Surgical video analysis: an emerging tool for improving surgeon performance

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Accepted 29 May 2015

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▶ http://dx.doi.org/10.1136/bmjqs-2014-003816

To cite: Dimick JB, Varban OA. *BMJ Qual Saf* Published Online First: [*please include* Day Month Year] doi:10.1136/bmjqs-2015-004439

Consistent with the emphasis on systems' approaches that have characterised much of the patient safety movement thus far, most existing efforts aimed at improving surgical safety tend to focus almost exclusively on perioperative care. For example, surgical quality committees spend the lion's share of their time discussing methods of ensuring optimal antibiotic prophylaxis to prevent wound infections or reining in the creative and highly variable ways surgeons use heparin (and its counterparts) to prevent deep venous thrombosis. Unfortunately, many of these initiatives have had only a modest impact on surgical outcomes.[1]

As a result, there has been growing enthusiasm for targeting the operation itself for improvement.[2] Surgical procedures are complex, technical in nature and are particularly vulnerable to human error: outcomes may depend on the individual surgeon's ability to avert or mitigate technical errors. However, very little is known about the impact of surgical skill and technique on patient outcomes. Ironically, this may be attributable to the tendency of patient safety to focus on systems rather than individuals. Two other practical barriers to advancing the study of the contribution of individual technical skill and competence to surgical safety and quality include the following: (1) obtaining data on the details of what happens in the operating room; and (2) the lack of scientific work aimed at systematically evaluating these data to better understand surgical skill and technique. Each of these barriers is currently being addressed and, as a result, the study of surgical intraoperative skill and technique is gaining momentum.

One recent study reminded us of the potential importance of surgeon skill as a driver of patient outcomes. This study, from the Michigan Bariatric Surgery Collaborative (MBSC), demonstrated that peer video ratings of surgical skill were strongly correlated with clinical outcomes for practicing surgeons performing laparoscopic gastric bypass procedures.[3] Surgeons from around Michigan submitted 'typical' videos and were rated by at least 10 of their peers using a modified version of objective structured assessment of technical skill (OSATS) instrument. This study demonstrated wide variations in surgical skill among practicing surgeons. But perhaps most importantly, it found a strong correlation between these video peer ratings of skill and all of the measured clinical outcomes—including 30-day surgical complications and medical complications. This paper shows that what happens in the operating room matters for safety and has generated great enthusiasm for strategies aimed at improving the intraoperative technical aspects of surgery.

Bonrath *et al*[4] add to our scientific understanding of intraoperative surgeon performance. The investigators reviewed 54 unedited videos of successful (uncomplicated) laparoscopic bariatric procedures to identify near-miss events using the Generic Error Rating Tool (GERT). They found 66 events in 38 of the video recordings, including 25 where the surgeon had to undertake additional measures (eg, haemostasis or suture repair) to address the problem.

This study makes several important contributions. First, expanding on the prior work demonstrating the reliability of peer ratings of surgeon skill, this study demonstrates the reliability of the GERT scale for using video review to categorise 'near-miss' technical errors. Second, the study provides a proof-of-concept that even videos of uncomplicated cases can yield generalisable teaching points. For example, the majority of the technical

errors in these laparoscopic gastric bypass cases occurred during one specific step of the operation: the dissection of the posterior gastric tunnel through the lesser curve mesentery. With this knowledge, this specific step (which can take 5–15 min) can be targeted for improvement by demonstration of technical best practices or short duration intraoperative coaching by more experienced surgeons.

One limitation of the study by Bonrath *et al* is that it is unclear whether the errors in this analysis would ultimately lead to adverse patient outcomes. It documents reliability (inter-rater) but not construct validity. Good surgeons may not have fewer errors intraoperatively, but they may be better at recognising and 'rescuing' the procedure after near-miss events. Nonetheless, the process of identifying the error-prone steps can serve as a learning opportunity for best practices aimed at both preventing and remediating intraoperative errors.

As Bonrath *et al* demonstrate, the systematic study of operative video represents an important opportunity for improving the quality of surgical care. Because of the growth in the use of laparoscopy and the 'built-in' video recording equipment, capturing details of what happens in the operating room is becoming easier for a variety of technically complex surgical procedures. Moreover, as the scientific methods for studying surgical intraoperative performance expand, there will likely be growing enthusiasm for using other video-recording platforms to studying open surgical procedures.

How do we reconcile this focus on individual surgeon's performance with the systems focus that has become a central theme of patient safety? Many would argue that the operative performance itself is not the result of a single person. Rather, it is a group performance, including the surgeon, surgical assistants (often trainees), scrub nurses and others. Moreover, it is clear that surgical outcomes are driven by numerous other factors inside and outside the operating room, including the quality of care delivered by the anaesthesia team, the quality of care on the post-operative ward and the ability of the hospital to recognise and treat complication once they occur.

All of these features no doubt make an important contribution to outcomes. Nonetheless, when reviewing a video of a surgical procedure, it is difficult to dismiss the idea that the surgeon is primarily responsible for the technical performance—and this new study adds to the growing evidence that suggests that the surgeon's skill and technique is an important driver of outcomes. It is worth recognising that rigid systems thinking may sometimes obscure the fact that the best outcomes are most likely obtained when the system is designed well *and* the human performance within those systems is conducted at the highest level.

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Competing interests JBD receives grant funding from the National Institutes of Health (NIH), the Agency for Healthcare Research and Quality (AHRQ) and BlueCross BlueShield of Michigan Foundation; and is a co-founder of ArborMetrix, a company that makes software for profiling hospital quality and efficiency. OAV receives funding from BlueCross BlueShield of Michigan for the Michigan Bariatric Surgery Collaborative (MBSC).

Provenance and peer review Not commissioned; internally peer reviewed.

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