Hospital- acquired Infection: Nosocomials

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- A hospital-acquired infection is an infection which was not present (or incubating) at the time of admission
- Common in up to 25% of patients administered to hospital
- Most common infections
    - Urinary tract
    - Respiratory
    - Wound
    - Skin
    - Soft tissue
    - Septicaemia

Preventable Versus Non-Preventable?

- Preventable = medical or nursing or surgical mishaps
    - Bad hand washing, leaving stuff inside patient, coughing all over
- Non-preventable - stuff you can't control
    - Immunodeficient patient, surgeries where organs are seriously damages, gunshot/stabbing to GI-tract

Where do they come from?

- Sources for hospital-acquired infections include
    - Environment
    - Person-2-person (endogenous versus exogenous?)
    - Food supply
    - Air supply
    - Vector
    - Water supply

Obvious Problems:

- While a hospital is supposed to help, medical activities can cause problems
    - Intravenous access
    - Urinary catheters
    - Surgeries

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- Three factors play a role in the transmission of a nosocomial infection

Nosocomial Infections: The Chain of Infection

- Source
    - Location where microorganisms replicate and disseminate
- Route of infection
    - Way by which microorganisms leave sources to get to host (us)
- Host
    - How susceptible are you? Age? Immune status? Etc..

Control over Nosocomials

- Chain of infection (source to host) must be prevented or avoided
- Hospital infection control plans are in place to
    - Render source non-infectious
    - Prevent microorganisms from leaving source
    - Interfere with dissemination routes
    - Prevent microorganisms from entering host
- The most efficient step is the identification and detection of the source of infection
- Source: what can we do?
- Route: What can be done?
- Host: What should you do?

Hospital infection control team

- Everyone involved
- Activities include, but are not limited to
    - Good clinical practices (separation of infected/non-infected patient)
    - Wound and enteric isolation (toilet facilities, basins)
    - Respiratory isolation (facemasks, SARS)
    - Strict isolation (patients highly susceptible to infection)
    - Typing (serology, phage, molecular)

Universal Precaution

- Infection control techniques recommended following the AIDS outbreak in the 1980's
- Every patient is treated as if they are infected and therefore precautions are taken to minimize risk
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- Universal precautions are good hygiene habits, such as hand washing and the use of gloves and other barriers, correct sharps handling, and aseptic techniques
- Additional precautions are used in addition to universal precautions:
    - Prion diseases (e.g., Creutzfeldt-Jakob disease)
    - Disease with air-borne transmission (e.g., tuberculosis)
    - Diseases with droplet transmission (e.g., mumps rubella, influenza, pertussis)
    - Transmission by direct or indirect contact with dried skin (e.g., colonisation with MRSA) or contaminated surfaces
- Universal precautions are recommended not only for doctors, nurses and patients, but for health care support workers. Some support workers most notably laundry and housekeeping staff, may be required to come into contact with patients or bodily fluids.
- Universal precaution does not equal isolation of patient

Infection control in communities

- Social and environmental factors
- Health education
- Food safety
- Vector control
- Immunization (immunoglobulins, vaccination)
- Chemoprophylaxis (e.g., rifampicin, ciprofloxacin for meningococcal contacts)
- Outbreak investigations
- National and international agencies

Cleaning, Sterilization and Disinfection

- What do we mean by clean?
    - Your room?
    - Wash your hands?
    - Apply some ethanol-based liquid and rub hands until dry?
- How clean is clean?
    - Removal of soil and dirt visible to the naked eye?
- Where are physical and chemical exist to achieve out objectives
- Physical (three approaches currently used):
    - Heat
        - Dry (150-200 degree Celsius)
        - Moist (pasteurization, boiling, autoclaving, microwaves)
        - Incineration (1000 degree Celsius)

    - Radiation
        - Gamma
        - Ultraviolet
    - Filtration
- Chemical

What affects a particular disinfectant?

- In order for a disinfectant to be effective, the following must be thought about…
    - Concentration of germicide?
    - What is the target?
    - What is the contact time?
    - What is the temperature that I should use product as?
    - Load? Organic? Inorganic?
    - Miscellaneous factors

Who is strongest against disinfectants?

- Interestingly, the resistance against a disinfectant is not necessarily related to how dangerous a microorganism is
- Decreasing order of resistance: spores/cysts >> Mycobacteria >> Fungi >> Vegetative bacteria >> Enveloped viruses

Antiseptics:

- Used to inactivate and remove flora (transient, resident) from hands prior to surgical procedures
- Used to inactivate transient and resident flora from site of operation
- Used for treatment and/or prevention of infection on skin surfaces or mucous membranes

Hand rubs:

- Removes transient flora only
- Usually contains 60-70% ethanol… plus emollient(s)