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# Hysterectomy in Norway 2008–18

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ORIGINAL ARTICLE

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The author has completed the ICMJE form and declares no conflicts of interest.

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## **BACKGROUND**

Hysterectomy is a common gynaecological procedure. No Norwegian guidelines for the choice of hysterectomy surgical method exist, but international guidelines recommend minimally invasive surgery. The objective of this study was to investigate the kinds of surgical methods that were used for hysterectomies in the period 2008–18. Furthermore, we wished to identify the scope of robot-assisted hysterectomies and to find out whether salpingectomies are undertaken on a benign indication in Norway.

## **MATERIAL AND METHOD**

The study is based on data from the Norwegian Patient Registry. Relevant variables for all gynaecological hysterectomies in Norway in the period 2008–18 were collected at the individual level.

## **RESULTS**

During the study period, 53 178 hysterectomies were registered in the Norwegian Patient Registry. The proportion of hysterectomies that were performed with minimally invasive techniques increased from 41 % to 73 % during the study period. Robot-assisted hysterectomies accounted for 15 % of the total in 2018. The number of concomitant salpingectomies also increased during the period, and were performed in more than half of all hysterectomies undertaken on a benign indication.

## **INTERPRETATION**

Norwegian gynaecologists largely follow international guidelines and recommendations regarding minimally invasive hysterectomy and salpingectomy. Although the total proportion of minimally invasive hysterectomies is now relatively high, there are considerable variations between the different health trusts.

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## **Main findings**

The proportion of hysterectomies performed using minimally invasive methods has increased, but still varies somewhat between the Norwegian hospital trusts.

The number of robot-assisted hysterectomies and hysterectomies with salpingectomy has increased since 2008.

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Hysterectomy is a common gynaecological procedure that can be performed using a variety of techniques. No national guideline regarding the preferred surgical procedure is available, but the national guideline for treatment of women with uterine myoma recommends the use of minimally invasive hysterectomy techniques when possible (1). Such methods include vaginal hysterectomy, laparoscopic hysterectomy and laparoscopically assisted vaginal hysterectomy.

A number of international studies have concluded that minimally invasive hysterectomy methods are preferable to abdominal hysterectomy (laparotomy) because of fewer complications, shorter hospitalisation periods, quicker recovery to a normal level of activity and less post-operative pain (2–5). Robot-assisted hysterectomy has been introduced as a new minimally invasive alternative, but its clinical value and cost-effectiveness are uncertain when compared to other minimally invasive techniques. A number of studies have found only small or non-significant differences between robot-assisted hysterectomy and other minimally invasive methods for hysterectomies undertaken on a benign indication (6, 7). The extent to which robot-assisted hysterectomy is undertaken in Norway is unknown.

Ovarian cancer is often diagnosed at a late stage. In recent years, increasing evidence has indicated that ovarian cancer develops distally in the fallopian tubes (8). Studies have shown that salpingectomy (surgical removal of one or both fallopian tubes) during a hysterectomy does not affect the ovarian reserve or menopausal age to a greater extent than hysterectomy alone, although some of these studies are of a poor quality (9, 10). The international literature recommends undertaking a bilateral salpingectomy during a hysterectomy (11), but no Norwegian guidelines are available.

The objective of this study was to identify the extent to which minimally invasive techniques were used in hysterectomies in Norway in the period 2008–18. We also wished to investigate whether the use of minimally invasive techniques varied between the health trusts or in terms of whether the diagnosis was malignant or benign. Furthermore, we wished to elucidate the scope of robot-assisted hysterectomy techniques and to identify the extent to which a concomitant salpingectomy is performed during hysterectomies undertaken on benign indications.

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## Material and method

The study is based on data from the Norwegian Patient Registry. Information on all hysterectomies undertaken in Norway in the period 2008–18 was collected at the individual level. All surgical codes followed The NOMESCO Classification of Surgical Procedures (NCSP). The following variables were included: the woman's year of birth, year of surgery, health trust, main and additional diagnoses (ICD-10), salpingectomy (LBE00, LBE01) and use of robot-assisted procedures (ZXC96).

In order to include all gynaecological hysterectomies, the following procedure codes were included in the data extract: laparoscopically assisted vaginal hysterectomy (LCD11), laparoscopic subtotal hysterectomy (LCC11), vaginal supravaginal hysterectomy (LCC20), hysterectomy (LCD00), total laparoscopic hysterectomy (LCD01), laparoscopic hysterectomy (LCD04), vaginal hysterectomy (LCD10), supravaginal hysterectomy (LCC10), radical hysterectomy (LCD30), radical laparoscopic hysterectomy (LCD31), radical vaginal hysterectomy (LCD40), other hysterectomy (LCD96), other laparoscopic hysterectomy (LCD97) and vaginal hysterectomy for prolapse (LEF13). Obstetric hysterectomies were not included.

We divided the hysterectomies into the following categories: laparotomy, laparoscopy, vaginal hysterectomy and other. The procedure codes LCD11, LCC11, LCD01, LCD04, LCD31 and LCD97 were included in the group of laparoscopies. Laparoscopic and vaginal hysterectomies were merged in the analysis of the proportion of minimally invasive hysterectomies. Procedures that were coded with two or more incompatible NCSP codes were excluded from the analysis. The data were categorised by health trust. Two hospitals reported a total of two and three hysterectomies respectively during the study period. These were hysterectomies that had been undertaken as part of gastrointestinal surgical interventions in hospitals that had no gynaecological department. We therefore chose to exclude these from the analyses related to surgery volumes in the health trusts.

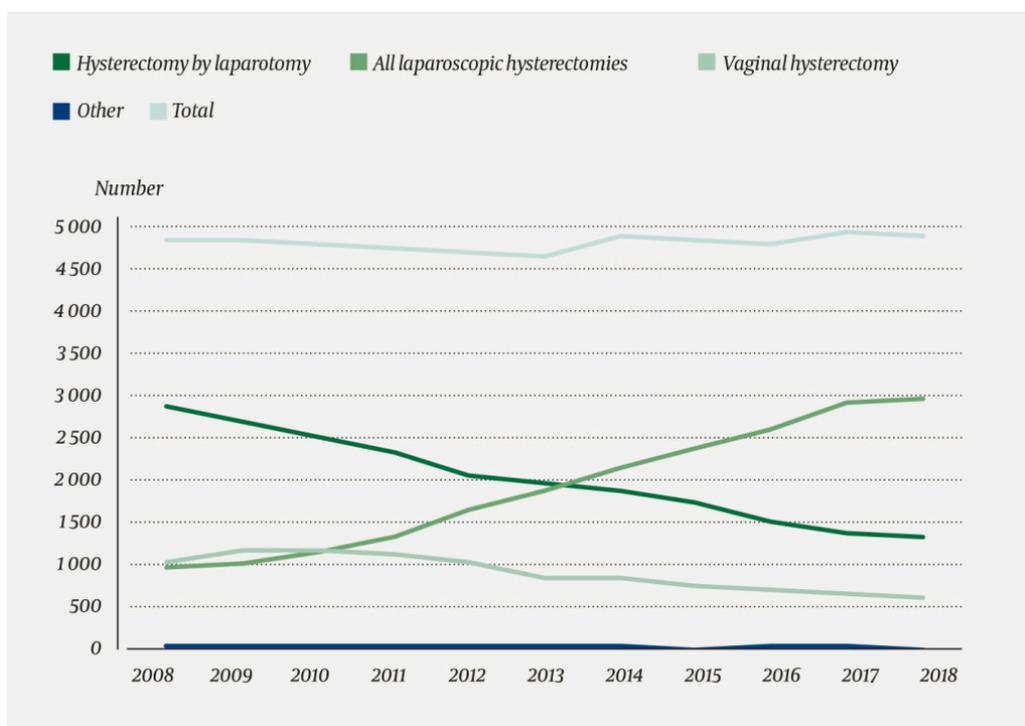
The data from the Norwegian Patient Registry were supplied in an encrypted computer file. The data were analysed with the aid of IBM SPSS, version 26 (IBM, New York) and given as averages (min/max) or percentages.

The Regional Committee of Medical and Health Research Ethics (REK) considered it unnecessary for the study to be subject to approval (REK Sør-Øst B, ref. 28752) and approved an exemption from the duty of confidentiality (REK Sør-Øst B, ref. 28551). The study was approved by the data protection service at the Norwegian University of Science and Technology.

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## Results

During the study period, 53 178 hysterectomies were recorded by the Norwegian Patient Registry. Of these, 150 patients (0.2 %) had multiple hysterectomy codes and were excluded. A total of 53 028 hysterectomies were included in the analyses. The number of hysterectomies remained stable throughout the period, with an annual average of 4821 (Figure 1). Table 1 shows the most common main indications for a hysterectomy. The women's average age at the time of their hysterectomy was 53.0 years (min. 0, max. 97). The average ages of women with malignant and benign diagnoses respectively at the time of their diagnosis were 63.5 (min. 19, max. 97) and 49.7 (min. 0, max. 95) years.



**Figure 1** Hysterectomy methods in Norway 2008–18

**Table 1**

Main indications for hysterectomy in Norway 2008–18

Main indication (ICD-10 code)	Total number (%)
<b>Benign indications</b>	
Leiomyoma (D25)	13 927 (26.3)
Abnormal uterine bleeding (N92)	10 363 (19.5)
Female genital prolapse (N81)	4 490 (8.5)
Endometriosis (N80)	1 852 (3.5)
Pelvic pain <sup>1</sup> (N94)	1 399 (2.6)
Benign neoplasm of ovary (D27)	861 (1.6)
Benign adnexal conditions <sup>2</sup> (N83)	849 (1.6)
<b>Total</b>	<b>33 741 (63.7)</b>
<b>Malignant indications</b>	
Malignant neoplasm of corpus uteri (C54)	6 691 (12.6)
Malignant neoplasm of ovary (C56)	2 721 (5.1)
Malignant neoplasm of cervix uteri (C53)	1 219 (2.3)
<b>Total</b>	<b>10 631 (20.0)</b>
<b>Pre-malignancy and indications with an uncertain potential for malignancy</b>	
Cervical carcinoma in situ (D06)	1 150 (2.2)

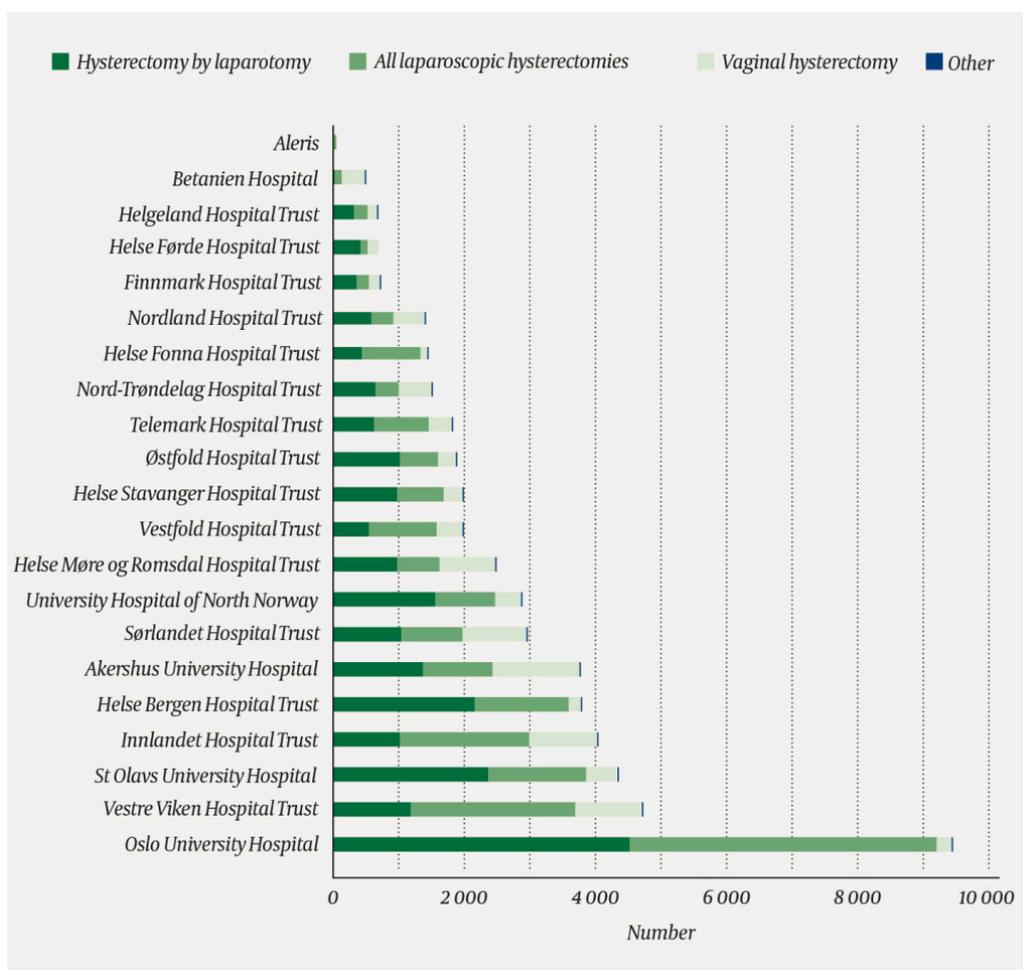
Main indication (ICD-10 code)	Total number (%)
Neoplasm of uncertain behaviour of female genital organs (D39)	1 102 (2.1)
Endometrial hyperplasia (N85.0/N85.1)	851 (1.6)
Dysplasia of cervix uteri (N87)	822 (1.6)
Other	4 731 (8.9)
Total	8 656 (16.3)

<sup>1</sup>N94 (ICD-10) includes various painful conditions in the female genitalia and cyclical symptoms

<sup>2</sup>N83 (ICD-10) includes non-inflammatory conditions in the ovaries, fallopian tubes and ligamentum latum

A total of 20 931 (39 %) hysterectomies were undertaken with laparoscopic techniques, 22 182 (42 %) with laparotomy and 9 808 (18 %) were vaginal. In addition, 107 (0.2 %) hysterectomies were coded as 'other'. The proportion of laparoscopic hysterectomies increased from 20 % in 2008 to 60 % in 2018. During the study period, the proportion of vaginal hysterectomies fell from 21 % to 12 % (Figure 1). The proportion of minimally invasive hysterectomies increased from 41 % in 2008 to 73 % in 2018. In women with a malign disease as indication for surgery, the proportion undergoing a minimally invasive intervention increased from 13 % to 49 %. The corresponding figures for women with benign conditions were 49 % and 81 %.

During the study period, a total of 19 public hospital trusts, one private health enterprise and one foundation reported that hysterectomies had been undertaken because of a gynaecological disorder. The highest number of hysterectomies reported by a single health trust was 9 469, the lowest was 39. Figure 2 shows the distribution of hysterectomy methods by the individual health trusts.



**Figure 2** Hysterectomy methods in all Norwegian health trusts 2008–18

Robots were used in 4028 (8 %) hysterectomies. The use of robots increased at an even pace throughout the study period, and in 2018 nine health trusts used robots and 15 % of all hysterectomies were robot-assisted. A robot was used in 1886 (15 %) of all hysterectomies that were undertaken on a malignant indication and 2142 (5 %) of those undertaken on a benign indication.

The proportion of hysterectomies with salpingectomy in women with a benign indication where the ovaries were preserved increased from 3 % in 2008 to 56 % in 2018. In women with benign conditions, a salpingectomy was undertaken in 68 % of the laparoscopic hysterectomies, 45 % of the abdominal and 18 % of the vaginal hysterectomies in 2018.

## Discussion

Our results show that the number of minimally invasive hysterectomies, robot-assisted hysterectomies and hysterectomies with salpingectomy increased in the period 2008–18. Furthermore, the study shows that the proportion of minimally invasive hysterectomies continues to vary between the health trusts.

A previous study showed that from 2003 to 2006, the proportion of abdominal hysterectomies fell from 75 % to 62 % in women with bleeding disorders and/or myomas (12). We found that the proportion of abdominal hysterectomies on a benign indication was 19 % in 2018. Accordingly, the previously observed

decline in abdominal hysterectomies has continued in Norwegian health trusts. This indicates that Norwegian gynaecologists follow the international recommendations for surgical technique.

A similar increase in minimally invasive hysterectomies has also been observed in other Western countries [\(3\)](#), [\(13–16\)](#). A previous study showed that departments with a low volume of hysterectomies used minimally invasive techniques less frequently [\(12\)](#). This trend was less conspicuous in our findings, but there was still considerable variation between the health trusts.

The principle of equal right to treatment is laid down by law [\(17\)](#). A reduction of unnecessary variation in the provision of health services has been one of the health minister's three main goals for the health services in both 2019 and 2020 [\(18, 19\)](#). Although the trend towards a higher proportion of minimally invasive hysterectomies is promising, there are differences in practices among the health trusts, which in our opinion defies the principle of equal treatment.

Robot-assisted hysterectomy was introduced during the period under study, and the use of this method has increased at an even pace for both malignant and benign diagnoses. Robot-assisted hysterectomy is discussed in the literature, especially for benign gynaecological conditions. A number of studies have shown that robot-assisted hysterectomy does not guarantee a better outcome compared to other minimally invasive techniques for this patient group [\(2, 7, 20\)](#). From the perspective of cost effectiveness, it is therefore worrisome to see that the proportion of robot-assisted hysterectomies is increasing without any assessment of the economic consequences of this trend.

We found a considerable increase in the number of hysterectomies with salpingectomy on benign indications. The same has been observed in studies from other countries [\(21, 22\)](#). Salpingectomy is less frequently undertaken during vaginal hysterectomies. This is also known from a previous study [\(23\)](#). Since performing a salpingectomy is technically more demanding during a vaginal hysterectomy, the recommendation for salpingectomy during hysterectomy may have contributed to the observed reduction in vaginal hysterectomies. A salpingectomy reduces the risk of ovarian cancer and should therefore be taken into consideration in the discussion of hysterectomy method for women being treated for gynaecological disorders [\(11\)](#). It is reassuring to observe that Norwegian gynaecologists appear to incorporate new evidence into their clinical practices. This notwithstanding, a salpingectomy was performed in no more than approximately half of all hysterectomies undertaken on a benign indication in 2018.

One strength of our study is its inclusion of a high number of hysterectomies, which means that this material lends itself to the study of trends. Since Norwegian hospitals must report all surgical procedures to the Norwegian Patient Registry in order to receive funding, the data set is likely to be virtually complete. No validation studies have been undertaken on gynaecological data in the Norwegian Patient Registry, but a validation study of data on diagnosis codes (ICD-10) and surgical codes (NCSP) for orthopaedics has shown satisfactory completeness [\(24\)](#). One weakness of the study is that coding practices may vary, and some procedures and diagnoses are likely to have been miscoded or omitted. Most likely, a salpingectomy has been performed, but not

coded, in a number of procedures. If this is the case, a salpingectomy is performed in a higher proportion of the hysterectomies than indicated in our study. Another weakness is that 150 hysterectomies had been recorded with multiple surgical codes and could therefore not be classified as abdominal, laparoscopic or vaginal.

## Conclusion

The increasing use of minimally invasive hysterectomy methods with concomitant salpingectomy implies that Norwegian gynaecologists follow new guidelines and recommendations. There are variations between the health trusts in terms of their hysterectomy surgical methods, which defies the principle of equal treatment. The number of robot-assisted hysterectomies in Norway is increasing.

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