this course involved several raters rating the same people with comparison of their ratings.

A second safeguard was the use of patient questionnaires (Hospital Anxiety and Depression scale, and the Outward Irritability section of the Irritability Depression and Anxiety scale) and other validated observer rating

instruments (Montgomery Asperg Rating Scale and Clinical Anxiety Scale) against which to compare the Present State Examination. These showed good agreement. Correlations between the MADRS and the depression component of the HAD were good as were correlations between the CAS and the anxiety component of the HAD. Similarly, the associations between these instruments and caseness on PSE were good with one exception. The outward irritability scale from IDA was not associated with caseness and also had a poor correlation with the visual analogue scale (VAS) for irritability. The fact that irritability is not well correlated with PSE is not surprising given that it is possible to have a range of diagnoses without irritability, and irritability is not a core symptoms of any major diagnostic group.

There were good associations between PSE and instruments rating anxiety and depression and this may be because a high proportion of PSE diagnoses were anxiety or depression related. The poor association between the Outward Irritability subscale of the IDA instrument and the irritability VAS is unlikely to be because the IDA instrument is poor. It has good face validity, good internal consistency and has been validated in four separate studies as well as being shown to have highly significant correlations with blind clinical raters rating outward irritability (Snaith & Taylor, 1985).

A possible reason for poor correlation between VAS irritability scores and the Outward Irritability subscale of the IDA is that the latter was validated using clinicians ratings of observed or perceived *outward* irritability. This may be different from internal perceptions of irritability. It is therefore possible that the Outward Irritability subscale relates to outward manifestations of irritability such as shouting and banging doors which are separate from inward irritability, and that the visual analogue scale is interpreted by women as representing more inward

manifestations of irritability which do not necessarily correlate with outward irritability. I did not measure inward irritability using the IDA scale and so I cannot test this hypothesis.

Finally, I made considerable efforts to keep the rates of follow up as high as possible. All 108 women who agreed to enter the study were interviewed at the pre-operatively, and 87 of the 92 women who had endometrial ablation were interviewed post-operatively as well as pre-operatively. This represented 95% and limits selection bias as far as possible.

7.12 Version of Present State Examination

The version of the Present State Examination (PSE 9) used was the same as that used by Gath (1982a; 1982b) in his studies and was the one most widely used and validated at the time. It therefore afforded comparison between this study and those of other authors examining surgery in women with heavy periods (Gath 1982a; 1982b; Ryan et al, 1989; Osborn & Gath, 1990; Gath et al, 1995).

7.13 Choice of study design

I had considered that a study randomising between women receiving endometrial ablation and hysterectomy would have had several advantages. It would have allowed comparison of the psychological effects between the two procedures. This was discussed by several gynaecologists in Leeds and the ethical issues were considered in the light of a number of facts. First, that hysterectomy is a major operation whilst endometrial ablation is not. Second, previous randomised studies have demonstrated the efficacy of endometrial ablation in relation to hysterectomy

(Dwyer et al, 1993; Gannon et al, 1991). Third, one of the hospital gynaecologists asked 35 women consecutively presenting for surgery because of dysfunctional uterine bleeding to consider the hypothetical question that if such a study was commenced would they be willing to participate and be randomised between endometrial ablation and hysterectomy. Only one woman said that she would, the other 34 saying that they would opt for endometrial ablation, mostly on the grounds that if endometrial ablation failed they would have the option to proceed to hysterectomy, but that this would not be the case in reverse. In view of the ethical issues raised and in conjunction with the gynaecologists, I made the decision not to randomise between endometrial ablation and hysterectomy, but to perform a longitudinal study of women receiving endometrial ablation.

I have since read with interest about several studies which have been performed, comparing endometrial ablation with hysterectomy (Alexander et al, 1996; Sculpher et al, 1996; O'Connor et al, 1997; Crosignani et al, 1997) where the authors made little mention of ethical considerations. Regardless of the ethical issues it is regrettable that these studies did not maximise the opportunity to study the psychological differences between the two groups. One used a measure of general functioning with a mental health subscale (Sculpher et al, 1996). Although this is a helpful screening instrument it does not provide diagnostic information or the quality of information necessary to compare the psychological effects of the two operations. The same can be said of another study (Alexander et al, 1996) which used the Hospital Anxiety and Depression (HAD) Scale, which is useful as a screening instrument or as an instrument to monitor change in diagnosed depression or anxiety, but not as a diagnostic instrument. The study by Crosignani and colleagues (1997) also uses the HAD and the Short Form 36 questionnaire. The study by O'Connor and colleagues (1997) was more robust using the 28 item

General Health Questionnaire, as well as mood and social adjustment scales. They demonstrated few differences between endometrial ablation and hysterectomy up to 3 years after surgery in any of these measures. None of the studies has used diagnostic instruments for psychological morbidity as used by the hysterectomy studies by Gath and colleagues in England (1982a, 1982b) or Ryan and colleagues in Australia (1989) or instruments capable of establishing psychiatric diagnoses.

7.14 Association with gynaecology study (randomising between two methods of endometrial ablation)

The link with the gynaecology study (i.e. comparison of the two methods of endometrial ablation) provided several advantages. The first related to high quality gynaecological information, which was available from the gynaecology study. Whilst much of this information was not directly relevant to the psychological study being performed, some of the information was useful. The gynaecology study primarily sought to decide whether one method of endometrial ablation was preferable to another and therefore had no impact on the psychological study.

A second advantage was the fact that the sample was a clearly definable one within the gynaecology service. Women with identifiable organic disease were excluded and this would have been a source of bias since some organic pathology (for example being perimenopausal or having a tumour) may have had psychological consequences which were independent of the factors being studied. In another sense this is a disadvantage since it represents a selected sample, but I

believe that having too varied a selection of gynaecological problems could have made interpretation of results difficult.

Third, the involvement in a wider study may have had a beneficial impact upon appointment return rates, although it was not possible to test this.

Finally, it provided for cross-fertilisation of thought and ideas between involved clinicians.

7.15 Frequency of psychological assessment

The length of time from operation to the post-operative psychological follow-up was chosen as at least one year. The reason for this was that in the follow up study by Gath and colleagues (1982a, 1982b), looking at the psychological effects of hysterectomy, there was very little difference between psychological morbidity at 6 months and 18 months. It was therefore felt to be unnecessary to follow up the women in this study to 18 months. However, 6 months was felt to be too soon for endometrial ablation (as compared to Gath's study of women undergoing hysterectomy) given the reported finding that in some women part of the endometrium regenerates with time (Davis et al, 1998). The gynaecologists felt that 12 months was a long enough period of time for women to judge the outcome of the operation against a number of menstrual cycles. This was therefore felt to be the most appropriate time to conduct the psychological follow-up. In the event, the average time of follow up was 15 months because of clinic space, and difficulties some women had in being able to attend appointments (one woman was given six appointments before she attended because she was a travelling thespian who was never certain when she would be available).

7.16 Completeness of data

There were a number of problems obtaining full data for women. These included the expected scenarios where women failed to attend clinics. Some women moved area, and follow up had to be performed in places such as Darlington as a result. Some women indicated that they were happy to participate in the study, but subsequently decided that they did not want to answer certain questions or complete certain parts of the study. For example, some women did not wish to answer questions relating to sexuality, or to perform the collections necessary for the actual loss estimations. In these circumstances, I respected the wishes of women, always giving them the option to leave the study, but also offering them the option to continue in the study without participating in the particular aspect with which they were not happy. In this way some women remained in the study without for example performing menstrual loss collections.

7.2 Main Findings

I shall discuss the findings against the original aims of the study.

7.21 Do women presenting for endometrial ablation with the complaint of heavy periods have high psychological morbidity?

Some authors have been tempted into attributing all post-operative psychiatric morbidity to pre-operative psychiatric status. This may be a swing of the pendulum away from the tendency in early literature to over-emphasise the role of hysterectomy in producing psychiatric morbidity. The two are not, of course, mutually exclusive.

According to the PSE, 59% of women in this study were found to have significant psychological morbidity prior to operation. This confirms the finding of Gath and colleagues (1982a, 1982b) and Ryan and colleagues (1989) which looked at women awaiting hysterectomy (Table 31). This is a high rate compared to the population where approximately 12% in this age group of women in the community were cases (Wing et al, 1974). Given that most of the women identified by PSE had a depressive component I expected MADRS and HAD depression scores to be significantly different between cases and non-cases and this was indeed so (sections 4.53-4.54). The Clinical Anxiety Scale (section 4.42) scores also significantly differed whether analysed continuously or categorically, although the HAD anxiety subscale (section 4.54) was significantly different when analysed continuously but not categorically. Since some (but not all) of the 'cases' on PSE are anxiety based or have anxiety symptoms as part of a depressive illness, this finding not too surprising.

In the light of this study's findings it is necessary to consider a range of possible ways in which psychological morbidity and surgery for heavy periods may influence each other. I have done this by considering mechanisms proposed by previous authors. I will explore these using data from this study and drawing from other peer reviewed published research.

First, it is necessary to consider the suggestion that heavy periods may lead to psychological morbidity (Slade & Anderson, 1992). This is plausible and many authors have little difficulty believing that high pre-operative psychological morbidity may on many occasions be related to heavy periods which have significant impact socially, including prolonged heavy periods, chronic pelvic pain and its effects. The finding in this study

that anaemia is significantly related to psychological morbidity lends support to this. Anaemia has several physical consequences, is likely to have social consequences, and in this group of women is associated with psychological morbidity. 37 women in this study who were 'cases' pre-operatively were not 'cases' post-operatively and this represents a large group of women who improved. The satisfaction ratings reported in hysterectomy samples (Schofield et al, 1991b; Nathorst-Boos et al, 1992) where women report being very relieved to be rid of the effects of heavy periods, support the importance of this effect, and in this study there is good correlation between subjective period related improvement scores, and emotional improvement scores. However, if this effect was the only one operating then I would expect psychological morbidity to return to population levels after operative treatment in this study. There is a trend towards this (Table 31) but it is not complete since 15 months later psychological morbidity had returned to 22% compared to an approximate population level of 12% (Wing et al, 1974). This poses the question: ' Are there other factors operating?'

Second, is it the case that women who have heavy periods and high levels of psychological morbidity, are more likely to present for surgery than women with heavy periods and low levels of psychological morbidity? It would need a community sample to answer this, but the finding from this study that women with actual heavy periods have higher levels of psychological morbidity than found in the general population makes this a hypothesis worth exploring further, and is consistent with the fact that 14

women were 'cases' pre-operatively *and* post-operatively despite low rates of complication and high rates of operative success.

Third, do women with high levels of psychological morbidity present without actual heavy periods but with perceived or reported heavy loss? The good sensitivity but poor specificity of the Higham chart in this study compared to Higham's own work was caused by 55% of women with high scores having actual losses below 80 millilitres (section 4.4). Since Higham's original work (not in women awaiting surgery) has good specificity scores (81% compared to 31% in this study) it begs the question why? One possible explanation is that some women in this study have either misinterpreted their own periods or were seeking to present their periods as heavier than they were.

Gath and colleagues (1995) imply that after years of doing mental health research in a particular geographical area, which involved working closely with local general practitioners, clinical practices changed. They suggested that there was a fall in the percentage of women with psychological morbidity in those women being referred through for the problem of heavy periods. They also suggest that this is because of a change in referral practices and a greater understanding of the needs of women. The implication is that women with psychological morbidity are less likely to be referred by knowledgeable general practitioners, and that this reduces rates of psychological morbidity in referred women. If so I would expect high levels of psychological morbidity in this study. This is the case with over 50% of women referred in this study who have actual blood loss less than 80ml in a single cycle. It is also borne out by the fact

that 7 women were counselled away from surgery because of very low menstrual loss. This would not have happened if the actual menstrual loss measurements had not been performed. It should be noted here that 6 of these seven women were cases on PSE, which is a direct example of this hypothesised mechanism.

A final piece of evidence which points towards this is that women who rated the period which was collected for the actual menstrual loss estimation as heavy (Tables 30) but had losses lower than 80 millilitres were less likely to do well in terms of their own psychological improvement rating post-operatively. This was a significant finding which demonstrates that whilst over all there was no clear association between pre-operative PSE and actual loss estimations there is a subgroup of women who rate their periods as heavy, but never-the-less do not have heavy periods on objective evidence and who do not do well post-operatively. Whilst some of these women were counselled from surgery, others opted to proceed.

Fourth, do women have psychological morbidity brought about by the stressful processes of attending clinic, awaiting surgery or being studied? This seems unlikely to be a major effect. Gath and colleagues (1995) found relatively low psychological morbidity just before hysterectomy in one large sample of patients, and they suggest that referral and selection for operation influence rates of psychological morbidity, and not anxiety about surgery. In any case the studies which have shown high rates of pre-operative psychological morbidity invariably show a predominance of depressive symptomatology (Gath et al, 1982a, 1982b; Ryan et al, 1989)

rather than anxiety disorders. As discussed earlier, research examining women with heavy periods who are not awaiting surgical intervention also shows high psychological morbidity (Greenberg, 1983). Furthermore, researchers using the Present State Examination instrument do so taking the patient's previous health over the last one month into account and not just their mental state in the clinic. In this way I was careful not to attribute ongoing mental ill health to a transitory state brought about for example by anxiety over clinic attendance. If anxiety were being presented as a symptom when I saw a women I was very careful to discern the nature, severity and longevity of the symptoms and their presence or absence in other life situations and over the previous weeks.

Fifth, it has been suggested that women having hysterectomy have ovarian failure that leads to high psychological morbidity (Khastgir & Studd, 1998). One advantage of this study is that ovarian failure is ruled out as a factor since the ovaries are neither removed nor damaged. Furthermore despite the fact that some authors (Khastgir & Studd, 1998) recently suggested this as a mechanism for post-operative psychological morbidity, other studies that have examined levels of oestrogens, luteinising hormone, follicular stimulating hormone, testosterone and prolactin levels before and after abdominal hysterectomy with preserved ovaries found no evidence of ovarian failure (Coppen et al, 1981).

Sixth, is it the case that some women's experience of surgery including complications (particularly hysterectomy) can be psychologically damaging? A randomised controlled trial in Bristol, England by Dwyer

and colleagues (1993) did appear to show an association in some women between high GHQ scores and post-operative complications after hysterectomy, as well as an association between pre-operative scores showing that this hypothesis is relevant (Dwyer et al,1993). The studies by Crosignani and colleagues (1997) and O'Connor and colleagues (1997) appear to show little difference in social functioning and satisfaction ratings after abdominal hysterectomy compared to endometrial resection. This may suggest that hysterectomy is not the damaging operation many used to think it was, although Crosignani's study does not have pre-operative ratings against which to judge post-operative findings in the two groups. The much lower complication rates after endometrial ablation means that the complications of hysterectomy are effectively sidelined by my study when compared to the hysterectomy studies. There were very low rates of complication in this study with no women requiring lengthy admission, and no women suffering uterine perforations or other serious complications.

The possibility of confounding factors should also be considered and these may include unidentified or unidentifiable factors which can lead to both heavy periods and psychological morbidity. Such factors may be metabolic or endocrine abnormalities impacting both gynaecologically and psychologically, or unknown life stresses impacting psychologically and physically.

Some authors have been tempted into attributing all post-operative psychiatric morbidity to pre-operative psychiatric status. This may be a swing of the pendulum away from the tendency in early literature to over-

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emphasise the role of hysterectomy in producing psychiatric morbidity. The two are not, of course, mutually exclusive. As set out in the preceding paragraphs, I consider that effects that are most likely to be operating in this study are:

1.   psychological morbidity as a response to a prolonged history of heavy periods and all of its consequences.

2.   Women with low loss but perceived 'heavy' loss presenting for surgery as a result of high psychological morbidity (in some way as yet to be fully understood).

Effects such as high rates of complication after surgery, ovarian failure leading to psychological morbidity and psychological morbidity secondary to clinic attendance are unlikely to be significant effects in this study.

Despite the fact that there was no overall clear association between measured menstrual loss and PSE status I postulate that two factors may be operating within the study to cancel each other out from the point of view of statistical analysis. There is enough evidence to postulate that PSE caseness is caused in some women by prolonged heavy periods and its socio-emotional consequences as shown in previous studies (Dwyer et al, 1993). It is also possible to postulate on the other hand that some women have a mental state which impacts in such a way as to lead to their presentation in clinic with heavy periods when in fact their loss is low or normal as shown in this study (discussed above). These two phenomena are not mutually exclusive in a sample of women, but would tend to cancel each other out when looking for an association between PSE status and actual menstrual loss (i.e. one group presents with high loss and PSE caseness and

the other presents with low loss and PSE caseness). Differential one year rates of improvement between these two groups in this study partly support this. This information may helpfully inform predicted outcome in different groups of women.

7.22 What is the prevalence of actual heavy menstrual loss amongst a population of women awaiting endometrial ablation for reported excessive menstrual bleeding?

Approximately half the women measuring their actual loss had loss less than 80 millilitres, with approximately a quarter having a loss below 40 millilitres. Regardless of the presence or absence of psychological morbidity, this means that in this cohort, half the women awaiting surgery for heavy periods showed at least one period which fell, outside the accepted range for 'heavy'. A quarter of the women had a low or normal measured actual loss. It is possible that these measured periods were lighter than usual, although typical period variations should operate both ways in a sample and so would not account for over half the women having reduced periods during the measurement month. Even when women with light periods were asked to repeat their measurements, only 51% women overall were found to have at least one (of two actual menstrual measurements) over 80ml. The fact that perception of periods is relevant is demonstrated by the finding that of the 53 women who recorded their periods as 'heavy' by virtue of a score of 100 or more using the Higham charts, 24 (45%) of them had a loss that was less than 80 millilitres for that same period (Table 7).

This may lead us to consider that between a quarter and a half of women awaiting surgery for heavy periods in this study may not have 'heavy' periods as currently defined in the research literature. Some of these women were counselled

from surgery, but some opted to proceed. It raises questions about how women came to be there, some of which may relate to the section above. It also raises ethical questions about whether surgery should be available for women wishing to pursue a desire to have 'light' periods or no periods for reasons of convenience (Higham & Reid, 1985).

7.23 The relationship between laboratory measurements of actual loss and psychological morbidity.

The fact that six of the seven women with very low menstrual loss were 'cases' on PSE leads me to hypothesise that some women arrive in clinic because their psychological morbidity impacts in some way upon the presentation of their periods. However, even though this percentage (86%) was considerably above the 52% cases in the remaining group, this was not statistically significant. This may be because of relatively small numbers. The fact remains that women with low actual menstrual loss and high levels of psychological morbidity agreed not to proceed with surgery. Without actual menstrual loss estimations in most clinic settings this may mean that some women are receiving hysterectomy or endometrial ablation when, from the point of view of gynaecological symptomatology they do not need surgery at all. Furthermore the study shows that women with low loss who do opt to proceed for surgery are less likely to be satisfied post-operatively.

Women with anaemia on the other hand are less likely to be 'cases' than women without anaemia and this association seems to get stronger the lower the haemoglobin level becomes (Table 17). This is an interesting finding since it implies that women with periods consistently heavy enough to cause anaemia are

less likely to suffer psychological morbidity. This may be because they attribute their symptoms to anaemia, or it may be because such women are more likely to be in the clinic by virtue of their periods, and less likely to be there by virtue of psychological morbidity. However, the rates of psychological morbidity in the anaemic women are still above population levels and this may be a contributory factor in the finding that there is no good overall association between PSE status and actual loss. Heavy periods with their physical and social consequences are likely to have psychological consequences. Never-the-less the women with large loss and anaemia have much lower levels of psychological morbidity in this study.

7.24 What were the overall changes in psychological morbidity after endometrial ablation for dysfunctional uterine bleeding?

With both categorical and continuous analysis of the data there is a significant improvement in psychological morbidity post-operatively. This improvement occurs regardless of whether the data is derived from semi-structured interview or questionnaire.

With respect to diagnosable psychiatric illness, there a is large drop in psychological morbidity post-operatively. The overall percentage in PSE caseness drops from 58.6% to 21.8%. Of the women losing their caseness, 31 (84%) women had recovered from a depressive or anxiety disorder. The five women becoming cases post-operatively (and not cases pre-operatively) may be related to the natural incidence of psychological disorder. When looking through their case histories there was no evidence that operative treatment was responsible. Four had clear life events including a marital breakdown, significant problems with a teenage daughter and a bereavement. One had another serious physical illness.

37 women who were 'cases' pre-operatively were no longer 'cases' post-operatively. This drop is broadly equivalent to the drop found by Gath and colleagues (1982a, 1982b) in Oxford, and Ryan and colleagues (1989) in Australia, in similar studies looking at psychiatric status before and after hysterectomy. Since I did not compare hysterectomy with endometrial ablation it is not possible to say whether there would have been a larger, smaller or similar drop in morbidity with women undergoing hysterectomy, although other studies suggest that this might be broadly similar for both treatments (O'Connor et al, 1997). This is also suggested by the fact that the results reported here are not strikingly different from those reported with hysterectomy (Ryan et al, 1989; Gath, 1982a & 1982b). There is a similar level of pre-operative psychiatric morbidity.

There appears to be a larger drop post-operatively than that reported in hysterectomy studies (Table 31), although it is not possible to statistically test this meaningfully. It is possible to hypothesise that the increased drop arises because negative post-operative psychiatric consequences of hysterectomy reported by so many authors (e.g. complications and self image) are not operating to affect psychological status in those women undergoing endometrial ablation. An example of this would be sexual functioning. It is well reported that sexual functioning improves after hysterectomy for many women and one might expect this to have an impact on their relationships and psychological functioning. However, the same studies report many women who assert that their sexual functioning deteriorates after hysterectomy. Some of these women may not 'become worse' with the less invasive endometrial ablation and hence demonstrate better improvement rates. In this study normal libido increases from 44% to 72% after operation.

However, the rates of post-operative psychological morbidity are still higher than the general population and some of these women remain

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psychologically unwell post-operatively. This may be because the psychological morbidity was not secondary to heavy periods in some women and so treating them surgically would have no impact. It is also theoretically possible that psychological morbidity, having been caused by heavy periods, does not remit on treating the cause. However, in this study gynaecological symptom improvement scores show that most women were happy with their operative outcome, and very happy that their heavy periods were either absent or much lighter.

It is worth restating a central difficulty that exists when exploring the relationship between actual loss and psychological morbidity. Put simplistically, if psychological morbidity is caused by heavy loss in some women and by pre-existing psychological morbidity which influences presentation to clinic in other women (e.g. with low or average loss), then these two effects will tend to cancel each other out in some of the statistical tests applied. It is therefore probable that comparisons of the rates of psychological morbidity across different amounts of menstrual loss will show no apparent differences. If psychological morbidity was only related to heavy periods then I would expect normal population levels in those women with low or average loss, which I did not find. Similarly, if only related to pre-morbid factors then I would not expect psychological morbidity rates to drop so dramatically post-operatively. The results demonstrate that neither of these routes is likely to be operating alone. There was a drop in morbidity post-operatively but still higher rates than in community samples for this age group of women. These two causative routes are not mutually exclusive. In other words psychological morbidity in this group of women is probably heterogeneous.

7.25 Is there a relation between actual loss and rates of improvement of psychological morbidity?

Since 7 women were counselled from surgical intervention we cannot explore how those women would have affected the results had they proceeded with surgery. It is probable that had actual loss measurements not been available they would have received surgery in the same way as the other women in the study.

Women who rated their periods as heavy on Higham scores but had losses lower than 80 millilitres were less likely to do well in terms of their own psychological symptom improvement rating. Of the 14 women who were cases before and after operation, 10 of them reported heavy loss on Higham charts and only 9 of them had actual losses of 80 millilitres or less. It is therefore the case that the amount of actual loss in relation to perceived loss had an association with satisfaction. In terms of psychological morbidity using Present State Examination, the analysis is more complex.

Table 34 gives a descriptive account of outcome. Those women who have the best outcome with 6 % PSE cases at follow up (i.e. half expected population levels for this age group of women) are those with genuine actual heavy loss and no pre-operative PSE caseness. The women who do worst are those with actual loss which is not heavy and with pre-operative PSE caseness with nearly 40% caseness at follow up (i.e. over three times expected population levels for this group of women).

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7.3 Usefulness of study

7.31 Implications for clinical practice and research

The sample here was women who had already been referred to gynaecology out-patients because of reports of heavy periods. Having been seen in out-patients they were all women in whom it was felt appropriate to offer gynaecological surgical intervention. They were therefore those women in whom the complaint of heavy periods had been taken seriously. It is interesting to note that after first measurement of menstrual loss, only 43% of women had a loss of 80ml or more. This accords with work by Gannon and colleagues (1996) who found that 170 out of 292 women (58.2%) had an actual measured loss of less than 80ml. This raises two questions. The first relates to whether these women need operative interventions, and the second relates to how they come to be in clinic awaiting surgery.

There is a wide variability in the rates of operative intervention between different countries (Dicker et al, 1982a; Pokras & Hufnagel, 1987; Schofield et al, 1991) and between different surgeons within those countries (Wennburg et al, 1984). Furthermore the referral rates of general practitioners for gynaecology problems are variable with a three fold variation between different practices in the same area (Coulter et al, 1991). With respect to heavy periods referrals are influenced by the sex of the general practitioner, with higher rates apparently from male doctors in some studies (Coulter et al, 1995). It is clear that culture and knowledge has an influence both on the perception of menstrual periods (Snowden and Christian, 1983) and upon both referral (Coulter et al, 1995) and hysterectomy rates (Domenighetti et al, 1988).

Furthermore, how a woman reports her periods when in discussion with a medical professional is in part dependent on the way that loss is perceived. This is not just related to the absolute amount of the loss. It would include recent changes, the range of losses experienced or interference with social functioning such as flooding. In this way perception depends partly on the actual loss but also on other factors. This study confirms that abnormal mental state appears more likely in women presenting for surgery with heavy periods than in population studies, and this has been shown in several different studies. It is replicated here. It also shows that women with heavy periods and no psychological morbidity pre-operatively do much better psychologically than women with low loss and pre-operative psychological morbidity. Despite the close relationship between menorrhagia and psychological morbidity, it is not uncommon to find that textbooks and management algorithms do not mention psychological screening when discussing the comprehensive management of women with heavy periods (Rees, 1987).

In addition to psychological morbidity and its impact and effects, it has been suggested that reports of loss may be related to the outcome a woman wishes to achieve. For example, if she wishes an end to menstruation (regardless of the heaviness of her periods) she may present her periods in such a way as to make that end more likely (Higham & Reid, 1995). All of these factors are relevant because they impact upon her behaviour including request for referral and presentation of symptoms. It is also well known that beliefs and attributions have a significant impact on our mental health. It is therefore possible (and for a future study to investigate) that improving some women's knowledge or correcting false attributions about the menstrual cycle may have some psychological benefits. It would seem that in Switzerland such an approach has reduced hysterectomy rates (Domenighetti et al, 1988) although it is not clear what happened from a

psychological perspective. Gath (1995) in his series of studies in Oxford appears to demonstrate changes in the profile of women attending for surgical intervention for heavy periods with the main suggested mechanism being changes in referral trends and beliefs of referring doctors.

With respect to the beliefs that women hold about their periods there is clearly a role for performing actual loss measurements in at least some women. Seven women with low loss in this study declined operative intervention when the situation was explained to them. This was an educational intervention in the sense that it allowed women to reference the heaviness of their periods against accepted benchmarks. This was reassuring to some women.

In summary then, I would make two points. First, that perceptions of symptoms, reporting of symptoms and the psychological impact of symptoms may be quite different for different women, but when they interface with professional practice they may lead down certain therapeutic tracks, and in a proportion of women this may be unnecessary. Second, whilst gynaecological symptoms may be responsible for aspects of psychological state, many other unrelated factors affect us psychologically and some of these may impact on the perception and reporting of symptoms in some women.

Mood disorder is an important accompaniment that is found in women presenting for endometrial ablation with heavy periods. This mirrors findings examining similar groups of women presenting for hysterectomy (Gath et al, 1982a, 1982b; Osborn & Gath, 1990; Ryan et al, 1989). I have found that for a proportion of women mood disorder is not alleviated by operation. Previous authors have attributed this to the psychological consequences of hysterectomy, but this group of women were receiving endometrial ablation and so hysterectomy cannot be responsible here.

Mood disorder is not closely enough linked to actual menstrual loss that low actual loss could be used as an indicator of psychiatric referral, but the finding that a large proportion of women counselled from operation in this study had psychological morbidity makes the use of a simple screening instrument worthwhile. All the instruments used in this study had good specificity but poor sensitivity. Sensitivity and specificity scores were used to give guidance only since none of the instruments used were designed to be able to predict or screen for all mental illnesses. They were designed to look for subgroups of psychological morbidity. For example, whilst PSE delineates psychiatric diagnosis, the HAD depression subscale looks specifically for depression. I would therefore expect sensitivity scores to be poor and specificity scores to be good. This is indeed what happened. The fact that there are few false positives means that when a woman in this group scores highly this should be taken seriously, and her emotional symptoms acknowledged and discussed to decide on any necessary interventions or referrals. The most simple screening instrument to use in a busy clinic is the HAD scale. The Higham chart did not appear to be useful because of high false positive rates (low specificity). The findings of this study suggest that should a woman screen positive this would not be a reason to prevent surgical intervention, particularly where heavy periods are demonstrably present. It is however the case that high psychological morbidity scores together with low actual loss measurements would indicate a poor outcome post-operatively. Post-operative screening of psychological status is also important with a view to advising some women with high screening scores to seek future help for their psychological problems.

A final clinical question relates to the ethics of operative treatment for a symptom, where many women have low actual menstrual loss, and some women

with psychological symptomatology do not improve after surgery. Conversely, since some women with heavy periods do very well post-operatively, both in terms of gynaecological symptomatology but also psychologically, is it justifiable to withhold the operation from women because some do badly? Psychological screening and measurement of actual loss are two ways of gaining more information. Given that there is a welcome trend to integrate patient choice and autonomy into the decision making process about surgical intervention (Gambone and Reiter, 1997), these additional pieces of information will help to produce an informed discussion with a woman who is presenting with heavy periods. Given the finding in one sample that approximately 60% women referred to gynaecology clinics with the complaint of heavy periods receive a hysterectomy (Coulter et al, 1991) clearer information about mental state and actual menstrual loss may prevent operations that in some women are at best unnecessary and at worst potentially physically or psychologically damaging.

IN SUMMARY

The findings discussed above are now discussed in the context of the initial hypotheses.

First, that women awaiting endometrial ablation for reported heavy periods would have high rates of psychological morbidity. This was robustly found to be the case for this cohort of women in Leeds. This has not been demonstrated before in women awaiting endometrial ablation.

Second, that women presenting with reported heavy periods **and** low (or normal) menstrual loss pre-operatively would have high levels of psychiatric morbidity. Overall analysis of women who measured their actual loss showed that women with low actual loss did indeed have high levels of psychiatric morbidity. However, this was not significantly different from women with high actual loss. Possible reasons for this are postulated in the discussion above. Of seven women counselled from surgery because of low or very low actual loss, 6 had significant psychological problems that were not the result of actual heavy periods.

Third that overall the rates of psychological morbidity would drop post-operatively. This was shown to be correct with a significant reduction in psychological morbidity fifteen months after operation. This did not drop to population levels. It is probable that some of this reduction relates to the amelioration of gynaecological symptoms and this is confirmed by most women when they were asked, and in their subjective gynaecological and psychological improvement ratings. Again, this finding has not been demonstrated before in the

research literature in women undergoing endometrial ablation for dysfunctional uterine bleeding.

Fourth that women with high actual menstrual loss and high pre-operative psychiatric morbidity would show significant improvements in post-operative psychological morbidity. This group of women had a post-operative psychiatric morbidity of 31%. Women who did best post-operatively from a psychological perspective were those with high loss and low psychiatric morbidity (with only 6% post-operative caseness). Women with low loss and who were not psychiatric cases had 18% post-operative morbidity.

Fifth, that women with low actual menstrual loss and high pre-operative psychiatric morbidity would be less likely than the other women to see improvements in post-operative psychiatric morbidity. This group of women did indeed fare worst with 39% post-operative psychiatric morbidity.

ACKNOWLEDGEMENTS

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APPENDICES

APPENDIX 1

Higham Chart for scoring reported menstrual loss

Before starting to fill in your menstrual blood loss chart, *please study the instructions and example chart inside.*

These charts should only be used with size 2 sanitary towels or Super Plus tampons — there is one chart for towels and a separate chart for tampons. If you use *both*, complete the towel and tampon charts together.
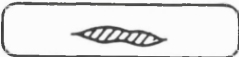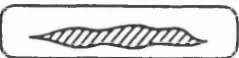
INSTRUCTIONS

Name...

Date period started.......................................

1. Enter your name and the start date (first day of your period).

2. *Before you dispose of each towel or tampon,* compare it with the pictures on the chart.

3. To record the amount of blood loss, make a mark (I) in the box opposite the picture which looks like your towel/tampon. Make a mark every time you discard a pad or tampon — on every day of your period.

4. When you reach four marks (IIII), make the next mark like this (IIII).

5. If you notice any blood clots on the towel/tampon, or pass any in the toilet, write in the size and number each day. Guess the size by comparing the clots to coins (see examples).

6. If you experience any flooding, write F on the day it happens.

7. Please do not forget to return your completed chart(s) to the hospital/clinic. If you do not understand how to complete these charts, *please* do not be embarrassed to ask your doctor — it is important to complete the chart correctly.

1p **2p** **50p**
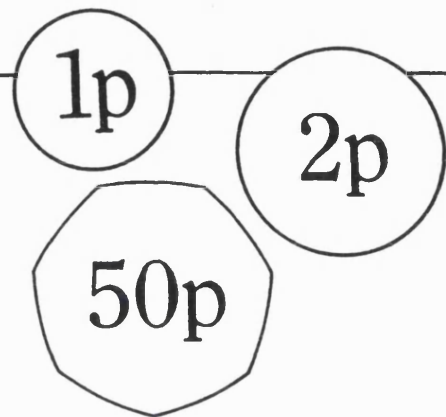
TOWEL	1	2	3	4	5	6	7	8
(light)	II	I	I	IIII	II	I		
(medium)		IIII	IIII	III	I			
(heavy)		I						
CLOTS		50px1 1px2	1p x1					
FLOODING								

© Sterling-Winthrop 1990

TOWEL	1	2	3	4	5	6	7	8	
CLOTS									
FLOODING									

© Sterling-Winthrop 1990

TAMPON	1	2	3	4	5	6	7	8	
CLOTS									
FLOODING									

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APPENDIX 2

Present State Examination rating Sheet

PRESENT STATE EXAMINATION

Score Sheet

PROJECT NUMBER

| | | | 1,2
|__|__|

SUBJECT'S IDENTIFICATION NUMBER

| | | | | 3,4,5
|__|__|__|

| | | | | 6,7,8
|__|__|__|

CARD NUMBER

| | | | 9,10
|__|__|

Rater's initials

| | | |
|__|__|

Subject's initials

| | | |
|__|__|

Date of completion

| | | | | | | | | |
|__|__| |__|__| |__|__|
day   month   year

Rater is Interviewer = 0
Rater not Interviewer = 1

| |
|__|

Live interview = 0
Video interview = 1
Audio interview = 2

| |
|__|

IMPORTANT NOTE : THIS SCORE SHEET SHOULD BE USED IN CONJUNCTION
WITH THE PSE (9th EDITION) INTERVIEW SCHEDULE.
Unless otherwise stated in the PSE schedule the
following codes should be used :

0 = Not present	8 = Not applicable
1 = Moderate	9 = Not known
2 = Severe	

TIME : Past four weeks

NB The numbers to the left of the symptoms conform to the PSE (9th Edition) symptom number.

---

2. HEALTH, WORRYING, TENSION

No	Symptom	Code	No	Symptom	Code
1	Subject's own subjective evaluation of present physical health	I___I 11	9	Hypochondriasis	I___I 19
2	Presence of physical illness or handicap	I___I 12	10	Subjective feeling of 'Nervous tension'	I___I 20
3	Psychosomatic symptoms (Special projects only)	I___I 13	11	Hypersensitivity to noise	
4	Worrying	I___I 14		**3. AUTONOMIC ANXIETY**	
5	Tension pains	I___I 15	11a	Free-floating autonomic anxiety	I___I 21
6	Tiredness or exhaustion	I___I 16	12	Anxious foreboding with autonomic accompaniments	I___I 22
7	Muscular tension	I___I 17	13	Autonomic anxiety due to delusions, etc.	I___I 23
				.......cut off.......	
8	Restlessness	I___I 18	14	Panic attacks with autonomic symptoms	I___I 24

15	Situational autonomic anxiety	|___| 25

25 Suicidal plans or acts |___| 35

......cut off......

| 16 | Autonomic anxiety on meeting people | |___| 26 |

26 Anxiety or depression primary |___| 36

| 17 | Specific phobias (not general situational anxiety) | |___| 27 |

27 Morning depression |___| 37

| 18 | Avoidance of anxiety provoking situations | |___| 28 |

6.   SELF AND OTHERS

4.   THINKING, CONCENTRATION, ETC.

28 Social withdrawal |___| 38

| 19 | Subjectively inefficient thinking | |___| 29 |

29 Self-depreciation |___| 39

| 20 | Poor concentration | |___| 30 |

30 Lack of self-confidence with other people (in social relationships) |___| 40

| 21 | Neglect due to brooding | |___| 31 |

31 Simple ideas of reference (not delusions) |___| 41

| 22 | Loss of interest | |___| 32 |

......cut off......

......cut off......

32 Guilty ideas of reference |___| 42

5.   DEPRESSED MOOD

| 23 | Depressed mood | |___| 33 |

33 Pathological guilt |___| 43

| 24 | Hopelessness (Subject's own view at present) | |___| 34 |

7   APPETITE, SLEEP, RETARDATION, LIBIDO

34	Loss of weight due to poor appetite	|__| 44
35	Delayed sleep	|__| 45
36	Subjective anergia and retardation	|__| 46

......cut off......

37	Early waking	|__| 47
38	Loss of libido (within present episode of illness and persisting during past month	|__| 48
39	Premenstrual exacerbation	|__| 49

8   IRRITABILITY

40	Irritability	|__| 50

9   EXPANSIVE MOOD AND IDEATION

41	Expansive mood (not ordinary high spirits)	|__| 51
42	Subjective ideomotor pressure	|__| 52

......cut off......

43	Grandiose ideas and actions and similar rituals	|__| 53

10   OBSESSIONS

44	Obsessional checking and repeating	|__| 54
45	Obsessional cleanliness and similar rituals	|__| 55
46	Obsessional ideas and rumination	|__| 56

11   DEREALISATION AND DEPERSONALISATION

47	Derealisation	|__| 57
48	Depersonalisation	|__| 58

12   OTHER PERCEPTUAL DISORDERS (NOT HALLUCINATIONS)

49	Delusional mood	|__| 59

......cut off......

50	Heightened perception	|__| 60

51 Dulled perception |‾‾| 61
                      |__|

52 Changed perception |‾‾| 62
                       |__|

53 Changed perception of time |‾‾| 63
                               |__|

54 Lost emotions |‾‾| 64
                  |__|

13. THOUGHT READING, INSERTION ECHO, BROADCAST

......cut off......

55 Thought insertion |‾‾| 65
                      |__|

56 Thought broadcast |‾‾| 66
                      |__|

57 Thought echo or commentary |‾‾| 67
                              |__|

58 Thought block or withdrawal |‾‾| 68
                               |__|

59 Delusions of thoughts being read |‾‾| 69
                                     |__|

14 HALLUCINATIONS

......cut off......

14A Auditory Hallucinations

60 Non-verbal auditory hallucinations |‾‾| 70
                                       |__|

61 Verbal hallucinations based on depression or elation or voice calling subject |‾‾| 71
                                                                                  |__|

62 Voice(s) discussion of subject in third person or commenting on thoughts or actions (not based on depression or elation) |‾‾| 72
                                                                                                                            |__|

63 Voice(s) speaking to subject (not based on depression or elation) |‾‾| 73
                                                                      |__|

64 Dissociative hallucinations (verbal and /or other) |‾‾| 74
                                                       |__|

65 Pseudo- or true hallucinations |‾‾| 75
                                   |__|

14B Visual Hallucinations

......cut off......

66 Visual hallucinations |‾‾| 76
                         |__|

67 Delirious visual hallucinations |‾‾| 77
                                    |__|

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14C. Other Hallucinations

......cut off......

68 Olfactory hallucinations | | 78
                                |___|

69 Delusion that subject smells | | 79
                                    |___|

70 Other hallucinations and | | 80
    delusional elaboration |___|

        Project | | | 1,2
                    |___|___|

        Patient | | | | 3,4,5
                    |___|___|___|

                    | | | | 6,7,8
                    |___|___|___|

        Card No. | | | 9,10
                    |___|___|

15   DELUSIONS

        ......cut off......

15A. Delusions of Control

71 Delusions of control   . | | 11
                               |___|

15B. Misinterpretations.
     Misidentification and
     Delusions of Reference

72 Delusions of reference | | 12
                              |___|

73 Delusional misinterpretation | | 13
    and misidentification |___|

15C. Delusions of Persecution

74 Delusions of persecution | | 14
                                |___|

15D. Expansive Delusions

75 Delusions of assistance | | 15
                               |___|

76 Delusions of grandiose | | 16
    abilities |___|

77 Delusions of grandiose | | 17
    identity |___|

15E. Delusions Concerning Various
     Types of Influence and
     Primary Delusions

78 Religious Delusions | | 18
                           |___|

79 Delusional explanations in
    terms of paranormal | | 19
    phenomena |___|

80 Delusional explanations in | | 20
    terms of physical forces |___|

81 Delusions of alien forces
   penetrating or controlling
   mind (or body) |___| 21

82 Primary delusions |___| 22

15F. Other Delusions

83 Subculturally influenced
   delusions |___| 23

84 Morbid jealousy |___| 24

85 Delusion of pregnancy |___| 25

86 Sexual delusions |___| 26

87 Fantastic delusions, delusional
   memories, delusional
   confabulations |___| 27

15G. Simple Delusions Based on
     Guilt, Depersonalisation,
     Hypochondriasis, etc.

88 Delusions of guilt |___| 28

89 Simple delusions concerning
   appearance |___| 29

90 Delusions of depersonalisation |___| 30

91 Hypochondriacal delusions |___| 31

92 Delusions of catastrophe |___| 32

15H General Ratings of Delusions
and Hallucinations

93 Systematisation of delusions |___| 33

94 Evasiveness |___| 34

95 Preoccupation with delusions
   and hallucinations |___| 35

96 Acting out delusions |___| 36

16. SENSORIUM AND FACTORS AFFECTING

97 Fugues, blackouts, amnesia
   lasting more than one hour |___| 37

98 Drug abuse during month |___| 38

99 Alcohol abuse during past
   month |___| 39

100 Dissociative states during
    past month |___| 40

101 Conversion symptoms |___| 41

102 Clouding or stupor at
    examination |___| 42

Any suspicion of poor memory/
disorientation

103 Organic impairment of
    memory |___| 43

17. INSIGHT

104 If psychotic symptoms
    (sections 12-15) |___| 44

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105	If neurotic symptoms (sections 1-11 only)	|__| 45
106	Social impairment due to neurotic condition	|__| 46
107	Social impairment due to psychotic condition	|__| 47

13 - 20   BEHAVOUR, AFFECT AND SPEECH

108	Self-neglect	|__| 48
109	Bizarre appearance	|__| 49
110	Slowness and underactivity	|__| 50
111	Agitation	|__| 51
112	Gross excitement and violence	|__| 52
113	Irreverent behaviour	|__| 53
114	Distractability	|__| 54
115	Embarrassing behaviour	|__| 55
116	Mannerisms and posturing	|__| 56
117	Stereotypies etc.	|__| 57
118	Behaves as if hallucinated	|__| 58
119	Catatonic movements	|__| 59
120	Observed anxiety	|__| 60
121	Observed depression	|__| 61
22	Histrionic	|__| 62

123	Hypomanic affect	|__| 63
124	Hostile irritability	|__| 64
125	Suspicion	|__| 65
126	Perplexity (puzzlement)	|__| 66
127	Lability of mood	|__| 67
128	Blunted affect	|__| 68
129	Incongruity of affect	|__| 69
130	Slow speech	|__| 70
131	Pressure of speech	|__| 71
132	Non-social speech	|__| 72
133	Muteness	|__| 73
134	Restricted quantity of speech	|__| 74
135	Neologisms and idiosyncratic use of words or phrases	|__| 75
136	Incoherence of speech	|__| 76
137	Flight of ideas	|__| 77
138	Poverty of content of speech	|__| 78
139	Misleading answers	|__| 79
140	Re-rate adequacy of interview	|__| 80

Montgomery & Asberg Depression rating Scale (MADRS)

The Montgomery and Asberg Depression Rating Scale (Montgomery & Asberg, 1979) is a semi-structured scale based upon interview and appearance.

Ten items are rated on a scale of 0 to 6. The items relate to:

insomnia,

lassitude,

psychic tension,

guilty or pessimistic thoughts,

reported sad mood,

appetite,

anhedonia (inability to experience feelings and pleasure),

concentration,

suicidal thoughts and

sad appearance.

Clinical Anxiety Scale (CAS)

The Clinical Anxiety Scale (Snaith et al, 1982) is a semi-structured assessment instrument for the assessment of the present state of anxiety. The subject is asked to consider anxiety over the past two days and the rater is given a series of guidelines to score each of seven items from 0-4. The items are

ability to relax (muscular tension)

startle response (hyperarousability)

subjective worrying

apprehension

restlessness

psychic tension

and panic attacks

A maximum score of 28 is possible. The authors report that severity of anxiety is represented by the following scores:

mild   5-10

moderate   11-16

severe   greater than 17

Hospital Anxiety and Depression Scale (HAD Scale)

The Hospital Anxiety and Depression scale (Zigmond & Snaith, 1983) is a self report questionnaire where the subject is asked to tick boxes relating to fourteen items, seven of which relate to anxiety and seven of which relate to depression. The anxiety items relate to:

Subjective feelings of tension

anticipatory fear

worrying thoughts

ability to relax and sit at ease

stomach 'butterflies' associated with fear

restlessness

panic feelings.

Depressive items relate to:

ability to enjoy things as before

ability to laugh and see the funny side of things

feeling cheerful

feeling slowed down

loss of interest in appearance

looking forward to things

ability to enjoy book/television/radio.

Items allow four possible answers and require the subject to tick boxes. They are scored from 0-3. This gives a maximum score of 21 for anxiety and 21 for depression. The authors report that a score above 11 represents the presence of significant anxiety and/or significant low mood respectively.

The Irritability Depression and Anxiety Scale (IDA Scale)

The Outward Irritability subscale of the Irritability Depression and Anxiety (IDA) Questionnaire (Snaith et al, 1978) is a self administered questionnaire. It is similar to the HAD Scale. It comprises an Outward Irritability subscale and an Inward Irritability subscale. The items for outward irritability are as follows:

losing temper with others verbally

being impatient with others

feelings that one might lose control and be aggressive

being upset by others enough to slam doors or bang about

A maximum score would be 12.

APPENDIX 7

Visual analogue Scales

Date   **FEELING SCALES**

The following lines represent the extremes of certain emotions and feelings which have been labelled. Please mark an X on these lines. Please judge, as accurately as possible, how you have been feeling over the last week, and place the X at the point on the line which fits best with the way that you have been feeling.

No Anger   _____ Extreme Anger

No Irritability   _____ Extreme Irritability

No Feelings of   _____ Intense feelings of
Femininity   Femininity

Not at all   _____ Extremely
self-conscious   self-conscious

No Anxiety   _____ Extreme Anxiety

Not feeling   _____ Extremely sexually
sexually   attractive
attractive at all

No depression   _____ Intense depression

No feelings of   _____ Complete feelings of
womanhood   womanhood

No   _____ Full self-confidence
Self confidence