

# Achieving high value in the surgical approach to hysterectomy



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Value-based care, best clinical outcome relative to cost, is a priority in correcting the high costs for average clinical outcomes of health care delivery in the United States. Hysterectomy represents the most common and identifiable nonobstetric major surgical procedure among women. Surgical approaches to hysterectomy in the United States have changed in recent decades. For benign indications, clinical evidence identifies the superiority of vaginal hysterectomy over all other routes. These conclusions rest on clinical outcomes; however, cost differentials also exist across hysterectomy approaches, with the vaginal approach consistently incurring the lowest overall costs. Taken together, vaginal hysterectomy has the highest value, whereas the robotic (given high costs) and abdominal approaches (given less favorable clinical outcomes) have less value. Traditional laparoscopic hysterectomy holds an intermediate value. Increasing the use of high-value hysterectomy approaches can be achieved by adopting multimodal strategies, with changes in the payment models being the most important.

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Health care quality and cost-effectiveness can be summarized as clinical value.<sup>1</sup> Value is calculated by dividing clinical outcome by the cost to deliver it. For example, a very expensive therapy that has marginal care outcomes would have poor value. It is well known that the United States spends the most money on health care per capita for equal or worse health outcomes compared to other high-income nations. To address this situation, thought leaders are promoting value-based health care delivery. Such an approach, at a minimum, rewards hospital or physician care that

delivers best clinical outcomes relative to cost. This approach is featured in Accountable Care Organizations and in the Quality Payment Program that was created with the Medicare Access and CHIP Reauthorization Act of 2015 (MACRA).

Hysterectomy represents the most common nonobstetric major surgical procedure among women, with approximately 400,000 hysterectomies performed annually in the United States.<sup>2</sup> The procedure is almost exclusively performed by gynecologic surgeons and has undergone a transformation over the past decade, with significant changes in the prevalence and surgical approach that often contradicts the clinical evidence. Even accounting for hysterectomies performed in an outpatient setting, in part reflecting changes in surgical approach, overall rates of this procedure between 2000 and 2014 declined by nearly 40%.<sup>3</sup>

There are substantial differences in the costs and outcomes of hysterectomy by surgical approach; however, both of these qualities favor the vaginal approach when appropriate and feasible. Given superior clinical and cost outcomes, the vaginal approach represents the best-value surgical approach; yet it is the least commonly performed.<sup>4</sup> The

purpose of this commentary is to identify barriers and to share evidenced-based strategies to increase the use of high-value hysterectomy in the setting of benign disease.

## Current State of Hysterectomy<sup>2</sup>

Despite favorable clinical and cost outcomes and the endorsement by professional organizations nationally<sup>5</sup> and internationally,<sup>6</sup> the vaginal approach has not been prioritized in the United States. In fact, from 1998 to 2010, the rate of inpatient vaginal hysterectomy dropped nearly 8% to 16.7%.<sup>2</sup> To be sure, there are settings in which a vaginal hysterectomy cannot be performed, including malignancy and poor vaginal access (ie, small vaginal caliber or lack of uterine descent), but these exceptions are not the rule. Of all hysterectomies, 90% are performed for benign indications,<sup>7</sup> and vaginal access problems (including obesity<sup>8</sup> or prior cesarean delivery<sup>9</sup>) are much less common or impactful than believed, as demonstrated by some nations achieving vaginal hysterectomy rates in excess of 40%.<sup>10</sup>

As in a quality improvement setting, unwarranted variation is undesirable. Physician experience, opinion, and motivation, independent of disease patterns or clinical evidence of benefit, can strongly affect rates of surgery and surgical approach.<sup>11</sup> In the context of hysterectomy, surgeon age, sex, year of training, and geography have been shown to influence the procedure prevalence and herald unwarranted variation.<sup>12</sup> The limited evidence on mechanisms to reduce unwarranted variation in the use of surgical approach is applicable to the question of how high-value hysterectomy rates might be improved in the United States. Given that the United States health care system has struggled with high care costs for

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average care quality, identifying strategies that improve value is a priority.

### Barriers to Adopting Vaginal Hysterectomy

Despite the benefits of vaginal hysterectomy, it is not prioritized among physicians in training, compounding the problem for the future. Using a validated vaginal surgery skills assessment tool, it was found that it took on average 27 vaginal hysterectomies to achieve minimal competency for this procedure.<sup>13</sup> This 2010 study apparently had no effect on recent revisions to the Accreditation Council for Graduate Medical Education (ACGME) case minimums for vaginal hysterectomy that remain at nearly half that value. According to ACGME case log reports, the number of vaginal hysterectomies has decreased 40%, with the average resident graduating having performed less than 20.<sup>14</sup> Likewise, only 1 in 5 incoming female pelvic medicine and reconstructive surgery fellows were deemed by their fellowship directors to be able to independently perform a vaginal hysterectomy.<sup>15</sup>

Use of any surgical procedure is dependent on surgeon expertise. Obstetrics and gynecology specialists tend to have lower volume and cannot perform enough vaginal, laparoscopic, and robotic hysterectomies to be proficient at all approaches. Training, experience, and indication compel reproductive endocrinologists and gynecologic oncologists to favor laparoscopic and robotic surgeries or open procedures, and these professionals are rarely proficient in vaginal surgery. Specialists in female pelvic medicine and reconstructive surgery are often trained in vaginal and laparoscopic surgery but do not generally perform hysterectomies for indications beyond pelvic organ prolapse.

Hysterectomy outcomes, both overall and by approach, have been linked to surgeon volume, acknowledging that surgeon volume is a blunt proxy of expertise. High-volume vaginal surgeons (surgeons who performed >13 vaginal procedures annually) performing vaginal hysterectomies have been associated with better perioperative care

outcomes and lower costs.<sup>16</sup> Similarly, a recent retrospective study of all benign hysterectomies performed by gynecologists in Maryland between 2012 and 2014 found that medium, relative to high, surgeon volume was associated with lower use of a minimally invasive surgery hysterectomy approach.<sup>17</sup> Most recently, a study from New York State demonstrated the problems of low-volume gynecologic surgeons in the context of hysterectomy, as both complications and resource utilization were higher among these surgeons.<sup>18</sup>

Given rare disposable instrumentation, there are no external influences that promote vaginal surgery. The makers of the robot were successful in changing surgeon behavior by sponsoring robotic training courses. These training courses have the purpose of increasing product market share and company profits without consideration of cost to individuals or populations. In sum, factors independent of the patient such as training, disease exposure, experience, and industry considerations can determine the route and outcome of hysterectomy, and none of these appear to be presently optimized.

### Strategies to Increase High-Value Hysterectomy

Reasons for unwarranted variations in care delivery are multifactorial but the best explanations relate to differences in physician's motivations and opinions on how effective a given care approach is for a given disease state.<sup>11</sup> Variation can be appropriate or at least expected in settings where there is no clear best approach to care but this is not the case in the setting of benign hysterectomy. The most recent Cochrane Review on surgical approach to benign hysterectomy identifies the superiority of the vaginal approach and recommends the robotic approach be "abandoned" given unimproved clinical outcomes and higher cost (ie, poor value) relative to other minimally invasive approaches.<sup>4</sup> Arguably, any use of the surgical robot for benign disease represents unwarranted variation with respect to promoting high-value hysterectomy approaches.

Overall, there are few studies investigating strategies to reduce surgical variation in general, and fewer still in the setting of gynecologic surgery. The Institute of Medicine's "Quality Chasm" report identified 4 levels changes that would be applied to the US health care system, and these have been used to organize approaches to reducing surgical variation. These levels include: Patient experience (Level A); the functions of small care delivery units ("microsystems") (Level B); the functions of the organizations that support microsystems (Level C); and the policy context that influences payment, regulation, accreditation, and other such factors (Level D). This organization can be used to approach promotion of high-value hysterectomy.

### Reducing Surgical Variation at Levels A, B, and C

Upward of 70% of hysterectomies were inappropriately indicated per 1 alarming 2011 study.<sup>19</sup> Given this result, there may be opportunities at Level A to provide women decision support on whether to pursue this treatment option among conservative alternatives. Indeed, decision aids have been demonstrated to decrease hysterectomy rates as much as 10%.<sup>20</sup> Reducing rates of inappropriate hysterectomies is desired, but there are no data on how a decision aid might alter a patient's hysterectomy approach preference. In the context of breast cancer surgery, decision aids have been shown to both increase and decrease breast conservative therapy; thus a Level A approach to promoting high-value hysterectomy may not work. Taken together, a Level A approach, like patient decision aids, can reduce surgical utilization, but an approach to hysterectomy appears to be an unworthy target for intervention.

Wider dissemination and adoption of clinical evidence by physicians engages Level B. High-quality research has informed uncertainties about clinical practice, and correspondingly practice has often changed. In gynecologic surgery, the use of transvaginal mesh to repair vaginal prolapse substantially decreased in the wake of disfavoring

evidence highlighted in government-issued product warnings,<sup>21</sup> although medico-legal factors were a strong tailwind. Disfavoring evidence regarding the robot is more recent and arguably has had less time to have an impact, but the robot was promoted to address the overuse of open hysterectomy that dominated despite viable minimally invasive options.<sup>22</sup> The evidence favoring vaginal or traditional laparoscopic hysterectomy over alternative surgical approaches has been available for some time; thus, wider dissemination is not anticipated to be any more effective now than before.

Summarizing clinical evidence into practice guidelines, another Level B function may be impactful in affecting surgeon behavior, but few of the studies addressing this question support this hope.<sup>23</sup> More than 15 years ago Kovac and associates<sup>7</sup> studied the effect of adopting published guidelines for choosing the route of hysterectomy in a resident clinic population. Resident physicians following the guideline increased the proportion of vaginal hysterectomies to over 90% and reduced the ratio of abdominal to vaginal hysterectomy from 3:1 to 1:11.<sup>24</sup> More recently, using a version of Kovac's guidelines, expert high-volume gynecologic surgeons at the Mayo Clinic performed nearly 70% of the benign hysterectomies vaginally.<sup>25</sup> That rate of vaginal hysterectomy dropped to 56.1% after the robot was introduced.<sup>25</sup> This example of a practice guideline altering surgeon behavior is promising and illuminating, insofar as the use of it appears to increase high-value hysterectomy and the robot is identified to erode that end.

Audit and feedback of physician practice, Levels B and C functions, has been demonstrated to have a positive impact on surgical variation. Another advantage of auditing physician's practices is that it can identify where learning opportunities exist, and both of these ends are desirable in trying to change surgeon behavior. A 2011 study of the Kaiser Permanente in Southern California (SCPMG) showed an example of where audit and feedback, coupled with training, was effectively used to decrease

abdominal hysterectomy numbers.<sup>26</sup> In 2005, the SCPMG began a concerted effort to reduce the numbers of open hysterectomies, then 35%, within their group. Content experts created a 9-hour educational program featuring vaginal and traditional laparoscopic hysterectomy techniques that was attended by 85% of the SCPMG physicians. Over 5 years, the number of non-open hysterectomies increased from 38% to 78%, with a corresponding decrease in hospital length of stay (34% decrease) and cost (\$9.3 million annually). Interestingly, the percentage of vaginal hysterectomies decreased during this time from 31% to 28%, strongly suggesting that additional savings could be still gained with greater utilization of the vaginal approach.

### Reducing Surgical Variation via Policy (Level D)

Resources and motivation across physicians, health systems, payers and policy (Levels B, C, and D) have to be developed to leverage the identified positive effects of guidelines and physician audit, with re-training where necessary. Altering care payment models is 1 way to drive this change, but this change will require leadership outside of health systems/hospitals (Level C) to ensure adequate training and sufficient surgical volume to achieve the best clinical outcomes. Hospitals and health systems have always been responsible for defining surgical competence, as they are corporately liable to ensure the qualified practice of their physicians; but in some payment models, high-value surgical skills would be strongly preferred. In turn, residency programs will be pressured to deliver on objective assessments of surgical competency and training in high-value hysterectomy approaches.

Changing the financial incentives to pursue higher-value approaches to hysterectomy is arguably the most viable approach to affect favorable physician practice change. How physicians are paid does have an impact on care delivery. When reimbursements for hormone injections for prostate cancer decreased, inappropriate use of this therapy declined without affecting appropriate

use.<sup>27</sup> Likewise, fee-for-service health care in the United States has been estimated to have increased surgery rates by 78% relative to salaried systems.<sup>28</sup> With respect to approach to hysterectomy, reimbursements for vaginal hysterectomy have historically been the lowest. In 2016, the surgeon national average Medicare payment for a vaginal hysterectomy (<250 g without adnexa) was \$839, whereas reimbursement jumps to \$1035 to perform the same procedure using a laparotomy.<sup>29</sup> Arkansas Payment Improvement Initiative is a government payer approach to changing the route and value of performed hysterectomies in that state. Qualifying surgeons in that state who meet quality standards with average care costs below a commendable threshold that favors the vaginal approach will share in cost savings. Financial incentives can be applied across the payment continuum to change surgeon behavior. Employers can negotiate with health systems to reward high-value medical care, including approach to hysterectomy. Payers can restrict (as was the case with United Healthcare's 2015 requirement for pre-authorization for benign hysterectomies scheduled by any route but vaginal) or alter payments by a hysterectomy approach, or can engage in a payment model that rewards cost savings and care outcomes. Health systems and hospitals could also engage in financial incentivization by negotiating bundled coverage contracts with employers that include only gynecologic surgeons who favor high-value hysterectomy approaches.

### Conclusion

Expanded use of vaginal hysterectomy and diminishing use of robotic and open hysterectomy for benign indications is supported by the available clinical outcomes and cost data. Where the vaginal approach cannot be performed, traditional laparoscopy can have intermediate value, but careless disposable use undermines that conclusion. Based on related evidence and experience to date, further development and wider dissemination of these conclusions, although desirable, is unlikely to alter gynecologic surgeons' behavior in the United States,

and practice guidelines already endorse the vaginal approach. Health systems and payers can implement strategies that have been demonstrated to alter surgeon behavior, and many of these should follow evolving changes in care payment models. National specialty leadership is needed to sort out how best to optimize gynecologic surgeon training and volume. Inevitably this effort will have an impact on resident training that must develop approaches to quantify surgical expertise that can be shared with hospitals. In turn, these hospitals and payers can further refine their approaches, setting up a continuous cycle of improvement that will improve individual and population outcomes related to gynecologic surgical care. ■

## REFERENCES

- Porter ME. A strategy for health care reform—toward a value-based system. *N Engl J Med* 2009;361:109–12.
- Wright JD, Herzog TJ, Tsui J, et al. Nationwide trends in the performance of inpatient hysterectomy in the United States. *Obstet Gynecol* 2013;122:233–41.
- Doll KM, Dusetzina SB, Robinson W. Trends in inpatient and outpatient hysterectomy and oophorectomy rates among commercially insured women in the United States, 2000–2014. *JAMA Surg* 2016;151:876–7.
- Aarts JW, Nieboer TE, Johnson N, et al. Surgical approach to hysterectomy for benign gynaecological disease. *Cochrane Database Syst Rev* 2015;8:CD003677.
- ACOG Committee on Gynecologic Practice. ACOG Committee Opinion No. 444: choosing the route of hysterectomy for benign disease. *Obstet Gynecol* 2009;114:1156–8.
- Deffieux X, Rochambeau B, Chene G, et al. Hysterectomy for benign disease: clinical practice guidelines from the French College of Obstetrics and Gynecology. *Eur J Obstet Gynecol Reprod Biol* 2016;202:83–91.
- Garry R. Health economics of hysterectomy. *Best Pract Res Clin Obstet Gynaecol* 2005;19:451–65.
- Committee on Gynecologic Practice. Committee opinion no. 619: Gynecologic surgery in the obese woman. *Obstet Gynecol* 2015;125:274–8.
- Boukerrou M, Lambaudie E, Collinet P, Crepin G, Cosson M. A history of cesareans is a risk factor in vaginal hysterectomies. *Acta Obstet Gynecol Scand* 2003;82:1135–9.
- Brummer TH, Seppala TT, Harkki PS. National learning curve for laparoscopic hysterectomy and trends in hysterectomy in Finland 2000–2005. *Hum Reprod* 2008;23:840–5.
- Birkmeyer JD, Reames BN, McCulloch P, Carr AJ, Campbell WB, Wennberg JE. Understanding of regional variation in the use of surgery. *Lancet* 2013;382:1121–9.
- Lewis CE, Groff JY, Herman CJ, McKeown RE, Wilcox LS. Overview of women's decision making regarding elective hysterectomy, oophorectomy, and hormone replacement therapy. *J Womens Health Gend Based Med* 2000;9(Suppl 2):S5–14.
- Jelovsek JE, Walters MD, Korn A, et al. Establishing cutoff scores on assessments of surgical skills to determine surgical competence. *Am J Obstet Gynecol* 2010;203:81.
- Washburn EE, Cohen SL, Manoucheri E, Zurawin RK, Einarsson JI. Trends in reported resident surgical experience in hysterectomy. *J Minim Invasive Gynecol* 2014;21:1067–70.
- Guntupalli SR, Doo DW, Guy M, et al. Preparedness of obstetrics and gynecology residents for fellowship training. *Obstet Gynecol* 2015;126:559–68.
- Rogo-Gupta LJ, Lewin SN, Kim JH, et al. The effect of surgeon volume on outcomes and resource use for vaginal hysterectomy. *Obstet Gynecol* 2010;116:1341–7.
- Mehta A, Xu T, Hutfless S, et al. Patient, surgeon and hospital disparities associated with benign hysterectomy approach and perioperative complications. *Am J Obstet Gynecol* 2017;216:497.
- Ruiz MP, Chen L, Hou JY, et al. Outcomes of hysterectomy performed by very low-volume surgeons. *Obstet Gynecol* 2018;131:981–90.
- Lawson EH, Gibbons MM, Ingraham AM, Shekelle PG, Ko CY. Appropriateness criteria to assess variations in surgical procedure use in the United States. *Arch Surg* 2011;146:1433–40.
- Kennedy AD, Sculpher MJ, Coulter A, et al. Effects of decision aids for menorrhagia on treatment choices, health outcomes, and costs: a randomized controlled trial. *JAMA* 2002;288:2701–8.
- Ghoniem G, Hammett J. Female pelvic medicine and reconstructive surgery practice patterns: IUGA member survey. *Int Urogynecol J* 2015;26:1489–94.
- AAGL Advancing Minimally Invasive Surgery Worldwide. AAGL position statement: route of hysterectomy to treat benign uterine disease. *J Minim Invasive Gynecol* 2011;18:1–3.
- Reames BN, Shubeck SP, Birkmeyer JD. Strategies for reducing regional variation in the use of surgery: a systematic review. *Ann Surg* 2014;259:616–27.
- Kovac SR, Barhan S, Lister M, Tucker L, Bishop M, Das A. Guidelines for the selection of the route of hysterectomy: application in a resident clinic population. *Am J Obstet Gynecol* 2002;187:1521–7.
- Schmitt JJ, Carranza Leon DA, Occhino JA, Weaver AL, Dowdy SC, Bakkum-Gamez JN, et al. Determining optimal route of hysterectomy for benign indications: clinical decision tree algorithm. *Obstet Gynecol* 2017;129:130–8.
- Andryjowicz E, Wray T. Regional expansion of minimally invasive surgery for hysterectomy: implementation and methodology in a large multispecialty group. *Perm J* 2011;15:42–6.
- Elliott SP, Jarosek SL, Wilt TJ, Virnig BA. Reduction in physician reimbursement and use of hormone therapy in prostate cancer. *J Natl Cancer Inst* 2010;102:1826–34.
- Shafirin J. Operating on commission: analyzing how physician financial incentives affect surgery rates. *Health Econ* 2010;19:562–80.
- Federal Register, Vol 80, No. 221, Monday, November 16, 2015/Rules and Regulations. 2016 Physician Conversion Factor (CF) = \$35, 8279.