Welcome to week 10 entitled “Surveillance for Healthcare Workers”. This is part 1 of 2 lectures for this week.

This week you will be provided with an overview of occupational health. That will be followed by more detail on blood borne pathogens and tuberculosis occupational safety and health. We will conclude with a brief example of how to conduct hand hygiene surveillance in healthcare facilities.

Healthcare is the fastest-growing sector of the U.S. economy, employing over 18 million workers. A partial list of the healthcare work force occupations includes physicians, dentists, dental hygienists and assistants, pharmacists, nurses, nursing aides, technologists and technicians, home health aides, respiratory therapists, occupational and speech therapists, social workers, child care workers, and personal and home care aides. Women represent nearly 80% of the healthcare workforce. Registered nurses constitute the largest occupation within the HCSA sector and number over 2 million, of which 70% are employed in hospitals.

Globally, it is estimated that 60 million persons work in healthcare.

Healthcare has expanded beyond the hospital setting. There are outpatient clinics, surgery centers, dialysis centers, nursing homes, extended care, assisted living, and home care. Many things can be done in the home, with different machinery, nurses, aides, therapists and other services making visits to the home. Thus, there are numerous different settings in which healthcare can be provided. Thus, only the acutely ill patients are in hospitals these days. In this unit, we will be focusing on healthcare workers in hospitals and other healthcare facilities.
The Bureau of Labor Statistics (BLS) at the U.S. Department of Labor collects a wealth of data on workplace illnesses and injuries, both fatal and non-fatal. One of their annual reports is entitled “Nonfatal occupational illnesses and injuries requiring days away from work.” For their 2014 report on 2013 data (so, their most recent report), the rate of nonfatal occupational injury and illness cases requiring days away from work to recuperate was 109.4 cases per 10,000 full-time workers, down from 111.8 in 2012.

Of the occupations with at least 30,000 cases, nursing assistants had the highest rate in 2013 at 373.2 per 100,000 full-time workers. In the healthcare and social assistance sector, 13% of the injuries and illnesses were the result of violence and the rate increased for the second year in a row to 16.2 cases per 10,000 full time workers, up from 15.1 in 2012.

For musculoskeletal disorders, of the 380,600 that occurred in 2013, healthcare worker categories contributed as follows:
- Nursing assistants 22,000 cases
- Registered nurses 11,430 cases
- Personal care aides, 4,920 cases

These are just a few selected findings from this report which related to healthcare workers.

The link to the full BLS report is listed on this slide and in the transcripts. Source: http://www.bls.gov/news.release/pdf/osh2.pdf

Here is a table from a 2014 BLS report entitled “2013 Survey of Occupational Injuries and Illnesses, Summary Estimates CHARTS Package, December 4, 2014” (Source: http://www.bls.gov/iif/oshwc/osh/os/osch0052.pdf). The name of the table is “Selected industries reporting 100,000 or more non-fatal occupational injuries and illnesses, all ownerships, 2013”.

Eight industries reported 100,000 or more injury and illness cases in 2013 and are all listed on this slide. Together these eight industries combined to account for more than one-third (35.7 percent) of all cases among private industry and state and local government workplaces in 2013. Note that healthcare worker industries (general medical and surgical hospitals, nursing and residential care facilitates and ambulatory health care services comprised three of these eight industries).
Occupational Health in Healthcare Workers

Hospital workers are exposed to chemical, biological, physical, & psychological stress at work.

(See examples in transcript)

Healthcare workers (HCWs) face a wide range of hazards on the job, including needlestick injuries, back injuries, latex allergy, violence, and stress. Although it is possible to prevent or reduce HCW exposure to these hazards, healthcare workers actually are experiencing increasing numbers of occupational injuries and illnesses. Rates of occupational injury to HCWs have risen over the past decade. By contrast, two of the most hazardous industries, agriculture and construction, are safer today than they were a decade ago.

There are numerous non-fatal occupational injuries sustained by HCWs. Back injuries are one of the number one causes of musculoskeletal injuries, in nurses, for example. Back injuries can be caused by repetitive motions that occur during lifting, pulling and moving patients, beds, wheel chairs, equipment, etc. Infectious exposures can also occur, maybe in the lab, or from a needlestick injury. Dermatitis from use of specific hand hygiene agents or gloves can occur. Mental disorders can result from stress. Eye diseases, shift work, violence, latex allergies and noise are other examples of work-related occurrences possible in the healthcare setting. Shift work is a really interesting component of occupational health because there are a number of industries that work in shifts. Some places also require rotation of shifts, so you shift from one to another. Studies have shown that rotating shift workers are unable to develop a normal sleep pattern. Violence can be a problem in emergency departments in health care facilities, and that is why you might see bullet proof and shatter proof windows in some of the intake areas. Noise can also be a problem, in areas using machinery (such as the dish room, sterilization areas, facilities maintenance areas, etc.).

Goals of Occupational Health Program

• Prevent transmission of infection
• Provide a safe workplace
• Maintain health of workers
• Treat & compensate for work-related injuries & exposures

An occupational health program in a healthcare facility has several important goals. First is preventing the transmission of infection. Next is to provide a workplace that is safe for the employees. Another goal is maintaining the health of the workers. The fourth goal is, in the unfortunate event that there is a work related illness or injury, is treating and compensating employees for any work-related injuries or illnesses.
There is a code of ethics for occupational health (OH). It is to “Provide health care in the work place with regard for human dignity & client rights, unrestricted by considerations of social or economic status, national origin, race, religion, age, sex, or the nature of the health status”. Some of these potential HCW exposures are delicate issues. For example, if you have an HIV positive employee, he/she needs to be placed in a setting where they are not going to be put at risk for acquiring an infectious disease as well as transmitting HIV to a patient. For HCWs who get exposed to another’s blood or body fluids, (e.g., needlestick), OH needs to get the information about the status of the source to them as soon as possible after a blood borne exposure, so the HCW can receive post-exposure prophylaxis (PEP) if necessary. Both of these examples require that there be equitable treatment for all involved and maintenance of confidentiality according to legislative mandates. This code of ethics is one that OH professionals must follow.

Occupational health in health care facilities can be divided into several areas. One is pre-employment, (e.g., before that employee gets hired). Items that fall under that category include tuberculin skin testing (TST) (formerly called PPD testing), and chest x ray. Then once they are hired, are vaccine preventable disease requirements, such as measles mumps, and rubella (MMR) or varicella (chickenpox) vaccines. Then there are mandated activities, e.g., OSHA mandates, which include the tuberculin skin test or TB screening for employees and offering them hepatitis B vaccine. There also has to be a mechanism if someone is exposed, to follow that up with screening, testing, treatment, and post exposure prophylaxis. In the event of an employee having an infectious condition or being exposed to one, work restrictions might need to be imposed. Some conditions, such as a diarrheal illness, cross into public health. Public Health might impose restrictions before an employee can return to work (RTW), for example, three stools negative for Salmonella. So a work restriction with someone with a diarrheal illness might be required if working in a food preparation area. For herpes (aka shingles), depending on where it is on the employee and where that employee works, determines if work restrictions are required.
Workers compensation is a mechanism that compensates employees for costs they incur, such as medical costs, if rehabilitation costs, lost wages due to an illness or injury, for examples. The implications for surveillance are that employers can test for some of these things pre-employment, and might want to do that. Then if there is an exposure and you find out later that this HCW now tests positive for a certain condition (e.g., HIV, hepatitis B, hepatitis C) but were not tested before they started working, it is difficult to know whether that employee acquired the condition at work or beforehand. The dilemma becomes, what should employees be tested for that you have to test for by mandate, what would you like to test for and the things you would like to test for, can the healthcare facility afford it, or is that really something people should be going to their outside provider for, or is it the hospitals responsibility to test for. So you get into a lot of issues with occupational health and workers compensation. What is very important when there is an illness or injury, it has to be determined that it arose out of the “course of employment”. If it did not arise out of the course of employment, then it is difficult to determine that it is work related. That is why it is sometimes it is important to have tested for it ahead of time.

Biological agents are a potential exposure source in healthcare facilities. Among the bloodborne pathogens, of course, are the big three: HIV, HBV and HCV. (These are covered in much more detail in another unit in this course). There can be needlestick injuries, blood exposures, and infections with multi-drug resistant organisms, such as Methicillin-resistant *Staphylococcus aureus* (MRSA) and Vancomycin-resistant *Enterococcus* (VRE). MRSA is a frequent item in the news, problematic not only in healthcare facilities but in the community as well. Tuberculosis is huge in terms of what has to be done to administer a surveillance program. Healthcare workers not using Universal Precautions, or not using personal protective equipment that is provided to them to prevent exposures to blood borne pathogens, can also be a problem.

Source: https://www.osha.gov/SLTC/etools/hospital/hazards/hazards.htm
There are multiple potential viruses to be a source of exposure in healthcare facilities. The first is Creutzfeldt-Jakob Disease (CJD), sometimes referred to as “mad cow disease”. There has been transmission of CJD in health care facilities from contaminated electrodes, corneal and dura mater transplants and other organic materials. Cytomegalovirus is a risk to pregnant women. Erythrovirus B 19, used to be called Parvovirus B-19, Slapped cheek disease, or Fifth’s disease. The problem with EVB-19 is that it is contagious before some of the symptoms develop so by the time someone seeks treatment, they have probably already transmitted it. Then there are all of the hepatitis viruses and HIV. Herpes simplex can be a risk for HCWs performing mouth care or suctioning, without gloves. There is a condition called herpetic whitlow, a herpes simplex virus infection on a finger or a thumb, which is very painful. Influenza can be transmitted to and from employees, patients & visitors. Viral hemorrhagic fevers (VHF), such as Lassa and Ebola, are not frequent nor endemic in our country. Unfortunately, there is currently an epidemic of Ebola virus diseases in parts of Africa. At the time of this writing, there have been 4 U.S. healthcare workers infected with Ebola who have been medically transported into the U.S. to receive healthcare. We are only one plane ride away from anywhere in the world, so we could knowingly or unknowingly import Ebola or other viral hemorrhagic fever cases. Measles, mumps, rubella, and varicella are vaccine-preventable diseases that can cause serious problems in the healthcare setting. Respiratory syncytial virus or RSV is a disease of children more prevalent in the winter months. If healthcare workers travel to polio endemic area or care for those who have received the oral polio virus vaccine (which causes shedding of the virus in the stool), there could be a risk of exposure.

There are a number of infectious risks from bacteria in healthcare settings. Examples include pertussis (also known as “whooping cough”); enteric diseases like *Campylobacter, Clostridium difficile, Salmonella* and *Shigella*; diphtheria; *Mycobacterium tuberculosis* (causative agent of TB); *Neisseria meningitidis, Staphylococcus aureus, Group A Streptococcus* and *Yersinia pestis* (or the plague organism). If a patient was admitted with bubonic plague, then it could progress to pneumonic plague, which is highly infectious. Or pneumonic plague patients could be admitted as a result of an intentional biological attack.
In terms of other infectious risks, there are psittacosis, Q-fever, cryptosporidiosis, *Mycoplasma pneumoniae*, pediculosis (lice), scabies, and animal-related risks. The animal-related risks might be present not only from animals outside of the facility (from a bite) but also if there are animals visiting the facility.

Looking at all of the possible exposure agents for HCWs, responsibility needs to be delegated to prevent these from occurring whenever possible. First let’s look at the employer. The employer has the following responsibilities: 1) To provide available safety equipment, policies, & procedures, 2) To provide compensation for work-related illness & injuries, 3) To promote a “culture of safety” for employees and patients, and 4) To comply with mandates & regulatory requirements. A “Culture of Safety” must filter from the “top down” to be effective. From the highest level there has to be an attitude that it is important to promote safety, that supplies will be provided and that any conditions that are unsafe, be remedied. In those organizations where there is such a culture of safety, studies have documented smaller numbers of occupational injuries. The employer must comply with any mandates that come out.

However, it is important to recognize that both employers and employees have responsibilities.

Employees have responsibilities for their safety as well. First, all occupational injuries/exposures should be reported. If an employee does not report it because afraid of getting in trouble, then if there is any adverse event like a disease or treatment needed later and it has not been reported, then there will be no evidence that it was work-related. Employees need to be able to comply with policies and procedures, which are designed for safety. That includes using all available safety and personal protective equipment. Employees need to be responsible for their own actions. Finally, unsafe conditions need to be reported.
As previously mentioned, employers have to comply with regulatory agencies and mandates. OSHA is a regulatory agency and its policies are mandatory. The Joint Commission (TJC) is a regulatory agency. If your hospital has decided to become Joint Commission accredited, then it must follow TJC guidelines. Some State Health Departments have mandates they require, like reporting mandates. Some local health departments have reporting mandates and we learned about that in the unit on reportable diseases. Some conditions are required to be reported locally in Hillsborough County, by the state of Florida and some require national reporting.

In addition to regulatory agencies, there are advisory agencies. It is important to know which ones are regulatory and which are advisory. The Centers for Disease Control & Prevention, contrary to popular belief, is an advisory agency. They develop and issue guidelines and rank their recommendations. Another advisory agency is the Advisory Committee on Immunization Practices (ACIP). Every year they release guidelines on immunizations for both adults and children, for the upcoming year. HICPAC, is the Healthcare Infection Control Practices Advisory Committee. They make many guidelines in conjunction with CDC that we are going to look at: Patient Care Guidelines, Hand Hygiene Guidelines, etc. In the spring class. Another misconception is that NIOSH, the National Institutes for Occupational Safety & Health, is a regulatory agency. They are not, they are an advisory agency. So if you see a recommendation that one has to use a NIOSH-approved N95 respirator, NIOSH may have approved the respirator in terms of testing it and recommending it, but they don’t mandate its use. However, OSHA might mandate the use of a NIOSH-approved respirator.

Controlling exposures to occupational hazards is a fundamental occupational health concept. Traditionally, a hierarchy of controls has been used as a means of determining how to implement feasible and effective controls. The idea behind this hierarchy is that the control methods at the top of the list are potentially more effective and protective than those at the bottom. Following the hierarchy normally leads to the implementation of inherently safer systems, ones where the risk of illness or injury has been substantially reduced.

One representation of this hierarchy can be summarized as follows:
- Elimination
- Substitution
- Engineering controls
Administrative & work practice controls
Personal protective equipment (PPE)

It is important to note that with some types of agents, like blood borne pathogens, there may NOT be a choice of all levels of controls to protect against those hazards.

At the top of the hierarchy is elimination. The best alternative is to completely eliminate that hazard. Obviously, if the hazard can be eliminated, it no longer poses a threat. For example, banning the use of a toxic cleaning agent eliminates it from the facility.

However, as if often the case, there has to be a substitution of a hazard with something less toxic or non-toxic. With the previous example, another non-toxic cleaning agent is needed to replace the toxic one. For another example, using non-latex gloves can be a substitution for workers who have allergies to gloves with latex. Using gloves made out of something besides latex eliminates the latex hazard but allows substituting with a non-latex gloves. Thus, substitution is accomplished by replacing the hazard (e.g., material, agent, chemical or device) with one less toxic or non-toxic. Other examples of substitution include designing tests that do not require blood, or replacing needles with non-sharp items.

If substitution is used, the substitute needs to be effective. If there is a way to test without using blood it is better. Not using needles if you don’t need to, is a substitution. (There are more examples in the Bloodborne Pathogens and Needlestick Injury Surveillance lecture.) Looking at these examples, it should be evident that substitution is possible with some hazards and not with others. The reason that elimination and substitution are desirable is that they do not require any action on the part of the employee.

Elimination and substitution, while most effective at reducing hazards, also tend to be the most difficult to implement in an existing process. If the process is still at the design or development stage, elimination and substitution of hazards may be inexpensive and simple to implement. For an existing process, major changes in equipment and procedures may be required to eliminate or substitute for a hazard.
Next in line in the hierarchy are engineering controls. Engineering controls are used to modify the source of the hazard, reduce the quantity of contaminants that are released into the environment or place a barrier between the worker and the hazard.

Engineering controls may include principles of substitution, isolation, enclosure or ventilation (or combinations). There are many different types of different engineering controls for different types of work settings, not just health care. Examples of engineering controls in non-health care settings are putting up barriers in a building during periods of construction, or guards on saws to prevent accidental injuries. Examples of engineering controls in healthcare settings include handwashing sinks for cleaning contaminants from hands, sharps disposal containers to remove sharps from the environment, isolation rooms to contain infectious patients, exhaust fans to remove hazardous aerosols or bacilli from a work area or isolation room, biological safety cabinets to contain infectious agents when working with them in the laboratory, and devices with engineered sharps injury protection (ESIP) to reduce or prevent sharps injuries.

Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection. The initial cost of engineering controls can be higher than the cost of administrative controls or personal protective equipment, but over the longer term, operating costs are frequently lower, and in some instances, can provide a cost savings in other areas of the process.

If provided, workers must use engineering controls. If there is only one choice available, there is a better chance it will be used, but his is not always feasible.

The next level down contains administrative and work practice controls. These control exposures by job rotation, control of work assignments, training, policies and procedures. Administrative controls include work practices. Examples of administrative controls include policies that prohibit recapping of used needles and require immediate disposal of used needles, educational requirements to work in an area, limited work assignments or frequent job rotations in areas with heat, cold or noise stress. Examples of work practice controls for HCWs means use of hand hygiene, not recapping used needles, and reporting exposures to bloodborne pathogens. Administrative and work practice controls must be followed by workers in order for them to be effective.
The last level of controls in this hierarchy is personal protective equipment (PPE). That is defined as devices worn by workers to protect against hazards in the environment, be it noise, chemicals, or blood borne pathogens. Hearing protection is a type of personal protective equipment as well. In the healthcare setting masks, gloves, gowns, protective eye wear, goggles, and face shields are all considered PPE. There is a major disadvantage with personal protective equipment: the employee must go get it and put it on. If the PPE are not accessible and easily located, it is going to decrease the chance and likelihood that employees are going to get PPE and put it on. Alternatively, placing it right next to them does not guarantee they are going to put it on either, if not motivated to do so.

Administrative controls and personal protective equipment are frequently used with existing processes where hazards are not particularly well controlled. Administrative controls and personal protective equipment programs may be relatively inexpensive to establish but, over the long term, can be very costly to sustain. These methods for protecting workers have also proven to be less effective than other measures, requiring significant effort by the affected workers.

You have probably heard the saying “you can lead a horse to water but you can’t make them drink”. I will take this one step further, to illustrate a point about PPE. With PPE and other safety devices; “you can lead a horse to water, you can put his/her head under the water and you can hold it there, but you still can't MAKE them drink.”

So the bottom line is that employees must take responsibility to put on PPE. Studies have shown, for example, that the inoculum of blood injected from a needle stick is decreased significantly with one pair of gloves and to a greater degree with two pairs of gloves. If information like that can be shared with a surgeon, for example, maybe he/she will wear two pairs of gloves. It is very important to motivate employees and to educate on how personal protection equipment can protect them. There are case reports of Hepatitis C and Hepatitis B from blood exposures in HCWs that resulted in disease. Wearing eye protection can prevent or reduce this possibility. Some people believe that just wearing their own eyeglasses is sufficient protection, but both side areas are not covered with regular eyeglasses. With a face shield or goggles, there is more protection.
**Slide 26**

**OSHA Mandate**

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OSHA’s Bloodborne Pathogens Standard (BBPS) has several mandates about different hierarchies of controls and surveillance that apply to healthcare workers.

**Slide 27**

**OSHA BBPS: HBV**

- Offer [hepatitis B vaccine](http://www.gsk.com.hk/files/products/vaccines/engerix_b_junior.png) free of charge to all HCWs who have contact with blood & body fluids as part of their job
- All employees who do NOT take vaccine must sign a declination form
- All employees exposed to blood must be offered post-exposure prophylaxis & followed-up with blood tests

Let’s first discuss the OSHA BBPS in relation to hepatitis B. OSHA requires that the hepatitis B vaccine be offered free of charge to all employees who might have contact with blood and body fluids in their daily job. If as part of your job you work with blood, you pick up blood, you carry blood, you draw blood, you spin specimens, you empty trash where blood is, you clean dialysis machines where blood is, then you have to be offered that vaccine free of charge. However, no one can make you take that vaccine. So if a health care worker does not want to take it, they sign a declination form. OSHA requires the offering of the vaccine and the signing of a declination form if not taking it. The other thing required is that if an employee is exposed to blood, he/she must be offered post exposure prophylaxis and followed up with blood tests. How long they follow up depends on whether the source had hepatitis B, or HIV, or hepatitis C, or any combinations; combinations make the exposure and surveillance period longer.

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**OSHA BBPS: HCV**

- All exposed employees must undergo serial blood testing if source patient (+) for HCV
- No pre-exposure drug regimen @ this time
- No PEP @ this time
- May benefit treating acute infection early

Regarding hepatitis C, OSHA requires that if an employee is exposed to a patient who has hepatitis C, that employee undergoes serial blood testing. Serial blood testing is a series of tests to be done after exposure. Right now, there is no pre-exposure for hepatitis C, and unfortunately there is no post exposure treatment. Thus, an employee needs to be motivated to protect themselves with personal protective equipment and policies to prevent exposure to hepatitis C. There may be a benefit for those who do seroconvert to hepatitis C, to receive early treatment, but there is no current mandate for that.

**Slide 29**

**OSHA BBPS: HIV**

- All employees must be offered post exposure prophylaxis ([CDC provides guidelines](http://www.medicineworld.org))
- All exposed employees must receive follow-up serial blood testing (interval varies, depending upon co-infection)

For HIV exposures, OSHA mandates all employees to be offered post exposure prophylaxis (PEP) (according to established CDC guidelines), and receive follow-up testing. CDC updates these guidelines intermittently. Depending on what other organisms or viruses the source patient was infected with, determines how long the follow-up testing continues for that exposed employee.
There are also some general requirements in the OSHA BBPS. OSHA requires employees to follow Standard Precautions for the care of all patients. That means treating all of them as if they had a bloodborne pathogen infection. (This is covered in more detail in the course PHC 6517 Infectious Disease Prevention Strategies). Employers must provide safe workplaces, devices, policies, and procedures. There is a requirement for a sharps injury log, as part of the 2001 Needlestick Safety & Prevention Act (NSPA). All employees must be educated about bloodborne pathogens, not only upon initial employment, but annually. Where that is a challenge is in presenting the same basic information year after year. That is why educational strategies are so important in this field and why we need to learn different ways to relay information than just lecture (more about this in PHC 6314 Infection Control Program Design).

This concludes Week 10, part 1.