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How Clean Is Your OR Air?

If you think the manual cleaning of OR surfaces is enough to prevent SSIs, you're not addressing a more invisible danger.

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STIRRING THINGS UP The more people, movement and activity there is in an OR, the more likely contaminants are to become airborne.

You can scrub every inch of an OR until your elbows ache, but the minute someone steps into that clean space the air becomes contaminated simply because of their presence. They're exhaling bacteria. Their hair and skin and clothes are shedding it. All of these contaminants released from surgical team members and patients float through the air, riding air currents in the room until they settle onto instruments and into incisions. You might not be able to see airborne pathogens, but they're there, and they pose a potential danger to every patient you treat.

The good news is that products and technologies have emerged to address airborne bioburden, and that awareness of the issue is increasing throughout the industry. What can you do to keep the air clean in your ORs? Proper ventilation definitely helps, but it's not a cure-all. You need a combination of protocols and technology to address the issue as fully as you can.

Airborne issues

One thing that's difficult about this issue is that we don't have OR air contamination standards. It's also difficult to measure airborne contaminants. But here is what we know: More and more research shows a connection between aerosolized bacteria and surgical site infections.

Although OR air quality should be a concern for all surgeries, it's particularly important during any procedure involving implants, such as orthopedics, where there's a lot of manipulation and sawing and reaming, and a lot of activity and movement of staff. Just a few organisms getting on an implant can start to grow rapidly once it's inside the body.



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DOOR BUSTER Laminar airflow is disturbed every time a staff member enters the OR during surgery.

Numerous studies have linked contamination and outbreaks in the OR to specific strains of bacteria transmitted from staff to patient. Those findings highlight the importance of ensuring your surgical team always wears proper scrub attire, performs skin preps correctly, and covers their hair and arms. Remind them to not bring cell phones or any other personal items in the OR. They need to be held accountable for their roles in preventing surgical site infections.

That accountability holds true for the number of times the OR door is opened during a case. There's an increasing amount of foot traffic in today's ORs; vendor reps are common visitors, but nurses and other clinicians are constantly running out for instruments or other equipment that's needed, but not in the room.

Random staff members are known to poke their heads in to ask questions unrelated to the surgery being performed. Every time the OR door opens, contaminated air from the hallway enters the room. The lesson here is to have the right equipment on hand, and to let other staffers know that they'd better have a very good reason for opening the OR door during a procedure, or else they should stay out.

Constant cleaning

Room turnovers are also a concern, especially because staff in many facilities who are under pressure to keep up with a packed surgical schedule rush through the process. Manual cleaning often isn't as deliberate or thorough as it should be, and a lot of contaminants escape from surfaces and float into the air.

The surface disinfecting policies staff follow can therefore only do so much to rid ORs of harmful bacteria. That's where new technologies can supplement their efforts. The goal is to have some technology in place that removes airborne contaminants as surgery is happening.

Here's a scary anecdote that brings home the need for this sort of background technology. A few years ago, there was a worldwide outbreak of *Mycobacterium* infections among cardiac surgery patients. It turned out that the heater-cooler systems used during these procedures were delivered to hospitals already contaminated with pathogens, which were being transmitted through the air. There are also current concerns about forced-air warming units allegedly blowing contaminants off of OR floors and into the surgical wounds of joint replacement patients.

These examples serve to illustrate that having a cleanliness-conscious staff alone won't always cover all of the bases for clean OR air. Having a device running in the background that constantly treats the air is essential.

Recently introduced air purification technologies include white light and UV-C light ceiling fixtures that replace traditional fluorescent lights in the OR. These lights continuously perform a small amount of disinfection during the day in a passive manner. If you're building a new OR, or renovating an existing one, it makes sense to install these kinds of lights.

I'm also impressed by another new technology: a big, thin disk, almost like a wafer, that you place in your air handling system. As air passes through the disk, it turns into dry hydrogen peroxide — not vaporized, so it's nontoxic to people. The disk treats air constantly, killing *C. diff* spores and other airborne contaminants.

Another neat technology that's getting traction, particularly in the orthopedic community, is a device that looks like a big ice machine. You wheel it into the OR, place it close to the sterile field, where it decontaminates air by sucking it in and treating it with a HEPA filter and a UV light. Add these platforms to other technologies such as mobile horizontal laminar airflow systems and movable ultraviolet light rapid disinfectors, and the options for OR air cleaning are rapidly expanding.

Future payoff

If you're not experiencing many SSIs, you may think these protocols and technologies are overkill. But as the patient population ages, and complex procedures become more common in outpatient ORs, the incidences and costs of SSIs will likely rise. Even a single SSI is costly for a facility. If you can spend a little money up front on air-cleaning technologies to save a lot down the road, why wouldn't you? **OSM**

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