



# Patient-reported satisfaction after robot-assisted hysterectomy among Korean patients with benign uterine disease

Suyeon Park<sup>1</sup>, Young-eun Lee<sup>1</sup>, Seong-Sik Cho<sup>2</sup>, Sung-ho Park<sup>1</sup>, Sung Taek Park<sup>1,3</sup>

<sup>1</sup>Department of Obstetrics and Gynecology, Hallym University Kangnam Sacred Heart Hospital, Seoul; <sup>2</sup>Department of Occupational and Environmental Medicine, Hallym University Sacred Heart Hospital, Anyang; <sup>3</sup>Institute of New Frontier Research, Hallym University College of Medicine, Chuncheon, Korea

## Objective

This study aimed to evaluate patient-reported satisfaction following robot-assisted hysterectomy due to benign uterine disease, and to identify the factors associated.

## Methods

We used a questionnaire to evaluate patients' satisfaction with robot-assisted hysterectomy. The questions concerned overall patient-reported satisfaction and specific factors affecting satisfaction, including postoperative pain, return to daily life, the hospital experience, wounds, cost, the doctor-patient relationship, whether expectations were met, and whether detailed information was provided. We also collected data from patient records, such as uterine weight, rate of pelvic adhesion, operation time, rate of transfusion, delayed discharge, and readmission. One hundred patients who underwent robot-assisted hysterectomy participated in the study. Seventy-three fully completed questionnaires were returned.

## Results

The majority of patients (95.9%) were satisfied with robot-assisted hysterectomy. The doctor-patient relationship, whether expectations were met, the hospital experience, wounds, and whether detailed information was provided were statistically significant factors influencing patients' overall satisfaction. Payment of fees and clinical and surgical outcomes did not significantly influence patients' overall satisfaction.

## Conclusion

Our findings show that most patients reported high levels of satisfaction following robot-assisted hysterectomy, regardless of cost or clinical and surgical outcomes. Therefore, if gynecologists consider robot-assisted hysterectomy suitable for patients they need not hesitate based on potential costs; they should feel confident in recommending the procedure to patients.

**Keywords:** Hysterectomy; Robot surgical procedures; Patient satisfaction

## Introduction

Hysterectomy is a common gynecological procedure for treatment of benign uterine disease. However, conventional laparoscopy has limitations, including limited dexterity and range of motion, 2-dimensional vision, and a slow learning curve. These factors make complex surgical tasks difficult [1]. To overcome these limitations, hysterectomy is frequently conducted with robotic assistance. The robotic approach is more feasible for routine clinical use than conventional lapa-

Received: 2018.05.15. Revised: 2018.06.30. Accepted: 2018.07.11.

Corresponding author: Sung Taek Park

Department of Obstetrics and Gynecology, Hallym University  
Kangnam Sacred Heart Hospital, 1-Singil-ro, Yeongdeungpo-gu,  
Seoul 07441, Korea

E-mail: parkst96@naver.com

<https://orcid.org/0000-0002-7841-4532>

Articles published in *Obstet Gynecol Sci* are open-access, distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/3.0/>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

Copyright © 2018 Korean Society of Obstetrics and Gynecology

roscopy. Its advantages include increased precision, 3-dimensional vision, and faster learning curves, and this could allow more providers to offer the robotic modality to a broader patient population with more advanced disease, particularly patients with adhesions from prior surgery, inflammation, or endometriosis [1-3]. This could ultimately lead to decreased overall numbers of abdominal hysterectomies. However, high level clinical evidence comparing robotic and traditional laparoscopic techniques in benign uterine disease is lacking [4,5]. Furthermore, the costs of robot-assisted hysterectomy in patients with benign uterine disease, which are associated with acquisition, application, and maintenance, have an unfavorable impact on cost-effectiveness [2,3]. For these reasons, gynecologists hesitate to recommend robot-assisted hysterectomy to suitable candidates for the procedure.

Surgical outcomes cannot be evaluated based on clinical outcomes and cost-effectiveness alone; patient satisfaction is an important factor and should be the main objective of healthcare providers. However, patient satisfaction is a subjective, complex concept involving physical, emotional, mental, social, and cultural factors [6]. Few existing studies examine satisfaction following robot-assisted hysterectomy. Furthermore, there is no standard for measuring patient satisfaction due to its complexity and multi-dimensionality.

The objectives of this study were to evaluate overall patient satisfaction with the results of robot-assisted hysterectomy and to analyze the specific factors associated with patient satisfaction using a questionnaire modified at our institution.

## Materials and methods

### 1. Ethical considerations

Informed consent was obtained from all study participants and the study protocol was approved by the Institutional Review Board (IRB) at Hallym University Kangnam Sacred Heart Hospital (IRB file No. 2016-11-143).

### 2. Patients and procedures

This was a prospective study of 100 patients who underwent robot-assisted hysterectomy using the da Vinci Xi<sup>®</sup> system (Intuitive Surgical Inc., Sunnyvale, CA, USA) between March 2016 and December 2017 in the department of obstetrics and gynecology at our institution.

Patients were included if they had benign uterine disease

(e.g., myoma or adenomyosis, endometrial polyp, endometrial hyperplasia) and underwent three-port robot-assisted hysterectomy. Patients were excluded if they had malignant or ovarian disease or underwent one-port robot-assisted hysterectomy.

All operations were performed by one of two surgeons, Sung Taek Park and Sung-ho Park, both of whom had overcome the learning curves of the procedure.

We distributed the questionnaire to patients when they visited outpatient department after discharge and collected the data from returned questionnaires. We also collected data on other variables from patient records, such as uterine weight, rate of pelvic adhesion, operation time, rate of transfusion, delayed discharge, and readmission.

### 3. Questionnaire development

The National Health Service (NHS) maintains a User Experience Survey Question Bank comprising a set of questions validated for patient use [7]. Questions considered relevant to our service were extracted from the bank and compiled into a questionnaire [8]. Additional questions specific to robot-assisted hysterectomy were then created, following the style of NHS-validated questions. Our questionnaire included questions regarding overall satisfaction and specific factors potentially affecting satisfaction, including postoperative pain, return to daily life, the hospital experience, wounds, cost, the doctor-patient relationship, whether expectations were met, and whether detailed information was provided.

We asked an expert for feedback on the first version of our questionnaire. We also performed a pilot study involving 5 patients to examine face and content validities, and to test the comprehensibility and feasibility of the questionnaire. In an open-ended question at the end of the questionnaire, patients were asked to provide additional comments or mention important issues that were missed in the questionnaire.

The final questionnaire included 20 questions, including 3 on overall satisfaction, 8 on demographic characteristics, 8 on factors thought to influence patient satisfaction, and one open-ended question for additional feedback or comments. The 3 questions on overall satisfaction concerned satisfaction with the surgery, whether patients would select the surgical modality again, and whether patients would recommend the surgical modality to others (questions 19, 20, and 21) (Supplementary data 1). Patients scored each question on a 5-point Likert-type scale. A Likert scale consists of several declara-

tive items that express a viewpoint on a topic. Respondents indicate the degree to which they agree or disagree with the opinion expressed by the statement [6]. The questionnaire was distributed to patients when they visited an outpatient clinic for 3 months following their surgery. A total of 73 patients returned fully completed questionnaires and were included in this study. Patients with incomplete questionnaires were excluded.

## 4. Statistical analysis

Data were analyzed using Stata 13.1 (Stata, College Station, TX, USA). The data were categorical; therefore, variables are presented as proportions. Satisfaction score was simplified into a binary variable indicating whether or not the patient was satisfied with the surgery. Overall satisfaction was evaluated using the sum of the scores for questions 19, 20, and 21 (Supplementary data 1). The median score was 4. Patients with a score below 4 were categorized as "satisfied"; those with a score above 4 were categorized as "not satisfied." A bivariate analysis was performed to determine whether differences in outcome were associated with satisfaction status. A multiple logistic analysis with the binary outcome was then performed to determine the variables associated with satisfaction. Correlation analysis was performed to identify the correlation between factors.  $P < 0.05$  was considered to be statistically significant.

## Results

One hundred questionnaires were mailed out, and a 73% response rate was achieved; 73 questionnaires were fully completed and returned.

### 1. Overall satisfaction

The vast majority of patients (95.9%) were satisfied with their robot-assisted hysterectomy (42.5% were very satisfied, and 53.4% were satisfied).

When asked whether they would choose robot-assisted hysterectomy as a surgical modality again if they could return to the past, patients' responses were overwhelmingly positive (94.5%), with 60.3% stating "yes definitely" and 34.2% stating "yes to some extent" (question 20) (Supplementary data 1). Three patients were unsure if they would reselect robot-assisted hysterectomy, and one would not reselect it.

When asked if they would recommend robot-assisted hysterectomy to other patients as a surgical modality, patients' answers were mostly positive (93.2%), with 64.4% of patients stating "yes definitely" and 28.8% stating "yes to some extent" (question 21) (Supplementary data 1). Four patients were unsure if they would recommend it, and one would not recommend it.

### 2. Study population characteristics

Demographic details of the patients in this study are described in Tables 1 and 2, which are split dichotomously into the satisfied and unsatisfied patient groups. These two groups were separated by a median score of 4 for the sum of questions 19, 20, and 21 (Supplementary data 1). None of the demographic characteristics influenced patients' overall satisfaction. Contrary to our expectations, out-of-pocket payment of fees did not influence patients overall satisfaction. Eighteen patients paid the entire fee out of pocket, and most of them (61.1%) were satisfied with their operation; 11 patients were very satisfied and 7 were satisfied (question 19) (Supplementary data 1).

**Table 1.** Patient's demographics

Variables	Value	
Age (yr)	48.85±4.93	
Uterine weight (g)	376.44±253.47	
Operation time (min)	128.08±44.32	
Estimated blood loss (mL)	159.32±106.14	
Pelvic adhesion <sup>a)</sup>	Yes	23/73 (31.5)
	No	50/73 (68.5)
Transfusion	Yes	12/73 (16.4)
	No	61/73 (83.6)
Health insurance status	Regional	31/73 (42.5)
	Work place	40/73 (54.8)
	Medical aid	2/73 (2.7)
Private insurance	Yes	69/73 (94.5)
	No	4/73 (5.5)
Payment method	Out of pocket	18/73 (24.7)
	Partially covered by private insurance	33/73 (45.2)
	Fully covered by private insurance	22/73 (30.1)

Values are presented as means±standard deviation and number (%).

<sup>a)</sup>The presence of pelvic adhesion was assessed by operation record.

**Table 2.** Comparison of patients' characteristics according to extent of satisfaction

Variables		Satisfied	Not satisfied	P-value
Age (yr)	40–50	29/48 (60.42)	19/48 (39.58)	0.731
	50–60	14/23 (60.87)	9/23 (39.13)	
	>60	2/2 (100)	0/2 (0)	
Education level	Middle school	8/11 (72.73)	3/11 (27.27)	0.399
	High school	23/35 (65.71)	12/35 (34.29)	
	University	14/26 (53.85)	12/26 (46.15)	
	Graduate	0/1 (0)	1/1 (100)	
Marital status	Unmarried	1/5 (20)	4/5 (80)	0.115
	Married	42/64 (65.63)	22/64 (34.38)	
	Widowed, divorced, separated	2/4 (50)	2/4 (50)	
Health insurance status	Regional	20/31 (64.52)	11/31 (35.48)	0.907
	Workplace	24/40 (60)	16/40 (40)	
	Medical aid	1/2 (50)	1/2 (50)	
Private insurance	Yes	43/69 (62.32)	26/69 (37.68)	0.635
	No	2/4 (50)	2/4 (50)	
No. of family members	1	3/6 (50)	3/6 (50)	0.799
	2	5/8 (62.5)	3/8 (37.5)	
	3	15/21 (71.43)	6/21 (28.57)	
	4	18/32 (56.25)	14/32 (43.75)	
	5	4/6 (66.67)	2/6 (33.33)	
Family income	<\$1,000	2/2 (100)	0/2 (0)	0.508
	\$1,000–4,000	17/30 (56.67)	13/30 (43.33)	
	\$4,000–7,000	17/30 (56.67)	13/30 (43.33)	
	\$7,000–10,000	8/10 (80)	2/10 (20)	
	>\$10,000	1/1 (100)	0/1 (0)	
Payment method	Out of pocket	11/18 (61.11)	7/18 (38.89)	0.643
	Partially covered by private insurance	22/33 (66.67)	11/33 (33.33)	
	Fully covered by private insurance	12/22 (54.55)	10/22 (45.45)	

Values are presented as the number (%). P-values are indicated for the differences between groups, as analyzed using  $\chi^2$  test.

Furthermore, our study showed that most patients (82.2%) obtained information about robot-assisted hysterectomy from their doctors or robot coordinators. Most selected robot-assisted hysterectomy as a modality based on their doctor's recommendation (64.4%).

### 3. Factors associated with patient satisfaction

Specific factors associated with patient satisfaction are described in Tables 3 and 4, which are split dichotomously into the satisfied and unsatisfied patient groups. Contrary to our expectations, surgical outcomes, such as estimated blood loss, operation time, transfusion, and complications (readmis-

sion or delayed discharge), did not influence patients' overall satisfaction (Table 3).

Only 16 patients had a delayed discharge, and none were readmitted (Table 3). Of the 16 patients who had delayed discharge, 10 opted to stay a day or two longer for private reasons, 4 developed a fever due to atelectasis or side effects of transfusion, and 2 received a transfusion due to postoperative anemia. None of the patients experienced severe complications, such as bowel injury, bladder injury, or death. Our study did not find that these factors influenced satisfaction (Table 3).

Neither clinical outcomes, such as postoperative pain or duration of return to daily life, nor cost were found to influence

**Table 3.** Comparison of surgical outcomes according to extent of satisfaction

Variables		Satisfied	Not satisfied	P-value
Uterine weight (g)		376.96±267.06	375.61±234.75	0.983
Operation time (min)		127.11±42.75	129.64±47.49	0.814
Estimated blood loss (mL)		176.67±118.51	131.43±76.44	0.051
Transfusion	Yes	6/45 (13.3)	6/28 (21.4)	0.364
	No	39/45 (86.7)	22/28 (78.6)	
Pelvic adhesion <sup>a)</sup>	Yes	13/45 (28.9)	10/28 (35.7)	0.542
	No	32/45 (71.1)	18/28 (64.3)	
Discharge delay	Yes	11/16 (68.75)	5/16 (31.25)	0.573
	No	34/57 (59.65)	23/57 (40.35)	
Readmission	Yes	0/0 (0)	0/0 (0)	1.000
	No	45/73 (61.64)	28/73 (38.35)	

Values are presented as means±standard deviation and number (%). P-values are indicated for the differences between groups, as analyzed using *t*-test and  $\chi^2$  test.

<sup>a)</sup>The presence of pelvic adhesion was assessed by operation record.

patients' overall satisfaction (Table 4). However, the doctor-patient relationship, whether expectations were met, the hospital experience, wounds, and whether detailed information was provided were found to be associated with differences in satisfaction (Table 4). Cronbach's alpha was found to be 0.8047.

The five meaningful variables were entered into a stepwise multiple regression model. Although there was no statistically significant difference in patient satisfaction according to a 95% confidence interval, the odds ratio of the hospital experience was 2.057661, and that of doctor-patient relationship was 3.007114 (Table 5).

#### 4. Provision of information and doctor-patient relationship

We performed a correlation analysis between those who obtained enough information and those who were satisfied with their doctor-patient relationship. The results showed that the more information patients received, the more satisfied they were with their doctor-patient relationship ( $r=0.518$ ;  $P<0.05$ ).

## Discussion

This study demonstrated that patients had high levels of overall satisfaction following robot-assisted hysterectomy. Most patients were satisfied with their operation, regardless of demographic differences. Interestingly, cost did not influence

the patients' overall satisfaction. The cost of robot-assisted hysterectomy in Korea (approximately \$8,000–9,000 for the surgery only, excluding inspection, hospital room, consultation, and examination fees) is 10 times greater than the cost of laparoscopic hysterectomy (approximately \$800–900). Furthermore, the surgery fee for robot-assisted hysterectomy is not covered by Korea's national health insurance system, so patients must pay the entire cost out of pocket; in contrast, laparoscopic hysterectomy is covered by the national health insurance, so patients are charged only 20% of the surgery fee (\$200). Notably, most patients in Korea (94.5%) have a private insurance policy to relieve financial burdens, which covers the majority of fees for robot-assisted hysterectomy (75.3%) (Table 1). To overcome this bias, we analyzed satisfaction according to actual payment of fees. Eighteen patients paid the entire fee out of pocket, and most of them were satisfied with their operation; 11 patients were very satisfied and 7 were satisfied (question 19) (Supplementary data 1). Therefore, we determined that cost is not an important factor in overall satisfaction.

The quality of healthcare was assessed according to three aspects: structure, process, and results [9]. Our initial study design assigned greater value to the clinical and surgical results of care provided than to the process of providing care. However, our study shows that overall satisfaction was significantly affected by whether preoperative expectations were met, how satisfactory the hospital experience was, how satisfactory the doctor-patient relationship was, and whether

**Table 4.** Significant predictors of being satisfied with the outcome of surgery

Variables		Satisfied	Not satisfied	P-value
Postoperative pain (VAS)	VAS 1–3	25/36 (69.44)	11/36 (30.56)	0.193
	VAS 3–5	15/25 (60)	10/25 (40)	
	VAS 5–7	5/9 (55.56)	4/9 (44.44)	
	VAS 7–9	0/2 (0)	2/2 (100)	
	VAS 10	0/0 (0)	0/0 (0)	
Return to daily life (wk)	<2	16/27 (59.26)	11/27 (40.74)	0.130
	2–4	9/21 (42.86)	12/21 (57.14)	
	4–6	9/12 (75)	3/12 (25)	
	6–8	4/4 (100)	0/4 (0)	
	>8	7/9 (77.78)	2/9 (22.22)	
Hospital experience	Very satisfied	19/22 (83.36)	3/22 (13.64)	0.005
	Satisfied	22/40 (55)	18/40 (45)	
	Neutral	3/9 (33.33)	6/9 (66.67)	
	Unsatisfied	1/1 (100)	0/1 (0)	
	Very unsatisfied	0/0 (0)	0/0 (0)	
Wound	Very satisfied	23/30 (76.67)	7/30 (23.33)	0.052
	Satisfied	20/38 (52.63)	18/38 (47.37)	
	Neutral	2/5 (40)	3/5 (60)	
	Unsatisfied	0/0 (0)	0/0 (0)	
	Very unsatisfied	0/0 (0)	0/0 (0)	
Cost	Very expensive	9/16 (56.25)	7/16 (43.75)	0.822
	Expensive	29/48 (60.42)	19/48 (39.58)	
	Reasonable	6/8 (75)	2/8 (25)	
	Cheap	1/1 (100)	0/1 (0)	
	Very cheap	0/0 (0)	0/0 (0)	
Doctor-patient relationship	Very satisfied	41/56 (73.21)	15/56 (26.79)	<0.05
	Satisfied	3/16 (18.75)	13/16 (81.25)	
	Neutral	1/1 (100)	0/1 (0)	
	Unsatisfied	0/0 (0)	0/0 (0)	
	Very unsatisfied	0/0 (0)	0/0 (0)	
Meeting expectations	Very satisfied	26/32 (81.25)	6/32 (18.75)	0.004
	Satisfied	17/37 (45.95)	20/37 (54.05)	
	Neutral	1/3 (33.33)	2/3 (66.67)	
	Unsatisfied	0/0 (0)	0/0 (0)	
	Very unsatisfied	0/0 (0)	0/0 (0)	
Detailed information	Very satisfied	36/52 (69.23)	16/52 (30.77)	0.058
	Satisfied	9/20 (45)	11/20 (55)	
	Neutral	0/1 (0)	1/1 (100)	
	Unsatisfied	0/0 (0)	0/0 (0)	
	Very unsatisfied	0/0 (0)	0/0 (0)	

Values are presented as number (%). P-values are indicated for the differences between groups, as analyzed using  $\chi^2$  test. VAS, visual analogue scale.

**Table 5.** Multiple regression model of each of the factors that significantly influenced patient satisfaction

Variables	OR	95% CI
Hospital experience	2.057661	0.908178–4.662048
Wound	1.372669	0.514548–3.661894
Doctor-patient relationship	3.007114	0.660713–13.68632
Meeting of expectations	1.272743	0.486516–3.32956
Detailed information was provided	1.373082	0.373142–5.052645

OR, odd ratio; CI, confidence interval.

sufficient detailed information was provided. The meaningful factors were associated not with clinical or surgical outcomes, as we expected, but with the process of providing services [6,10,11]. These findings are consistent with those of other studies evaluating patient satisfaction with surgery. Mira et al. [12] reported a satisfaction rate of 75% in a large sample of urological, traumatological, ophthalmological, and general surgery patients discharged from multiple Spanish hospitals during a 2-month period. They found that in addition to a successful surgical procedure, other aspects of the surgical experience, such as preoperative explanation of the procedure, provision of information upon admission and discharge, and a satisfactory hospital experience, substantially influenced patients' overall satisfaction [12]. From the patient's perspective, satisfaction with healthcare is determined not only by the outcome of treatment, but also by the extent to which the patients are supported during their hospital stay and outpatient care [6].

In our hospital, most patients were initially provided with information about robot-assisted hysterectomy, such as its technical aspects, cost, and expected outcomes, by robot coordinators and doctors, and they selected robot-assisted hysterectomy as a surgical modality based on their doctor's recommendation. Further, our study reported that better-informed patients also evaluated their doctor-patient relationship more highly than those who were less informed. Combining these observations, we conclude that provision of information and the doctor-patient relationship are the major factors influencing patient satisfaction. Our findings concur with those of Heidegger et al. [13], who concluded that a questionnaire to assess patient satisfaction should contain factors such as patient information, patient approach in decision-making, and contact with doctors. This indicates the importance of the healthcare delivery method in addition to the specifics of the care delivered.

Surgeons and patients choose robotic surgery for many reasons. First, robotic surgery may be easier to learn than laparoscopy because it is more analogous to traditional open surgery [14]. Second, robotic assistance may allow for successful completion of more technically demanding cases that would otherwise have required laparotomy [14]. Third, robotic surgery has been the subject of extensive marketing, not only to surgeons and hospitals but also to medical consumers [14]. For these reasons, hospitals are rapidly acquiring robotic technology and using it routinely in gynecology [14,15]. However, the cost of robot-assisted hysterectomy is high, and there is little evidence to support its economic value [15]. In this study, we confirmed the overall satisfaction of patients who underwent robot-assisted hysterectomy. Most patients were satisfied with their operation, regardless of its cost and clinical or surgical outcomes. Patients placed more value on the process of healthcare provision than on its costs or its clinical or surgical results. Furthermore, overall satisfaction was determined by the way the healthcare provider behaved toward the patient. Therefore, if gynecologists consider robot-assisted hysterectomy to be suitable for patients, they can confidently recommend it, despite its high cost.

This study has strengths in that it is the first prospective study of patient satisfaction with robot-assisted hysterectomy in a real-world setting. Additionally, data were collected prospectively, with a good follow-up rate.

However, the study also has several limitations. First, the sample size was too small. We included only 73 patients who underwent robot-assisted hysterectomy for benign uterine disease. Second, analysis was performed using data collected from a non-random sample of patients, and the results thus cannot be generalized to reflect the opinions of the overall population. Third, self-reported questionnaires are subject to participants' reporting and selection biases. Because patients voluntarily participated in this study, the results were positively

biased. Forth, the questionnaire and its items were insufficient to accurately measure patient satisfaction. Additionally, only robot-assisted hysterectomy was evaluated; therefore, no direct comparison can be made to other surgical modalities within the same field of gynecology [4].

To overcome these limitations, large, multi-center cohort studies are needed to represent the overall population in assessing the satisfaction of patients who undergo robot-assisted hysterectomy. In addition, the questionnaires used require further testing and confirmation by other investigators. More reliable and valid questionnaires are also needed to assess overall satisfaction, and further research is recommended to investigate the influence of confounding variables on patient satisfaction. Only then will the ratings of patient satisfaction become discriminatory, reproducible, and able to truly reflect overall patient satisfaction with robot-assisted hysterectomy.

## Acknowledgements

This research was supported by Hallym University Research Fund 2017 (HURF-2017-49) and the Bio & Medical Technology Development Program of the National Research Foundation (NRF) funded by the Korean government (MSIT) (No. 2017M3A9E8033229).

## Conflict of interest

No potential conflict of interest relevant to this article was reported.

## Supplementary materials

Supplementary data associated with this article can be found online at <https://doi.org/10.5468/ogs.2018.61.6.675>.

## References

1. Shashoua AR, Gill D, Locher SR. Robotic-assisted total laparoscopic hysterectomy versus conventional total laparoscopic hysterectomy. *JLS* 2009;13:364-9.
2. Kristensen SE, Mosgaard BJ, Rosendahl M, Dalsgaard T,

- Bjørn SF, Frøding LP, et al. Robot-assisted surgery in gynecological oncology: current status and controversies on patient benefits, cost and surgeon conditions - a systematic review. *Acta Obstet Gynecol Scand* 2017;96:274-85.
3. Tapper AM, Hannola M, Zeitlin R, Isojärvi J, Sintonen H, Ikonen TS. A systematic review and cost analysis of robot-assisted hysterectomy in malignant and benign conditions. *Eur J Obstet Gynecol Reprod Biol* 2014;177:1-10.
4. Zakhari A, Czuzoj-Shulman N, Spence AR, Gotlieb WH, Abenhaim HA. Laparoscopic and robot-assisted hysterectomy for uterine cancer: a comparison of costs and complications. *Am J Obstet Gynecol* 2015;213:665.e1-7.
5. O'Neill M, Moran PS, Teljeur C, O'Sullivan OE, O'Reilly BA, Hewitt M, et al. Robot-assisted hysterectomy compared to open and laparoscopic approaches: systematic review and meta-analysis. *Arch Gynecol Obstet* 2013;287:907-18.
6. Caljouw MA, van Beuzekom M, Boer F. Patient's satisfaction with perioperative care: development, validation, and application of a questionnaire. *Br J Anaesth* 2008;100:637-44.
7. National Health Survey (UK). Question-bank [Internet]. Leeds: National Health Survey; c2012 [cited 2018 Mar 28]. Available from: [http://content.digital.nhs.uk/media/9556/Question-bank/xls/Question\\_Bank\\_-\\_National\\_and\\_Extended\\_UESv4.xlsx](http://content.digital.nhs.uk/media/9556/Question-bank/xls/Question_Bank_-_National_and_Extended_UESv4.xlsx).
8. Long E, Kew F. Patient satisfaction with robotic surgery. *J Robot Surg* 2018;12:493-9.
9. Bollinger LA, Kruk ME. Innovations to expand access and improve quality of health services. In: Black RE, Laxminarayan R, Temmerman M, Walker N, editors. *Disease control priorities, third edition: volume 2. Reproductive, maternal, newborn, and child health*. Washington (DC): World Bank; 2015. p.285-98.
10. Hamilton DF, Lane JV, Gaston P, Patton JT, Macdonald D, Simpson AH, et al. What determines patient satisfaction with surgery? A prospective cohort study of 4709 patients following total joint replacement. *BMJ Open* 2013;3:e002525.
11. Robertsson O, Dunbar M, Pehrsson T, Knutson K, Lidgren L. Patient satisfaction after knee arthroplasty: a report on 27,372 knees operated on between 1981 and 1995 in Sweden. *Acta Orthop Scand* 2000;71:262-7.
12. Mira JJ, Tomás O, Virtudes-Pérez M, Nebot C, Rodríguez-Marín J. Predictors of patient satisfaction in surgery. *Sur-*



gery 2009;145:536-41.

13. Heidegger T, Husemann Y, Nuebling M, Morf D, Sieber T, Huth A, et al. Patient satisfaction with anaesthesia care: development of a psychometric questionnaire and benchmarking among six hospitals in Switzerland and Austria. *Br J Anaesth* 2002;89:863-72.
14. Pasic RP, Rizzo JA, Fang H, Ross S, Moore M, Gunnarsson C. Comparing robot-assisted with conventional laparoscopic hysterectomy: impact on cost and clinical outcomes. *J Minim Invasive Gynecol* 2010;17:730-8.
15. Wright JD, Ananth CV, Lewin SN, Burke WM, Lu YS, Neugut AI, et al. Robotically assisted vs laparoscopic hysterectomy among women with benign gynecologic disease. *JAMA* 2013;309:689-98.