Slide 1: Slide 1

Welcome to Week 3, part II of this week’s lectures entitled Healthcare-Associated Infection (HAI) and Healthcare Surveillance. In Part II, the focus will be on specific types of healthcare surveillance, including healthcare-associated infection surveillance, environmental surveillance, product surveillance and employee-related surveillance.

Slide 2: Healthcare-Associated (HAI) or “Nosocomial” (NI) Infections

Healthcare associated or acquired infections (formerly known as nosocomial infections) are defined as not present or incubating upon admission to a healthcare facility. For example, if a patient is admitted to a hospital and develops chickenpox on day 3, that is NOT an HAI, because the incubation period for that disease is 10-21 days. If a patient is admitted to a nursing home and develops a urinary tract infection 2 weeks later, after being asymptomatic and culture negative upon admission, most likely does have an HAI. HAI account for approximately 2 million cases per year, 90,000 deaths and 4.5 billion dollars in excess cost annually. These infections increase length of stay, morbidity, mortality and cost.

Slide 3: Endogenous vs. Exogenous

Here are some other terms with which you should become familiar. Endogenous refers to origin from within the patient. Exogenous refers to a source outside of the patient. These terms are often referred to when describing sources of HAI in patients. Exogenous sources can include visitors, other patients, healthcare workers, the environment or products.

Slide 4: Application & Integration

It is important, and part of my teaching philosophy, that students are able to apply and integrate concepts from this course. To do this, the following are recommended. First, as we are going through the different types and categories of infections, note what surveillance has found regarding some of the patient care practices and how that has added,
deleted, or modified these practices. When we cover outbreak management, note how important the outbreak investigation and microbiology information are, related to surveillance. Finally, be thoughtful about how the different types of surveillance are measured.

**Slide 5: 4 Major Sites of Healthcare-Associated (HAI) Infections**

In the terms of healthcare-associated infections, there have traditionally been four major sites: urinary tract infections (UTI), nosocomial pneumonias (NP) now called healthcare associated pneumonia (or HCAP), surgical wound infections (SWI) now called surgical site infections (SSI), and bloodstream infections (BSI). We will go through these four sites. Then we will describe the categories that NHSN uses.

**Slide 6: 1. Healthcare-associated Urinary Tract Infections (UTIs)**

Healthcare-associated urinary tract infections, or UTIs, are the most common type of HAI and have traditionally accounted for 40% of HAI. UTIs are most often related to instrumentation of the urinary tract, such as occurs with the insertions of urinary catheters. Twenty percent (20%) of catheterized patients are expected to become infected each year, resulting in an estimated 600,000 UTIs annually. Of patients who develop a UTI in the hospital, 75% have urinary catheters. This is a significant concern because 15-20% of hospitalized patients have an urinary catheter during their hospital stay. The most commonly isolated pathogen for UTI is Escherichia coli or E. coli, which is a gram negative organism. Additional organisms of concern with UTI are Serratia marcescens and Burkholderia cepacia.

**Slide 7: Surveillance for Urinary Tract Infection**

When conducting surveillance for UTIs, the usual event of interest, or numerator, is the # of UTIs. Denominators can include the total number of catheterized patients, or the total number of catheter days (incidence density, as two examples.). Those populations at high risk of UTIs include residents of long-term care facilities, intensive care unit patients, and patients with neurogenic bladders. Patients with neurogenic bladders are not able to void, so they require catheterization about every 6 hours.
*Slide 8: Urinary Catheter System*

On this slide is a diagram of a closed urinary catheter system with two areas noted for potential sources of infection. Extraluminal infection can occur early, when the catheter is inserted or later, by capillary action. Intraluminal infections can occur when there is a break in the closed system (such as where the collection system is connected to the end of the catheter) or if the collection bag for urine is contaminated.

*Slide 9: Patient Care Practices to Prevent UTI*

It used to be that routine changing of urinary catheters was required. Another practice required was to clean the meatus, or opening to the bladder where the catheter entered, on a daily basis. A third former recommended practice was to use antibiotics within the bladder when catheterized. After many years of collecting surveillance data, these three practices were not shown to be effective in reducing the number of urinary tract infections. What has been shown to be effective in reducing or preventing UTIs is to maintain a closed urinary system.

*Slide 10: 2. HA Pneumonia*

Healthcare associated pneumonia is the second most frequently occurring type of HAI. However, it has the highest mortality rate of the 4 types of HAI. Even though it is not the most common type of HAI, persons who are on mechanical ventilators are at a 20x higher risk than those not on ventilators, of acquiring healthcare-associated pneumonia. One interesting characteristic of healthcare-associated pneumonias is that they are often polymicrobial (or caused by more than one organism).

*Slide 11: Slide 11*

This slide nicely illustrates the components of mechanical ventilation.
Slide 12: Surveillance for HA Pneumonia

Let’s give some examples of rates that may be calculated for healthcare-associated pneumonia. If the numerator were the number of cases of pneumonia, you could use a denominator of patient discharges, the number of patients on a unit. If the event of interest (numerator) was the number of cases of ventilator-associated pneumonias, if calculating the incidence density, the denominator would be the total number of ventilator days for the ventilated patients during the surveillance period. You could not use a numerator of the number of cases of ventilator-associated pneumonia and a denominator of the number of patient discharges. That is because all patients discharged may not have been on ventilators. The most accurate way to calculate the number of cases of ventilator-associated pneumonia is to use the denominator of total number of ventilator days for ventilated patients.

Slide 13: Patient-Care Practices

Let’s look at some patient care practices for preventing pneumonia. It used to be that the requirement was to change ventilator tubing every 48-72 hours. Through studies and surveillance it was determined that this practice did not contribute to decreasing infections. Now there is not a routine change time for tubing. Selective decontamination of the digestive tract to prevent aspiration of gastric contents into the lungs is used in Europe, but in this country it has not been added as a practice for preventing pneumonia because it can result in resistance to the antibiotics used. If using antibiotics to decontaminate the digestive tract, and resistance develops, this will be problematic. Aseptic techniques using sterile items for suctioning is very important in preventing pneumonia as well as handwashing and glove use. One very important environmental and device related issue is that when you look at ventilator tubing and you see how it can pool with secretions in the corrugated tubing; it is very important number one to not do anything to that tubing to make it reflux back into the patient. Two, use hand washing if you are going to manipulate that tubing and then suction the patient. And three, when you are going to put respiratory treatments through an endotracheal tube or tracheotomy, only sterile fluids should be used. Tap water could contain an organism like Pseudomonas, so only sterile water should be used. (You will learn much more about patient care practices in PHC 6517 Infectious Disease Prevention Strategies). The important point from this slide is that by collecting surveillance data when using certain patient care practices, it can result in some practices being modified or discontinued altogether).
Slide 14: 3. Surgical Site Infections (SSI)

The third category of HAI is surgical site infections (SSI). The way a surgical site infection is defined is that it occurs within 30 days after the surgery unless it is an implantable device. If you have an implantable device and get an infection for up to one year, that’s also considered a surgical site infection. Of all the categories, SSI is the most complicated because in order to understand it, some background information is necessary. First, SSI have three divisions: superficial incisional, deep incisional or organ/space. Second, there are 4 classifications of surgery: clean, clean-contaminated, contaminated, and dirty or infected. Let’s give some examples. A surgery is judged to be clean when the operative procedure does not enter a normally colonized area of the body. If you have an elective internal hernia repair, that is an example of a clean operative procedure. When you have a clean operative procedure, the risk of surgical site infection is minimal, and usually if you do get one it comes from contaminants of the O.R. environment, or the surgical team, or the most commonly found skin colonizing organisms. The most common pathogen that one would get in a clean surgery is an infection with Staphylococcus aureus. Surgical site infections in this class should be 2% or less. The third category is contaminated. A contaminated procedure is when there is gross contamination at the surgical site. When a dirty surgery is performed, it is when the infection is already present. If someone has peritonitis or an intra-abdominal abscess, that is considered a dirty surgery. When we have this type of surgery, you expect to find pathogens or organisms in the wound. This type of surgery has the highest risk for an infection.

Slide 15: SSI continued

Surgical site infections or SSI are the third most common type of HAI. The most common source of SSI are endogenous flora. Other sources of SSI include the operating room environment, hospital personnel, and seeding of the operative site from a distant focus of infection.

Slide 16: Surveillance for SSI

Surveillance for surgical site infection can be complicated, if you think about all the factors involved in surgery: the classification, who performed the surgery, when it was done, where it was done, and the risk factors of the patient. Therefore, surveillance for SSI needs to be stratified. It can be stratified by the classification, risk factors, the surgeon, or
the service, to give a few examples. The National Nosocomial Infection Surveillance Study (or NNIS) had a specific strategy for classifying surgeries for surveillance. A score of 0-3 was assigned, based on 3 variables. The first was whether it was a contaminated or dirty wound class (Class 3-Contaminated or Class 4-Dirty/infected). Either of these two types got one point from NNIS. The second was the score assigned to the patient by the American Society of Anaesthesiologists (ASA). ASA has a risk rating scale of 1-5. A score of 3, 4 or 5 got one point from NNIS. Finally, NNIS may have also assigned a risk point depending upon the duration of surgery. If it exceeded the 75th percentile for that type of surgery, there was another risk point assigned. So the NNIS strategy was to assign a score of 0-3. Now the National Healthcare Safety Network (or NHSN) allows facilities to categorize surgical patients by the NNIS System SSI risk-stratification method just explained. This method accounts for the patient’s pre-surgical medical status, length of surgery compared to similar surgeries and a extent of contamination of the surgical wound. Using this information, facilities are able to categorize their patients, calculate risk-stratified rates, and compare those rates against national risk stratified rates. A variety of comparison percentiles and statistical analysis options are offered including line listings, frequency tables, rates, and control charts and can be used to better inform quality improvement decisions.

Here is a summary of the Basic SSI Risk Index. This index now used in NHSN assigns surgical patients into categories based on the presence of three major risk factors:

1. Operation lasting more than the duration cut point hours, where the duration cut point is the approximate 75th percentile of the duration of surgery in minutes for the operative procedure.

2. Contaminated (Class 3) or Dirty/infected (Class 4) wound class.

3. ASA classification of 3, 4, or 5.

The patient’s SSI risk category is simply the number of these factors present at the time of the operation.

**Slide 17: Surgical Practices**

For surgical practices, there are guidelines issued by ACOS (the American College of Surgeons) and AORN, the Association of Perioperative Registered Nurses. Surveillance results have influenced several operative surgical practices. Antimicrobial prophylaxis is effective in only certain situations. Removing hair before surgery is a practice that has radically changed. It used to be done immediately before surgery with a razor. That has been shown to cause skin cells to be damaged, to cause shedding of skin and to bring more risk of infection. So now the recommendation is to use a clipper (which is like a scissor) and to not damage the skin when you are doing so, if you have to remove the hair. If the
hair isn’t in the way, then it’s left there. Other practices have to do with how you prepare the skin before you have surgery. The operating room environment has to do with air filtration the number of air exchanges. In an operating room, from the waist up is considered a sterile area, and from the waist down is considered a dirty area. If something falls below the sterile area, then it is considered contaminated and will have to be resterilized. An operating room has positive pressure so that airflow is outwards. The purpose is to prevent organism from migrating into the operative field. It has been shown that brushes can cause more organisms to shed and damage the skin, so scrubbing recommendations no longer require use of a brush. The surgical attire that is worn needs to be one that protects the patient from the organisms in the healthcare worker and vice versa. The other point that I wanted to mention is the notion of open versus closed incision care. If you would have a clean or a clean-contaminated surgery you would want to have a closed wound after the surgery because there was not a pre-existing infection. If the wound is closed up afterwards, it should heal without any problem. With a dirty contaminated surgery, often the surgeon will leave an open drain so the organisms can drain out for a couple of days or a week, as there was a pre-existing infection. So that is the difference between an open and closed incision: you will have a closed one when it is not an infected area, and you will have an open incision or a drain if it is needed, because it was already infected. These practices have been modified or evolved into revised ones, as a result of surveillance.

**Slide 18: 4. Bloodstream Infections (BSI)**

Let’s move on to bloodstream infections or BSI. Bloodstream infections can be associated with a device, as well as without a device. For example, one can become septic because of a wound infection or a urinary tract infection, resulting in an infection within the bloodstream. However, it is more common to have BSI associated with a device than not. Approximately 200,000 BSI occur in the U.S. each year, with a 20-30% mortality rate. These types of infection often require IV antibiotics, and result in a prolonged hospital stay. Thus, they are quite costly. The rates of bloodstream infection vary greatly according to the population at risk, the size of the hospital, unit or service involved and the type of device.

**Slide 19: Surveillance for Bloodstream Infections**

An increasing percentage of BSI are due to gram positive organisms, including Coagulase negative Staphylococcus, Candida species, Enterococci and Staphylococcus aureus. When a gram negative organism is involved in a bloodstream infection, one might suspect a contaminated IV solution or monitoring device. That could have happened extrinsically, in
the factory, or within the healthcare system when they were preparing the solution, or if it became contaminated with another fluid, or if it was entered by a contaminated device. These are all to be considered when a BSI is caused by a gram negative organism. To get the best and most accurate bloodstream rate you should use the number of catheter-related bloodstream infections the numerator and the denominator is per 1000 device days.

**Slide 20: Patient-Care Practices**

There are numerous patient care practices in this category that have been affected by surveillance. First is the frequency of change for intravascular catheters. There used to be a recommended interval for changing a peripheral IV, but they do not have that any longer. Even with a central line, a catheter should only be changed when an infection is suspected. For catheter insertion sites, some locations are better than others, and you are going to learn all about that in the spring class. Catheter site care has had similar findings in terms of using ointments that use to be routine but now are not used routinely anymore, with some exceptions. Dialysis catheters have been found to be more effective in reducing infections when using an ointment, because a dialysis patient has to have that site entered several times a week. That is one instance when ointment is used. Use of filters is not a routine infection control practice. They do filter out large particles that you do not want in an IV system, but do not have an effect on infection. Hand hygiene practices come into play in preventing infections. So do preparations of medications, use of single versus multi-dose vials, and how intravenous fluids are prepared. Up until this point, we have covered the 4 major types of health-care association infections and how surveillance has influenced the corresponding patient care practices.

**Slide 21: NHSN HAI Surveillance**

Now let’s include what National Healthcare Safety Network (NHSN) covers in their patient safety surveillance component for HAIs.

1. Device-associated module which includes the following:

Bloodstream infection which is designated by the acronym CLABSI for “central-line associated bloodstream infection”

CLIP—which stands for “central line insertion practices” adherence
Urinary tract infection, focusing on “catheter-associated urinary tract infections” (or CAUTI)

VAE or “ventilator-associated events” in adults only

Pneumonia-focusing on VAP or “ventilator-associated pneumonia” in pediatric locations or neonatal intensive care units and adult locations

2. Procedure-associated module which focuses on “surgical site infections” (SSI)

3. Antimicrobial use and resistance module (AUR)

4. Multi-drug Resistant Organism and Clostridium difficile infection (MDRO/CDI) module

Required Reading #2 and Supplemental Reading #3 provide more information on these types of surveillance.

**Slide 22: Additional HAIs of Concern**

We are now going to discuss two organisms that are of concern regarding HAIs. Multi-drug resistant organisms (or MDROs) include Methicillin-resistant Staphylococcus aureus (or MRSA), Vancomycin-resistant Enterococcus spp. (or VRE), multi-drug resistant Klebsiella (or MDR Klebsiella), and MDR Acinetobacter. Clostridium difficile (also referred to as C. diff) is another organism that can cause HAIs. MDROs and C. diff are both reported to the NHSN. The photo on the left shows an abscess caused by MRSA. The photo on the right shows an enlarged view of the C. difficile organism.

**Slide 23: Multi-Drug Resistant Organisms (MDROs)**

MDROs of all types have been increasing in frequencies over the past several decades. In 2003, almost 60% of S. aureus isolates reported to NHSN were methicillin resistant, an increase of approximately 40% since 1999. Similarly, almost 29% of Enterococcus isolates reported to NHSN in 2003 were vancomycin resistant, while less than 1% were resistant in
1990. MDROs occur more frequently in the Intensive Care Unit (or ICU) setting and there is an abundance of evidence showing that MDROs can be spread from patient to patient on the hands of healthcare workers. MDROs are of clinical importance because limited antibacterial treatment options result in increased lengths of stay, costs, and mortality.

**Slide 24: MDRO Surveillance**

MDRO surveillance through NHSN results in an infection incidence rate, expressed as the number of infections by MDRO type per number of patient days, multiplied by 1000. MDRO incidence rates may also be calculated by infection event type such as primary, BSI, pneumonia, UTI, SSI, and total MDRO infection events. The denominator is expressed as the number of patient days. If the reported incidence rate is specific to the unit, then the number of patient days would be restricted to patient days on that specific unit.

**Slide 25: C. difficile Infections (CDI)**

Clostridium difficile is a spore forming, gram positive anaerobic bacillus that produces two exotoxins - Toxin A and Toxin B. C. difficile is a common cause of antibiotic-associated diarrhea (or AAD) and causes between 15-25% of AAD cases. C. difficile is shed in the feces of an infected patient and the spores can be transmitted indirectly through contact with contaminated surfaces.

**Slide 26: C. diff Infections**

In recent years, national trends of C. difficile are increasing, as well as the severity of disease and associated mortality. It is believed that the emergence of a new strain is responsible for increasing rates of infection in patients considered to be “low risk”. This new strain appears to be more virulent and is resistant to fluoroquinolones, a class of drug commonly used to treat CDI. The graph in the lower right hand corner depicts the number of deaths due to C. difficile infections from 1999 through 2010, as reported by the CDC. You can see the increasing trend in the past 11 years.
**Slide 27: CDI**

The case definition for CDI entails the presence of symptoms, usually in the form of diarrhea, and either a positive stool test for C. difficile toxins, toxigenic C. difficile, or findings on colonoscopy. The minimum recommendation from the Society for Healthcare Epidemiology of America (or SHEA) and the Infectious Disease Society of America (or IDSA) is for surveillance of healthcare facility-onset, healthcare facility-associated CDI in all inpatient facilities, expressed in a rate of the number of cases per 10,000 patient-days.

**Slide 28: Environmental Surveillance**

The next type of surveillance conducted in healthcare facilities is environmental surveillance. There are several types of and ways to conduct environmental surveillance. It can be done on inanimate surfaces to see how contaminated they are or if cleaning has been adequate. It can be done to monitor sterilization and disinfection systems. It can be conducted to see what type of organisms are in a ventilation system. Water can be tested for Legionella or other organisms. Specialty units can be monitored, for example, dialysis water systems, and neonatal intensive care unit infant formulas. One might want to test IV fluids that have been prepared in-house.

**Slide 29: Principles of Environmental Surveillance**

There are several important principles to follow if conducting environmental surveillance. First, routine microbiologic sampling of the environment is NOT recommended. To go around and routinely sample if the table, or the bed rail, or the medical record, or the floor has organisms is not recommended. One exception is that surveillance has to be conducted on dialysis fluids every month. Another exception is to conduct environmental surveillance that is part of an outbreak investigation. Dialysis water should not contain more that 200 colony forming units per ml, and dialysate should not contain more that 2,000 colony forming units per ml. You need to know these values and they are always asked on the CIC exam.
Slide 30: How Does Dialysis Work?

Here is a diagram of someone on dialysis. When on dialysis the blood is pulled out and goes through a filter, is cleaned, and then recirculates back into the body. There are many different kinds of dialysis machines, but the principles of them are the same.

Slide 31: Dialysis Machine

Here is an example of a dialysis machine. Water is used, as well as the fluid that goes into the dialyzer. Water that goes into a dialyzer should not have more than 200 colony forming units per ml, and the dialysate fluid that runs through the filter should not have more than 2,000 colony forming units per ml. If either of these values are ever exceeded on a monthly surveillance report, there must be a system in place to pull that machine back, clean it, and retest it before it is used again.

Slide 32: Influencing Agencies

What agencies influence environmental surveillance? It is important to become familiar with these acronyms, because you will often hear them in infection control. First is the EPA or Environmental protection Agency. Next is OSHA or the Occupational Safety and Health Administration. Health Care Financing Association (HCFA) is another. The American Society of Heating, Ventilation & Air Conditioning Engineers (ASHRAE) and American Institute of Architects (AIA) influence construction and ventilation requirements for healthcare facilities.

Slide 33: Examples

Here are a few examples of when it might be appropriate to conduct environmental sampling. During an outbreak of Legionella you might want to look at water cooling systems. During periods of construction or renovation, the CDC
recommends environmental sampling for Aspergillus if any high risk patients develop aspergillosis. Looking at environmental cultures when you have an outbreak or cluster of infections is appropriate. Finally, environmental sampling may be considered for educational purposes. For example, you may want to demonstrate whether appropriate cleaning of a patient’s room was done-by culturing items such as bed rails, bedside tables, etc.

**Slide 34: If You Do Environmental Surveillance...**

It is very important for you to be familiar with these concepts regarding environmental surveillance. If planning to conduct environmental surveillance, a hypothesis about how the environment might be related as well as clear and measurable goals, need to be established beforehand. Also before starting this, the procedure for collecting cultures and sampling need to be defined. Parameters for interpreting the collected data need to be set beforehand as well-what is considered positive, what control measures need to be enacted if there are positive cultures, etc. Lets say that you culture bed rails in the hospital, and you several that are positive for micro-organisms. What are you going to say or do about that? If you have not have thought about that ahead of time, that is not a good plan. It is absolutely essential that you work with the laboratory because they have to be able to handle the number of samples you send as well as make sure they are properly collected. The lab can assist in determining the procedure to be able to do that.

**Slide 35: Product/Device Surveillance**

The third type of surveillance a hospital can do is product or device surveillance. The Food and Drug administration, or the FDA, has guidelines for reprocessing single-use devices. Single use devices are designed to be used for single use. If you are going to reprocess them, then you need to use manufacturer’s guidelines that the manufacturer can stand behind. If you do something not recommended and someone gets an infection, there are liability issues. There is a publication called the Health Devices Alert, that comes out once a week. It lists everything from hospital beds to children’s cribs to commercial food items, that need to be recalled for some reason or another related to safety and health. There is another type of product surveillance, that the OSHA Needlestick and Prevention Act requires. The purpose of this surveillance is to identify if there is a particular brand or brands of devices involved in more injuries than others. so they can find out what products are involved and identify them.
**Slide 36: Employee-related Surveillance**

The last category of surveillance is employee-related. Several agencies have either mandatory or recommended guidelines for employee-related surveillance: the OSHA Bloodborne Pathogen Standard, CDC Guidelines on Prevention and Control of Tuberculosis, and the Joint Commission (TJC) (formerly known as the Joint Commission for the Accreditation of Healthcare Organizations or JCAHO regulations). OSHA is interested in knowing who has been immunized for hepatitis B. They require that the hepatitis B vaccine be offered to all employees who have contact with blood or body fluids. If an employee refuses they must sign a declination form. Thus the percentage of phlebotomists, or nurses or physicians, that received hepatitis vaccine and who did not, but who signed a declination form, is a form of surveillance that should be conducted. Another type of surveillance would be for employees receiving annual influenza immunizations or for immunity to rash illnesses such as measles, rubella and varicella. Tuberculin skin testing, for exposure to tuberculosis, is another type of surveillance conducted among healthcare employees. Monitoring compliance with hand hygiene among healthcare facility employees is now mandated by TJC, as one of their patient safety goals. Monitoring employees for competencies, such as with administering tuberculin skin testing, or starting intravenous lines, is another example of surveillance that can be conducted among employees. You will learn much more about some of these examples later in the course as well as in the course, PHC 6517, Infectious Disease Prevention Strategies.

**Slide 37: How Do Hospitals Choose?**

With all these types of surveillance, how does a health care facility choose what type(s) of surveillance to conduct? There are The Joint Commission (TJC) mandates for certain types of surveillance to be conducted. For example, TJC mandates that CDC guidelines or WHO guidelines for hand hygiene be followed and CDC guidelines recommend surveillance of compliance with hand hygiene. The Occupational Safety & Health Administration (OSHA) mandates that needlestick injuries be followed and recorded. CDC recommends some types of surveillance for bloodborne pathogen exposures and for tuberculosis in healthcare facilities. The choice of surveillance also depends on the size of the hospital, how many personnel are available to conduct surveillance, what the budget is, and whether there are outbreaks or clusters of infections. Finally, there may be mandates, like CMS, that certain types of surveillance be conducted. All of these factors lead to targeted surveillance for most facilities.
Slide 38: “So What” re: Healthcare Surveillance

Up until now we have talked about the evolution of healthcare surveillance, the 7 recommended practices for healthcare surveillance, and types of healthcare surveillance. You might be asking, “What does this have to do with infection control?” I.C. personnel must determine how surveillance data from their facilities can be used to evaluate and influence hospital practices. In addition, I.C. programs should use this information to develop more effective strategies to prevent HAIs. Thus, surveillance is an integral component of an effective infection control program.

Slide 39: What We DID

Just for an example, let me share what types of surveillance we conducted at the 620 bed hospital where I worked in California from 1986-2000.

Slide 40: Hospital Example

We did surveillance for an overall hospital bloodstream infection rate, as well as by units, and then we looked at parenteral nutrition (which is giving nutrients through an IV line). We looked at ventilator-associated pneumonia one month per year. We looked at obstetrical surveillance, e.g., infections in maternal and child health, every two years. We did screening for VRE on rotating units, on a quarterly basis, and we did it anonymously. What we did, for example, was take all patients on a unit, put all 20 room numbers in a bowl and decide we were going to sample 10%. Patients in the selected rooms were all tested and we would not attach a names to culture results, as this was done just to determine the prevalence of VRE. Surgery did their own surveillance and they did not share with infection control at that time. Since that time, this has been modified so that IC does get information on surgeon-specific rates.
Slide 41: Ongoing Surveillance

In terms of ongoing surveillance, we looked at microbiology reports everyday, and some of them had panic values, such as positive hepatitis A, B, or C values or a culture positive for Neisseria meningititdis. We looked at all autopsy reports to see if we missed any infections that needed to be reported and if we needed to do any exposure work ups. We looked at blood exposures, needlestick injuries, or splashes in employees. We did surveillance for resistant organisms. We did surveillance for disinfection and sterilization systems. We did specific tuberculosis surveillance, and we did that because we had the highest number of foreign born cases of TB in the country for the previous 5 years. That was a community-related reason to do TB surveillance. We did surveillance for communicable diseases, and we did do post-discharge surveillance by sending a post card to surgical patients.

Slide 42: Surveillance As Needed

Then we conducted surveillance as needed. If we were doing construction, we looked for Aspergillus. If epidemiologically linked to an outbreak, we cultured employees for MRSA. We did environmental culturing if it was indicated in an outbreak. We also had a pet visitation program and conducted process surveillance. For that, we looked at whether the organization bringing in the animals and the department using animals for therapy complied with the infection control policies we developed for animal visitation. Animals had to have current vaccinations, be free of fleas, and the therapy department could only bring in animals to public areas, not individual patient rooms.

In this part of the lecture, we have covered the 4 major categories of HAI surveillance as well as HAI of additional concern, C. difficile and multi-drug resistant organisms; identified NHSN HAI surveillance modules, environmental sampling, product/device related surveillance and employee-related surveillance. Finally, I have given you a case example of one facility's surveillance program. You will be applying the knowledge gained, in the assignment for this week, to formulate rates for different types of surveillance.

This concludes Week 3, Part 2.