



Module 9: Healthcare- Associated Infections Across the Spectrum of Care

Part 3: Prevention of Healthcare-Associated Infections in Long Term Care Facilities

Susan: Moving on, I thought we would next talk about how to prevent the common causes of healthcare-associated infections in long-term care facilities.

First, we need to remember that a large proportion of our population actually lives in long-term care facilities. It's estimated that at any given time, 1.5 million Americans will be in a long-term care facility, and that over their lifetime, somewhere on the order of 1 in 4 Americans will spend some time in one of these facilities.

Long-term care facilities include nursing homes, skilled nursing facilities and rehabilitation centers. One way to think about these is these are facilities which are residential, but provide nursing care and other care for people who cannot live in a community setting. This can be because of a chronic condition or because individuals are recovering from an acute condition.

The actual risks for healthcare-associated infection are quite similar between people who are receiving care in a long-term care facility as well as an acute care hospital. People who are most vulnerable are those who are quite elderly or have impaired immune systems. Individuals with other comorbid conditions also have an increased risk of healthcare-associated infections if they're in long-term care facilities. And then finally, changes in our healthcare practices such as early hospital discharges also contribute to an increasing risk of healthcare-associated infections for patients in long-term care settings.

Long-term care settings also have unique challenges. One is that many patients who reside in long-term care settings have cognitive deficits, resulting in some basic challenges to hygiene practices. These settings are also residential, and by definition, long-term, so there's a blurring of the home and the medical care delivery setting, and compromises often need to be achieved in order to create an environment that serves both needs.

Long-term care settings often have large reservoirs of antibiotic-resistant organisms because it's a place where large numbers of chronically ill individuals are residing together.

And finally, in many settings, there is frequent use of medical devices. It's estimated that approximately 5% of patients in long-term care facilities have urinary catheters, and many long-term care facilities provide infusion therapies, meaning that many patients in long-term care facilities will have some sort of vascular catheter.

This table shows us a little bit of some of the specific types of healthcare-associated infections that are a specific risk for patients in long-term care settings.



Respiratory illnesses, such as those caused by influenza or aspiration pneumonia or tuberculosis, are of particular concern for patients in long-term care settings.

Food-borne illnesses and norovirus are relatively frequent causes of gastrointestinal illness in these patients.

Other infections that we need to be thinking about for patients in long-term care settings include catheter-associated urinary tract infections as well as infections caused by resistant organisms such as staph aureus or enterococcus.

What we'll do now is talk about two of these types of infections that happen frequently in long-term care facilities but also pose a risk for patients in other care settings, including acute care hospitals as well as ambulatory settings.

This table depicts the reservoir mechanisms of transmission as well as successful interventions to prevent influenza as well as the transmission of resistant organisms.

We can see for influenza that healthcare workers are often the major source of infection for patients in long-term care settings. The vehicle of transmission is a respiratory droplet, and we can have successful interventions through the use of hand hygiene and respiratory etiquette, increasing the frequency with which healthcare workers receive influenza vaccination, screening our visitors for any sort of acute respiratory illness, and then also encouraging vaccination of patients, performing surveillance for disease, and in the event disease is identified, cohorting patients to limit ongoing transmission.

In terms of resistant organisms, there the reservoir is typically other patients to a much greater extent than healthcare workers. These organisms are transmitted through a different mechanism, typically through contact, either direct or indirect.

Interventions, however, are somewhat similar. Hand hygiene plays a huge part of preventing transmission of resistant organisms. However, environmental cleaning is also uniquely important in reducing the risk of transmission of resistant organisms in any healthcare setting. Finally, judicious use antibiotics to lessen the development of resistance in the bacteria is also a critical part of reducing the risk of infection due to resistant organisms.

We've mentioned surveillance in a couple of contexts already, but I thought it would be good to pause and talk a little bit about what surveillance is. Surveillance is defined as the monitoring of behavior, activities, or other changing information, usually of people, for the purpose of influencing, managing, directing, or protecting them. In my mind, surveillance is one of the core activities of public health, and specifically of preventing of healthcare-associated infections.

Without conducting surveillance for healthcare-associated infections, we don't know what the burden is, we don't know where to focus resources, and we don't know whether interventions may be working.



In thinking about surveillance for long-term care facilities, we need to recognize there are some unique challenges. We may need to employ a different model for conducting surveillance for healthcare-associated infections in long-term care facilities because the staffing of infection control programs in these facilities is often quite limited. In addition, the nature of the care provided, the residential and medical care that's being provided simultaneously, can change the best type of surveillance to do.

Common approaches to surveillance in long-term care settings include conducting weekly walk rounds, often rounding with the clinical team, learning which of the patients may have developed new onset fever, new onset respiratory symptoms, and new onset GI symptoms that may be a trigger to investigate and learn more about whether or not this new set of symptoms represents likely healthcare-associated infections.

Similarly, using a surveillance strategy that relies on syndromes such as respiratory symptoms, fever, and GI, can often be much more successful than building a surveillance strategy that's driven simply by positive microbiology test results.

Finally, different sorts of data can be used to conduct surveillance, whether it's systematic review of a sample of patient charts, interviewing of staff, or reviewing of antibiotic use. All of these data sources can be employed to help identify and monitor for healthcare-associated infections.

How to choose what will be your surveillance target also needs to be built on the specific population that's receiving care, the current trends both in that facility and elsewhere, and any knowledge that is emerging about new challenges to either the community or the region.

Here's an example of data which comes from a long-term care facility and depicts over several years three targeted healthcare-associated infections that they were monitoring. What you see in blue is their quarterly frequency of influenza healthcare-associated infections; in yellow, urinary tract infections; and then in red, MRSA, or methicillin-resistant staph aureus infections.

These data can be used and reviewed over time for a variety of reasons. They can be used to monitor the quality of care, they can be used to educate staff about priorities and risks for patients, they can be very helpful for the early detection of outbreaks, and then finally, to assess the impact of different interventions which have been introduced.

So first, let's look at a little bit of the influenza data, which we've shown from this facility. The first thing that I think is striking about this is that this is a great example about how there are secular trends in surveillance data that must be understood and incorporated into our interpretation of the data. We can see that over a three-year period that there are seasonal peaks and also valleys. This doesn't mean that we have had three different successful interventions resulting in prevention of influenza, but rather, that this is the predictable nature of the disease moving in and out of a community.



However, if we look more closely at what is the peak rate of disease, we can see that actually it does appear that something has happened. There's been an overall downward trend over three successive influenza seasons, suggesting that there has been a change in the rate of influenza in the patients who are receiving care in this facility.

So what happened at this point? We don't know for sure with the data we have available here, but I propose that perhaps this is the result of a successful campaign to improve healthcare workers' acceptance of influenza vaccination, resulting in a huge protection of their patients from influenza.

Here's data from the same facility about the frequency of MRSA infections. What you can see is there's not been a lot of change, and depending on your interpretation of the data, you might even argue that there's been a slight upward trend ranging from two to three infections per 1,000 patient days over the three years of surveillance data we have. So we need to do something, I would argue. We're not making any sort of improvements here.

So, changing gears, thinking about this MRSA data we've just looked at, what can we do to prevent the spread of multi-drug resistant organisms, often called MDRO? To begin with, we need to know what are the reservoirs of these infections and what are the modes of transmission. These are often fundamental principles which can be used to build interventions.

First, we know that the environment is often a reservoir of infection; hands, as well as other patients, and hands are often a vehicle for transmission. These can lead to interventions such as a hand hygiene campaign to limit transmission, a re-education of environmental service workers to reduce the burden of organisms in the patient care environment, and focusing on interrupting transmission in contamination of the environment can also help us control the reservoir of MDROs in other patients.

Another strategy which is sometimes used would be cohorting, but I don't think we'll spend a lot of time going into that at this point.

So hand hygiene is arguably the most important intervention to prevent healthcare-associated transmission in any healthcare setting. You can see here why we're still, 150 years after excellent scientific evidence of the success of hand hygiene to prevent healthcare-associated infections, why we're still talking about it.

Data from the 1990s, data from the 2000's, data from last week, will all show we still have a lot of improvement needed in the careful adherence to appropriate hand hygiene in health care settings.

One of the problems I think with hand hygiene is that it's invisible. The risk we're trying to prevent, transmission of bacteria from hands to patients, is not something that we can see.



On these blood agar plates, what you can see on the left is what a typical healthcare worker hand looks like before performing hand hygiene; overloaded with bacteria, many of which are very pathogenic.

Over on the right, you can see what happens after appropriate hand hygiene. The frequency and the diversity of bacteria basically disappears, thus, with the application of hands onto a patient, substantial reduction in risks are achieved by doing appropriate hand hygiene.

Hand hygiene is also incredibly important because every time we're working in a patient care environment, we are entering an environment that is overloaded with pathogenic organisms. In part, this is because organisms, including resistant bacteria, can live for long periods of time on inanimate objects, items such as the patient's chart or a privacy curtain between beds.

Here, you can see data from a study demonstrating that staph aureus can live on these inanimate objects for more than a week and approaching two weeks, in some settings.

This picture depicts another bacteria, something called VRE, vancomycin-resistant enterococcus. In this patient care room in an ICU, you can see loads of green X's. What these X's represent are sites which tested positive for VRE after a patient with VRE had been discharged from the room. The room looks clean, ready for the next patient; however, we can see through these X's just how heavily contaminated it is.

So when do we need to think about doing hand hygiene? Remember, our goal is to interrupt transmission of organisms we have in our hand as we approach a patient, or organisms we pick up when touching things in the patient's environment. So those principles can help guide us into what the appropriate times to do hand hygiene might be.

This graphic depicts a concept of when to do hand hygiene developed and promoted by the World Health Organization. It's referred to as 'My Five Moments For Hand Hygiene'. I think it really encapsulates a good approach to hand hygiene.

First, hand hygiene is recommended before touching a patient. Next, hand hygiene needs to be performed before performing a clean or an aseptic procedure. The third moment for hand hygiene is after exposure to body fluids; blood, urine, and fecal material. Fourth, after touching a patient, hand hygiene is needed. And fifth, and most frequently forgotten, is it's very important to perform hand hygiene after touching the surroundings or the patient care environment. Again, remember just how overloaded that environment typically is with potentially pathogenic organisms.

Hand hygiene we've talked about is not done nearly as frequently as we need it to be done, and why is that? Well, healthcare workers do have many reasons why they fail to do hand hygiene appropriately.



First, frequent cleaning of the hands can result in a lot of damage to the skin. Sinks are sometimes inconveniently located, they might be outside of the room, and it's very difficult to pause in an episode of care to walk out of a room, clean your hands, and then come back into a room. Sometimes restocking of materials is not done in a timely fashion, and so there might not even be soap or paper towels available at the sink which is closest to the patient.

With increasing complexity of patient care, increasing attempts to achieve economy in the delivery of healthcare, healthcare worker staffing is very lean, and what this often means is that healthcare workers are generally very busy, and sometimes believe they are too busy and don't have sufficient time to perform hand hygiene. This is compounded by understaffing or overcrowding.

Patients often appear to have an immediate need that seems to take priority over performing hand hygiene. And then finally, healthcare workers sometimes believe they actually are at low risk of acquiring an infection from a patient, and therefore, don't believe that hand hygiene might actually provide some element of protection for themselves.

So again, we're talking about healthcare-associated infections in long-term care facilities and have talked about how influenza infections are really one of the major risks. We know that healthcare worker vaccination can be a very successful way to prevent healthcare-associated influenza infections, and there are also secondary benefits. In addition to protecting patients, they reduce absenteeism for healthcare workers. As well, they've been demonstrated to reduce secondary infections in the homes of healthcare workers. So, a lot of benefits.

Healthcare worker vaccination is also especially important in settings such as long-term care facilities, pediatric settings, or specialty care settings where there are large numbers of patients who are extremely susceptible.

A question is often asked as to what proportion of healthcare workers have to be vaccinated against influenza in order to achieve the maximal protection of patients, and the honest answer is we don't know. However, it's believed that the degree of protection is likely related to the proportion of people who are vaccinated both who work there as well as amongst the patients who are receiving care there. So it's a function of the level of protection of the entire community.

The graph on this slide is from data collected from an acute care hospital, and it shows the rate of nosocomial or healthcare-associated infections due to influenza over the course of many years at this hospital. On this graph, they've charted what the rate of nosocomial infections is against the proportion of their staff who had received influenza vaccine.

What you can see is that the rate of nosocomial infections goes down quite markedly as the rate of vaccine compliance, or healthcare worker acceptance of influenza vaccine, goes up. And



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this relationship is true in virtually any healthcare setting where increasing protection of the staff will result in a decreasing risk of transmission.

Other benefits associated with healthcare worker vaccination have been identified by a variety of studies. We know that healthcare workers who protect themselves from influenza infection will experience fewer sick days due to either respiratory infection or from any cause during the winter season. And then finally, there are several studies which have demonstrated that healthcare worker vaccination can have direct impact on patient mortality. All excellent motivators to push healthcare workers to receive vaccination against flu.

We know a fair amount about some things that can help us improve the rate of healthcare worker vaccination.

Education with a focus on what are the risks of influenza disease, and also about vaccine safety and efficacy, areas in which there is a lot of misinformation.

Strategies to improve access to vaccine, recognizing that healthcare workers are busy and oftentimes have challenges breaking away from their work in order to go and seek vaccines. These sorts of challenges can be addressed through the use of mobile carts which might rove through a facility offering vaccine during a shift to workers who are otherwise unable to take a break. Providing walk-in clinics or after-hour clinics to healthcare workers so access is a bit easier is also another successful strategy.

And then finally, expanding the responsibility of administering vaccine as well as educating about the importance of vaccination beyond just an occupational health department can be seen hugely successful. Creating a cadre of coworkers who might serve as vaccine deputies that can go out and talk about the benefits of receiving vaccine and perhaps even deliver vaccine to peers has also been used successfully.