INFECTION PREVENTION: TEAMWORK, COMMUNICATION, BRIEFING, CHECKLISTS, AND OR SAFETY

Hi, I'm Patchen Dellinger, surgeon from the University of Washington.And I'd like to talk with you today about teamwork, communication, briefing, checklists, and OR safety.If we look at a systems approach to understanding errors, we can observe that human error is caused, often, by a combination of active and latent failures, only the last of which is an unsafe act of an individual.And, if you will, this is sort of the verbal version of the arrow going through the Swiss cheese that you've probably all seen on many occasions.

Wiegmann and colleagues, looking at 31 consecutive cardiac surgical cases observed technical errors occurring almost four times per hour, and surgical flow disruptions at a rate of about eight times per hour.And they found that the cause of surgical flow disruption was most commonly teamwork, followed by extraneous interruptions, equipment issues, and resource-based issues.When they looked at teamwork and communication failures and they looked at surgical errors, they found that as communication failures increased, surgical errors increased in a fairly convincing relationship.

Now, on the other hand, they also observed that when an error was discovered immediately it was usually corrected by the person who made the error, whereas when an error was discovered later, after the fact, it was often corrected by someone other than the person who had made the error.And so we can see that poor teamwork may predispose to surgical errors, but good teamwork, in turn, may facilitate the detection and the remediation of errors.

Makary and colleagues looked at teamwork in the operating room and asked how this appears to different players in the operating room.What they found is if you ask the surgeon how good surgeons are at teamwork, they thought they were pretty good.Anesthesiologists thoughts anesthesiologists were pretty good.Nurses agreed that they had good team work.And CRNA's agreed that they had good teamwork.If you asked the surgeon about the other specialists, they thought the anesthesiologists had good teamwork, nurses had good teamwork, and CRNA's had good teamwork.But if you asked CRNAs, nurses, or anesthesiologists about surgeon teamwork the ratings were not nearly as good.So there clearly are differing perceptions among personnel in the OR as to what constitutes teamwork and who has good teamwork, as we see here in these ratings.

Now Carney and colleagues did a similar study, in which they asked surgeons how good communication was, and they thought it was good; and how good the nurse's communication was, and they thought it was good.But when they asked nurses about surgeon communication on a scale of one to five, they got a significantly lower rating.And when they asked surgeons and nurses how they defined collaboration, nurses thought that collaboration meant having their input respected, whereas surgeons thought it meant having nurses ready to do what they wanted.

Carney asked about ratings of whether nurse input is well-received, whether it's difficult to speak up if you perceive a problem, whether disagreements are resolved by what is best for the patient and not who is right, whether it's easy to ask questions if you don't understand, and whether the surgeons and nurses

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worked as a well-coordinated team.They got significantly different ratings by nurses and surgeons for these questions.

Mills, in the Journal of the American College of Surgeons, asked fairly similar questions, and, again, got very different ratings from nurses and from surgeons about whether they felt comfortable intervening in a procedure if they had concerns about what was occurring, whether during surgical and diagnostic procedures everyone was aware of what was happening, whether morale on the team was high, and whether everyone was comfortable giving feedback to other team members.

Lingard, at Toronto, evaluated the introduction of a preoperative checklist and briefings among surgeons, nurses, and anesthesiologists at the beginning of a case to reduce failures in communication.What they found was that before briefing only 6% of all cases had no failures at all.After briefing this was increased by more than six-fold, six times as many cases that were able to be completed with no communication failures.They found that the number of communication failures per procedure was significantly reduced and that failures with consequence were also reduced.

Henrickson, looking at cardiac surgical procedures, again, after the introduction of preoperative briefings, found a 47% reduction in disruptions per case, 53% reduction in miscommunications, 53% less time by the circulator in core and out of the room and unavailable to assist with whatever needed to be done.And they also found that the duration, the amount of time taken for briefings, decreased dramatically over time as the operative team became more familiar with briefings.One of the arguments that surgeons will sometimes give about briefing is that time in the OR is expensive, we need to just get on with the business, get the operation done.

So Nundy and colleagues looked, again, at the introduction of preoperative briefings at Johns Hopkins and asked what happened to operating room delays.Officially-reported delays were reduced by 31%, but the surgeons actually reported a greater reduction in delays than the official reports and agreed that there were fewer communication breakdowns after briefings were introduced.

Beldi and colleagues in Switzerland looked at intraoperative behavior and surgical site infections.They found, as you would expect, that a high body mass index resulted in an increased odds ratio of infection, long operations increased infection risk, intestinal anastomosis increased infection risk, all of which you would expect, and having a poor discipline score in the operating room increased infection risk.This was more significant than extended antiseptic measures, frequent glove changes, compulsive cover-ups, scrub clothing, adherent iodine drapes, and so on.

I had the privilege of participating in the first WHO checklist study, which was carried out as a before-and-after study in London; in Toronto; Seattle; Auckland; New Delhi; Amman, Jordan; Manila in the Philippines; and Ifakara, Tanzania.We found in this study almost a 40% reduction in surgical site infections, and similar reductions in unplanned return to the OR, any complication, and mortality rate.Skeptics said to us, "Oh, you know, you probably just got all those benefits in these developing countries.We doubt you made much of a change in London, Toronto, Seattle, or Auckland."We saw when we did a safety attitude questionnaire before and after that the hospitals with the greatest change in the safety attitude score had the greatest relative reduction in complications.

Our paper was followed by a paper from Netherlands.Now nobody considers this very nice civilized Northern European country to be a developing country.Here they introduced a more complicated checklist

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than the WHO checklist, and they found a very similar reduction in surgical site infections, complications, any complication, and mortality rate.In addition, these Dutch investigators looked at hospitals which did more than the median amount of the checklist or less than the median amount of the checklist, and there were fewer complications where more of the checklist was done.

This was followed by another study from the Netherlands.Van Klei and colleagues looked at a 22-item checklist, very much like the WHO checklist, with over 25,000 patients, and they reported for each patient, whether the checklist was not done, partially done, or completely done.They showed a 15% overall reduction in mortality after introduction of the checklist.But, interestingly, the reduction in mortality was actually more than 50% when the entire checklist was done, and not significantly different at all when only partially done or not done.When we were introducing the checklist in my general surgery division at the University of Washington I asked my colleagues, "Would you be willing to fly to Chicago tomorrow if you knew the pilot did not do the preflight checklist?"As you can be sure, I got no positive responses.I next asked them, "Do you think it's safer to have an operation than to fly to Chicago?"Again, no positive responses.Clearly, there's something about this that we ought to be able to learn from the airline industry.

Another thing we did at the University of Washington is after the checklist had been introduced in the general surgery group, we gave a safety attitude questionnaire to the nurses, surgeons, and anesthesiologists who had been experiencing this.I was fascinated to learn that only 60% of the participants believed that the checklist improved OR safety, and yet 88% would have wanted the checklist used for them if they were having an operation.This seems like a rather interesting disconnect.

Now Neily and colleagues, working in the VA system in the United States, introduced medical team training using the Team Steps program, along with the introduction of a checklist.And they took everyone out of the OR, anesthesia, surgery, nursing, scrub techs for a day to go over the whole Team Steps program, and they showed a significant mortality reduction over the quarters following the introduction of the checklist.And you can see that different numbers of facilities are listed here in the bottom because they were done in a different order.But if you just take the number of quarters after the checklist had been introduced and team training introduced you see a steady reduction in mortality rates.You also see a reduction in wrong site or incorrect surgical procedures that became especially marked in the period of time during which team training and the checklist was being introduced.

Now there were 74 hospitals, and they were only able to do 42 of them by the end of 2007.And during this time, both the hospitals who had team training and those who did not did have a reduction in overall morbidity and postoperative infections; however, hospitals with team training had a 20% greater reduction in morbidity and a 17% greater reduction in infections than the hospitals that had reductions without team training.I think it is very clear that culture, communication, and teamwork in the operating room have an enormous amount to do with patient outcome, including surgical site infection risk, retained foreign bodies, and many other potential complications.

Kozhimannil and colleagues, writing in the Seminars in Thoracic and Cardiovascular Surgery, observed that the culture of delivering safe, high-acuity perioperative care requires clear central goals which are widely shared across the organization.There will always be a hierarchical structure in the operating room, but it needs to honor collegial decision-making, independent of rank.Vigilance has to be prized, and safety rewarded.Databases should support safety goals.And reporting and simulation can enhance learning.

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What you see here is the surgical safety checklist which we use in my institution and which is used in many hospitals throughout the State of Washington.This was promoted by the Surgical Care Outcomes Assessment Program, or SCOAP, a collaborative of 48 hospitals across the State of Washington that report back process measures and outcome measures to hospitals on a quarterly basis so that they can see how they are doing and compare their results with other hospitals in the state.

In our hospital we put together recommendations and basically a manual explaining how the checklist should be used in the operating room.We believe the checklist must be visible and readable by every professional involved in the case in the OR for each stage of the checklist, and that it should never be done from memory.We emphasize that the checklist requires the participation of all persons in the operating room.And leading the checklist means requesting permission from the other professions in the OR to make sure that they are at a stage in the performance of their own professional duties that would allow them to stop and pay attention to the checklist as it is being done, and that the checklist needs to address every single line by reading every line in the checklist.As much as possible, the checklist should be run in a way that involves all of the professional disciplines in the room and generates responses to the items on the checklist.

We require that a member of each of the three disciplines, anesthesia, nursing and surgery, must be present for the checklist which occurs in the operating room before induction of anesthesia because there are a number of items that really have to be settled and confirmed and guaranteed before induction.So this is the first pre-induction part of our checklist.We begin by the standard timeout confirmation of the patient with at least two identifiers, and indicating the procedure, the site, and whether it's left or right.We ask the surgeon to describe the procedure, the expected duration, and any anticipated difficulties.We discuss expected blood loss and whether there is blood availability if that is needed.We review whether any special instruments or supplies or IV access beyond usual are required and make sure that this is available before induction.We discuss whether the patient's preoperative heparin was given for DVT prophylaxis and whether our sequential compression devices are in place and turned on.

We ask the nursing team to review any equipment issues, make sure they have the instruments that they need, that they are in-serviced for any special instrumentation, and that if implants are needed they are available.We ask the anesthesia team to review any airway concerns, allergies, or special medications.We conclude with asking all team members whether they have any issues or concerns regarding this procedure and remind them that they have a duty to speak up immediately at any time during the procedure if they have a question or a concern about what is happening.

The second part of our checklist occurs after anesthetic induction and before the incision, the old timeout.Now we asked whether the attending surgeon was present for the first part of the checklist.The attending surgeon is allowed to designate another member of the surgical team to do the pre-induction checklist, but if that is done, the member of the team doing the checklist before induction must be present for the entire operation, must understand and know the details of the patient history and the plan procedure, and be prepared to address any questions.And if the attending surgeon was not present for SCOAP one, then it is repeated before the operation begins.After that, each person in the operating room introduces him or herself by name and explains what it is they do, attending surgeon, resident surgeon, scrub tech, scrub nurse, circulating nurse, CRNA, anesthesia resident, anesthesia attending.

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We know that many personnel exchanges can be difficult during a complex operation and we ask personnel that might be changing for a lunch break to make sure that it's a good time and that it doesn't interrupt a crucial part of the operation.We ask that any changes be announced and that any new persons in the room be introduced when they come in.We review whether essential imaging is needed and displayed, whether the patient position has changed since the pre-induction checklist.We review what antibiotic prophylaxis was given, how much, and when.We ask whether active warming is in place, which it should be for the overwhelming majority of operations which are done in the operating room.We ask whether there is a risk for hyperglycemia, and we know that this is not only for diabetics, but also for elderly patients, patients having major operations, and patients who are obese are at high risk for hyperglycemia.And we need to have a plan for measuring glucose and controlling it with an insulin infusion if needed.We also ask for an agreed upon sharps management plan between the nursing and the surgical team to avoid injury during the case.

We ask if a specialty-specific checklist is needed.So this was first requested when we introduced the checklist by our transplant team, who has introduced a checklist that looks at the organ availability, whether the organ number matches that of the patient, whether we have the right blood type, and so on.So for very specialized procedures there is the option of introducing an additional specialty checklist.Specialty groups with specific issues like this are encouraged to develop specialty checklists and use them at this time.

The third part of our checklist occurs just before closure of the operative field or removal of trocars and is aimed at making sure that there are no retained foreign bodies.We specifically ask the surgeon to perform a methodical visual and physical sweep of the wound and report, and then we ask the circulating nurse and scrub tech or nurse to perform preliminary counts of needles, sponges, and instruments while any music and conversations and other distractions are halted.The last part of the checklist occurs after skin closure or as skin closure is almost complete.And, again, we want to confirm the absence of retained foreign objects.We need to debrief and discuss what's going to happen with the patient's postoperative care and discuss care transition to recovery room and then later to intensive care for the ward.

We ask that the needles, sponges, and instrument count be confirmed and the attending surgeons specifically views all sponges and laps in their holders off the field.The surgeon confirms the name of the procedure.The surgeon asks the circulating nurse to read the specimen labels and instructions on any specimens to be sure that they are appropriately labeled.We ask if there were any equipment issues that occurred during the operation, and, if so, what is the response plan to prevent similar issues from occurring in the future.We ask if there were other issues in the conduct of the case, and, again, who will take responsibility for a response plan.

Then, in particular, the surgeon and anesthesia team need to discuss whether special monitoring for the patient is needed, perhaps because of cardiac issues, blood pressure, or pulse rate.Is there a postoperative insulin drip needed?Was this patient on pre-op beta blockers and needing post-op beta blockers?What sort of post-op anticoagulation is needed or not needed?What will the pain management be?Is the pain service going to manage it, for instance, for an epidural or will it be managed by the surgery service?And then are there any other special concerns for patient recovery that we should be looking out for and transmitting to the recovery room staff and the ward staff.

We also ask that any team member who observes any deviation from the policies expressed in this document consider it his or her obligation to call this out immediately.And it is our assumption that this will

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be accepted graciously.If not, the incident should be reported to the supervisor as soon as possible during or immediately after the case.I can tell you that on at least three occasions that I know of in my institution in the past year, a surgeon or an attending anesthesiologist has basically belittled a staff member with a concern and blown it off.This was reported, and that attending surgeon or anesthesiologist was called in for a discussion with his chairperson and invited to come and observe how the checklist actually needs to be done.

Final thoughts: effective teamwork is the foundation of patient safety.Teams can learn to be more effective.I suggest you consider the following opening statement for an operative procedure, "I am a good surgeon, but I am vulnerable to error, so you are here to help me take care of this patient.We are a team."

I have an interesting slide quote that I got from Bryce Taylor in Toronto from a Canadian airline pilot who said, "It's hard for me to believe that surgeons haven't been doing checklists for many years.If surgeons shared the fate of their passengers as pilots – sorry – if surgeons shared the fate of their patients as pilots share the fate of their passengers, perhaps checklists would have been introduced decades ago."And close with this thought from George Bernard Shaw, "The single biggest problem in communication is the illusion that it has taken place."

Thank you for listening, and I hope that you all can work for the best possible teamwork, communication, and patient safety possible in your operating rooms, and a reduction in complications and surgical site infections in the coming year.Thanks, again, and goodbye.