Readmission to hospital 5 years after hysterectomy or endometrial resection in a national cohort study

A Clarke, A Judge, A Herbert, K McPherson, S Bridgman, M Maresh, C Overton, D Altman

Original Article

Objective: To investigate the readmission experience of a large national prospective cohort of women up to 5 years after undergoing either transcervical resection of the endometrium (TCRE) or hysterectomy to assess reasons for readmission and whether TCRE can be viewed as a definitive substitute for hysterectomy.

Design and participants: Data are from the VALUE/MISTLETOE prospective national cohort studies of hysterectomy and TCRE respectively. 5294 women who underwent hysterectomy for dysfunctional uterine bleeding in 1994/5 and 4032 women who underwent TCRE in 1993/4 and who responded to postal questionnaires were included. Surgeons gathered operative details. Women completed postal follow up questionnaires at 3 and 5 years after surgery asking about readmission and reasons for readmission. Adjusted proportional hazard ratios were calculated for likelihood of readmission in each category comparing types of surgery.

Results: 41.7% of women undergoing hysterectomy and 44.6% of women undergoing TCRE experienced one or more readmissions to hospital overall within 5 years (adjusted hazard ratio for all readmissions (AHR) 0.87 (95% confidence interval (CI) 0.80 to 0.95)). 12.6% of hysterectomy patients and 30.3% of TCRE patients were readmitted for gynaecological reasons (AHR 0.40 (95% CI 0.33 to 0.48)). Rates of readmission for gynaecological reasons were similar up to 6 months but were markedly reduced for hysterectomy compared with TCRE patients towards the end of the follow up period (AHR for readmission at 3–5 years 0.28 (95% CI 0.20 to 0.39)).

Conclusions: There are differences in the pattern of readmission to hospital after hysterectomy and TCRE for dysfunctional uterine bleeding. Women undergoing a hysterectomy are less likely to be readmitted to hospital up to 5 years after their operation overall, and are significantly less likely to be readmitted for reasons related to their operation, particularly for gynaecological reasons. Hysterectomy appears to be a more definitive operation. The different options for surgery for dysfunctional uterine bleeding are not interchangeable; they represent different patterns of care. Information should be available to women and practitioners to inform choices between these options.

Readmission to hospital has been seen as a potential measure of outcome of care. It is attractive because it can be gleaned relatively easily from administrative databases and because it has an intuitive appeal.1 We were interested in investigating readmission to hospital for women undergoing two different interventions for benign cause menorrhagia or dysfunctional uterine bleeding. Readmission to hospital, especially for operation related reasons, is likely to be distressing and may indicate a lack of definitive intervention in the index (first) admission. We wanted to compare readmission as a measure of outcome and quality for women undergoing either hysterectomy or transcervical resection of the endometrium (TCRE) to assess whether the newer operation (TCRE) can be seen as a definitive substitute for hysterectomy.

Both of these operations are common. More than 42 000 women in the UK opted to have a hysterectomy in the public sector in 2002–3, and in the preceding year there were more than 21 000 hospital admissions for TCRE.2 Benign cause menorrhagia, otherwise known as dysfunctional uterine bleeding (persistent troublesome menstrual bleeding), is the main reason for this surgery for most of these women.4,5 Hysterectomy is a major operation entailing an abdominal incision and removal of the uterus and sometimes also the fallopian tubes and ovaries. TCRE is a more minor procedure involving in situ destruction of the endometrium. Whereas hysterectomy entails a length of stay of 4 days or more, TCRE is undertaken as a day case procedure and therefore, in the first instance, costs substantially less. There is a recent UK recommendation from NICE (the National Institute for Clinical Excellence which makes recommendations to the NHS on the use of drugs and technologies, box 1) on the use of microwave endometrial ablation. NICE recommends substituting hysterectomies in favour of increasing the number of endometrial removals.6 New techniques of TCRE have been introduced.6 Bysterectomy, however, remains popular despite the introduction of these new less invasive techniques.7

There are a number of important issues related to quality which need to be taken into consideration in decisions about which operation should be undertaken in practice, but information is not always readily available to help patients or professionals in making decisions related to the surgery.7,8 Health trade-offs are known to exist alongside cost trade-offs. A systematic review undertaken by Lethaby et al9 comparing hysterectomy and TCRE suggests that, while both procedures are effective and satisfaction rates are high, there is a significant advantage in favour of hysterectomy in the improvement of menstrual bleeding, satisfaction, SF36 scores and general health at 1 year. But this has to be traded off against reduced immediate complications, an earlier return to work, and lower health care costs for those undergoing the less invasive initial operation of endometrial resection.9 Lethaby et al9 also reported that women undergoing
We were interested in the readmission experience of women undergoing endometrial resection compared with hysterectomy. The VALUE MISTLETOE studies set out to compare outcomes for women undergoing hysterectomy and transcervical resection of the endometrium undertaken for menorrhagia or dysfunctional uterine bleeding after adjustment for appropriate confounders (including exogenous and endogenous oestrogens) in a national unselected cohort of women.

Three sets of outcomes to be compared:

- Short term outcomes: early operative and postoperative complications.
- Medium term outcomes: readmission, medications, bladder and sexual functioning.

**Participants**

25,929 eligible women were recruited from routine practice and included in the original cohort: inclusion criteria included: age under 60 years, suffering from dysfunctional uterine bleeding, no diagnosis of cancer.

**Methods**

92% of women have been flagged at the NHS Central Registry so that diagnoses of cancer or mortality can be logged. Consultants completed operative case notes on the women at surgery and again at follow up. Postal questionnaires enquiring about change in circumstances and relevant outcomes were sent at 1, 3, and 5 years after surgery.

More information is available from Maresh et al. and Overton et al.

endometrial ablation were more likely to require further surgery in each year of the first 4 years of follow up where comparative data were available (OR 9.8, 95% CI 4.9 to 19.7 at year 4), and that this narrowed the initial cost differential between the two operations.

We report here 5 year follow up data from the ongoing VALUE-MISTLETOE prospective studies of an unselected cohort of women in the UK designed to investigate the risks of two types of gynaecological surgery for dysfunctional uterine bleeding (benign cause menorrhagia) (box 2).

We were interested in the readmission experience of women undergoing endometrial resection compared with hysterectomy.

**METHODS**

**Participants and methodology**

Information was collected from over 400 gynaecologists who provided baseline information and information on the operation, at discharge and 6 weeks after surgery. Baseline data included patient identifiers, relevant past medical history, number of pregnancies, previous gynaecological management, and indications for surgery. Operative information included details of surgical methods used, operative findings, grade of surgeon, and complications. Women who had undergone either TCRE or hysterectomy, who were premenopausal, aged under 60 years, free of cancer, and for whom the indication for surgery was benign cause menorrhagia or dysfunctional uterine bleeding were included and were sent follow up postal questionnaires at 1, 3, and 5 years after surgery. The postal questionnaires asked for information on whether and when women had been readmitted to hospital and the reasons for that readmission; they also covered satisfaction with the procedure and various aspects of health and quality of life.

Ethical approval was obtained from the relevant ethical committees and the British Medical Association (BMA) and the UK Royal College of Obstetricians and Gynaecologists (RCOG) approved the study.

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**Box 1 The National Institute for Clinical Excellence (NICE)**

**About NICE**

The National Institute for Clinical Excellence (NICE) is part of the NHS. It is the independent organisation responsible for providing national guidance on treatments and care for people using the NHS in England and Wales. Guidance is intended for healthcare professionals, patients and their carers to help them make decisions about treatment and health care.

NICE guidance is developed using the expertise of the NHS and wider healthcare community including NHS staff, healthcare professionals, patients and carers, industry and the academic community.

Technology appraisals are recommendations on the use of new and existing medicines and treatments within the NHS in England and Wales such as:

- medicines;
- medical devices (for example, hearing aids or inhalers);
- diagnostic techniques (tests used to identify diseases);
- surgical procedures (for example, repairing hernias);
- health promotion activities (for example, ways of helping people with diabetes manage their condition).

NICE recommendations are based on a review of clinical and economic evidence. Clinical evidence measures how well the medicine or treatment works, and economic evidence, put simply, is a measure of how well the medicine or treatment works in relation to how much it costs—does it represent good value for money? NICE acknowledges that something can be both expensive and good value for money.

**What are technology appraisals for?**

NICE is asked to look at particular drugs and devices where the availability of the drug or device varies across England and Wales or where there is confusion or uncertainty over its value. To end this uncertainty, NICE makes a national decision on its use.

Since January 2002, the NHS has been legally obliged to provide funding and resources for medicines and treatments recommended by NICE as part of its technology appraisals programme.
Readmission to hospital was defined as either overnight or day case admission after the index surgical operation. Timing of readmission was divided into six categories: 0–6 weeks, 6–12 weeks, 12 weeks–6 months, 6–18 months, 18 months–3 years, 3–5 years. Free text reasons given by respondents for their readmission were collated into larger subcategories—for example, gall bladder related, mental health related, etc.

Four categories of readmission were then constructed with reference to previous research on readmission, the outcomes of hysterectomy and endometrial resection, and were agreed with practising gynaecologists (CO and MM). The four categories identified were: “all”, “unrelated”, “operation related”, and “gynaecological”. “All” included all readmissions to hospital for a day case procedure or longer; “unrelated” were identified as those where a relationship to the original surgery was considered to be highly unlikely; “operation related” were defined as those where a readmission was considered by the research team to be related to the original index admission; and “gynaecological” was identified where women were readmitted to hospital for reasons such as vaginal bleeding, gynaecological pain, or for repeat surgical intervention and is a subcategory of “operation related”. Table 1 gives examples of categories identified for different reasons for readmission.

### Statistical analysis

STATA 8 was used to model the rate of readmission to hospital. A Cox proportional hazards model was fitted to investigate time to first readmission up to 60 months after operation.

A hazard ratio (HR) was produced for each of the categories of readmission (all, unrelated, operation related, and gynaecological) controlling for age, number of pregnancies, current/previous history of serious illness, marital status, presence of fibroids found at surgery, and operator status. The assumption of proportionality was checked through a visual check of a log-log plot and formal testing using Schoenfeld’s residuals. When there was evidence of non-proportionality, separate hazard ratios were estimated for time intervals of <6 weeks, 6–12 weeks, 12 weeks to 6 months, 6–18 months, 18–36 months, and 36–60 months.

In addition, a Poisson regression model was fitted to calculate a rate based on the number of readmissions and person-years of observation at risk, in time intervals after surgery of 0–6 weeks, 0–12 weeks, 0–18 months, 0–36 months, and 0–60 months. The standard error was inflated using the square root of the Pearson χ² statistic because repeat readmissions in the same woman cannot be assumed to be independent.

### RESULTS

#### Recruitment and response

A total of 26 758 women in the original studies had dysfunctional uterine bleeding, were premenopausal, under 60 years of age, and cancer-free and were eligible for inclusion in this analysis. The sample is representative of women in the reference population in terms of age, indications, and surgical method used. The data used for analysis of readmission to hospital come from those who responded to the 3 and 5 year follow up questionnaires (table 2).

Table 3 shows a comparison of the characteristics of women who responded to 3 and 5 year follow up questionnaires with those included in the original cohort. The respondents were representative of the original cohorts and were well balanced with respect to most confounders. A higher number of fibroids was found in women in the TCRE cohort (difference 18.14% (95% CI 16.39 to 19.89)) who also had a higher percentage of any previous or current serious illness (difference 10.49% (95% CI 9.33 to 11.65)). The majority of women undergoing TCRE were operated on by a consultant, whereas fewer having a hysterectomy had a consultant to perform their surgery (difference 30.99% (95% CI 29.29 to 32.69)). For both interventions, table 4 shows that the majority of women were not readmitted and that most of those who were readmitted were readmitted only once. For both interventions, however, a minority of women experienced more than two readmissions.

A high proportion of readmissions was for day cases (table 5). Most readmissions were for unrelated reasons (62.3% of TCRE readmissions and 78.7% of hysterectomy readmissions overall). About one third of TCRE readmissions and just over one fifth of hysterectomy readmissions were considered to be operation related.

The large majority of operation related readmissions following TCRE were for gynaecological reasons, while the proportion of operation related readmissions following hysterectomy for gynaecological reasons was much smaller.

Table 6 shows crude and adjusted hazard ratios for any readmission (either day case or overnight) at different time periods after TCRE or hysterectomy. Hazard ratios are adjusted for age, number of pregnancies, marital status, presence of fibroids, seniority of operator, and co-morbidity. Figure 1 shows these adjusted hazard ratios for all readmissions for hysterectomy patients at different time intervals and for different types of readmission compared with patients who had a TCRE.

Table 6 and fig 1 show that women undergoing hysterectomy were significantly less likely to be readmitted for any reason by 5 years after surgery. Differences are apparent when comparing both operation related readmissions and gynaecological readmissions at the different time intervals after the index operation. Women who had a hysterectomy...
were equally likely to be readmitted for an operation related reason in the first 12 weeks after surgery but substantially less likely at each time interval after 6 months following their operation. Women who had a hysterectomy were significantly less likely to be readmitted to hospital at all time periods after 6 months for gynaecological reasons (AHR at 5 years 0.28 (95% CI 0.20 to 0.39)).

**DISCUSSION**

In this 5 year follow up study of women undergoing hysterectomy and TCRE for dysfunctional uterine bleeding we found that there are differences in the pattern of readmission to hospital.

Adjusted rates of readmission show that women undergoing a hysterectomy are less likely to be readmitted to hospital up to 5 years after their operation overall (41.7% of women undergoing hysterectomy and 44.6% of women undergoing TCRE experienced one or more readmissions to hospital within 5 years) and are significantly less likely to be readmitted for any reasons related to their operation and more particularly for gynaecological reasons. Women who had a hysterectomy were significantly less likely to be readmitted by 6 months after their surgery for any reasons related to their operation or, more particularly, for gynaecological reasons. Only one in five of the women undergoing hysterectomy was readmitted for a reason related to the operation, whereas over a third (37%) of women undergoing TCRE were readmitted for a reason related to their original surgery. By 5 years, women undergoing a hysterectomy were significantly less likely to be readmitted for gynaecological reasons (AHR 0.28 (95% CI 0.20 to 0.39)). These findings suggest that the different options for surgery for dysfunctional uterine bleeding are not interchangeable. They represent different patterns of care which, at the extremes, could be characterised as either one-off definitive major surgery or multiple minor interventions.

The findings of the study are critically dependent on our categorisations of readmissions as “unrelated”, “operation related”, and “gynaecological.” We worked as a team, including clinicians, and used the published literature to ensure as far as possible that these categories were valid and repeatable. Response rates at 3 and 5 years were disappointingly low, largely due to the relative mobility of this population. Crucially, though, we have no reason to believe that response rates affected reporting of readmission or reason for readmission differentially by the two cohorts, and we have achieved similar response rates to other long term follow up studies in similar areas.17 Our findings are also critically dependent on the accurate recall by our cohorts of their readmissions to hospital over a period of 5 years. Again, we have no reason to suspect that there would be a systematic difference between our cohorts in their ability to recall whether or not they had been admitted to hospital. However, while it is possible that over such a long period some women may have either forgotten the exact reasons for or the exact timing of a readmission to hospital, it is unlikely that there is a systematic difference between the two cohorts in their ability to recall these events and we believe that recall bias is unlikely to affect our findings substantially.

In addition, there is a possible problem in that readmission to hospital may not be an independent signifier of severity of...
complications due to surgery. It is dependent on stoicism of patients as well as local admission rates and on other factors. Again, however, we have no reason to believe that there should be any other reason for systematic variation in readmission rates between our hysterectomy and TCRE cohorts.

Our analyses suggest that respondents are representative of non-respondents. In this unselected sample, however, in actual practice we found the constituencies for the two operations to be different. In particular, women undergoing TCRE had a greater likelihood of suffering from fibroids, a higher rate of co-morbidity, and were more likely to be operated on by a more senior surgeon (a consultant). Although we were able to adjust for these factors in our analyses, they are important. TCRE is a lesser operation and it may be that it is preferentially recommended to women deemed less able to withstand serious surgery. It is also the case that our original cohorts were recruited in the early days of TCRE and the findings of the relative seniority of the operating surgeon may reflect that fact.

In this study fibroids were more likely to be reported in women undergoing a TCRE by their surgeon at operation. Fibroids commonly co-occur with dysfunctional uterine bleeding and are a frequent incidental finding at hysterectomy. Certainly, fibroids may complicate the TCRE procedure and a pre-existing diagnosis of fibroids is a relative contraindication to TCRE. This finding in our results may represent reporting bias (selective over-reporting of the incidental finding of fibroids in the TCRE group). Although we do not believe that these differences in the groups of women undergoing TCRE and hysterectomy change our overall findings, it would be of interest to establish whether there are differences between present day cohorts of women undergoing these operations. Our findings may, however, also have implications for the generalisability of randomised trials in this area.

The women in this study underwent their surgery during the early to mid 1990s. Since that time it is possible that practitioners have improved in their ability to undertake TCRE as the newer techniques have “bedded in”. We believe, however, that these findings are still relevant for today’s practitioners since they represent results of the longest comparative follow up findings to date for the two interventions.

Our findings are of particular interest given the recent guidance to the NHS, the prevalence of dysfunctional uterine bleeding, and the popularity of both methods of intervention to control such bleeding. As yet there is little evidence on

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<th>Table 5</th>
<th>Readmissions by type and whether inpatient or day case admissions</th>
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<tr>
<td>Category of readmission</td>
<td>TCRE Overnight admission</td>
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<tr>
<td>All readmissions</td>
<td>1733</td>
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<tr>
<td>Unrelated</td>
<td>971</td>
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<tr>
<td>Operation related</td>
<td>757</td>
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<tr>
<td>Gynaecological</td>
<td>606</td>
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<tr>
<td>Missing</td>
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**Gynaecological** is a subcategory of “operation related”.
†These women told us they had been readmitted to hospital but gave no reason.

<table>
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<tr>
<th>Table 6</th>
<th>Hazard ratios (HR) of time to first readmission for hysterectomy compared with TCRE (HR = 1.00)</th>
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<tbody>
<tr>
<td>Category</td>
<td>Hysterectomy</td>
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<tr>
<td>All readmissions</td>
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<td>By 5 years</td>
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<td>All operation related</td>
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<td>3–5 years</td>
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<tr>
<td>Gynaecological</td>
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<td>All follow up time</td>
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*HR adjusted for age, number of pregnancies, marital status, presence of fibroids, seniority of operator, and co-morbidity.
quality of life or cost issues at longer term follow up after TCRE or hysterectomy, although one might speculate that the need to return to hospital represents a reduction in quality of life and an increase in healthcare costs.

We need to bear in mind that 55% of TCRE respondents and 58% of hysterectomy respondents did not undergo a repeat admission in the 5 year follow up period. Furthermore, almost half of all the readmissions were day case admissions. Together these results suggest that, for the majority of patients, either operation might suffice as definitive surgery. For a further proportion the need for a single day case readmission may be relatively unbothersome. It would be of interest to investigate these issues further—that different groups of patients may value different outcomes differently. A more prolonged initial period of recovery after a more major operation may be preferable for some people, in the knowledge that the intervention is likely to be definitive. For others, the possibility of a further intervention after a slightly less definitive operation might be a reasonable risk to take. And for some women, a perceived loss of femininity after hysterectomy might far outweigh the possible benefits of a reduction in the likelihood of readmission to hospital. What can be concluded is that, for a substantial minority of women, there are important trade-offs to be made between definitive major surgery and multiple minor surgery. Information for women undergoing these operations should make these trade-offs more explicit. Women should be clearly informed of the different risks and benefits of TCRE and hysterectomy at the time of choosing which operation to undergo for dysfunctional uterine bleeding.

ACKNOWLEDGEMENTS

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REFERENCES


Key messages

• There are differences in the pattern of readmission to hospital for women who have a hysterectomy compared with women who have transcervical resection of the endometrium (TCRE) for dysfunctional uterine bleeding.

• By 6 months after their operation, women who have a hysterectomy are less likely to be readmitted to hospital for any reason and particularly for a gynaecological reason.

• Hysterectomy is a more major operation, but some women may prefer a more definitive intervention which is less likely to result in readmission to hospital.

• Information on the different outcomes of these treatments should be made available to women choosing surgery for dysfunctional uterine bleeding.


Committee on Publication Ethics Seminar 2005
Friday 11 March 2005, 9.30 am – 5 pm, BMA House, London

This year’s seminar will focus on COPE’s new Code of Conduct for Editors and interactive workshops on common ethical and editorial dilemmas. The seminar is for editors, authors, and all those interested in increasing the standard of publication ethics.

The Code aims to set a new basic standard for the ethical conduct of editors and sets out guidelines for quality and correcting the record, standing by decisions made, ethics committee approval, consent for publication confidentiality of submitted material, guidance to authors, pursuing misconduct, relationship to publishers, owners, and advertisers, and conflict of interest. The code also creates a mechanism to refer a complaint to COPE if an editor has breached the code.

The seminar will include:
- The new Code of Conduct for Editors
- Dr Iona Heath, Chair BMJ Ethics Committee—research, audit, and ethics committee approval
- COPE’s new website—full text and keyword searching for COPE’s advice on specific issues, for example research misconduct, conflict of interest, and deception
- Interactive workshops—common ethical and editorial dilemmas for editors
- Opportunities to network with other editors and share your experiences and challenges

The seminar is free for COPE members and £30.00 for non-members. Numbers are limited and early booking is advisable. For registrations or more information please contact Sam Knottenbelt at cope@bmjgroup.com or call 020 7383 6602. For more information on COPE see www.publicationethics.org.uk/
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