Resident participation in laparoscopic hysterectomy: balancing education with safety

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In our own experience as medical students in the 1990s, preparatory materials for a day in the operating room consisted of a surgical atlas, suture obtained from a well-meaning nurse, and, if you were fortunate, a needle driver or Kocher clamp. These tools used to learn anatomy and the basic skills of knot tying and proper instrument handling have since been augmented by realistic manikins, laparoscopic and robotic trainers with computer-generated simulation, and mock interviews with actors. The saying of practice makes perfect is imprecise. Rather, we should eschew the concept that perfect practice makes perfect.

These education tools provide house staff with the opportunity to practice perfectly in a safe environment away from patients and enter the operating room with greater confidence and skills. We hope these improvements will enhance the speed and efficiency with which our house staff mature into independent, caring physicians within a restricted work week, ensuring high-quality care. Adoption of these methods has occurred inconsistently among training programs, but nevertheless, it is clear that the phase, see one, do one, teach one, has become an artifact of the 20th century, absent from the lexicon of modern medical education.

But the question remains: does resident involvement compromise surgical quality, even with these advances? We tend to flatter ourselves with the assumption that outcomes correlate only with our surgical skills and clinical judgment, rather than the care provided by other members of the team including anesthesiologists, nurses, pharmacists, and even house staff.

Care processes and surgical expertise are critical contributors to high-quality outcomes, but investigations have demonstrated that nonmodifiable variables such as disease and patient characteristics dominate the value equation. Nevertheless, an inexperienced or, in the worst case, incompetent team member has a great capacity to do harm, emphasizing the importance of leadership and supervision. Thus, assessments of the impact of residents on patient outcomes are more accurately assessments of the attending surgeons’ ability to provide appropriate oversight.

In this issue of the Journal, Igwe et al investigate the impact of resident involvement on surgical outcomes for 3441 patients undergoing benign total laparoscopic hysterectomy from the National Surgical Quality Improvement Program (NSQIP). To date more than 400 hospitals have contributed data from millions of patients to the NSQIP, which provides state-of-the-art, validated, risk-adjusted outcomes for the purposes of quality assessment and improvement.

Details not available in NSQIP were inferred through the use of relative value units and Current Procedural Terminology codes. This allowed the authors to control for potential differences in patient factors such as surgical complexity in this nonrandomized study. Overall, there was no increase in morbidity or mortality rates when a resident was involved in the procedure, a reassuring finding for patients, surgeons, educators, and residents alike, and consistent with prior findings. However, closer examination of specific endpoints provides additional observations that may prove useful in our endless quest to improve surgical and educational quality.

Unsurprisingly, cases including residents were significantly longer, 43 minutes on average, compared with cases performed by attending physicians alone. This is one of the most frustrating aspects of teaching, but certainly it is unreasonable to expect trainees to complete an operation as efficiently as a seasoned attending physician. However, this difference may be minimized with the use of laparoscopic trainers and robotic simulation. The operating room is not the place for a resident to learn how to control the camera, clutch, and third arm of a robot. Ideally, participation in a surgical procedure should only be allowed once specific tasks within a standardized, validated curriculum have been completed satisfactorily.

In this investigation the postgraduate year was known, but no information on specific training that residents had prior to stepping into the operating room was available. Although simulation-based training has been shown to have a positive impact on basic laparoscopic skills, more research is needed to understand its impact on advanced laparoscopic skills and, most importantly, performance in the operating room. Another strategy for managing operating time is to allow residents a set amount of time to complete a given step in the operation. It is important to challenge residents with difficult cases to improve their skills and confidence, but a struggling resident should not be allowed to continue infinitely. As attending surgeons, it is our responsibility to lead the care team, and part of that includes balancing resident autonomy with safety.

Reducing operating times through the approaches listed in the previous text is likely to reduce not only frustration but also cost and potentially complications. In a study of more than 600,000 patients from the NSQIP undergoing general and...
vascular procedures, morbidity that may have been related to operative time was higher when a resident was involved in the procedure. For example, surgical site infection rates were 21% higher. Another analysis of 2293 patients undergoing 1 of 5 general surgical procedures showed no increase in morbidity but a longer length of stay and a 46% increase in cost.

It should be noted that in the current investigation, resident involvement did not increase the risk of wound complications, although there was a borderline increase in risk when comparing junior residents with attending physicians alone (2.4% vs 0.8%, \(P = .05\)). The statistical significance of this difference may have been diminished by the small number of procedures performed by junior residents (\(n = 255\)).

Although the overall complication rate was no different between groups, the rate of transfusion of more than 4 units of packed red blood cells was higher with resident involvement. Even considering the multiple comparisons performed, this difference appears to be significant (2.0% vs 0.4%, \(P < .0001\); odds ratio, 5.4). The authors were unable to assess intraoperative complications, but the increased need for transfusion suggests that the attending surgeon did not intervene appropriately in these cases.

The need for any transfusion, particularly more than 4 units, should be a rare occasion indeed for a benign laparoscopic hysterectomy. Patients were also more likely to require reoperation (odds ratio, 1.7), suggesting an increased likelihood of intraoperative complications with resident involvement. Unfortunately, the reason for reoperation was not available in the dataset. Although patients tended to be older and have higher American Society of Anesthesiology scores, surgical complexity, the need for lysis of adhesions, and other patient characteristics appeared to be similar between groups. However, the possibility remains that other unmeasured case-mix differences between resident and no-resident cases may be partially responsible for the higher rates of transfusion and reoperation. Clearly, this subject requires further investigation.

Interestingly, patients were nearly twice as likely to require readmission when a resident was involved in the procedure. However, aside from a higher rate of transfusion, which presumably would have occurred during the index admission, this was not associated with a higher complication rate. This finding is likely a reflection of increased vigilance and testing that may occur while under the care of a resident. In fact, in the previously cited study of more than 600,000 patients, resident involvement actually resulted in a slightly decreased mortality rate that was hypothesized to result from increased vigilance.

Similar findings were described in nearly 78,000 patients undergoing oncological surgery. Up to now we have assumed that the impact of resident involvement on outcome, positive or negative, depends exclusively on whether they were present in the operating room, but postoperative management may be equally important. Future investigations may consider stratifying patients by hospital type. If the cohort was limited to teaching hospitals or compared against nonteaching hospitals, it may be possible to learn if increased vigilance truly reduces mortality or merely increases costs.

Future research should attempt to address 2 limitations of this investigation. First, cohorts were selected based on resident involvement, but it was not possible to determine the degree of involvement. This may have varied from simply holding the camera to performing the entire procedure with minimal supervision. The Accreditation Council for Graduate Medical Education requires residents to maintain a case log and assign their role in the procedure; they are classified as surgeon if they complete more than 50% of the cases. These data could be used to more accurately address this subject.

Accreditation Council for Graduate Medical Education case log numbers could also help us understand at what point the residents were on the learning curves for the procedure. Second, it was not possible to determine whether the hysterectomies in this series were performed laparoscopically or robotically. It is generally accepted that robotic skills are more rapidly assimilated by inexperienced surgeons than laparoscopy. In this way, differences in operating time, transfusion, and reoperation rates may be less pronounced for robotic hysterectomy. However, the impact of robotics on cost of care should be considered together with its impact on the learning curve.

Despite the above caveats, this is a well-designed, well-executed investigation and should provide reassurance to the thousands of patients each year who undergo hysterectomy at teaching hospitals. As we continue to refine our methods of training and evaluation of house staff to improve education, it is worth reminding ourselves that the risks of not teaching far outweigh the risks of teaching. Our patients trust us to deliver the highest quality care available, but we also owe it to them to ensure that the next generation of surgeons is better trained than the last.

REFERENCES