1. Welcome to Unit 4 entitled, “Infection Control and Patient Safety”. This is part I of II. This section will focus on the Joint Commission’s 2016 National Patient Safety Goals related to infection control; a specific salient patient safety issue: blood glucose monitoring; as well as resources and organizations related to this topic. I would like to acknowledge Dr. Christine McGuire-Wolfe, a recent PhD graduate, who assisted with development of this week’s lectures while serving as a Teaching Assistant in this course.

2. In July 2002, the Joint Commission approved its first set of National Patient Safety Goals (NPSG) with related specific requirements for improving the safety of patient care in health care organizations. All Joint Commission accredited health care organizations are surveyed for implementation of the NPSGs as appropriate to the services the organization provides. The NPSGs are prioritized from a “pool” of recommendations identified by the Patient Safety Advisory Group as evidence- or consensus-based, cost-effective and practical. The purpose of the Joint Commission’s National Patient Safety Goals is to promote specific improvements in patient safety. The requirements highlight problematic areas in health care and describe evidence and expert-based solutions to these problems. The requirements focus on system-wide solutions, wherever possible. Goals and requirements are guided and prioritized by the Sentinel Event Advisory Group. Each year, the Sentinel Event Advisory Group works with the Joint Commission to undertake a systematic review of the medical literature and available health care databases to identify potential new goals and requirements. The updated goals and their requirements are published annually by mid-year after extensive vetting, public commentary and approval phases. The NPSGs underwent a review process in 2010 and 2011 resulting in revised 2011-2013 goals.

3. In its 2015 NPSGs, there is 1 goal specifically related to infection control. This is goal #7, “Reduce the risk of healthcare-associated infections (HAI)”. This goal and its requirements will be outlined here. For 2015, there are a total of 5 requirements for this goal as follows:
   1) hand hygiene guidelines, 2) preventing multi-drug resistant organism infections, 3) preventing central-line associated bloodstream infections, 4) preventing surgical site infections, and 5) preventing catheter-associated urinary tract infections. We will cover each one of these requirements in more detail in the next set of slides. For each requirement, a rationale is given (if provided), examples of elements of performance (EP), and applicable settings where the requirements apply. (For a complete list of elements of performance, see the Supplemental Reading #1 for this week.)

4. The first requirement is, “Comply with either the current Centers for Disease Control and Prevention (CDC) hand hygiene guidelines or the current World Health Organization (WHO) hand hygiene guidelines”. We cover these guidelines in great detail in PHC 6517 “Infectious Disease Prevention Strategies”. The rationale for this requirement is that compliance with WHO or CDC guidelines will reduce the transmission of infectious agents by staff to patients, thereby decreasing the incidence of healthcare-associated infections or HAI. To ensure compliance with this NPSG, an organization should assess its compliance with the CDC and/or WHO guidelines through a comprehensive program that provides a hand hygiene policy, fosters a culture of hand hygiene, monitors compliance, and provides feedback. One element of performance (EP) (there are 3 total) for this requirement states, “Set goals for improving compliance with hand hygiene guidelines”. This requirement applies to the following settings:
5. The second requirement states, “Implement evidence-based practices to prevent healthcare-associated infections due to multiple drug-resistant organisms (or MDRO) in acute care hospitals.” Infections with MDRO can cause serious problems for patients. This requirement applies to, but is not limited to, epidemiologically-important organisms such as: methicillin-resistant *Staphylococcus aureus* (MRSA), *Clostridium difficile* infection (CDI), Vancomycin-resistant *Enterococcus* (VRE), and multiple drug-resistant gram negative bacteria. The rationale for this requirement is that patients continue to acquire healthcare-associated infections at an alarming rate. Risks and patient populations, however, differ between hospitals. Therefore, prevention and control strategies must be tailored to the specific needs of each organization based on its risk assessment. Infection control strategies to address MDRO include hand hygiene; Contact Precautions; as well as cleaning and disinfecting patient care equipment and the patient’s environment. The CDC Guideline “Management of Multi-Drug Resistant Organisms in Healthcare Settings” outlines all of these essential prevention strategies. Two elements of performance for this requirement are as follows (there are 9): “1. Conduct periodic risk assessments (in time frames defined by the hospital) for MDRO acquisition and transmission. 2. Educate patients and their families as needed, who are infected or colonized with a MDRO, about HAI infection prevention strategies”. The link to this guideline is provided here: http://www.cdc.gov/hicpac/pdf/guidelines/MDROGuideline2006.pdf. This requirement applies to the following settings: Critical Access Hospital, and Hospital.

6. The third requirement states, “Implement evidence-based practices to prevent central line–associated bloodstream infections.” This requirement covers short-and long-term central venous catheters and peripherally inserted central catheter lines. (These devices are covered in greater detail in “Infectious Disease Prevention Strategies” course.) Three EP for this requirement are (there are 13): “1. Perform hand hygiene prior to catheter insertion or manipulation. 2. For adult patients, do not insert catheters into the femoral vein unless other sites are unavailable. 3. Use a standardized protocol for sterile barrier precautions during central venous catheter insertion.” This requirement applies to the following settings: Critical Access Hospital, Hospital, and Long Term Care.

7. The fourth requirement for this goal states, “Implement evidence-based practices for preventing surgical site infections.” Compliance with this requirement necessitates hospital education programs to prevent surgical site infections, including staff and families; best practices and adherence to regulatory requirements; and surveillance for surgical site infections, to name a few examples. Two specific EP for this requirement (there are 8) are: “1. Educate patients, and their families as needed, who are undergoing a surgical procedure, about surgical site infection prevention. 2. When hair removal is necessary, use a method that is cited in scientific literature or endorsed by professional organizations.” This requirement applies to the following settings: Ambulatory, Critical Access Hospital, Hospital, and Office-Based Surgery.
8. The fifth requirement for this goal states, “Implement evidence-based practices to prevent indwelling catheter-associated urinary tract infections (CAUTI). NOTE: This NPSG is NOT applicable to pediatric populations as research has been conducted in adults, with no consensus that these practices apply to children. There are 3 EP for this goal that relay specific references to the insertion, management and monitoring of urinary catheters according to the “Compendium of Strategies to Prevent Healthcare-associated Infections in Acute Care Hospitals” (available at: http://www.shea-online.org/about/compendium.cfm) and “Guideline for Prevention of Catheter-associated Urinary Tract Infections” (available at: http://www.cdc.gov/hicpac/cauti/001_cauti.html). This requirement applies to the following settings: Critical Access Hospital and Hospital.

9. In March 2002, the Joint Commission, together with the Centers for Medicare and Medicaid Services, launched a national campaign to urge patients to take a role in preventing health care errors by becoming active, involved and informed participants on the health care team. The program features brochures, posters and buttons on a variety of patient safety topics. For infection control, the initiative is entitled, “Five Things You Can Do to Prevent Infection”. These 5 things are: 1. Clean your hands 2. Make sure healthcare providers clean their hands or wear gloves. 3. Cover your nose and mouth 4. If you are sick, avoid close contact with others. 5. Get shots to avoid disease and fight the spread of infection. The brochure for this initiative is available at the following link: http://www.jointcommission.org/speakup.aspx

In 2012, the Speak Up videos won the Magnum Opus award for Outstanding Achievement in Content Marketing for a video series.

10. For the next section of this lecture, we will use blood glucose monitoring and insulin administration as an infection control/patient safety case example. By way of an introduction, here are some examples of a blood glucose meter (on the left) and a reusable finger stick lancet device (on the right). For the blood glucose meter, you can see that the patient is placing a drop of blood on the strip, in close proximity to the blood glucose meter.

11. Blood glucose monitoring and insulin administration are examples of how patient care practices impact patient safety. Assisted monitoring of blood glucose and administration of insulin occurs when another person assists with or performs testing of capillary blood for glucose levels and insulin administration for the patient or individual. Assisted monitoring and insulin administration are routine in a variety of settings, including clinics, nursing homes, assisted living facilities (ALFs), and senior centers; health fairs, correctional facilities; schools; or camps.

There is risk of exposure to bloodborne pathogens (BBP) during assisted blood glucose monitoring or insulin administration if contaminated equipment and supplies are used. This most frequently occurs when blood glucose monitors, finger stick devices, or insulin pens are shared between patients and not properly cleaned. Particularly in long-term care settings, outbreaks due to these patient care practices are becoming more common. In the last 10 years, all 15 outbreaks of Hepatitis B have been linked to providers failing to implement basic principles of infection control during diabetic care.
12. Unsafe practices related to diabetic care include using a finger stick device for more than 1 person, using a blood glucose meter for more than 1 person without cleaning/disinfecting between uses, using insulin pens for more than 1 person, and failing to change gloves and perform hand hygiene between finger stick procedures.

13. This patient safety issue has even had local implications. Between October and the end of December 2009, the Palm Beach County Health Department received positive serology test results for acute Hepatitis B for three patients living at 2 separate assisted living facilities (ALFs). An outbreak investigation was started. Patients #1 and #2 lived at ALF1. Patient #3 lived at ALF2, but was linked to the other patients because they received services from the same home health care agency. Patients were classified based on Hepatitis B markers obtained through serologic testing. Patients were classified as having recent acute infection if they tested positive for hepatitis B IgM core antibody, negative for surface antigen, and positive for the antibody to hepatitis B surface antigen.

14. The investigation included four site visits to ALF1 and ALF2 between December 2009 and April 2010. Policies and procedures for storing and handling medications, equipment, and waste, as well as policies and procedures for infection control and diabetes care procedures at ALF1 and the HHA were included. Patient care was directly observed at both ALFs. A review of the nurses’ schedules at ALF1 and ALF2 was conducted to determine if there was movement between the two facilities. ALF1 and ALF2 were both for-profit, free-standing facilities operated by the same management. Skilled nursing services were provided by the same HHA, sometimes by the same HHA staff on the same day. Podiatry and dental services were provided by separate services for each facility.

15. Numerous infection control deficiencies were noted at ALF1 as follows:
   • improper cleaning of glucometers and lancing devices,
   • cross-contamination of clean supplies after touching a patient’s glucose monitoring equipment,
   • improper storage of clean supplies in the same cabinet with glucose monitoring equipment and in-use sharps containers,
   • traces of blood were visible on several on the glucometers and one of the lancing devices,
   • there was improper removal and disposal of gloves and alcohol preps that were contaminated with blood,
   • ALF1 did not offer hepatitis B vaccination to the staff,
   • there were no policies and procedures in place for sharps injuries or needlesticks, and
   • The last bloodborne pathogen training was in 2007.

ALF2 had similar operating practices as ALF1 and included:
   • it was noted that there was no sink readily available in the room where blood glucose monitoring occurred.
   • at least one nurse was unfamiliar with how to clean equipment between patients.
16. At ALF1, 48 residents were tested for hepatitis. Five tested positive for acute hepatitis B, another 2 tested positive for recent infection with hepatitis B and had developed immunity. 1 patient tested as immune to hepatitis B due to previous vaccination. 4 residents tested positive for hepatitis C. Of the 7 positive cases for hepatitis B, 6 were diabetics who received blood glucose monitoring services. The seventh positive patient was a sexual partner of one of the hepatitis B positive diabetics. At ALF2, 10 diabetic patients were tested and an additional chronic case of hepatitis B was identified. Specimens from ALF1 and ALF2 underwent viral DNA molecular sequence analysis and showed identical viral properties between 3 samples from ALF1 and 1 sample from ALF2 (these were the only samples sufficient for complete testing).

17. The results from this outbreak are listed on this slide. Diabetic residents were 14 times more likely have evidence of recent hepatitis B infection. Residents who received glucose monitoring or insulin injections were 22 times more likely to have acute or recent hepatitis B infection. There was a statistically significant association between diabetic care procedures and HBV infection. The findings strongly implicate diabetic care procedures with HBV transmission within the facility.

18. In response to these types of outbreaks, the Centers for Disease Control and Prevention issued best practices for assisted blood glucose monitoring and insulin administration. Fingerstick devices should never be used on more than one person. There are commercially available single-use disposable lancets that feature a retractable sharp. If shared, blood glucose meters should be cleaned & disinfected after every use. Injection equipment, such as insulin pens, needles, and syringes should never be used for more than one person.

19. The CDC also has issued “Recommended practices for preventing bloodborne pathogen transmission during blood glucose monitoring and insulin administration in healthcare settings.” These recommendations are more detailed and intended for healthcare workers. These guidelines are available from the link listed on the slide.

20. In regards to finger stick devices, the CDC recommends restricting use of finger stick devices to individual persons, selecting single-use lancets that permanently retract upon puncture, and disposing of used lancets at the point of use in an approved sharps container. For blood glucose meters, the CDC recommends that in the healthcare setting, if possible, blood glucose meters should not be shared. If they are shared, the device must be cleaned and disinfected after every use to prevent carryover of blood and infectious agents. For a general recommendation, unused supplies and medications should be maintained in clean areas separate from used supplies and equipment. Healthcare workers should not carry supplies and medications in their pockets.
21. Additional recommendations in the healthcare setting for insulin administration specify that insulin pens should be assigned to individual persons and be labeled appropriately. Insulin pens should never be used for more than one patient. Multiple-dose vials of insulin should be assigned to one patient whenever possible. If this is not possible, then insulin vials should be stored in a clean medication preparation area that is separate from patient care areas and multiple-dose vials should always be entered with a clean needle and syringe. Used injection equipment should be disposed of at the point of use in an approved sharps container. The CDC recommendations for healthcare workers also involve hand hygiene. Healthcare workers should wear gloves during blood glucose monitoring and any other procedure with potential blood exposure. Gloves should be changed between patient contacts. Gloves that have potentially blood-contaminated objects or finger stick wounds should be changed before touching clean surfaces. Gloves should be discarded in appropriate receptacles. Healthcare workers should perform hand hygiene immediately after removal of gloves. The last category of recommendations from the CDC for healthcare facilities involves training and oversight. It is recommended that individual schedules be regularly reviewed for persons requiring assistance with blood glucose monitoring and insulin administration. The facility should provide the full Hepatitis B vaccination series to all staff who may be exposed to blood or body fluids. Responsibility for oversight of blood glucose monitoring activities should be established. Staff who are involved in performing finger stick duties or injection activities should receive infection control training. The facility should assess adherence to recommendations by periodically observing staff and tracking supplies. Lastly, the facility should check with state authorities to determine if there are specific state and federal regulations regarding laboratory testing.

22. The healthcare system has reached a critical juncture between patient safety, infection prevention, and quality of care. Significant changes in where care is and will be delivered are central issues. These changes represent an unprecedented opportunity for infection preventionists (IPs) to accelerate progress towards the elimination of healthcare-associated infections (HAIs). APIC leaders have committed to an uncompromising vision and organization of the association’s mission and goals around a plan to advance toward healthcare without infection in their 2020 Strategic Plan. APIC published a position paper in 2010 entitled, “Safe injection, infusion, and medication vial practices in healthcare”. It is available at the following link: http://www.apic.org/Resource_/TinyMceFileManager/Position_Statements/AJIC_Safe_Injection0310.pdf. This document provides practice guidance for healthcare facilities on essential safe injection, infusion, and vial practices that should be consistently implemented. Outbreaks involving the transmission of bloodborne pathogens or other microbial pathogens can be prevented by using proper aseptic technique in conjunction with basic infection prevention practices for handling parenteral medications. A joint white paper entitled “Moving toward elimination of healthcare-associated infections: A call to action”, was also published in 2010. A link to that paper is provided here: http://www.apic.org/Resource_/TinyMceFileManager/Position_Statements/AJIC_Elimination_of_Healthcare-Associated_Infections.pdf. That paper is a joint effort of APIC, SHEA (the Society for Healthcare Epidemiology of America), the Association of State and Territorial Epidemiologists, the Pediatric Infectious Diseases Society, and the Centers for Disease Control and Prevention. It demonstrates a clear consensus of the advancement toward the cause of eliminating HAIs. (These are Required Readings #1 and #4 for this week.)
23. There are numerous resources for patient safety with relation to infection prevention. A link to them located on APIC’s website is provided here: [http://www.apic.org/For-Consumers/Additional-patient-safety-resources](http://www.apic.org/For-Consumers/Additional-patient-safety-resources). I recommend that you peruse some of these sites to review the materials available on patient safety. Please note that there are many other sources of information on patient safety than on the APIC website.


In this lecture, we have covered the concept of patient safety in relation to infection control, focusing on the Joint Commission’s National Patient Safety Goals for 2015 and used a case example on infection control & patient safety. We have also provided patient safety resources, both more general and those related to infection prevention.

This concludes Unit 4, Part 1.