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CLINICAL ARTICLE

Using international data to set benchmarks for morbidity outcomes after hysterectomy

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ABSTRACT

Objective: To set an international benchmark for monitoring morbidity after hysterectomy. **Methods:** In a retrospective, observational study, data were assessed from women who underwent abdominal, vaginal, or laparoscopic hysterectomy in three countries (Australia, England, and the USA) between 2008 and 2012. The main outcome measures were length of stay (LOS), readmission, hemorrhage, and intraoperative conversion. **Results:** Overall, 32 181 procedures were included. The intraoperative conversion rate from vaginal and laparoscopic to abdominal hysterectomy was 1.5%. The LOS was significantly higher after abdominal surgery (3 days) than after vaginal (2 days; $P < 0.001$) or laparoscopic (1 day; $P < 0.001$) surgery. LOS was also higher after conversion (3 days) than after vaginal and laparoscopic hysterectomy ($P < 0.001$ for both). Conversion cases had the highest rate of hemorrhage (7.5% vs 2.4% for abdominal, 1.8% vaginal, and 1.2% laparoscopic) and readmission (5.0% vs 4.2% for abdominal, 3.1% vaginal, and 2.8% laparoscopic). The odds of readmission were higher after abdominal than after laparoscopic hysterectomy (odds ratio 1.41, 95% confidence interval 1.19–1.67; $P < 0.001$). **Conclusion:** The morbidity associated with different surgical approaches to hysterectomy, including after intraoperative conversion, should be used as a benchmark. There is a need to measure and publish morbidity data after hysterectomy.

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1. Introduction

Although hysterectomy is one of the most common gynecologic operations—by age 60 years, one in three women in the USA and one in five women in the UK are likely to have had a hysterectomy [1,2]—the rates of postoperative morbidity are rarely analyzed with rigor or published. Consequently, it is impossible for patients to make informed decisions.

In 2002, the UK VALUE study [3] found that operative complications occurred in one of every 30 women undergoing hysterectomy, postoperative complications occurred in at least one of every 10 women, and laparoscopic techniques were associated with increased rates of complication. The subsequent VALUE study [4] concluded that young women, especially those who underwent laparoscopy-assisted vaginal hysterectomy with symptomatic fibroids, were at greatest risk of operative and postoperative complications.

The eVALuate study [5] recruited 1380 patients with an objective to test the null hypothesis that there is no significant difference among abdominal, laparoscopic, and vaginal methods of hysterectomy with regard to outcome measures and to examine the cost-effectiveness of the methods. The study found that abdominal laparoscopic hysterectomy was associated with a significantly higher risk and took longer to perform than abdominal hysterectomy. However, laparoscopic hysterectomy was associated with a shorter recovery period and better short-term quality of life. Another major study of outcomes of hysterectomy, the FINHYST study [6], prospectively analyzed complications occurring in 5279 laparoscopic, abdominal, and vaginal hysterectomies, and concluded that, when possible, hysterectomy should be minimally invasive.

The aim of the present study was to provide an international benchmark for the specific analysis of morbidity after hysterectomy by abdominal, laparoscopic, and vaginal approaches, and to examine the occurrence of a second surgical procedure within 1–7 days of a hysterectomy. The study is part of the Global Comparator Program, a quality improvement program in which healthcare organizations from nine countries (the USA, England, the Netherlands, Australia, Finland, Denmark, Italy, Belgium, and Norway) share outcome data for comparison with the aim of improving patient care. In doing so, norms can be

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established whereby the best performers provide the benchmark of what is achievable for others to improve quality of care for patients.

2. Materials and methods

In a retrospective, observational study, data were compared for women who underwent abdominal, vaginal, or laparoscopic hysterectomy at 25 university, teaching, and district hospitals in Australia, England, and the USA between January 1, 2008, and December 31, 2012. The three study countries were chosen because they had the highest volume of cases in the Global Comparator Program dataset and included 25 hospitals. Robotic hysterectomy was excluded as a procedure group because it has been performed mainly in the USA and could not be evaluated to set benchmarks in the three countries. Urgent short stay admissions, as defined by Bottle et al. [7], were excluded to enable a standardized definition of an inpatient admission across countries. Low-quality records, records with a cancer diagnosis, and records from women younger than 16 years were also excluded. The Global Comparator Scientific and Research Committee approved the study in November 2012. The study did not include patient identifiable data and thus informed consent was not needed.

The study data were interrogated using three procedure-coding systems (ICD-9-CM, ACHI version 7, and OPCS 4.5), and two diagnosis-coding systems (ICD 10, including the Australian modification ICD 10-AM, and ICD 9) [8–11]. Hysterectomy procedure groups were defined as abdominal, vaginal, laparoscopic, and conversion using diagnosis and procedure codes. As a check, feedback was sought on codes and surgical volumes from each participating country and, when possible, each center. Codes for each morbidity were identified and applied to the dataset so that cases with hemorrhage, wound dehiscence, and infection were identified as such.

The main outcome measures extracted from the records were length of stay (LOS), readmission incidence, hemorrhage, conversion, wound infection and/or dehiscence, and second surgical procedure within 1–7 days of the index hysterectomy as a measure of “return to theatre.”

Statistical analyses were performed in R version 2.15.2 (<http://www.R-project.org>). Wilcoxon signed-rank test was used to compare the LOS across hysterectomy type. Logistic regression models were used to investigate the association between readmission or second surgical procedure and type of hysterectomy while controlling for confounders (age, country, and co-morbidity). The data were also analyzed separately within the three study countries (Australia, England, and the USA) to assess global variation. Backwards stepwise elimination was used to help to create a parsimonious model, and χ^2 statistics were used to refine the models. $P < 0.05$ was considered statistically significant.

3. Results

Overall, 32 181 hysterectomy procedures from the three study countries were included in the analysis of morbidity (3351 from Australia, 13 429 from England, and 15 401 from the USA). There was a slight decrease in the frequency of abdominal hysterectomy over the 5-year study period and a corresponding rise in laparoscopic hysterectomy (Fig. 1). No change was evident in the rate of vaginal hysterectomy. The overall rate of conversion from vaginal or laparoscopic to abdominal hysterectomy was 1.5% (483/32 181).

Abdominal and laparoscopic hysterectomies were performed mainly for women aged 30–60 years (data not shown). By contrast, vaginal hysterectomy was performed in equal proportion among all age groups (data not shown). Conversion was most common among women aged 40–50 years (data not shown).

The median LOS was 3 days for abdominal hysterectomy as compared with 2 days for vaginal hysterectomy ($P < 0.001$) and 1 day for laparoscopic hysterectomy ($P < 0.001$) (Fig. 2). LOS after conversion (median 3 days) was also higher than after vaginal and laparoscopic hysterectomy ($P < 0.001$ for both) (Fig. 2).

Readmission rates within 30 days were highest in the conversion group (5.0%) and lowest in the laparoscopic hysterectomy group (2.8%) (Fig. 3). Logistic regression showed that the odds of readmission were highest for women younger than 30 years and for those who underwent abdominal hysterectomy or experienced hemorrhage ($P < 0.001$ for all) (Table 1).

The frequency of a second surgical procedure within 1–7 days of the hysterectomy varied from 0.4% to 1.3% by type of hysterectomy (Fig. 4). Logistic regression showed that the odds of undergoing a second procedure was highest for women younger than 30 years and for those who experienced wound dehiscence, a postoperative infection, or hemorrhage ($P < 0.001$ for all) (Table 2).

The rates of hemorrhage, wound dehiscence, and wound infection are shown in Supplementary Material S1. Conversion cases showed the highest rate of hemorrhage (7.5%). The abdominal hysterectomy group had high rates of wound dehiscence and wound infection (0.4% and 1.5%, respectively). The codes for “wound infection” were analyzed in the present study. In the vaginal hysterectomy group, “infection” was not assessed because the dataset was not examined for high vaginal swab results indicating infection.

Supplementary Material S2 shows the rates of hemorrhage, and wound dehiscence or wound infection at readmission. Regarding readmission, hemorrhage was the most common reason in cases of vaginal hysterectomy, whereas wound problems most frequently led to readmission after abdominal hysterectomy (data not shown).

Overall, the median LOS was lowest in the USA for all three approaches to hysterectomy. After abdominal hysterectomy, the LOS

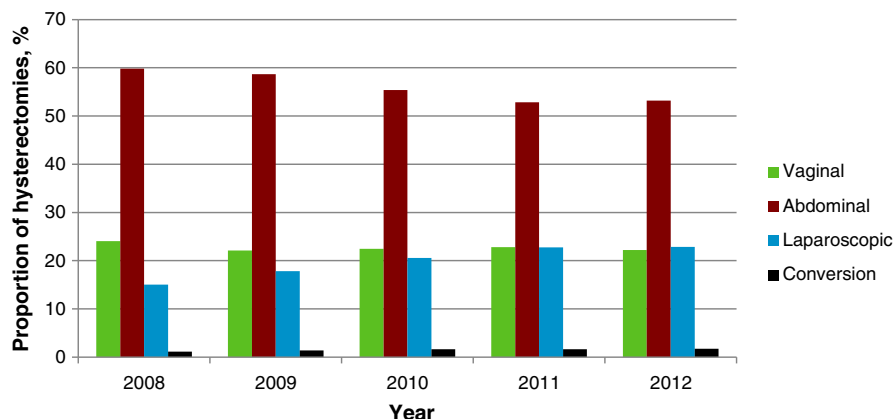


Fig. 1. Rates of each type of hysterectomy by calendar year.

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