

Patient Safety Tip of the Week

July 26, 2016

Confirmed: Keep Your OR Doors Closed

In several of our columns we've warned that long surgical duration has the potential to increase surgery-related infections and that excessive OR traffic and opening of OR doors is likely a major factor.

In our March 10, 2009 Patient Safety Tip of the Week "[Prolonged Surgical Duration and Time Awareness](#)" we noted a study ([Lynch 2009](#)) that suggested increased foot traffic may be factor related to prolonged procedures that increases the likelihood of surgical site infections.

Then in our January 2010 What's New in the Patient Safety World column "[Operative Duration and Infection](#)" we discussed another study ([Proctor et al 2010](#)) that looked at a large database of general surgical procedures and demonstrated a linear relationship between duration of surgery and infectious complications. This relationship persisted even after adjustment for a variety of other risk factors for perioperative infections. The unadjusted infectious complication rate increased by 2.5% per half hour. Hospital length of stay (LOS) also increased geometrically by 6% per half hour. We again speculated that increased foot traffic may be another factor related to prolonged procedures that increases the likelihood of surgical site infections as suggested by Lynch et al.

And our December 30, 2014 Patient Safety Tip of the Week "[Data Accumulates on Impact of Long Surgical Duration](#)" cited several other studies in which surgical infections were one of several complications related to prolonged surgery.

Then in our November 24, 2015 Patient Safety Tip of the Week "[Door Opening and Foot Traffic in the OR](#)" we discussed a study from Johns Hopkins that formally studied how often OR doors are opened during joint arthroplasty surgeries and the impact on OR air flow ([Mears 2015](#)). The researchers measured how often and for how long OR doors were opened during 191 hip and knee arthroplasty procedures. They also measured air pressures in the OR and adjacent corridors. They found that, on average, OR doors were open 9.5 minutes per case and the average time between door openings was 2.5 minutes. As you'd expect the number and duration of door openings correlated with the length of surgery. In 77 of the 191 cases positive pressure within the OR was defeated. The implications are obvious. While they found only one surgical infection in the 191 cases, the effects of the door opening on OR pressure and air flow theoretically would

predispose to surgical infections. OR's have positive pressure to avoid flow of air and airborne pathogens from nonsterile adjacent areas.

Now a new study has actually demonstrated that a program to reduce unnecessary door openings may reduce surgery-related infections ([Camus 2016](#)). A Canadian hospital did a manual count of door openings during total joint replacement operations and revision procedures. They counted between 42 and 70 door openings per operation from incision time to joint capsule closure time. Operations averaged 75 minutes. Reasons for entering and exiting the OR during operations included retrieving charts, instruments, or equipment, and taking a break.

Next their CUSP (Comprehensive Unit-Based Program) team brainstormed and came up with key changes, including stopping all traffic in and out of the OR between total joint capsule opening and closure, communicating by phone, and increasing the use of templates to identify implant size prior to each operation. They also put a sign on the OR door reminding staff to minimize traffic and asking them to record why they are entering the OR during an operation. Subsequent traffic audits taken every six months indicated an amazing reduction in OR traffic from between 42 and 70 door openings to 3.2 door openings per case. They felt this intervention may have contributed to a decrease in orthopedic SSIs from 2.8 percent to 2.1 percent. The Canadian team is expanding its program to multiple other services and other hospitals in their multi-hospital system.

We've previously suggested two "nudges" that could reduce OR door openings: (1) using a sign akin to the "On Air" signs recording studios use to indicate a procedure is in progress and (2) requiring those opening and closing the OR doors to record the reason for their action. It appears that those were two of the interventions used in their program. Also we've discussed in numerous columns how use of presurgical "huddles" or briefings and postsurgical debriefings may help identify issues that can lead to reduction in surgical duration and unnecessary OR traffic (see our December 30, 2014 Patient Safety Tip of the Week "[Data Accumulates on Impact of Long Surgical Duration](#)").

The Canadian study only reported the impact on surgical infections. But we're willing to bet that their efforts reduced not only door openings but likely significantly reduced surgical durations. That, in turn, likely reduced several other unwanted complications seen with prolonged surgery, not to mention the economic benefits to the hospital from improved efficiencies.

Of course, we'd like to see validation of their study at other sites. We don't know if every hospital can achieve the remarkable reduction in OR door openings reported by the Canadian researchers but it's certainly worth your while to emulate their efforts.

Our prior columns focusing on surgical case duration:

- March 10, 2009 "[Prolonged Surgical Duration and Time Awareness](#)"
- January 2010 "[Operative Duration and Infection](#)"
- July 21, 2012 "[Surgical Case Duration and Miscommunications](#)"

- August 26, 2014 [“Surgeons’ Perception of Intraoperative Time”](#)
- December 30, 2014 [“Data Accumulates on Impact of Long Surgical Duration”](#)
- November 24, 2015 [“Door Opening and Foot Traffic in the OR”](#)

References:

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Mears SC, Blanding R, Belkoff SM. Door Opening Affects Operating Room Pressure During Joint Arthroplasty. Orthopedics 2015; 38(11): e991-e994

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Camus S. Operating Room Traffic Monitoring Improves Patient Safety. Abstract session presentation at the 2016 American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP®) Conference. July 18, 2016 as reported in ACS (American College of Surgeons). Minimizing Operating Room Traffic May Improve Patient Safety by Lowering Rates of Surgical Site Infections. ACS Press Release July 18, 2016

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