



Microbiology

Lecture 6

Nosocomial infections

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Nosocomial infection

(from the Greek nosokomeion, meaning "hospital"),
also named **Hospital-acquired infection**
also referred **health associated infection (HAI)**

is an infection that is acquired in a hospital or other health facility
acquired during receiving health care that was not present during time of
admission

They may occur in different areas of healthcare delivery, such as in hospitals,
long-term care facilities, and ambulatory settings, and may also appear after
discharge.

HAIs also include occupational infections that may affect staff

Infection occurs when pathogen(s) spread to a susceptible patient host. The
etiology based on the source or type of infection and the responsible pathogen, which
may be bacterial, viral, or fungal. HAI is the most common adverse event in health
care that affects patient safety. They contribute to significant morbidity, mortality,
and financial burden on patients, families, and healthcare systems

Etiology

**The Centers for Disease Control and Prevention broadly categorizes the types of HAI as follows:

1. Central line-associated blood stream infections (CLABSI)
2. Catheter-associated urinary tract infections (CAUTI)
3. Surgical site infections (SSI)
4. Ventilator-associated pneumonia (VAP)

Other types of HAI include :

non-ventilator associated hospital-acquired pneumonia (NV-HAP), gastrointestinal infections, other primary bloodstream infections—not associated with central catheter use, and other urinary tract infections—not associated with catheter use.

HAI may also be grouped by affected systems :

- ✓ eye, nose and throat infections
- ✓ lower respiratory tract infections
- ✓ skin and soft-tissue infections
- ✓ cardiovascular infection
- ✓ bone and joint infections
- ✓ central nervous systems infection
- ✓ reproductive tract infections

Causative Organisms

Pathogens responsible for nosocomial infections include bacteria, viruses, and fungi. Specific microorganisms have unique characteristics that favor particular types of infections in susceptible hosts. The prevalence of infections caused by particular microorganisms varies depending on the healthcare facility location, healthcare setting, and patient population. **Overall, bacteria are the most common pathogens, followed by fungi and viruses

A. Bacteria

Bacteria may originate from an ***exogenous or endogenous source

**Opportunistic bacterial infections occur when there is a breakdown of the host immune system functions.

- ✓ Common Gram-positive organisms ** *Clostridium difficile* accounts for the most commonly reported pathogen in hospitals
- ✓ Common Gram-negative organisms ** *Acinetobacter baumannii* is associated with high mortality within the intensive care setting owing to its inherent multi-drug resistant properties.

Multidrug-resistant bacteria are commonly seen in HAI and are associated with significant mortality. One study found that approximately 20% of all reported pathogens show multidrug-resistant patterns.

Notorious pathogens include :

1. methicillin-resistant staph aureus (MRSA),
2. Vancomycin intermediate Staphylococcus aureus (VISA)
3. Vancomycin-resistant Staphylococcus aureus (VRSA),
4. vancomycin resistant Enterococcus (VRE),
5. multi-drug resistant Pseudomonas aeruginosa

B. **Fungi**

Fungal pathogens are usually associated with opportunistic infections in immunocompromised patients and those with indwelling devices, such as central lines or urinary catheters.

Candida species, are the most commonly encountered fungal organisms associated with HAI.

Candida auris poses a serious problem as a globally emerging multidrug-resistant organism with high morbidity and mortality** due to difficulty with diagnoses and high rates of treatment failure Altogether, *Candida* species make up the fourth most common pathogen across all types of HAIs ??

Aspergillus fumigatus may be acquired by airborne environmental contamination in areas of healthcare construction. However, infected hospitalized patients may be a primary source

C. **Viruses**

Infections due to viral pathogens are the least reported of all HAIs pathogens.

Healthcare-acquired hepatitis B and C and human deficiency virus (HIV) has been implicated in unsafe needle practices. Globally HIV infections are not healthcare associated and frequently occur in developing countries. Other reported viral pathogens include rhinovirus, cytomegalovirus, herpes simplex virus, rotavirus, and influenza