

Occupational Infections: Risks for the Anesthesiologist

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Dr. Alan Jay Schwartz: Hello. This is Alan Jay Schwartz, Editor-in-Chief of the American Society of Anesthesiologists' 2017 *Refresher Courses in Anesthesiology*, the latest research and educational findings. The focus of the *Refresher Courses in Anesthesiology*'s CME program and the modules featured is to educate learners on current developments in the science and clinical practice of the specialty of anesthesiology. Returning for a second year, we will be speaking directly with individual authors to learn about their expertise, perspective and insight regarding the featured module.

Today, we are pleased to present the following one-on-one conversation with fellow RCA editor Dr. Samuel Wald and author Dr. Keith Candiotti. They will be highlighting the module titled "Occupational Infections: Risks for the Anesthesiologist."

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Dr. Samuel Wald: We have Dr. Keith Candiotti here, a Professor of Anesthesiology and Internal Medicine from the Department of Anesthesiology and Perioperative Medicine and Pain Management at the University of Miami Miller School of Medicine. He's going to be talking to us today about occupational infections – risks for the anesthesiologist. He's going to cover how to educate anesthesiologists about the risks of infectious diseases, talk about emerging

diseases, and some of the protective equipment we can use to decrease our risk of transmission. Dr. Candiotti, I'll turn it over to you.

Dr. Keith Candiotti: Thank you very much. This is a subject that I've had an interest in for quite a few years. There's a lot of literature on preventing infection in patients, of course, and that certainly is a primary goal; but there's a lot less known and a lot less research in the area of how to prevent infection in healthcare providers caring for patients. And especially, there's even less in the area for anesthesiologists. So, we're going to briefly talk about how diseases are transmitted via physical contact, air and blood to healthcare providers, specifically anesthesiologists.

There are a large number of infectious agents that historically have infected people who are delivering healthcare. Roughly 60 agents have been reported in the literature as being transmitted to healthcare providers. And we're certainly at risk because we care for patients that come into hospitals who are sick—anesthesiologists in particular, being exposed to blood as well as airborne infectious agents, due to the fact that we do airway interventions.

Now, there's basically three routes that people are infected: through direct contact, through air, and through blood. Now, this can occur through needle punctures for blood, or actual blood exposure on a mucous membrane. But I think, in the beginning, let's talk about respiratory transmission. So, first of all, small droplets are really the problem. When patients breathe, cough or sneeze, they often project small droplets which often carry infectious agents in them. Interestingly enough, it's been shown that transmission from sneezing can occur up to six meters away. So, if you're dealing with a patient with a respiratory illness who sneezes and you're within five to six meters, you could actually be subjected to the infectious agent.

Now, of the agents that are out there, some are more common than others. One of the most common is tuberculosis. It's actually one of the top infectious disease killers in the world. Also of interest, about a third of the world's population has latent TB, meaning that they're ill and they don't even know it. It's actually one of the top killers of patients with HIV. Now, there was a resurgence of TB in the US, actually, in the mid-1980s, and that has been steadily decreasing, of course. Healthcare providers in general, however, still have about a three-time increased risk compared to the general population of contracting TB. And some forms of TB are actually quite dangerous—multidrug resistant and extensively drug-resistant—which are very, very hard to treat. Even in a modern, advanced healthcare system, healthcare providers that become infected with these entities—still, unfortunately, some of them die.

Now, the treatment, of course, for patients exposed to TB does exist, and we treat it with antibiotics, and many patients recover. However, those resistant forms often can be very hard to treat.

Besides TB, other respiratory viruses present a hazard to anesthesiologists. We have examples both in recent history and currently. In recent history, SARS, for instance. A large number of healthcare providers – about 20% of the SARS cases actually occurred in healthcare providers. How many of those were anesthesiologists is unknown. And that's probably because it's highly contagious and transmitted through respiratory droplets and other secretions. Now, SARS fortunately has calmed down, but it's an example – a classic example of a new, emerging virus that's transmitted through respiratory agents to both healthcare providers as well as other patients.

Current emerging viruses out there such as the Middle East respiratory syndrome coronavirus, or what we call MERS, is primarily isolated to the Middle East currently but has the potential to spread to other individuals. Specifically, in the Middle East, a large number of the patients suffering from

MERS are actually healthcare providers who contracted it. In one – a group of outbreaks in Jordan, 50% of all the patients affected were actually nurses. So, this demonstrates how this emerging virus, until they're well understood and controlled, can easily spread to healthcare providers. Unfortunately, there's no treatment for MERS at this time.

Zika has been in the news and certainly occurs in my part of the world, in Miami. And while there are no cases of healthcare providers converting from Zika, the potential certainly does exist, and we know that it can be transmitted through exposure to secretions—in other words, routes other than from the bite of a mosquito.

I think, really, if I had to pick my greatest area of concern, it's actually influenza. Now, we know that there are periodic pandemic outbreaks of influenza throughout the world, and in the United States one of our last outbreaks was the H1N1 influenza of 2009. In the US alone, 57 million cases, a quarter of a million people were hospitalized, and about 12,000 people died, actually. The first index case was just simply a child that showed up in a hospital. It was a novel agent that we'd never seen before.

What's interesting is, if you look at ER staff, 65% of them test positive for having been exposed to (N1H1) at the time and 35% of OR personnel also showed testing positive, even though there was only a background rate in the general population of 13%. This gives you an idea how medical staff could be susceptible to the viruses such as influenza.

Right now, there are no pandemics obviously out there that are known, but there are types of influenza, specifically avian influenza, which is seen mostly in the Asiatic countries currently but does exist throughout many countries in the world. This is being closely watched. There is a strain called H7N9; H5N1. These are avian influenza which do show rare human-to-human transmission.

Fortunately, they've not been transmitted easily; but in those unfortunate individuals that do contract it, the mortality rate is somewhere in the area of 50%. So, you can imagine anesthesiologists being exposed to patients with acute or severe influenza and having the potential for becoming infected themselves in the event of a large-scale pandemic.

Now, just for the record, there are no cases of avian influenza being transmitted to healthcare providers even in spite of exposure, but this is primarily probably due to the characteristics of the virus itself. If those characteristics were to change, then of course we could become at much greater risk.

And of course, everyone's familiar with the diseases such as Ebola and those other types of viruses that we simply don't normally encounter. They all basically fall into the same category of infectious agents that healthcare providers, particularly anesthesiologists, can be susceptible to.

But we can protect ourselves. And how do we do that? Well, the first line of protection is actually management of patients. In other words, patients who are potentially infected or sick are not mixed with other patients and not exposed to healthcare providers without being segregated out or being identified. Healthcare providers can of course protect themselves with the next line, which is use of protective gear, specifically respiratory protection.

And something that's often missed: we fail to protect our eyes. We wear goggles when we intubate, but many viruses and other agents have been shown to be transmitted through the ocular route. In particular, influenza appears to be transmitted through the ocular route.

So, there are certain steps that can be taken in general for healthcare providers when trying to protect themselves, especially against emerging viruses where we may not know a lot about them, limiting the number of people who are

exposed during aerosol-generating-type procedures, using isolation wards, and of course proper protective gear. And I'll discuss more of that in a minute.

Now, there are, of course, the well-known viral agents that are transmitted by blood, such as the hepatitis, which fortunately we have vaccines for; hepatitis C, which doesn't have a vaccine but there is a fairly effective treatment available in the event that we do become exposed; and of course there is HIV, obviously very well-known and probably one of the blood-borne viruses that most people in medicine are most concerned about. But interestingly enough, there's only one confirmed HIV conversion case in a healthcare provider in the US since 1999. It occurred in 2008. It was actually a laboratory technician who sustained a needle puncture while working with an HIV culture.

So, the number of healthcare providers converted for HIV is actually quite small. And also, fortunately, there is good efficacy for post-exposure prophylaxis apparently, for patients who are injured and exposed to HIV. And that post-exposure prophylaxis, as with hepatitis and other entities where rescue agents or protective agents are available, should be instituted as quickly as possible. I think for this podcast, going through specific prophylactic or post-exposure treatments is probably a little too much. So, we'll leave it at that, and I offer to the listeners that these are available online in multiple places.

So, let's talk about, again, protective measures in general. Doctors in general, anesthesiologists, don't have a good record for using protective equipment effectively. In many studies, we often don't wear gloves and masks when appropriate. When we do, we even self-contaminate sometimes when we remove them. Training can help reduce that self-contamination in general. Gloves, obviously one of our main lines of protection, actually have their own failure rate. The FDA finds it acceptable to have a defect rate of medical exam gloves of about 2.5% in medical gloves, and in surgeon gloves about 1½%. But the regular gloves that you get out of a box may actually have a higher rate

overall, if you consider the number of times you change gloves during a shift or a day, and if you're frequently exposed to patients over and over again you eventually run a risk of eventually having a successful exposure. Nonetheless, gloves are still appropriate to be used and double-gloving, especially in high-exposure situations, has been shown to significantly reduce risk.

Let's not forget handwashing. Doctors are well trained that handwashing transmits diseases to patients, from patient to patient; but at the same time, failure to handwash appropriately allows the transmission of diseases even to ourselves. So, handwashing and use of sanitizing gel is very important.

Again, I mentioned the transocular route for transmission. This is often overlooked. Face masks should be worn whenever dealing with patients who are potentially not even just being intubated, but coughing, or demonstrate a virus that can be transmitted (sounds like: respiratorially), such as influenza or something else like that.

So, I've given you kind of a brief overview. I didn't go into too much details due to the limitation of time. But I think if I had to summarize, I'd simply say that there are well-known diseases and new diseases that present risks to healthcare providers, in particular anesthesiologists, and this is in particular for diseases that are (sounds like: respiratorially) transmitted. By being observant, following already established protocols, and using equipment that's available pretty much throughout most Western hospitals, we can protect ourselves and still be able to deliver appropriate care to our patients.

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Dr. Samuel Wald: Thank you so much, Dr. Candiotti, for that wonderful and insightful review. And I'll turn it back over to Dr. Schwartz. Thanks very much.

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Dr. Alan Jay Schwartz: Thank you for joining us today and participating in this insightful conversation with this month's featured author. Be sure to join us for next month's one-on-one author interview. To purchase the full subscription of the 2017 *Refresher Courses in Anesthesiology* program, please visit www.asahq.org, click on the Shop ASA link, and search for RCA.

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