

Nosocomial infections

Microbiology – III

Hospital acquired infection is also called **Nosocomial infection** or **Healthcare-associated infections**.

"nosus" = disease

"komeion" = to take care of

Nosocomial infections can be defined as infection acquired by the person in the hospital, manifestation of which may occur during hospitalization or after discharge from hospital. The person may be a patient, members of the hospital staff and/ or visitors.



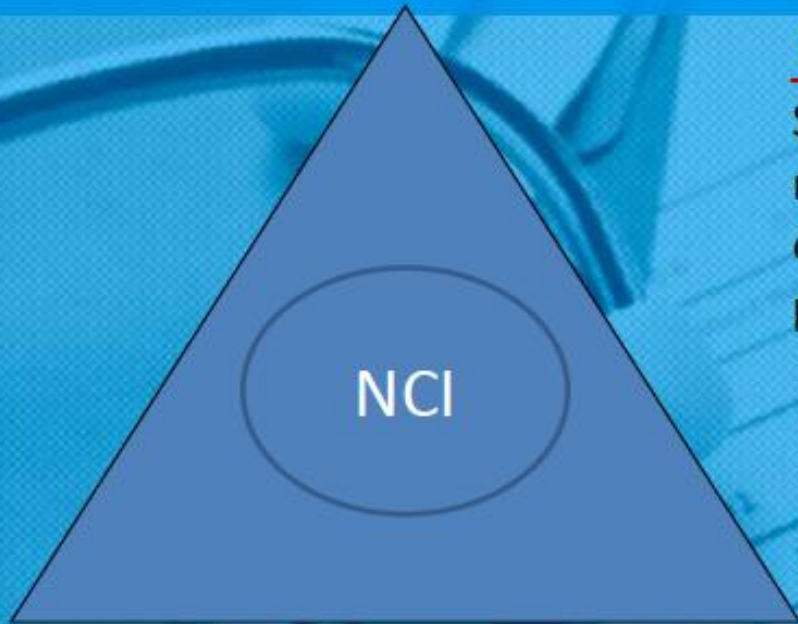
**Presence of
microorganisms in
hospital environment**

**Immunocompromised
patients**

**Nosocomial
infection**

**Transmission of
pathogens between
staff and patients
and among patients**

EPIDEMIOLOGICAL INTERACTION



HOST FACTORS

Suppressed immune system due to Age, Poor nutritional status, severity of underlying disease, complicated diagnostic & therapeutic procedure, therapeutic,

THE AGENT

Varieties of organisms
Institutional and human
Reservoirs & their virulence

THE ENVIRONMENT

Everything that surrounds the patient in the hospital is his environment.

Other patients
Hospital staff and visitors
Eatables
Dust and other contaminated articles

SOURCE OF INFECTION

Endogenous/direct:

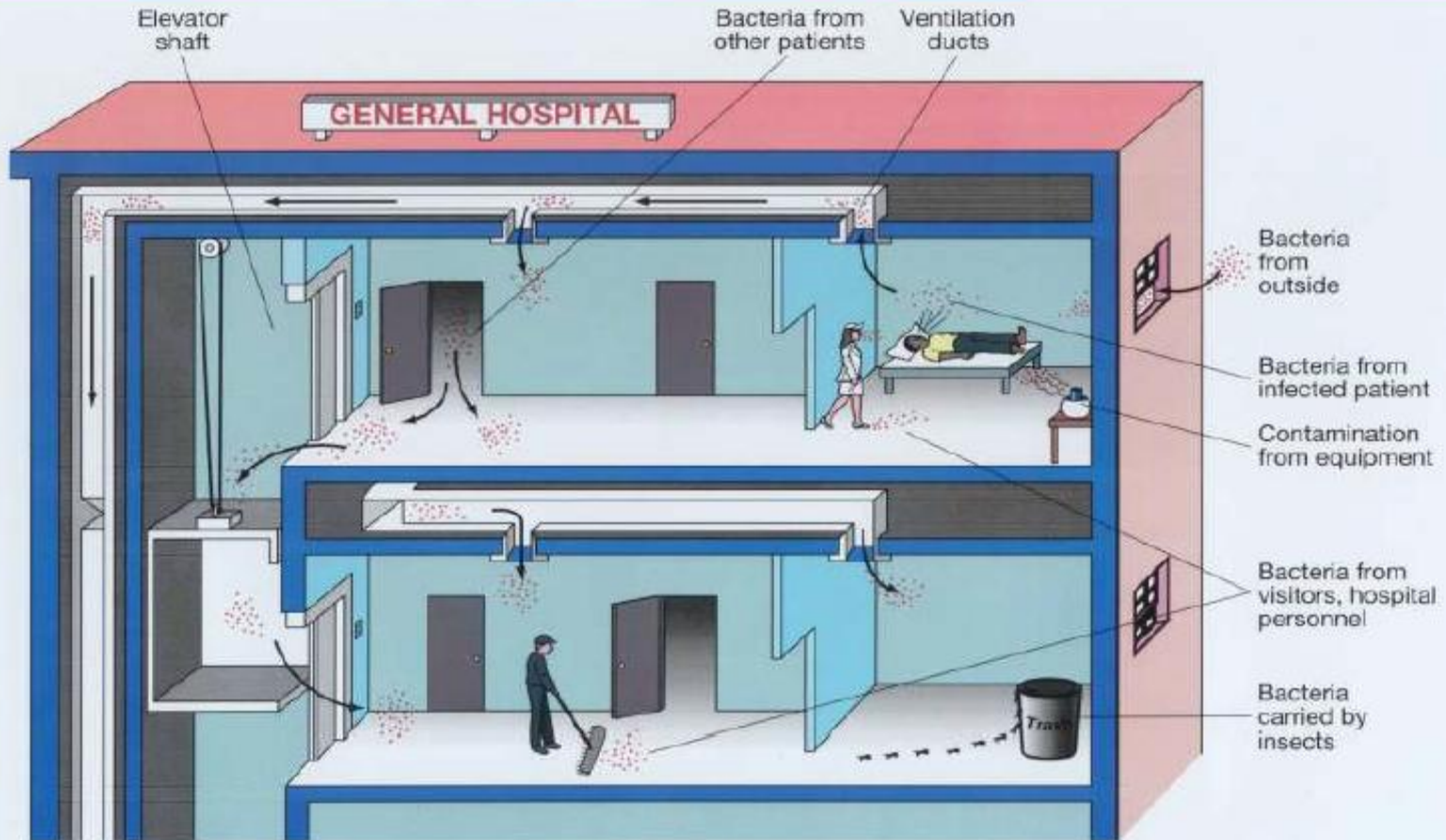
Caused by the organisms that are present as part of normal flora of the patient

Exogenous/indirect

Caused by organisms acquiring by exposure to hospital personnel, medical devices or hospital environment, cross-infection from medical personnel

- hospital environment- inanimate objects
 - air
 - dust
 - IV fluids & catheters
 - washbowls
 - bedpans
 - endoscopes
 - ventilators & respiratory equipment
 - water, disinfectants etc

EXOGENOUS INFECTION SITES



The Inanimate Environment Can Facilitate Transmission



~ Contaminated surfaces increase cross-transmission ~



Exogenous Pathogens

Nosocomial Infections: Changing Microbiology

- Mid-1980's

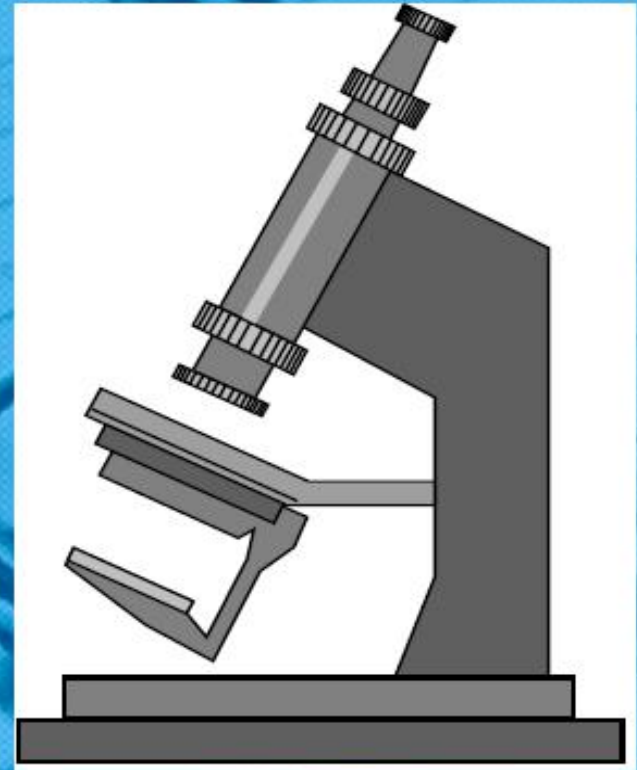
- Enterobacteriaceae
- *S. aureus*
- *P. aeruginosa*

- Mid-1990's

- Decline in Enterobacteriaceae
- Increase in gram-positive cocci
- Emergence of fungi
- Recognition of viruses

All microorganisms can cause nosocomial infections

- ▶ Viruses
- ▶ Bacteria
- ▶ Fungi
- ▶ Parasites



BACTERIA

Gram +ve

Staphylococcus aureus

Staphylococcus epidermidis

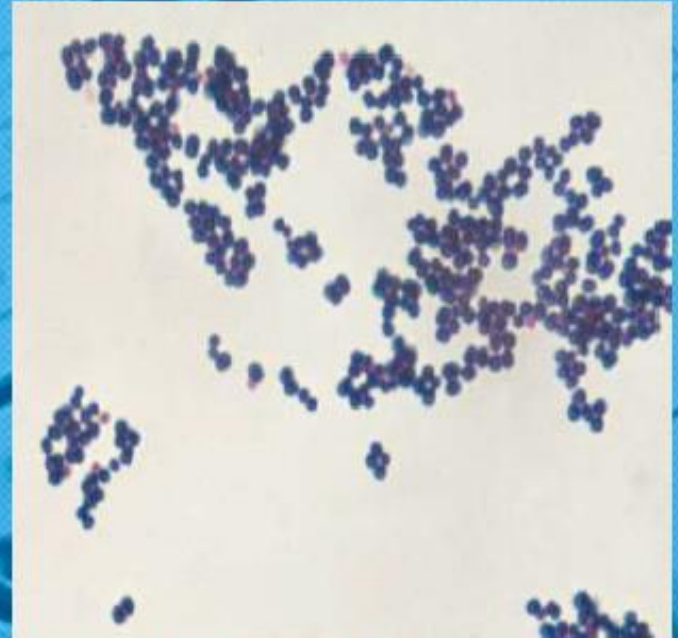
Gram -ve

Enterobacteriaceae

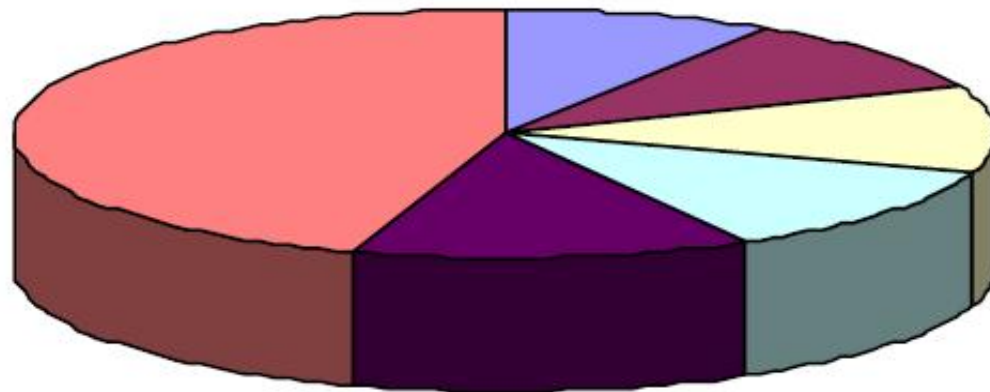
Pseudomonas aeruginosa

Acinetobacter baumannii

Mycobacterium tuberculosis



COMMON BACTERIAL AGENTS



- Pseudomonas aeruginosa (9%)
- Enterococcus (10%)
- Coag-neg staphylococci (11%)
- E-coli (12%)
- Staphylococcus aureus (13%)
- Other (45%)

Viruses

- Blood borne infections : HBV, HCV, HIV
- Others: rubella, varicella, SARS

Fungi

- Candida
- Aspergillus

TYPES OF INFECTIONS

- Urinary tract infections (UTI)
- Surgical wound infections (SWI)
- Lower respiratory infections
- Traumatic wounds and burns infections
- Primary bacteraemia
- Gastrointestinal tract
- Central nervous system

Mode of transmission

Contact/hand borne (most common)

Aerial route or air borne

Oral route

Parenteral route

Vector borne

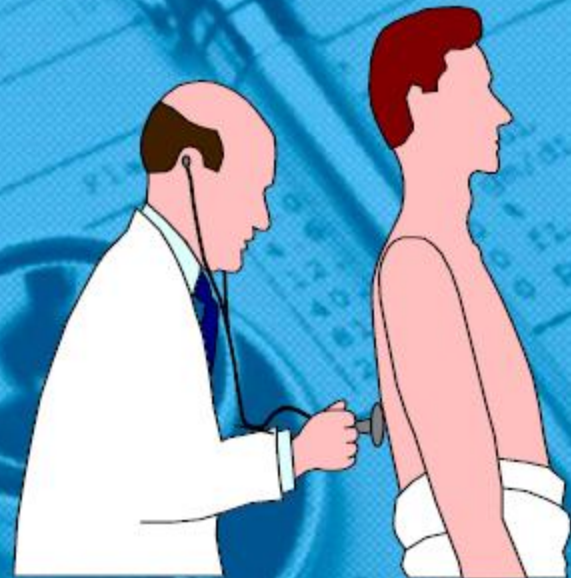
1. Contact (most common)

Direct (physical contact)

- Hands & clothing
- Droplet contact followed by autoinoculation
- Clinical equipment

Indirect via contaminated articles

- Bedpans,
- bowls, jugs,
- Instruments like needles,
- dressings,
- contaminated gloves, etc.



2. Airborne Transmission

- Droplet respiratory secretions on surfaces
- Inhalation of infectious particles

e.g. (TB, Varicella)

3. Oral route

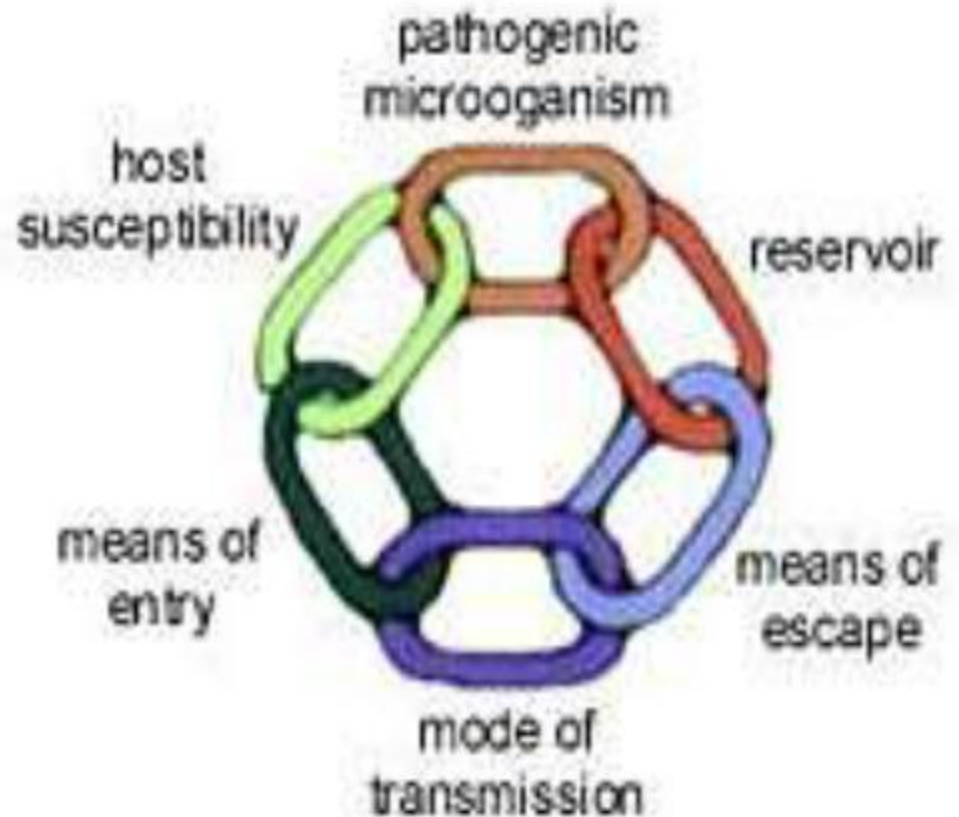
4. Parenteral route

5. Vector borne: through mosquitoes, flies, rats



Control of NCI

To control the nosocomial infection we need to consider the chain of infection and the transmission of an infectious agent



Prevention & control of nosocomial infections

- observance of aseptic technique
- frequent hand washing especially between patients
- careful handling, cleaning, and disinfection of fomites
- where possible use of single-use disposable items
- patient isolation
- avoidance where possible of medical procedures that can lead with high probability to nosocomial infection (urinary catheter)

Prevention & control of nosocomial infections (cont.)

- Various institutional methods such as air filtration within the hospital
- Appropriate isolation precautions to protect patients, visitors, and HCWs.
- Surveillance for common infections, monitoring of high risk patients, and hospital area to identify outbreaks, document incidence and prevalence rate of specific infections and set goal for improvement.