and Other Interventional Techniques

The surgical competence conundrum

Much attention has been focused on the changing times we are experiencing in the world of surgical practice and training. A growing chorus of voices, including some recorded in this section of *Surgical Endoscopy*, is telling us the days of “see one, do one, teach one” surgical apprenticeships are past [1]. We hear that surgeons must be held to more consistent and tangible measures of performance than have been expected of us to date [17]. We are increasingly and correctly told of the need to provide objective measures of surgical competence to an ever more educated patient population, to more demanding third party payers, and to hospital credentialing boards. That such measures do not yet exist in any way that is meaningful or universally agreed upon remains a source of consternation for all involved. It has been suggested, again correctly, that new technology (e.g., mechanical and virtual simulators, robotics, telesurgery) must be harnessed to enable surgeons to acquire new skills and certify mastery of those skills. Yet at present, the medical community can neither define competence in new surgical procedures and technology nor agree on the best means of acquiring it.

A survey of surgical education over the past century indicates that neither reassessment of surgical training nor the search for an objective measure of surgical performance is a new phenomenon, as Professor Peracchia made clear in his address to the European Surgical Association [14]. However, the most recent incarnation of minimally invasive surgery (MIS) in the late 1980s has again brought the issues of surgical training, competence, and credentialing to the fore [5, 6, 13]. Challenges raised by MIS have been enumerated by various authors [1, 2, 4, 7–10, 15–19, 21]; they include:

1. Cost
2. Operative time constraints
3. Loss or diminution of tactile feedback while operating
4. The unique technical demands of laparoscopic surgery amplified by the surgeon’s “visual disconnect” from the operative field
5. Rapid adoption of laparoscopic cholecystectomy and other laparoscopic procedures due to patient demand
6. Increasing demand for accountability to the public (highlighted by the recent Institute of Medicine report) [3, 11].

The particular challenges of MIS mean that surgical programs must achieve trainee competence not only by teaching residents the procedures but also by allowing them sufficient time to develop and hone the motor skills required.

Evaluating surgical skills is still a major impediment in the cycle and, although it causes unique problems and opportunities for MIS, it has been recognized by the American Council of Graduate Medical Education and the Institute of Medicine as a general surgical training issue [20]. Numerous suggestions for skill evaluation based on new technology have been investigated and reported in the literature, ranging from assessing trainees’ competence in “trainer” boxes to using virtual reality approaches. As things stand, there is still no universally accepted or recommended model of training, since the suggested approaches raise multiple concerns that so far remain largely untested. Indeed, there is precious little direct evidence that practice on mechanical or porcine models is predictive of future MIS performance in the operating room. What is obvious, however, is that a high degree of skill development is necessary to become a competent laparoscopic surgeon and that, without developing these psychomotor skills, an otherwise competent surgeon could put patients at risk. Further, we have no way to determine exactly what level of training individuals need to assure the minimum risk to patients, or the optimum time to provide it in relation to other surgical experience. What seems to be missing are standard and valid methods to measure and certify competence in these psychomotor skills.

We may need to step back further in our approach to the competence conundrum. We need to establish and agree upon a vocabulary that equips us to speak in meaningful terms across clinical, academic, and even geographic divides. To this end, a workshop was convened by R. Satava in July 2001 in Scottsdale, Arizona, USA. The workshop was entitled “Metrics for Objective Assessment of Surgical Skills.” Attending the conference were international experts in objective assessment of surgical technical skills and representatives of relevant official bodies involved in surgical education evaluation and certification. They acknowledged that several investigators are validating many different systems for training and evaluation, using different tests, criteria, validation method, and nomenclature. The purpose of the workshop was to develop an infrastructure for the objective assessment of technical skills by standardizing nomenclature and assessment methodologies, so the surgical education, training, and evaluation community can communicate with a common language and have a common basis for comparing statistics from different centers.

Ideally we should put in place a developmental approach to training that takes a trainee’s current skills

and knowledge of MIS into account, but also considers his or her aptitude. In clinical terms, the trainee would undergo diagnostic testing, which would ultimately lead to a tailored prescription for learning for that individual. Yet achieving an accurate diagnosis requires that we have a standardized skills test and a knowledge assessment battery. So far that tool is missing.

We have considered many of these issues in our planning and development of an MIS training program within our own institution. We have taken a developmental approach to training (starting in medical school) whereby students begin being exposed to MIS anatomy during the first and second years (in anatomy and pathology). During their third year, students are offered opportunities to begin developing psychomotor skills in the MIS simulators. For interns and residents, we have implemented a developmental resident training curriculum that involves learning and practicing the psychomotor skills required by laparoscopic surgery, moving along from the video-trainer for established skills to inexpensive model simulations (e.g., performing a portion of a laparoscopic appendectomy) to porcine models. Thus, the MIS training cycle now includes providing (1) cognitive knowledge, (2) motor skill learning and practice, and (3) evaluation of skills to ensure that the resident is ready to go to the operating room.

Our plans for interns include doing an initial assessment of their knowledge of MIS anatomy and procedure-specific information, perioperative skills, and psychomotor skills. By tracking performance and providing systematic and timely feedback to each resident across their residency careers, we will not only be able to certify their varying levels of performance, but will also be able to assist them more efficiently and effectively in their training.

To identify the most effective MIS training and assessment methods, we believe multiple programs may need to coordinate their efforts. We propose, therefore, that systematic research be orchestrated in collaborating institutions to develop and validate differing training and assessment approaches. To meet the general requirements of surgical education, coordinated research should identify assessment and training methodologies that (1) are economical and efficient, (2) are reliable and valid, (3) enable us to certify competence at varying levels for specific skills or parts of a procedure, (4) make use of current and future training and evaluation technology, and (5) fit in with and within the structure of the current surgical training program. Through such efforts, we might be able to determine that some training outcomes might be achieved through more than one method, whereas other outcomes might be wedded to a single approach.

To draw an analogy (unabashedly) from the 2002 Winter Olympics, consider the team speed skating event. Our attempts at forming independent solutions to the conundrum of new surgical training and credentialing often end in confused and disconnected pile-ups

reminiscent of those frequently seen in the team short track speed skating. Instead we must adjust our stride to that of others on the same track, and as a team speed toward a universally agreed upon goal.

Those attending the "Metrics for Objective Assessment of Surgical Skills Workshop" envisioned just such a convergence in concluding: "It is anticipated that, as the field of objective assessment using simulators matures with validation by outcomes analysis at the end of the training programs, there will be a convergence toward a core curriculum that can provide a standardization for surgical resident training and evaluation as well as certification — all directed at reducing errors to improve the quality of patient safety [12]."

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