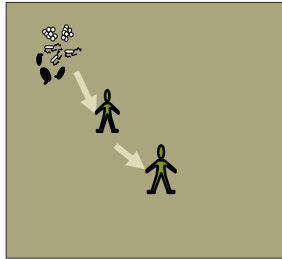


## Role of Respiratory Therapist in Infection Prevention: Routine Practices and Additional Precautions



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## OVERVIEW

- **Introduction to Infection Prevention**
  - Key Concepts / Background / Strategies = Practices & Precautions
- **Definition of HAI**
  - Sites / Causes / Factors
- **Sources of Infection**
  - Microorganisms / Transmission by example
- **Chain of Infection**
  - Medical asepsis / Precautions/ Spread of Infection / Breaking the chain / Generally and Specifically
- **Microorganisms...what is coming next?**
- **Final words...**

## Infection Prevention

- Key concepts
  - Basic principles of infection prevention
- Conditions that allow infections to be transmitted to others
- How to stop the spread of infectious diseases
- What the role of the CDC isolation guidelines are in preventing hospital acquired infections (HAI)

## Background

- People receiving health and medical care are at risk of becoming infected unless precautions are taken to prevent infection.
- Hospital-acquired (Nosocomial) Infections are a significant problem throughout the world
- Most of these infections can be prevented with readily available, relatively inexpensive **strategies by:**

## Strategies by...

- Adhering to recommended infection prevention practices, especially hand hygiene and gloves
- Paying attention to well-established processes for cleaning soiled equipment and environment
- Improving safety in operating rooms and other high-risk areas where the most serious and frequent injuries and exposures to infectious agents occur.

## Risky Business?

- Infection Prevention is for everyone
  - Patients
  - Staff
  - Visitors
- Healthcare workers, including support staff who work in these settings also are at risk of exposure to serious, potentially life-threatening infections.

## Definition: What's meant by HAI?

- Hospital Acquired Infection (HAI)
- Any infection causing illness that wasn't present or in its incubation period when admitted to the hospital
- Infections are considered HAI if they first appear 48 hours or more after admit

## Hospital-acquired Infection why worry?

- 5-10% of U. S. patients will get infected during a stay in hospital
- Effects of Hospital acquired infection
  - Increased mortality & morbidity
  - Prolonged hospital stay
  - Increased use of antibiotic = increase resistance
  - Increased staffing costs
  - Decreased public confidence in hospitals & doctors

## HAI by Site

- Surgical Site Infection (SSI)
- Catheter Associated Blood Stream Infection (CA-BSI)
- Catheter Associated Urinary Tract Infection (CA-UTI)
- Ventilator Associated Pneumonia (VAP)
  - Ventilator Associated Event (VAE)
  - Ventilator Associated Condition (VAC)
- Hospital Associated Pneumonia (HAP)
- Intravascular Infections (IV site)

## HAI Causes

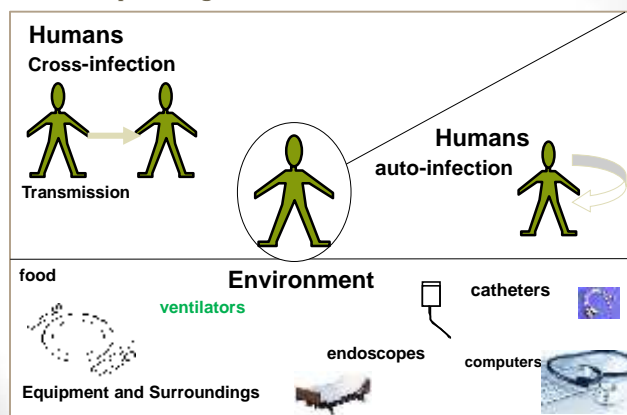
- Endogenous sources are body sites, such as the skin, nose, mouth, gastrointestinal (GI) tract, that are normally inhabited by microorganisms
- Exogenous sources are those external to the patient, such as patient care personnel, visitors, patient care equipment, medical devices, or the health care environment.

## HAI Factors

- Non compliance to precautions and Hand Hygiene (HH)
- Increasing number of people with compromised immune systems
- Emerging organisms
- Increasing bacterial resistance

## Sources of infection

Where do patients get their infections from...



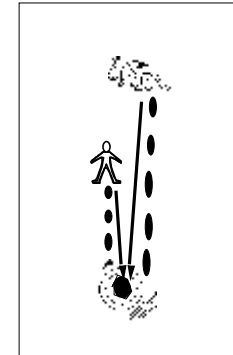
## Microorganisms?

- Microorganisms are the causative agents of infection.
- They include bacteria, viruses, fungi and parasites.
- They live everywhere in our environment.
- We normally carry them on skin and in the upper respiratory, intestinal and genital tracts.
- In addition, microorganisms live in animals, plants, soil, air and water.

## Transmission of Infection

...common example

- *Salmonella* gastro-enteritis
- Reservoir
  - more commonly
    - animal gut flora
  - less commonly
    - human cases & carriers
- Source or Vehicle
  - food from affected animals
  - contaminated food



## They Live Everywhere...

- For Infection Prevention purposes, bacteria can be further divided into three categories:
  - vegetative (e.g., staphylococcus, c diff)
  - mycobacteria (e.g., tuberculosis)
  - endospores (e.g., c diff).

Of all the common infectious agents, **endospores** are most difficult to kill due to their protective coating.

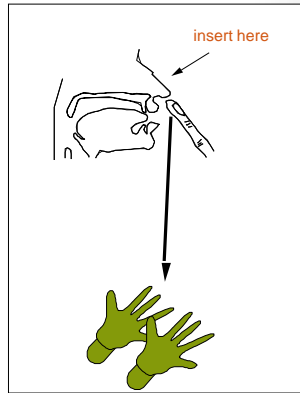
## Pathogenic

- Some microorganisms, however, are more **pathogenic** than others, that is, they are more likely to cause disease.
- Given the right circumstances, **all** microorganisms may cause infection, such as when transmitted to a patient

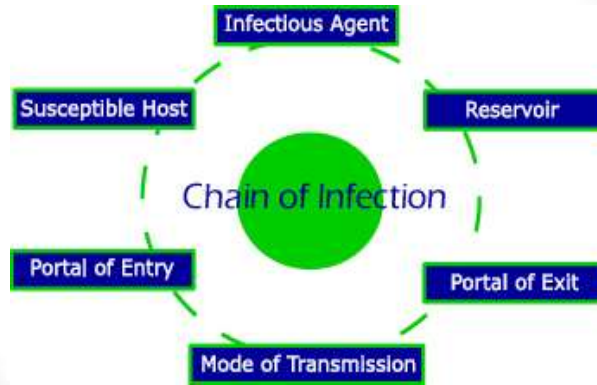
## Transmission of Infection

...better example

- *S. aureus*
- Reservoir
  - Human nose & skin
- Source or Vehicle
  - Hands of health care workers



## Chain of Infection



## Can We Break The Chain?

- We maintain the immediate health care environment of the patient.
- Because we provide care for a variety of patients, the risk of contamination from **pathogenic** microorganisms is increased.
- The practice of **medical asepsis** and **standard precautions** provides us with techniques for destroying or containing pathogens and for preventing contamination to other people or to bedside materials and equipment.

## Medical Asepsis

- Techniques used to prevent, reduce, and control the spread of pathogenic microorganism.
- The techniques used to maintain medical asepsis include **hand hygiene**, **gloving**, **gowning** and wearing facial **masks** when appropriate.

## Routine Practices & Additional Precautions

- Standard precautions combines universal precautions and body substance isolation.
- Standard precautions alert the health care worker to patient situations that require special barrier techniques.
- These *barrier techniques* are used when working with any patient where potential *contact with blood or body fluid exists*.

## Transmission Based Precautions

- Isolation of infectious patients
  - Whenever you assess a patient think:
    - **does this patient need to be isolated?**
  - Isolation Precautions
    - Contact isolation - Use of gloves and gowns
    - Airborne isolation – Use of PR mask
    - Droplet isolation – Use of procedural mask
  - Consult
    - Infection prevention specialist for advice
    - Infection prevention manual for isolation protocols
      - Contains advice on meningitis, TB, MRSA, hepatitis, VRE, and lots more
      - Including critters!!

## The Spread of Infection

**Infectious Agent** = Escherichia coli

**Reservoir** = Large intestine

**Portal of Exit** = Feces

**Mode of Transmission** = E. coli exited the body in feces.

Staff removed contaminated linen from the bed. The E. coli organism contaminated the hands of the HCW who then provided assistance with the patient's nebulizer set up. The Respiratory Therapist came in and worked with patient and nebulizer. The E. coli organism on the nebulizer is now on the hands of the therapist.

**Portal of Entry** **Susceptible Host** = The second patient on a vent is being seen by the same therapist. Now the suction catheter requires changing to due to clogging so the therapist opens the closed system and the E. coli is introduced. This patient was elderly and had a chronic illness adding to his immunocompromised condition



## Break that Chain...

- Remove reservoirs & sources
  - Human-to-human
    - Isolate patients when warranted
    - Effectively clean patients
      - showers, 2% CHG bath cloths, oral care
    - Head of Bed to prevent aspiration
  - Environment
    - Wash in Wash out (stops transmission)
    - Unit cleaning (Isolation signs stay on door)
    - Equipment must be wiped down between patients

## ...and

- Increasing host resistance
  - Good nutrition
  - Vaccinate (Influenza, Pneumonia)
  - Correct underlying defects
    - Control diabetes
  - Restore normal physiology as quickly as possible through regular ASSESSMENTS
    - Remove lines, catheters etc.
- Proper Oral Care

## Assessment and Follow up!

- "Urinary catheter indicators" Expectation is that this is completed at least q24 hours. Completion requires follow through with advocating for removal if a low score is obtained (meaning it is not indicated).
- "Oral Care" risk assessment. This assessment identifies which oral care products are most appropriate for the patient
  - and that it is performed.

## Hospital Staff

- Your first responsibility is to your patients
  - **Do not work** if you have diarrhea, or a flu-like illness, a sore throat, or if you may be incubating a viral illness
  - Vaccination (Influenza and Pertussis)
  - Practice and Encourage cough etiquette
  - Hold your co-workers accountable
  - Practice good HH

## Control of Cross-Infection

- **Hand Hygiene is for all...**
  - Wash In and Wash Out
  - Alcohol hand rubs/gels/foam provide a convenient alternative to soap and water
  - Hand Washing must be performed when hands are visibly soiled



## Common Hospital Pathogens

- Methicillin-resistant *Staphylococcus aureus*
  - MRSA
  - Infection Requires Vancomycin treatment
  - Identification of Colonization (Screening)
- Vancomycin-resistant enterococcus
  - VRE, includes *E. faecalis* and *E. faecium*
  - If also multi-drug resistant treatment can be difficult

## ...continued

- *Clostridium difficile*
  - Causes Antibiotic-associated colitis
  - Can cause outbreaks in hospitals
  - Patients must be isolated
- Multi-Drug Resistant Organisms (MDRO)
  - Require treatment with expensive drugs
  - Patients must be isolated
  - Can cause outbreaks (*Acinetobacter*)
  - And what's coming next????????

## A New Super Bug is Coming CRE



## Have you heard about the new superbug?

- **CRE:** Carbapenem-Resistant Enterobacteriaceae
  - These bugs are resistant to powerful antibiotics (Carbapenems)
    - Last line antibiotics reserved for severe infections
  - “CRE produce enzymes that break down carbapenems and make them ineffective”



cdc.gov 2014



## Which bugs will cause this risk?

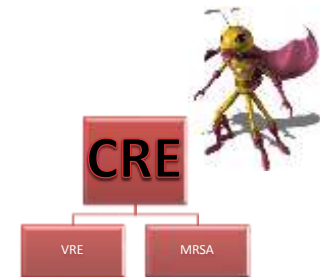
Enterobacteriaceae is a family of bugs that include:

- *Klebsiella / e coli*
  - *Serratia / Proteus /Citrobacter/Enterobacter*
  - **Pseudomonas and Acinetobacter** are other **HIGH ALERT** MDROs (Multiple Drug Resistant Organisms) not CRE
- Some reports say the mortality can be as high as 50%
- The lab department will flag these organisms and alert the units to promote early Contact Precautions



## How does it Spread?

- CRE bacteria are most often spread person-to-person in healthcare settings
  - Particularly contact with wounds or stool
- The bugs can enter the body through IV catheters, urinary catheters, or wounds



## Precaution Insight

- **Early contact** precaution is required
- Patients should remain in precautions until removed by the Infection Prevention Team
- Gloves to enter and gown/gloves for contact with patient or surroundings
- Remember to dedicate equipment in the room and completely wipe equipment that must be utilized between patients

## What other Things Can We Do?

- ✓ Strict adherence to hand hygiene
- ✓ Attention to the details of culture reports:
  - ✓ Review new and old results of the sensitivity report
  - ✓ When Resistance is noted for multiple antibiotics...**react quickly**
- ✓ Communicate with all providers and support staff
- ✓ Pass this information on throughout all phases of care and transitions to other facilities

A screenshot of a laboratory culture report. The report includes patient information, test results, and a table of antibiotic sensitivities. The table has columns for antibiotic name, concentration, and result (S, R, I, or N).

| Antibiotic  | Concentration   | Result |
|-------------|---|--------|
| Amikacin    | 32 µg   | S      |
| Clindamycin | 2 µg  | R      |
| Clindamycin | 8 µg  | R      |
| Clindamycin | 16 µg   | R      |
| Clindamycin | 32 µg   | R      |
| Clindamycin | 64 µg   | R      |
| Clindamycin | 128 µg  | R      |
| Clindamycin | 256 µg  | R      |
| Clindamycin | 512 µg  | R      |
| Clindamycin | 1024 µg   | R      |
| Clindamycin | 2048 µg   | R      |
| Clindamycin | 4096 µg   | R      |
| Clindamycin | 8192 µg   | R      |
| Clindamycin | 16384 µg  | R      |
| Clindamycin | 32768 µg  | R      |
| Clindamycin | 65536 µg  | R      |
| Clindamycin | 131072 µg   | R      |
| Clindamycin | 262144 µg   | R      |
| Clindamycin | 524288 µg   | R      |
| Clindamycin | 1048576 µg  | R      |
| Clindamycin | 2097152 µg  | R      |
| Clindamycin | 4194304 µg  | R      |
| Clindamycin | 8388608 µg  | R      |
| Clindamycin | 16777216 µg   | R      |
| Clindamycin | 33554432 µg   | R      |
| Clindamycin | 67108864 µg   | R      |
| Clindamycin | 134217728 µg  | R      |
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| Clindamycin | 245199286538542217334677039493049119068763567848015710208 µg      | R      |
| Clindamycin | 490398573077084434669354078986098238137527135696031420416 µg      | R      |
| Clindamycin | 980797146154168869338708157972196476275054271392062840832 µg      | R      |
| Clindamycin | 1961594292288337738677416315944392952550108542784125681664 µg     | R      |
| Clindamycin | 3923188584576675477354832631888785905100217085568251373328 µg     | R      |
| Clindamycin | 7846377169153350954709665263777571810200434171136502746656 µg     | R      |
| Clindamycin | 15692754338306701909419330527555143620400868342273005493312 µg    | R      |
| Clindamycin | 31385508676613403818838661055110287240801736684546006986624 µg    | R      |
| Clindamycin | 62771017353226807637677322110220574481603473369092013973248 µg    | R      |
| Clindamycin | 125542034706453615275354644220441149632069467338184027946496 µg   | R      |
| Clindamycin | 251084069412907230550709288440882299264138934676368055892992 µg   | R      |
| Clindamycin | 502168138825814461101418576881764598528277869352736111785984 µg   | R      |
| Clindamycin | 1004336277651628922202837153763529197056555738705472223571968 µg  | R      |
| Clindamycin | 2008672555303257844405674307527058394113111477410944447143936 µg  | R      |
| Clindamycin | 4017345110606515688811348615054116788226222954821888894287872 µg  | R      |
| Clindamycin | 8034690221213031377622697230108233776452445909643777788575744 µg  | R      |
| Clindamycin | 16069380442426062752445394460216467552904891819287555577151488 µg | R      |
| Clindamycin | 32138760884852125504890789320432935105809783638575111154222976 µg | R      |
| Clindamycin |   |        |

