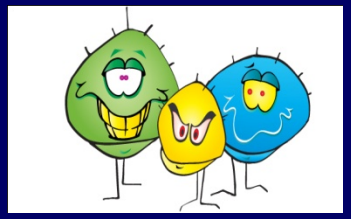


The Basics of Healthcare Associated Infections

Central Line-Associated Bloodstream Infections

Ventilator-Associated Pneumonias

Urinary Tract Infections

Surgical Site Infections

Multidrug Resistant Organisms and other Significant Organisms

Hand Hygiene

Children's Hospital of The King's Daughters Health System

Objectives

- Participants will be able:
  - To define “healthcare-associated infections” (HAI)
  - State one effect a HAI has on a person or on society
  - Identify at least three HAIs that may be preventable
  - Name three infection prevention measures that help prevent or control HAIs

Why Should We Care about Healthcare-Associated Infections?

Healthcare providers are all taught to "First, Do no harm."

Everyone working in a healthcare setting, regardless of his or her job role should follow this advice.

Healthcare Associated Infections (HAIs): The Burden

- In a Public Health Report, it was estimated that in 2002 there were:
  - 1.7 million HAIs in hospitals
    - high risk nurseries and intensive care units (adult and pediatric) account for over 400,000 of the infections
  - 4.5 infections per every 100 patients admitted
  - 99,000 deaths associated with HAIs.
    - 36,000 pneumonias
    - 31,000 bloodstream infections

Healthcare Associated Infections (HAIs): The Burden

- While we may not be able to prevent all infections, many are preventable and we need to at least try to prevent them all.

- There are costs associated with Healthcare Associated Infections
  - Direct Medical Costs (estimated in the billions)
  - Costs associated with lost productivity and other non-medical costs
  - Diminished quality of life
  - Loss of Life

The Most Common HAIs

- The most common HAIs in hospitals
  - Urinary Tract Infections
  - Bloodstream Infections
  - Pneumonias
  - Surgical Site Infections

HAIs at CHKD

- Our most common infections are
  - Central Line-Associated Bloodstream Infections (CLABSI)
  - Urinary Tract Infections (UTI)
  - Surgical Site Infections (SSI)

- Other infections of major concern to CHKD for which there are targeted interventions:
  - Viral respiratory infections, especially RSV and influenza
  - Gastrointestinal illnesses, like rotavirus
  - Multidrug resistant organisms (MDROs) and other significant pathogenic organisms, especially methicillin-resistant Staph aureus (MRSA) and Clostridium difficile (C. difficile).

HAIs: Central Line Associated Bloodstream Infections

- Many hospitalized patients need vascular access with central catheters (CVL) for long-term therapies, nutrition, fluids, and even blood drawing in a very ill patient.
  (At CHKD, CVL is used to mean all central catheters, including arterial.)

- Unfortunately, these devices, especially those in the central or large blood vessels of the body, put the patient at a much higher risk of developing mechanical complications, infections at the catheter exit site, and central lines-associated bloodstream infections (CLABSI).

- Blood stream infections are serious and costly both in human suffering and actual cost; each infection can cost an additional $4,000-$29,000.

HAIs: Risk Factors for Central Line Associated Bloodstream Infections

- Risk Factors:
  - Having a CVL is a risk factor since it goes directly into the blood stream through the skin making a path for bacteria to enter.
  - Prolonged hospitalization
  - Prolonged duration of CVL use
  - Prematurity
  - Total parenteral nutrition

- Risk Factors:
  - High bacterial counts at the insertion site
  - High bacterial counts of the catheter hub
  - Internal jugular CVLs
  - Very low white blood cell counts
  - Too much or frequent manipulation of the CVL
  - Reduced nurse to patient ratio

HAIs: Central Line Associated Bloodstream Infections Basic Prevention Practices

- Prior to CVL insertion, educate the family about CVL infections by giving the family the Way to Grow: Catheter-Associated Bloodstream Infections, FAQ
- CVL insertion carts are provided and hold the supplies necessary to insert a line

HAIs: Central Line Associated Bloodstream Infections Basic Prevention Practices

- Follow the standardized CVL insertion protocol, which incorporates infection prevention practices known as the “central line bundle.”
- The central line bundle is a group of evidence-based practices that when used together result in better outcomes.

HAIs: Central Line Associated Bloodstream Infections Basic Prevention Practices

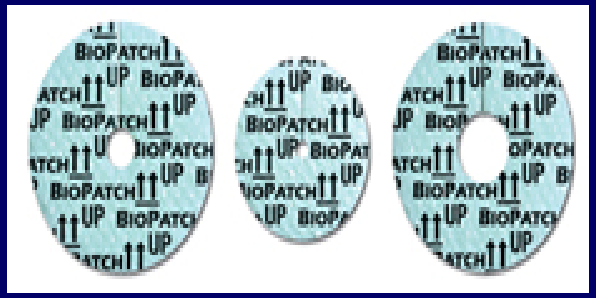
- Use the CVL insertion checklist for each CVL insertion to ensure adherence to the protocol. A trained observer is a member of the insertion team and is present to promote adherence to the standardized protocol.

- The person inserting the CVL will document the use of the checklist as part of the insertion note/form.

HAIs: Central Line Associated Bloodstream Infections Basic Prevention Practices

- The elements of the bundle are:
  - Hand Hygiene prior to catheter insertion
  - Select an insertion site with the least risk of infection balanced by the difficulty of insertion and other patient-specific factors
  - Use Chlorhexidine-based skin antisepsis
  - Maximal sterile barriers during insertion
    - Mask, cap, sterile gown, sterile gloves, and full sterile drape
  - Physicians and nurse practitioners must daily assess the need for continued central access and remove the line as soon as feasible

HAIs: Central Line Associated Bloodstream Infections Basic Prevention Practices



- CVL General Infection Prevention
  - Perform hand hygiene prior to any line manipulation, entry or dressing change.
  - Cleanse site with a chlorhexidine based antiseptic
  - Disinfect access port/hubs for at least 15 seconds prior to each line access
  - Minimize line entries as much as possible
  - Place chlorhexidine based sponge dressing at the insertion site.

HAIs: Surgical Site Infections

- It has been estimated that about 500,000 surgical site infections (SSIs) occur each year in the United States.
- SSIs may result in prolonged hospital stays, poor patient outcomes including death, and have great financial impact on healthcare systems

HAIs: Surgical Site Infection Basic Prevention Practices

- Prior to surgery, educate families by providing the Way to Grow sheet: Surgical Site Infections, FAQ
- Some surgeons request that patients bathe the night before surgery with an antiseptic cloth or liquid.
- Perform a surgical scrub prior to each surgery
- Remove hair with an electric clipper if hair removal is needed
- If a prophylactic antibiotic is needed, ensure the first dose is completed prior to starting the actual surgery
- Discontinue prophylactic antibiotics within 24 hours after the procedure (48 hours for cardiac surgery cases)

HAIs: Surgical Site Infection Basic Prevention Practices

- Use of effective skin antiseptics for site preparation: Allow time for surgery site antiseptic application to be completed.
- Maintain surgical asepsis.
- Minimize traffic in and out of the operating room
- Use properly cleaned and sterilized instruments
- Optimal cleaning and disinfection of environmental surfaces

HAIs: Urinary Tract Infections

- The urinary tract is a common site for HAIs and can lead to more severe infections
- Some of these infections can add a great deal of cost to each hospital stay
- Most of these urinary tract infections (UTIs) occur in patients with urinary catheters.
- Not all UTIs are preventable, but many can be with proper catheter management.

HAIs: Urinary Tract Infection Basic Prevention Practices

- Prior to inserting the urinary catheter, provide the family with the Way to Grow sheet: Catheter-Associated Urinary Tract Infections, FAQ
- Use urinary catheters only when needed and remove as soon as no longer essential
- Do not keep them in for convenience
- Use the smallest catheter needed
- Use aseptic technique for insertion
- Perform hand hygiene before insertion
- Perform hand hygiene anytime you touch the catheter, tubing or bag

HAIs: Ventilator Associated Pneumonia

- Ventilator-associated pneumonia (VAP) is a leading cause of healthcare-associated infections and develops while on or just after being on a ventilator.
- This type of infection is uncommon at CHKD, but continued efforts are needed to keep these serious and expensive infections from occurring.

HAIs: Ventilator Associated Pneumonia Basic Prevention Practices

- Perform hand hygiene before and after contact with the patient and any part of the ventilator or circuit.
- Keep the head of the bed elevated (based on age in pediatrics)
- Routinely evaluate a patient's readiness to breathe without the ventilator.

Respiratory and Gastrointestinal Illnesses

- For viral respiratory infections such as RSV and flu, we annually activate a special plan that educates staff and outlines the patient placement and cohorting plan.
- For rotavirus, while less common due to vaccination, an annual prevention and educational flier is distributed to inpatient clinical areas
- RSV, flu and Rotavirus are found in the environment and are easily spread by hands and contaminated objects found in the environment or items brought into a patient room.
- Isolation precautions for all viral respiratory and diarrheal illnesses are based on disease process and patient age, when appropriate. This may include Contact and Droplet Precautions.

Multiple Drug-Resistant Organisms (MDROs)

- MDROs are commonly found in hospitals
- Patients may be colonized or infected
  - Both colonization and infection may result in transmission to others
    - *Colonization means the patient carries the bacteria, usually on a mucosal or other **surface**. These bacteria can be found in different body sites, such as the nose, wounds, or the bowel, depending on the organism.*
    - *Infection refers to the body's inflammatory response to the presence and **invasion** by an organism*
- Transmission commonly occurs
  - via the hands of healthcare workers and
  - via contact with contaminated environment surfaces and patient care equipment

MRSA

- MRSA is currently the MDRO that has the greatest impact in the healthcare community
- Many MRSA infections occur in the community in people with no exposure to a hospital
- Both community and hospital strains of MRSA can spread within the hospital and cause infections
- MRSA may cause simple skin infections or very serious infections such as bloodstream infections, osteomyelitis, and necrotizing pneumonia.
- MRSA is associated with both a higher mortality and direct costs than methicillin-sensitive Staph aureus

MRSA

- MRSA
  - Whether the patient is colonized or infected, there is a risk of environmental contamination (e.g., bed linens, blood pressure cuffs, patient gowns, etc.)
  - Healthcare workers (HCW) are known to contaminate their work garb during patient care; therefore gowns and gloves are important

Extended Spectrum Beta Lactamases (ESBLs) and Klebsiella pneumoniae Carbapenemases (KPCs)

- These enzymes are found in gram negative bacteria, such as E. coli or Klebsiella
- Organisms with these enzymes are selected as a result of widespread antibiotic use
- Organisms with these resistance enzymes may cause a variety of infections, including bloodstream.
- ESBLs and KPCs contaminate the environment

Vancomycin Resistant Enterococcus (VRE)

- VRE developed as a result of the use and overuse of vancomycin
- In some institutions, it is a frequent cause of serious infections such as blood, urinary tract and wound infections.
- VRE heavily contaminates the environment

MDRO Risk Factors

- While anyone can get an MDRO there are some factors that may contribute to resistance
  - Antibiotic overuse or misuse, such as taking an antibiotic when one is not needed or it is not known if it is needed
  - Patients may not follow the instructions for when and how to take the antibiotic
  - Unfortunately, some MRDOs develop even when treatment is correct and may even develop while on the antibiotic

MDRO Patient Risk Factors

- While anyone may get an MDRO, some patients have a higher risk; some of the risk factors are:
  - Previous antibiotic therapy
  - Hospital stay in the prior year
  - Prolonged length of stay
  - Extremes of age (the elderly and the low birthweight baby)
  - Underlying chronic diseases
  - Immunocompromise
  - Invasive devices (intravascular catheters, ventilators, urinary catheters)
  - Presence of devices that traverse the skin (tracheostomies, gastrostomies)

MDRO Modes of Transmission

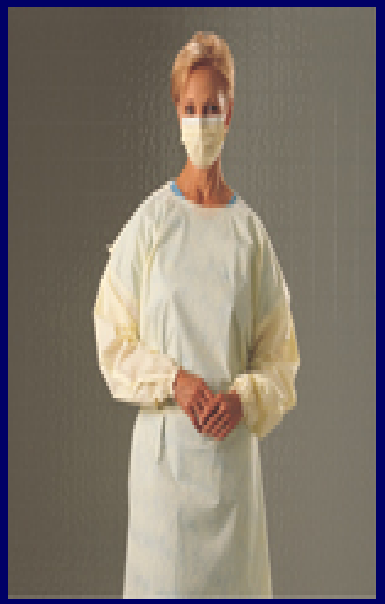
- Poor or no hand hygiene
- Gloves worn from patient to patient
- From contact with a contaminated environmental surface (e.g. bed rails, tables, and door handles, or sheets).
- Inadequately cleaned and disinfected equipment (e.g. blood pressure devices or stethoscopes).
- Other considerations: Lab coats? Ties? Pagers? Cell phones? Supplies left at a bedside?

MDRO Prevention

- Good hand hygiene including (but not limited to)
  - Upon entering and leaving the patient room or bedspace
  - After removing gloves
  - After handling contaminated items
  - When moving from a dirty task to a clean task (e.g., after diapering to handling a ventilator or IV)
- Proper use of antibiotics
- Early identification of MDRO colonized or infected patients through active surveillance culturing
  - At CHKD, we weekly test patients in the NICU and annually in the PICU

MDRO Contact Precautions

- Patients with MDROs are placed on Contact Precautions and remain on them for future visits at CHKD. (Patients with skin and soft tissue infections are automatically placed on Contact Precautions until it is determined if MRSA is present.)
- Patients with MDROs other than MRSA will remain on Contact Precautions until a reliable clearance testing method is established.
- A computer alert is put in the various computer systems to assure early identification and isolation of patients with MDROs.
- Parents and patients should be educated about the diagnosed MDRO, the isolation procedures, and the vital role that good hand hygiene plays for all, including parents and visitors.



MDRO: MRSA and Removal of Contact Precautions

- While there is no current expert consensus on how to determine if a patient with a history of MRSA has cleared it, CHKD developed its own algorithm (flowchart) to enable physicians to attempt to remove patient MRSA isolation requirements.
- The MRSA Contact Precautions Removal Algorthim is located on the CHKD intranet under “Infection Control Policies.”
- The requirements of this process must be met for CHKD Infection Prevention and Control to remove the patient from the MRSA list.

MDRO: MRSA and Contact Precautions

- Educate families about MDROs. Provide the family with the Way to Grow sheet on MRSA as soon as it becomes known the patient has MRSA: MRSA, FAQ . For less common MDROs the physician may educate the family or contact Infection Prevention and Control for assistance.

- Patients identified as having MRSA are sent a letter and an MRSA information sheet in the mail. The primary care physician, if one is identified, also receives notification that MRSA was diagnosed.

- If the patient is in the hospital, a Way to Grow Frequently Asked Question sheet on MRSA is given to the family to help them better understand MRSA.

Contact Precautions

- Put on gloves prior to ANY entry for ANY reason into the room
- Put on a gown to protect clothing and skin above the elbow
- Clean and disinfect shared equipment thoroughly after each patient use, like a stethoscope or thermometer.

Clostridium difficile (C. difficile)

- C. difficile is a bacterial infection that causes diarrhea and abdominal pain and is most often associated with the use of antibiotics
  - A new strain identified in 2005 has caused more severe disease in patients and may be more difficult to treat
- C. difficile heavily contaminates the environment with spores that may not be killed with routine hospital disinfectants and may not be killed by alcohol hand rubs
  - This means special precautions are necessary

Clostridium Difficile

- Requires special cleaning and hand hygiene
  - *If you see this sign:*
    - Use soap and water hand washing. Alcohol hand rub may be used, if wanted, *afterward*.
    - Environmental services will use bleach to clean the room

C. difficile

- Place patient on Contact Precautions in a private room for duration of illness
- Ensure a Way to Grow sheet Clostridium difficile, FAQ is given to the family and patient.

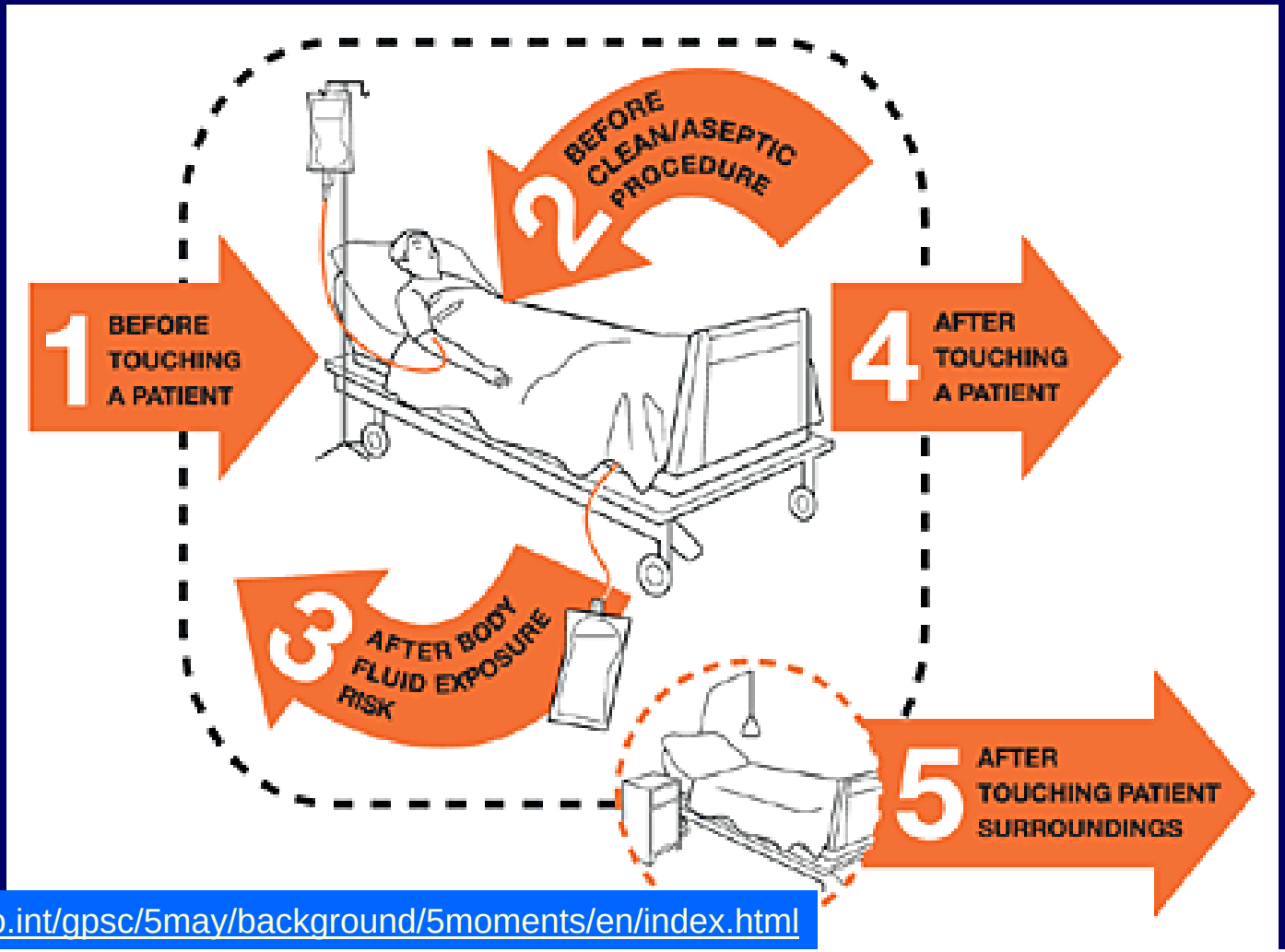
The Cornerstone of Infection Prevention: Hand Hygiene

- Every infection prevention and control effort stresses the importance of hand hygiene.
- Yet, though most people believe they always do it when they should and do it properly, multiple observational studies show compliance as low as 40% among physicians, nurses, and other healthcare workers.
- Additionally, observations also show that many don’t wash long enough or follow the correct procedure.
- The next three slides review the basics of hand hygiene knowledge.

Hand Hygiene "Know When"

- Soap and water is always appropriate for routine handwashing
- Soap and water are required when hands are:
  - Visibly soiled
  - Contaminated with blood or body fluids
  - C. difficile is present or possible
  - After using the restroom
  - After eating, drinking, or smoking
- Alcohol based hand rubs may and should be used:
  - Before and after going into the patient room
  - After removing gloves
  - After handling trash
  - After handling dirty linen
  - Before putting on gloves
  - After removing gloves
  - After contact with items in the patient room/bedspace
  - After cleaning a patient room.

“My 5 Moments for Hand Hygiene”



http://www.who.int/gpsc/5may/background/5moments/en/index.html

Hand Hygiene “Know How”

If you use soap and water:

1. Wet hands
2. Get soap
3. Rub hands to create friction
4. Wash each finger
5. Pay attention to nails, knuckles and between fingers
6. Wash wrists with circular motion
7. Wash for a full 15 seconds
8. Rinse
9. Dry
10. Turn faucet off with clean paper towel

If you use alcohol based hand rub (Purell):

1. Get Purell by putting hand under the dispenser and allowing it to complete one full squirt of the product. (one time is enough for most people).
2. Rub the Purell over all the skin surfaces on your hand.
3. Include palms and backs of hands, wrists, between fingers, around and under nails.
4. Rub until completely dry.
5. Do not wave hands to dry or wipe them dry.

Ultimate Goal

To prevent as many infections as possible and thereby improve the lives of the children we care for at CHKD.

Click this link

http://www.zoomerang.com/Survey/WEB229YBZ7ZM6A

to take you to the Post Test.

References

- Ihi.org/Topics/Patient/Safety
- www.premierinc.com/quality-safety/education-newsletters
- www.cdc.gov/ncidod/dhqp/
- SHEA/IDSA Compendium/Practice Recommendations (MRSA, Central-line Associated Bloodstream Infections, Urinary Tract Infections, Surgical Site Infections, and Clostridium difficile (October 2008)
- US Department of Health and Human Services: HHS Action Plan to Prevent Healthcare Associated Infections
- Klevens, RM, et.al., Estimating Health Care-Associated Infections and Deaths in U.S. Hospitals, 2002. Public Health Reports 2007
- Guideline for Isolation Precaution: Preventing Transmission of Infectious Agents 2007
  - **SAVE LIVES: Clean Your Hands** website at:
- www.who.int/gpsc/5may/en