

# Rates and Routes of Hysterectomy for Benign Indications in Austria 2002–2014

## Hysterektomieraten und Zugangswege in Österreich 2002–2014

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### Key words

hysterectomy, hysterectomy rates, routes of hysterectomy, vaginal hysterectomy, minimally invasive hysterectomy, abdominal hysterectomy

### Schlüsselwörter

Hysterektomie, Hysterektomieraten, operativer Zugangswege bei der Hysterektomie, vaginale Hysterektomie, minimalinvasive Hysterektomie, abdominale Hysterektomie

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### ABSTRACT

**Introduction** Rates and routes of hysterectomy have implications for quality, costs and training. This study analyzed rates of benign hysterectomy and surgical approaches for benign hysterectomy in Austria from 2002 to 2014.

**Material and Methods** This was a population-based retrospective observational study of coding data from all acute

care hospitals (public and private) in Austria. Main outcome measures were numbers of women undergoing hysterectomy for benign indications in Austria per year and the route of hysterectomy for benign indications.

**Results** The number of benign hysterectomies performed per year declined from 10675 in 2002 to 7747 in 2014, a decline of 27%. The use of vaginal hysterectomy was stable (53% and 47%, respectively). Use of laparoscopic techniques increased (5% in 2002, 32% in 2014) whereas use of abdominal hysterectomy decreased (41% and 20%, respectively).

**Conclusions** Numbers of benign hysterectomies performed per year in Austria declined substantially between 2002 and 2014. Use of vaginal hysterectomy was stable at about 50%, whereas increased use of laparoscopic techniques was associated with lower rates of open hysterectomy.

### ZUSAMMENFASSUNG

**Einleitung** Die Anzahl durchgeführter Hysterektomien und der gewählte operative Zugangsweg haben Implikationen für Qualität, Kosten und ärztliche Ausbildung. In dieser Studie wurden die Anzahl der in Österreich zwischen 2002 und 2014 durchgeführten benignen Hysterektomien und der gewählte operative Zugangsweg untersucht.

**Material und Methoden** Es handelt sich hier um eine retrospektive bevölkerungsbezogene Beobachtungsstudie basierend auf codierten Daten aus allen (öffentlichen und privaten) Akutkrankenhäusern in Österreich. Die wichtigsten Ergebnisse waren die jährliche Anzahl der Frauen in Österreich, die sich einer Hysterektomie für benigne Grunderkrankung unterzogen, sowie der gewählte operative Zugangsweg.

**Ergebnisse** Die Anzahl der jährlich durchgeführten Hysterektomien für benigne Erkrankungen ging von 10675 im Jahre 2002 zurück auf 7747 im Jahre 2014, was einem Rückgang von 27% entspricht. Der Anteil vaginaler Hysterektomien blieb relativ stabil (53% resp. 47%). Laparoskopische Methoden wurden zunehmend eingesetzt (5% im Jahre 2002, 32% im Jahre 2014), während der Anteil abdominaler Hysterektomien abgenommen hat (41% resp. 20%).

**Schlussfolgerungen** Die Anzahl der jährlich in Österreich für benigne Grunderkrankungen durchgeführten Hysterektomien ist zwischen 2002 und 2014 erheblich zurückgegangen. Der Anteil vaginaler Hysterektomien blieb stabil mit ca. 50%, wohingegen der verstärkte Einsatz laparoskopischer Verfahren mit niedrigeren Raten von abdominalen Hysterektomien einherging.

## Key Message

Rates of benign hysterectomy in Austria per year declined by 27% between 2002 and 2014. Use of vaginal hysterectomy was stable at about 50%; increased use of laparoscopic techniques was associated with lower rates of open hysterectomy.

## Introduction

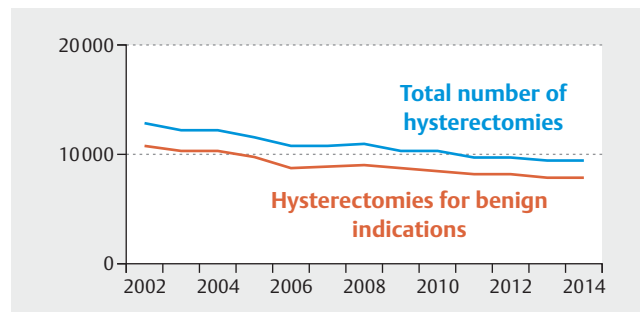
Hysterectomy is a common surgical procedure in women and most hysterectomies are performed for benign indications [1]. Hysterectomy rates vary considerably among regions and countries [2–12]. Medical and hormonal treatments (such as the levonorgestrel-releasing intrauterine device) and less invasive surgical options (such as endometrial ablations) have contributed to declining hysterectomy rates in numerous countries [2–12]. The subject of benign hysterectomy has received and continues to receive considerable attention in the medical literature and in the lay press [13–15]. In addition, hysterectomy can be done by various routes and with different technologies, and these have shifted and evolved over the years [1, 10, 11]. It is now widely agreed that hysterectomies should be performed by a minimally invasive approach, i.e., vaginally or laparoscopically, if possible. Furthermore, rates and routes of hysterectomy have implications for quality, costs and training.

We used a national database to analyse both hysterectomy rates and surgical routes for hysterectomy for benign indications in acute care hospitals in Austria between 2002 and 2014.

## Material and Methods

Rates and routes of hysterectomy were analysed from data collated by the Austrian Ministry of Health and Women's Affairs, data evaluation was done by GÖG (Gesundheit Österreich GmbH). The GÖG is a government agency with the mission to research, plan and coordinate healthcare in Austria. The data for the study derive from the Austrian DRG system (Diagnosen- und Leistungsdokumentation der österreichischen Krankenanstalten 2002–2014, DLD), which is used by all hospitals and therefore covers all inpatient treatments in both public and private hospitals in Austria. The DLD is a documentation system initiated in 1997 and is based on the ICD-10 coding system for diagnoses and so-called MEL codes (Medizinische Einzelleistung) for medical procedures. In 2002, this coding system was expanded to include the route of hysterectomy. The Austrian system has seven separate codes for hysterectomies: laparoscopic supracervical hysterectomy, total and laparoscopically assisted hysterectomy, abdominal hysterectomy, vaginal hysterectomy, radical laparoscopic hysterectomy, radical abdominal hysterectomy and radical vaginal hysterectomy.

We identified all inpatient stays in Austria with the intervention “Hysterectomy” from 2002 to 2014. MEL codes were linked to the coded diagnoses during the respective stay in order to ascertain which type of hysterectomy was done for which indication. Rates for hysterectomy for benign indications were calculated by subtracting hysterectomies performed for a malignant condition from



► **Fig. 1** Numbers of hysterectomies (overall and for benign indications) in Austria 2002–2014. Source: MoHW – DLD 2002–2014; data evaluation by GÖG.

the overall number of hysterectomies. Hysterectomies coded for transgender patients were not included in the calculated rates per 100 000 women, but are included in absolute numbers.

Age-adjusted rates were calculated as the number of inpatient stays with the intervention “Hysterectomy” per 100 000 women referring to the mean European standard population 2013 obtained from Eurostat.

Because this was a secondary analysis of anonymized data, the protocol was not submitted to the institutional ethics committee.

## Results

### Rates

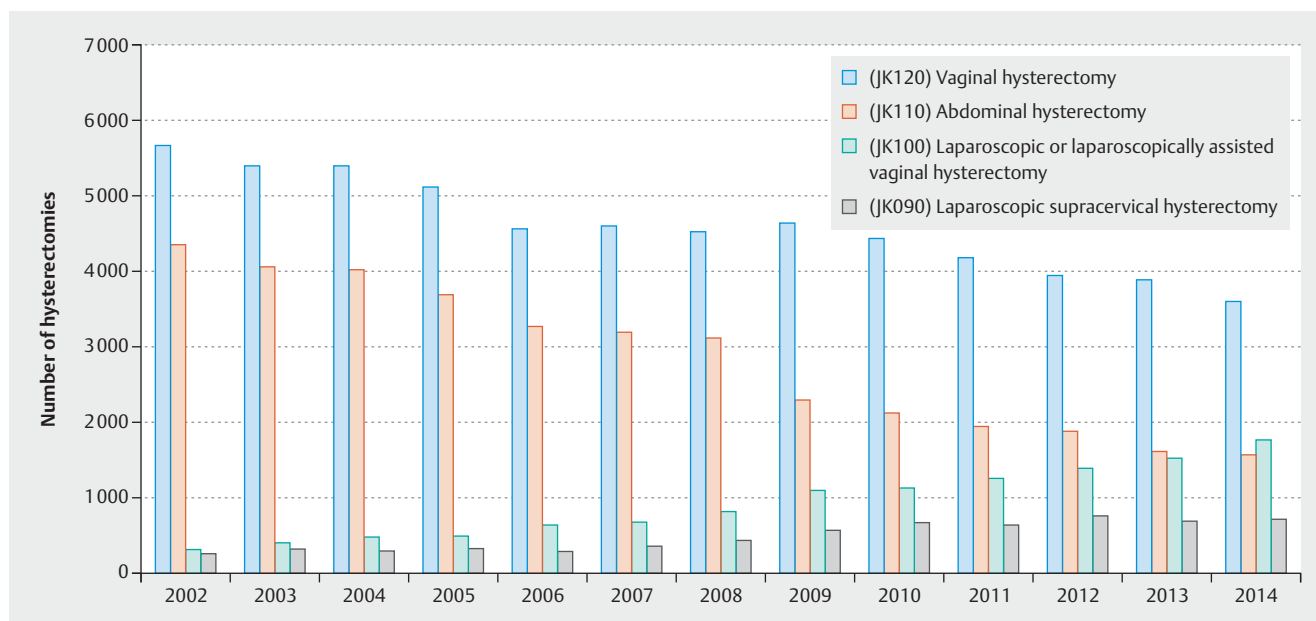
A total of 140 329 hysterectomies were performed in acute care hospitals in Austria between 2002 and 2014. The overall number of hysterectomies per year declined steadily from 12 764 in 2002 to 9501 in 2014. This is a decline of 25% – with 3263 fewer hysterectomies performed in 2014 than in 2002. The age-adjusted overall hysterectomy rate thus decreased from 316/100 000 women in 2002 to 206/100 000 women in 2014.

Over the entire study period the large majority of hysterectomies were done for benign indications (84% in 2002 and 82% in 2014; ► **Fig. 1**). While the number of hysterectomies done for a malignant indication decreased by 16% (2089 in 2002 vs. 1754 in 2014), the number of hysterectomies performed for benign indications decreased by 27% (10675 in 2002 vs. 7747 in 2014). The age-adjusted hysterectomy rate for benign indications decreased from 265/100 000 in 2002 to 168/100 000 women in 2014.

Three indications accounted for 78% of the benign indications for hysterectomy: leiomyomas (42%), pelvic organ prolapse (25%) and abnormal uterine bleeding (11%). Other benign indications included endometriosis, adenomyosis, chronic pelvic pain, cervical atypia, infections, benign tumors other than fibroids, and peripart complications.

### Routes

Minimally invasive techniques, specifically vaginal hysterectomy, were the most frequently used techniques for benign indications. In 2014, 47% of benign hysterectomies were done vaginally, 23% laparoscopically, 20% abdominally, and 9.3% as laparoscopic



► **Fig. 2** Routes of benign hysterectomy in Austria 2002–2014. Source: MoHW – DLD 2002–2014; data evaluation by GÖG.

supracervical hysterectomies; in 2002 the respective numbers were 53%, 3.1%, 41%, and 2.5% (► **Fig. 2**). Thus, use of laparoscopic hysterectomy increased at the expense of abdominal hysterectomy, whereas the use of vaginal hysterectomy was near 50% in both time periods (► **Fig. 2**). Robotically-assisted hysterectomy is a rarity in Austria.

## Discussion

Within the relatively brief period of 13 years, hysterectomy rates for benign indications in Austria fell by 27%. This amounts to a major change in gynecologic practice. Regarding the routes of benign hysterectomy, laparoscopic approaches reduced the rate of abdominal hysterectomy from 41% to 20%; the rate of vaginal hysterectomy was stable near 50%.

A number of factors are likely to have contributed to the decline of benign hysterectomy in Austria. Less invasive treatment options – such as endometrial ablations, levonorgestrel-releasing intrauterine devices (introduced in Austria in 1997), other hormonal interventions, uterine artery embolization (UAE) – have been used increasingly to treat benign conditions such as abnormal uterine bleeding and fibroids. Also, it is likely that today neither women nor providers consider hysterectomy a first-line treatment for benign gynecologic conditions.

Declining hysterectomy rates in recent years have been reported from Australia [3], the Netherlands [9,16], England [8, 21], Switzerland [4], Portugal [12], and Denmark [22]. In the USA, rate reductions of 36–39% in benign hysterectomies have been reported [10,11].

Comparing hysterectomy rates amongst different countries is complicated by differences in data collection, definitions and doc-

umentation as well as by different populations used for age-adjustment. With an overall hysterectomy rate of 207/100 000 and a hysterectomy rate for benign indications of 168/100 000 women in 2014, the hysterectomy rate in Austria is low compared to that reported from other countries (► **Table 1**).

The large variations in hysterectomy rates amongst countries with similar demographics imply that nonmedical factors influence the rates of hysterectomy. Specifics of local health care and reimbursement systems likely play a role, as do differences in attitude and clinical practice patterns [14–18].

In Austria, vaginal hysterectomy remains the most common approach to benign hysterectomy, with rates near 50% through 2002 and 2014. The advance of laparoscopic surgery has increased the proportion of minimally invasive hysterectomies at the expense of abdominal hysterectomy (in Austria robotic hysterectomy is practically non-existent). This is consistent with efforts to increase the rate of minimally invasive approaches for hysterectomy for benign conditions.

There are remarkable variations in the use of different operation routes for benign hysterectomy amongst countries. In Western Australia 45% [3], in France 58% [19], in Germany 55% [7], in Finland 44% [20], and in the Netherlands 51% [9], Portugal 21% [12], Denmark approximately 20% [22] of benign hysterectomies are performed by the vaginal route. In contrast, laparotomy is the preferred approach in the U.S. (54% of inpatient hysterectomies [11]) and Sweden (63%) [6]. Robotically-assisted hysterectomy, which accounted for 9.5% of all hysterectomies in the United States in 2010 [23], is practically non-existent in Austria.

Hysterectomy rates over time in the United States have been looked at by Wright et al. [11,23] and more recently by Doll et al. [10]. Wright et al., analysing inpatient procedures, reported that the number of hysterectomies (including those done for cancer)

► **Table 1** Hysterectomy rates (and definitions) in different countries.

Country	Authors	Benign/ malignant/total	Year	Hysterectomy rate
Austria	Current study 2016	Total	2014	206/100 000 women
Austria	Current study 2016	Benign	2014	167/100 000 women
Germany	Stang 2011	Total	2005–2006	362/100 000 person years
Germany	Stang 2011	Benign	2005–2006	295/100 000 person years
Switzerland	Schweizer Gesundheitsobservatorium 2007	Total	2005	2.9/1000 female residents
USA	Whiteman 2008	Total	2003	5.1/1000 women
Western Australia	Spilsbury 2006	Total	2003	4.8/1000 women years
New Zealand	Scott 1995	Total	1991	365/100 000 women
Sweden	Lundholm 2009	Benign	2003	210/100 000 women years
Denmark	Gimbel 2001	Total	1998	182/100 000 women
Netherlands	Hanstede 2012	Benign	1995–2005	17.2 per 10 000 women
Portugal	Gante et al. 2017	Total	2000–2014	212 and 171/100 000 women per year

performed annually decreased by 36% between 2002 and 2010 [11]. Abdominal hysterectomies accounted for 69% of procedures in 2002, declining to 54% by 2010; the use of vaginal hysterectomy declined from 25 to 17% [11]. Use of laparoscopic hysterectomy declined from 15% in 2006 to 8.6% in 2010, whereas use of robotic hysterectomy increased markedly, from 0.2 to 8.2% [11, 23]. These figures did not include patients discharged on the day of surgery and thus probably underestimate the numbers of minimally invasive hysterectomies. Looking only at benign hysterectomies, Wright et al. reported an increase of the use of robotically-assisted hysterectomy from 0.5% in 2007 to 9.5% in 2010 [23]. In hospitals where robotic hysterectomies were done, robotic procedures accounted for over 22% of benign hysterectomies [23]. More recently, Doll et al. [10] reported that overall annual hysterectomy rates in commercially insured women decreased by 39% from 2000 to 2014, and that in 2014 70% of benign hysterectomies were performed in an outpatient setting [10]. Doll et al. [10] did not report on routes of hysterectomy.

The reports from the U.S. by Wright et al. [11, 24] and Doll et al. [10] predate the morcellation debate that began in 2013 and led to an FDA safety communication on laparoscopic power morcellation in April 2014. Today, worries regarding morcellation of uteri containing unrecognized malignancy may influence decisions about the route of hysterectomy for presumed benign disease. In 2016 Harris et al. [24] looked at over 15 000 benign hysterectomies in the Michigan Surgical Quality Collaborative before and after the FDA Communication in April 2014 and found a 4.1% decrease in laparoscopic procedures and a commensurate increase in open and vaginal procedures. Similarly, a 5% increase in the rate of open hysterectomies was reported from the Kaiser Permanente system [25].

Reviews and guidelines consistently underline that vaginal hysterectomy, if feasible, is the method of choice concerning outcome and costs [13, 26–28]. The comparatively high and stable

rate of vaginal hysterectomy in Austria is encouraging in this regard.

The strengths of our study are the consistent acquisition of data over a 13-year time period in an entire (albeit small) country with a high-quality healthcare system and a strong tradition in gynecologic surgery and vaginal surgery in particular. Also, since all hysterectomies in Austria are performed on an inpatient basis (in contrast to the situation in the U.S. [10]), we captured virtually all procedures. Limitations are that coding may not always correct, though we consider major coding problems regarding benign vs. malignant procedures or the route of the procedures unlikely. Also, we have no data on complications because these data are not recorded centrally.

In conclusion, hysterectomy rates for benign indications in Austria declined by 27% in the 13 years between 2002 and 2014. This is a major shift in clinical practice and has implications for costs and training. In the era of work-hour restrictions, the numbers of hysterectomies required in training and certification programs may not be realistic. Austria ranks among countries with low hysterectomy rates. The decline in benign hysterectomy rates is likely due to an increased use of conservative treatment options, both medical and surgical. The proportion of benign hysterectomies performed with a minimally invasive approach increased from 58% to 79%, with an increase in laparoscopic hysterectomies seen at the expense of abdominal hysterectomies. This is encouraging and consistent with efforts to increase rates of minimally invasive approaches.

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## Conflict of Interest

None of the authors have competing interests relevant to this study.

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