2017 UPDATE
INFECTION PREVENTION and CONTROL

ISOLATION PRECAUTIONS & BLOODBORNE PATHOGENS

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*Which pathogen causes the most serious hospital assoc’d infections?

A. MRSA (methicillin resistant Staph aureus)
B. VRE (vancomycin resistant Enterococcus)
C. CDIFF (Clostridium difficile)
D. ESBL (extended spectrum beta lactamase bacteria)
E. CRE (carbapenem resistant enteric bacteria)

Infections in the NEWS...
Cases of nonfatal occupational injury and illness in healthcare workers are among the highest of any industry sector.

A. True
B. False
C. Don’t know
1996 CDC ISOLATION GUIDELINES

STANDARD PRECAUTIONS

Reduce risk to HCP & patients of transmissible infectious agents.

Apply to any healthcare encounter:

- blood
- body fluids
- secretions
- excretions (except sweat)
- nonintact skin
- mucous membranes
The Centers for Disease Control & Prevention says

“the most common mode of transmission of pathogens is via the hands”

*What is the most important reason for healthcare workers to practice good hand hygiene?*

1. To remove visible soiling from hands
2. To prevent transfer of bacteria from patient to physician
3. To prevent infections that patients can acquire in the hospital
4. To prevent bacterial colonization of the hands of physicians

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Use of Alcohol foam: use enough to cover your hands well.

Effect of Alcohol-Based Handrubs on Skin Condition

~ Alcohol-based handrub is less damaging to the skin ~

KMC Hand Hygiene Compliance

<table>
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<th>Q2</th>
<th>Q3</th>
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Observations:
- 3256 Observations
- 4136 Observations
- 3912 Observations
- 3487 Observations

Dozens of studies indicate, hand hygiene is only achieved 50% of the time.

November 2016 KMC Gemba Walk showed 58% Hand Hygiene Compliance.

HAI's are:
1. 4th leading cause of death in America.
2. Cost the US healthcare system between $30 – 40 billion dollars each year.
3. Every year, an estimated 2,000,000 patients get a hospital-related infection.
4. 90,000 people die from their infection.
5. The HAI problem is closely related to Hand Hygiene.
PERSONAL PROTECTIVE EQUIPMENT

- gloves
- gowns
- masks
- goggles
- face shields
- shoe covers
- hair covers
- CPR resuscitator masks

Gowns

- Gowns are single use only.
- Dispose of in appropriate container.
- To remove, grasp around top and pull off turning inside out as it is removed so your clothing doesn’t become contaminated.

Gloves

- Are single-use only.
- Must fit properly and cover wrist.
- Change gloves and wash hands if going from a dirty to a clean activity.
- Remove by grasping at wrist and turn inside out.
- Discard in regular trash, or in biohazard trash (red bag) if appropriate.
- Wash hands after gloves are removed.
WORK PRACTICE CONTROLS

Handle sharps with care
Practice good hygiene
- avoid splashing potentially infectious fluids
- keep food/beverages away from patient areas
- wash hands frequently
- change white coat or scrubs if soiled

ENGINEERING CONTROLS

...are designed to eliminate hazards at the source.

Sharps Safety

• Use sharps containers.
• Do not overfill containers.
• Do not recap needles.
• Use forceps to remove needle from syringe.
• Do not bend, break, cut or manipulate sharps.
• Never handle broken glass—use forceps, or a dust pan and broom...

HOUSEKEEPING CONTROLS

• Do not push trash down into container with your hands or feet.
• Do not overfill trash containers.
• Hold trash away from your body when transporting.
• Discard all infectious waste in biohazard containers.
• Decontaminate work surfaces with an appropriate disinfectant.
Hepatitis B
Hepatitis C
Human Immunodeficiency Virus

Risk of Infection following exposure:

**HBV (30%)**
- Percutaneous: 1-43%
- Mucocutaneous: 1-6%

**HCV (3%)**
- Percutaneous: 0.3-1.8%
- Mucocutaneous: unknown (very small)

**HIV (0.3%)**
- Percutaneous: 0.3%
- Mucocutaneous: < 0.1%

Document the Injury…
- Report immediately for evaluation and testing to:
  - Employee Health or
  - Emergency Department
- EARLY PEP most effective!
PEP Recommended:

HBV
- If source HBsAg+ and HCP HBsAb <10 mIU/mL
- use of HBIG and/or HBV vaccine

HCV
- followup HCV testing
- No current recommendations for prophylaxis with immune globulin or antiviral agents

HIV
- 4 weeks antiretroviral drug protocol
- consider possible HIV resistance of source

PEP FOLLOWUP

HCP to report:
- Any PEP medication side effects
- Signs or symptoms of possible acute HIV infection within 12 weeks of exposure

Recommended laboratory testing:
- Anti-HIV at baseline, 6 weeks, 3 months, and 6 months (for all HIV-exposed HCP)
- CBC, renal & hepatic panels at baseline and 2 weeks to monitor for toxicity

TRANSMISSION BASED PRECAUTIONS

INFECTION PREVENTION is everyone's business

Case 1

What's wrong with her?
Droplet Transmission

Droplets are generated by talking, coughing, and sneezing.

Microorganisms in droplets (10um) are propelled a short distance through the air and deposited on conjunctiva, nose, and mouth mucosa.

*Which statement is NOT true about Droplet Precautions?

A. Use of dedicated patient equipment is recommended
B. PPE requires mask when entering room
C. Room door must remain closed
D. PPE includes gown and gloves only if potential contact with secretions or possible contaminated environment

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Case 2

A 80 yo smoker presented to KMC with 6 months worsening dyspnea, cough with frequent hemoptysis, night sweats, poor appetite, and 20lb weight loss. You are the on call physician for admission.

CXR: Apical lung infiltrate.
LABS: CBC & CHEM pending.

What infection control measures should you consider when admitting this patient?

Airborne Transmission

- Microbes eg, AFB in small droplet nuclei (<5um) or dust particles.
- Dispersed widely by air currents and remain suspended for prolonged periods of time.
- Requires special PPE respiratory protection.
- Requires special air handling and ventilation: negative pressure room or portable HEPA filter

*Airborne Precautions include all of the following except:

A. Negative pressure room with door closed
B. No PAPR or N-95 mask for immune HCP with disseminated Zoster (shingles) patient
C. PAPR or N-95 mask for immune HCP with suspected or confirmed primary Varicella (chickenpox) patient
D. PAPR or N-95 mask for HCP with any suspected or confirmed TB patient
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D. PAPR or N-95 mask if available for HCP with any suspected/confirmed TB patient
Case 3

A 25M presented to ED for extremely painful swollen red forearm with fever 101.5°F and suspected abscess with purulent drainage. Patient was admitted for I&D.

When questioned, he admitted to IVDA with progressive symptoms over several days at most recent injection site. What antibiotic coverage is needed pending cultures?

What if any isolation is indicated?

Contact Transmission

Direct:
Between body surfaces resulting in transfer of microorganisms

Indirect:
Between a susceptible host and a contaminated intermediate object
At KMC/SMC, what percentage of Staph aureus isolates are MRSA?

1. <5%
2. 25%
3. 50%
4. 75%
5. 90%

Colonized or Infected: What is the Difference?

- People who carry bacteria without evidence of infection (fever, increased white blood cell count) are colonized.
- If an infection develops, it is usually from bacteria that colonize patients.
- Bacteria that colonize patients can be transmitted from one patient to another by the hands of healthcare workers.
  * Bacteria can be transmitted even if the patient is not infected.
Why is *Staph aureus* so important?

2nd most common cause of HAIs reported to NHSN

- CNS (15%), *Staph aureus* (14%)

Most common cause of SSIs (30%) and VAPs (24%)

MRSA first identified in the 1960s in hospitalized patients

MRSA has become a predominant cause of *S. aureus* infections in both healthcare and community settings

- Primarily due to transmission of relatively few ancestral clones rather than the de novo development of methicillin-resistance among susceptible strains

Recent estimates:

- 49-65% of *S. aureus* HAIs reported to NHSN are caused by MRSA
- 86% of all invasive MRSA infections are healthcare-associated


Why is the Emergence of MRSA so important?

- MRSA treatment options limited
- increased morbidity & mortality
- Antibiotic misuse can spread resistance
  - prevalent MRSA >> more vancomycin use >> more vancomycin resistance (VRE and VRSA) >> more linezolid/daptomycin use >> more resistance
- Preventing MRSA infections reduces all *S. aureus* infections
- MRSA is a marker for ability to contain transmission of important pathogens
- Programs that prevent MRSA transmission will likely reduce patient-to-patient transmission of other epidemiologically important healthcare pathogens


*Contact Precautions when entering the patient’s room:*

A. No PPE after hand hygiene if staying in “view only zone.”

B. Hand hygiene, use gloves but no gown unless CRE patient.

C. Hand hygiene, use gloves and gown plus mask if MRSA patient.

D. Hand hygiene, use gloves & gown if anticipated contact with the patient who has ESBL.
The Inanimate Environment Can Facilitate Transmission

Contaminated surfaces increase cross-transmission.


- X represents VRE culture positive sites

Recovery of VRE from Hands and Environmental Surfaces

- Up to 41% of healthcare worker’s hands sampled (after patient care and before hand hygiene) were positive for VRE1
- VRE were recovered from a number of environmental surfaces in patient rooms
- VRE survived on a countertop for up to 7 days2


Case 4

80 WF was admitted with several days of progressive weakness, poor oral intake, abdominal cramping and diarrhea. One month earlier she had completed a 7-day course of Levofloxacin for pneumonia.

Exam: abdomen fairly soft but tender, BS diminished.
Xray: distended loops of bowel with air fluid levels

What specific diagnostic test should be done?

Does this patient need isolation?
If so, what precautions should be instituted?
**Healthcare Burden**

- *C. difficile* most commonly reported pathogen in 2011 multistate prevalence survey of healthcare-associated infections (HAI)¹
  - 12.1% of 452 HAIs caused by CDI
  - Rates of CDI per 1,000 discharges have risen through 2013²

**Epidemiology: Host Factors**

**Advanced age**
- Incidence higher among females, whites, and persons > 65 years¹
- Death more common in persons > 65 years (5x greater risk)²

**Underlying illness and medical history**
- 7% of 7421 patients with CDI had a comorbid condition²
- 38% of 585 patients with NAP1 strain had ED visit in previous 12 weeks³
- Tube feeds³

**Immunosuppression**
- Inflammatory bowel disease²
- Immune-suppressive treatment²
- Hematological malignancy/stem cell transplant (15-25x greater risk)³

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Contact Precautions (CP)

- Contamination of the environment is highest prior to treatment.
- Presumptive CP, while CDI test results are pending, may be used as a special approach whenever indicated by risk assessment.
- Patients who have been treated may have asymptomatic shedding.
- Prolonging the duration of CP until discharge is a special approach based on evidence of continued shedding of spores after diarrhea resolves (especially up to 4 weeks after treatment ends).


Stewardship Approach: Feedback

Non-restrictive feedback resulted in statistically significant reductions in incident CDI.

Reducions in CDI attained through antimicrobial stewardship surpassed those attained through infection control measures.

Tertiary Hospital in Quebec, 2003-2006

*Hand Hygiene appropriate for C.difficile patients:

A. Alcohol foam before and after patient care.
B. Soap and water wash before and after patient care.
C. Alcohol foam when entering room, but soap & water on exiting room.
D. B and C

Currently 39% (1,642/4,184) of U.S. hospitals have an antibiotic stewardship program with all 7 core elements.

The national goal is 100% of hospitals by 2020.
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*Neutropenic Precautions include all except:

A. ANC of <500 or 1000 and dropping.
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C. Hand hygiene for everyone who enters the room.
D. No plants, fresh fruit, or flowers.
E. Gown and gloves not required for possible contact with the patient.

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The hierarchy of hazard control...
Dial hospital operator 24/7 to reach Infection Prevention and Control