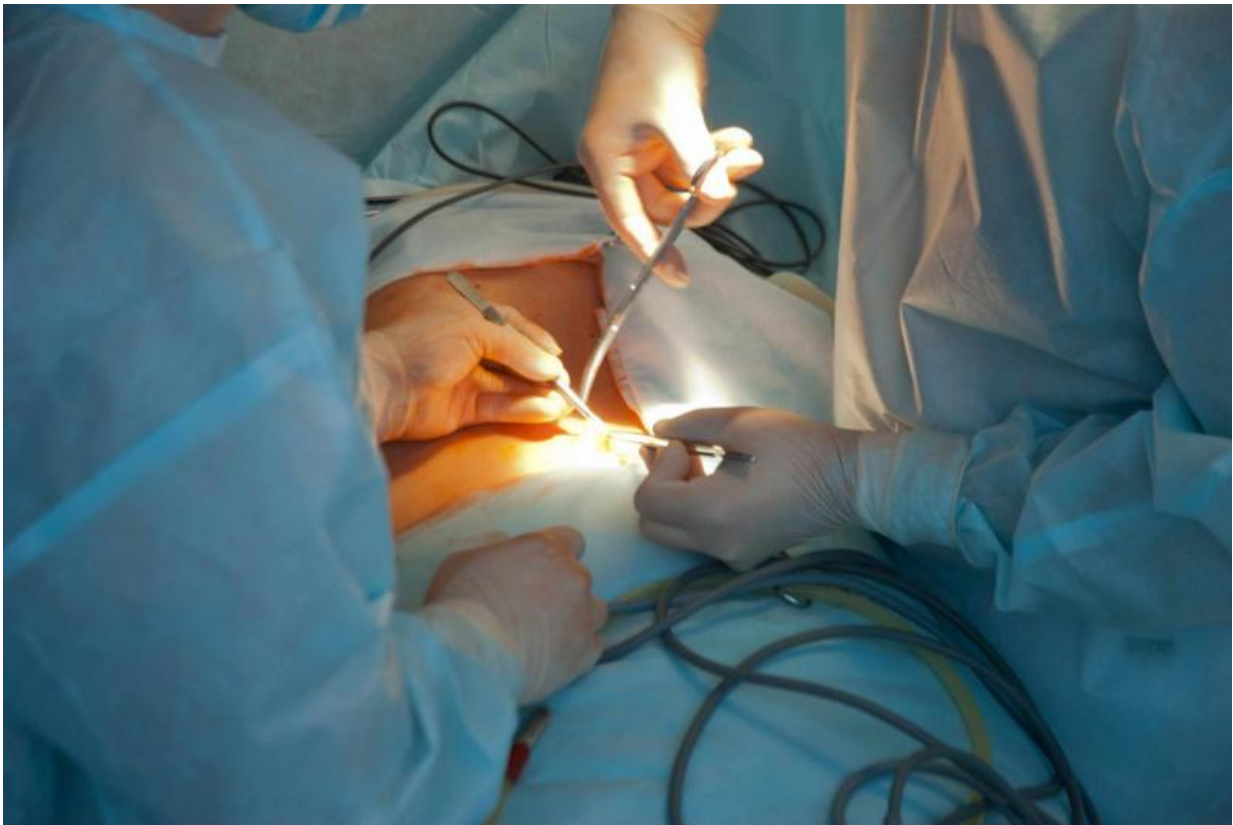


How does human behavior lead to surgical errors? Researchers count the ways

June 1 2015



Why are major surgical errors called "never events?" Because they shouldn't happen—but do. Mayo Clinic researchers identified 69 never events among 1.5 million invasive procedures performed over five years

and detailed why each occurred. Using a system created to investigate military plane crashes, they coded the human behaviors involved to identify any environmental, organizational, job and individual characteristics that led to the never events. Their discovery: 628 human factors contributed to the errors overall, roughly four to nine per event. The study results are published in the journal *Surgery*.

The never events included performing the wrong procedure (24), performing surgery on the wrong site or wrong side of the body (22), putting in the wrong implant (5), or leaving an object in the patient (18). All of the errors analyzed occurred at Mayo; none were fatal.

The Mayo Rochester campus rate of never events over the period studied was roughly 1 in every 22,000 procedures. Because of inconsistencies in definitions and reporting requirements, it is hard to find accurate comparison data, but a recent study based upon information in the National Practitioner Data Bank estimated that the rate of such never events in the United States is almost twice that in this report, approximately 1 in 12,000 procedures.

Nearly two-thirds of the Mayo never events occurred during relatively minor procedures such as anesthetic blocks, line placements, interventional radiology procedures, endoscopy and other skin and soft tissue procedures.

Medical teams are highly skilled and motivated, yet preventing never events entirely remains elusive, says senior author Juliane Bingener, M.D., a gastroenterologic surgeon at Mayo Clinic. The finding that factors beyond "cowboy-type" behavior were to blame points to the complexity of preventing never events, she says.

"What it tells you is that multiple things have to happen for an error to happen," Dr. Bingener says. "We need to make sure that the team is

vigilant and knows that it is not only OK but is critical that team members alert each other to potential problems. Speaking up and taking advantage of all the team's capacity to prevent errors is very important, and adding systems approaches as well."

For example, to help prevent surgical sponges from being left in patients, Mayo Clinic installed a sponge-counting system and uses that bar code-scanning system and vigilance by the surgical team to track sponges. Other preventive systems include use of The Joint Commission health care quality organization's Universal Protocol, team briefings and huddles before a surgery starts, a pause before the first incision is made, and debriefings using a World Health Organization-recommended safety checklist.

To investigate the never events, the researchers used [human factors](#) analysis, a system first developed to investigate military aviation accidents. They grouped errors into four levels that included dozens of factors:

- "Preconditions for action," such as poor hand-offs, distractions, overconfidence, stress, mental fatigue and inadequate communication. This category also includes channeled attention on a single issue: In layman's terms, focusing so much on a tree that one cannot see the forest.
- Unsafe actions, such as bending or breaking rules or failing to understand. This category includes perceptual errors such as confirmation bias, in which surgeons or others convinced themselves they were seeing what they thought they should be seeing.
- Oversight and supervisory factors: Inadequate supervision, staffing deficiencies and planning problems, for example.
- Organizational influences: Problems with organizational culture or operational processes.

In addition to systems approaches and efforts to improve communication, attention should be paid to cognitive capacity, such as team composition, technology interfaces, time pressures and individual fatigue, the researchers say.

The stakes are high for patients, physicians and hospitals, Dr. Bingener says.

"The most important piece is the patient perspective. You don't want a patient to have to experience a never event. The breach in trust that happens with that is the most important part," she says.

Provided by Mayo Clinic

Citation: How does human behavior lead to surgical errors? Researchers count the ways (2015, June 1) retrieved 26 April 2024 from <https://medicalxpress.com/news/2015-06-human-behavior-surgical-errors-ways.html>

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