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Patient Safety Tip of the Week

March 17, 2020 Video Recording in the OR

For over a decade we've argued for proactive use of video recording, particularly in the OR. Video recording can be used constructively to assess communication and teamwork in the OR. It can be used evaluate OR door opening and closing, which may be factor contributing to surgical site infections. It can help quantitate interruptions and distractions that occur during procedures and identify some of the reasons for those interruptions and distractions. It can be used to determine compliance with Universal Protocol, surgical timeouts, surgical checklists and whether parties were truly active participants in those important processes. It can help determine whether all parties are actively participating in sponge/instrument counts. In our March 2019 "Another Use for Video Recording" we showed how it has been used to demonstrate compliance with key steps in specific surgical procedures. And it can obviously be used to assess and improve performance in medical education and training.

So we were pleased to see a recent article in HealthLeaders on Northwell Health's use of such technology (Cheney 2020). Northwell Health has employed OR black box technology since early 2019. They have used it in laparoscopic cases of urologic and colon surgery. Those were chosen for pilot projects because there is a digital feed from the camera used during the laparoscopic surgery and because there were physician champions for the project.

So, what's recorded? There are video feeds from the laparoscopic camera and video of the OR staff, audio of the OR staff, and physiological data from various OR monitors.

Northwell's primary purpose has been to use the integrated data to help improve OR teamwork and communication. They use it proactively to improve coordination in the OR. They have used it for one of our examples above – to identify distractions and interruptions and, especially, people entering and leaving the room. But it's also used in their quality improvement and educational activities. Interestingly, Northwell has also used it to cover some of the aspects we discuss during post-procedure "debriefings". For example, they might identify issues related to equipment availability or other problems with equipment or supplies.

Can they use this technology akin to the way the airline industry and NTSB use black boxes? Yes. Northwell does use the collected information when they do root cause analyses (RCA's) or other investigations on adverse outcomes.

It also has a role in teaching programs. They can look to see if a resident's performance improved over a 4-month rotation, to evaluate the success of the teaching program. Our March 2019 "Another Use for Video Recording" noted a study (van de Graaf 2019) that showed systematic video recording was better at capturing the essential steps of some laparoscopic procedures than was the narrative operative report.

Our first 3 columns listed below recommended use of video recording as one means of improving compliance with surgical timeouts or elements of a safe surgery checklist. In fact, Overdyk et al. (Overdyk 2016) demonstrated that real-time feedback from video recording conferred a 3.37-fold increased odds of time-out compliance versus no feedback, and 2.75-fold and 2.4-fold increased odds of compliance with the sign-in and sign-out components of the WHO surgical safety checklist, respectively. It also led to some improvements in efficiency (shorter OR turnaround times for scheduled cases).

In our March 17, 2015 Patient Safety Tip of the Week "Distractions in the OR" we recommended video/audio recording in the OR with subsequent playback for all parties in a constructive fashion so they can see how well (or not so well) they communicated and how distractions and interruptions interfered with their communications. Jung et al. reported their first-year analysis of the operating room black box study (Jung 2020). They conducted a prospective cohort study in 132 consecutive patients undergoing elective laparoscopic general surgery at an academic hospital during the first year after the definite implementation of a multiport data capture system called the OR Black Box to identify intraoperative errors, events, and distractions. They found that auditory distractions occurred a median of 138 times per case and that at least 1 cognitive distraction appeared in 64% of cases. Medians of 20 errors and 8 events were identified per case. Both errors and events occurred often in dissection and reconstruction phases of operation. Technical skills of residents were lower than those of the attending surgeon.

Some formal studies have demonstrated that such use of video/audio recording can in fact, reduce interruptions and distractions. Bergstrom et al. (Bergström 2018) found that audio-video recording during laparoscopic surgery in a Swedish study reduced irrelevant conversations in the OR. Irrelevant conversation time fell from 4.2% of surgical time to 1.4% when both audio and video recordings were made. No differences in perioperative adverse event or complication rates were seen but, again, sample size was too small to assess those outcomes.

People entering and exiting the operating room, with consequent door opening and closing, has been identified as a factor potentially exposing patients to surgical infections. In our November 24, 2015 Patient Safety Tip of the Week "Door Opening and Foot Traffic in the OR" we noted some low-cost methods that might assess such events, but we also noted that video/auditory recording might identify not only the frequency of such events, but also the reasons for such events.

We've often recommended doing video/audio recording in the OR and then play it back for all parties in a constructive fashion so they can see how well (or not so well) they communicated and how distractions or interruptions interfered with their

communications. Teodor Grantcharov, MD, creator of surgery's 'black box' and senior author on the Jung study, noted in an interview that they've shown that coaching surgical teams with black box data reduces the rate of surgical errors by 50%. (Grantcharov 2019). He notes that the black box captures video and audio recordings of everything that happens in the OR, including what steps were completed, how well the team communicated, and includes physiological information from patient monitors and the physical environment of the room, including ambient temperature, decibel levels and how many times the door is opened. He notes that it's designed to identify near misses, understand the risks involved and proactively mitigate those risks. But he notes this isn't just about targeting errors and near-misses. They use the data to study successes in great detail, so they can identify and reinforce positive behaviors. They use the information to coach surgical teams on ways to improve their performances, using the analogy of how sports teams study videos and stats to enhance how they play.

Unfortunately, too many surgeons and hospital attorneys are loathe to use video recording even when it is clearly being done for quality improvement activities and even when the recordings would be destroyed immediately following their use in quality improvement activities. It might take very clear cut statutes in every state to protect such recordings from the legal discovery process for us to convince more organizations of the value of video recording.

So how did Northwell get around those fears of litigation? First, everything is de-identified. The cameras even blur the faces of the OR team! And second, the focus is to look at system issues, not individual human issues. They also note that de-identifying the data also protects patient privacy.

Several of the studies in today's column note that design of the systems or studies had the purpose of looking at team performance and not individual performance, and that this was a critical step in recruiting the support of all OR stakeholders.

There are ethical considerations for video recording in the operating room. Prigoff et al. (Prigoff 2016) discussed these and recommended the following guidelines:

- Creation of a video/audio recording should have a clearly stated purpose. This may include educational, research, quality improvement, patient request, or others.
- Any patient undergoing a procedure that may include recording should be made aware and properly consented. This includes, but is not limited to, the purpose of the recording, the intended audience, and the parts of the procedure recorded.
- Patients, faculty, and staff should be notified that a recording will take place during the procedure and given the opportunity to opt-out.
- If editing is required for visual accuracy or timeliness for a presentation, the alterations should be clearly disclosed to the audience.
- All recordings should be protected with the same security and scrutiny that the hospital and physicians use for patients' medical records.

Northwell has not yet published any outcome data that can be attributed to their OR black box program. Likewise, several studies that have demonstrated improvement in process measures have not been of sufficient sample size to assess actual patient outcomes.

So, what does all this cost? It's not for the faint of heart! Northwell's OR Black Box equipment costs $100,000 per operating room according to the HealthLeaders article. They also analyze all their data centrally, so that lessons learned can be shared among multiple hospitals in their system. The total cost of implementing the less sophisticated remote video auditing in the Overdyk study (Overdyk 2016) had three cost components: one-time video equipment cost of approximately $4000 per camera; one-time remote video auditing set-up and onsite consulting training fee of $7500 per OR; and an remote video auditing service charge of $40/day per OR. So, there is probably a whole spectrum of implementation components and costs.

Nice job, Northwell! We wish we could convince more hospitals to adopt this approach. Hopefully, other hospitals will see the benefit of video recording and black box integration that you've experienced and implement it at their facilities.

Some of our previous columns discussing video recording:

September 23, 2008 "Checklists and Wrong Site Surgery"
December 6, 2010 "More Tips to Prevent Wrong-Site Surgery"
November 2011 "Restricted Housestaff Work Hours and Patient Handoffs"
March 2012 "Smile...You're on Candid Camera!"
August 27, 2013 "Lessons on Wrong-Site Surgery"
March 17, 2015 "Distractions in the OR"
November 24, 2015 "Door Opening and Foot Traffic in the OR"
March 2019 "Another Use for Video Recording"

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