Infection vs Colonization

Introduction to Infection Prevention, Epidemiology, and NHSN Definitions Workshop, 2017
Healthcare-Associated Infections Program
Louisiana Office of Public Health

Objectives

By the end of the presentation, attendees will be able to:
• Define Infection
• Define the different categories/states of infection
• Define colonization
• Name of few examples where a clear distinction between colonization vs infection is vital to testing/treatment procedures
• Understand the necessity of communicating infectious status/colonization status upon patient transfer

Infection

• The entrance and development of an infectious agent in a human or animal body, whether or not it develops into a disease
• An infectious agent is a micro- or macro-organism capable of producing an infection or an infectious disease
• An infectious disease is an illness caused by a specific infectious agent or its toxic product that results from transmission of that agent or its product from an infected person, animal, or reservoir to a susceptible host
• A few words you may hear in front of infection:
  • Asymptomatic and Symptomatic
  • Subclinical or Clinical
  • Inapparent or Apparent

Clinical/Symptomatic/Apparent Infection

• An infection that results in signs and symptoms. Some of these may be general and obvious others may be very minor and less obvious
  • Fever, malaise
  • Inflammation, heat, pain, erythema
  • Change in enzyme levels, composition of bodily fluids
• Remember: Immunocompromised patients do not show signs of infection as normal patients
  • Neutropenic patients (< 500 neutrophils /ml) show no pyuria, no purulent sputum, little infiltrate and no large consolidation on chest X-ray

Subclinical/Asymptomatic/Inapparent Infection

• Does not mean that “all is quiet”. It may cover some very active processes as in the asymptomatic phase of HIV infection, tuberculosis infection, hepatitis B carrier state.
Colonization vs Infection

Colonization: Definition

- The presence of a microorganism on/in a host, with growth and multiplication of the organism, but without interaction between host and organism (no clinical expression, no immune response).
- You wouldn’t know it was there unless you looked for it (via lab tests)
- Oftentimes it will lead you somewhere you shouldn’t go (maybe away from the true villain!).

Colonization

The microorganism is
- Present
- Growing and Reproducing
- Detectable via lab tests

The microorganism is not
- Invading Tissues
- Causing Damage
- Releasing Toxins
- Initiating an Immune Response

Exposure: Definition

- Simply coming into contact with anything (capable of causing disease)
- The definition of exposure can vary depending on what organism you are referencing.
  - An airborne organism vs a bloodborne organism
  - An organism requiring droplet precautions vs an organism requiring contact precautions

Exposure-Infection Spectrum

- Clinical or Symptomatic
- Subclinical or Asymptomatic
- Colonization
- Exposure but no foothold
- Infection
- No Infection
Colonization vs Infection

Carrier: Definition
- Four basic flavors which can be have varying lengths:
  - Colonized
  - Asymptomatic, but infected
  - Incubation Period
  - Convalescent Stage following Acute
- Different levels of detection based on the flavor
- All can act as a source of infection possibly
- A likely explanation for someone who is apparently not infected

Flora at Colonization Sites

Skin Hand Flora
- RESIDENT FLORA
  - Survives on the skin more than 24 hours
  - Not easily removed, hours of scrubbing
  - Complete sterilization impossible
  - Low virulence
  - Staphylococci, diphtheroids, mostly Gram + , very few Gram -
- TRANSIENT FLORA
  - Survive on skin less than 24 hours
  - Easily removed with soap and water
  - Acquired during contacts with contaminated areas mouth, nose, perineal area, genitals, anal area, catheter, bedpan, urinary, patient care casual contact
  - May have high virulence

Colonization Protects the Host
- Normal flora protects against infectious diseases originating at mucous membranes.
- Non specific stimulation of immune responsiveness
- Specific cross reactive immunization
- Competitive bacterial interference
- General shift towards Gram-negative flora in hospitals, LTCF and other health care facilities
- Invasive procedures provides a portal of entry to different flora
**Clostridium difficile (CDIFF)**

**Colonization**
- Asymptomatic
- CDIFF is detected in the absence of symptoms of infection
- The number of colonized patients is higher than symptomatic CDI cases among hospital patients
- Absence of diarrhea without colonoscopic histopathologic findings of pseudomembranous colitis and
  - Detection of CDIFF or
  - Presence of CDIFF toxins

**Infection**
- Presence of diarrheal symptoms (3+ unformed stools in 24h)
- Stool tests positive for CDIFF toxins or
- Detection of toxigenic CDIFF or
- Colonoscopic findings demonstrating ulcerative colitis

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**Carbapenem-resistant Enterobacteriacea (CRE)**

**Colonization**
- Organism can be found on the body but not causing any symptoms or disease
- Strains can go on to cause infections in sterile sites of the body
- Generally colonized in the GI tract

**Infection**
- Cause infections when they enter the body through medical devices like central lines, urinary catheters, or wounds
- Treatment options include tigecycline, colistin, and polymixin B

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**Urinary Tract Infections**

- Asymptomatic bacteriuria (ASB)
  - 23-50% in non-catheterized NH/SNF residents
  - 100% among those with long-term urinary catheters
- Treating is a major source of antibiotic misuse
- Overuse increases the likelihood of adverse events and complications
  - CDI
  - MDRO emergence, transmission, and acquisition
  - Future risk of other infections
- Critically important issue in all healthcare settings

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**Transferring patients to other facilities**

- Implement systems to designate patients known to be colonized or infected with a targeted MDRO
- Notify receiving healthcare facilities and personnel prior to transfer of such patients within or between facilities