

# Nosocomical Infections

# *What's meant by Nosocomial Infections?*

- Any infection causing illness *that wasn't present* (or in its incubation period) when the subject entered the hospital or received treatment in outpatient clinic.
- This type of infection is also known *as a hospital-acquired infection* (or more generically healthcare-associated infections, HAI )
- Infections are considered nosocomial if they first appear *48* hours or more after hospital admission or within *30* days after discharge.

# WHO notes that the rate of nosocomial infections will continue to rise as a result of four factors :

- Crowded hospital conditions
- Increasing number of people with compromised immune systems
- New microorganisms
- Increasing bacterial resistance



# There are five main routes of transmission:

- 1-Contact
- 2-Droplet
- 3-Airborne
- 4-Vectorborne
- 5- Vehicle

*Note: The same microorganism may be transmitted by more than one route*

# Methods of transmission in the health care setting:

## ❑ Droplet transmission:

- Droplets generated by coughing, sneezing, or respiratory tract procedures such as bronchoscopy, or suction



## ❑ Vector transmission:

Transmitted through insects and Other invertebrate animals (e.g. mosquitoes can transmit malaria and yellow fever, fleas can transmit plague)



## □ *Airborne transmission:*

- Tiny droplet nuclei ( $\leq 5$  microns) that remain suspended in the air



## □ *Common vehicle transmission:*

- Transmitted indirectly by material contaminated with the infectious (e.g. contaminated food, blood products, water or contaminated instruments and other items)



# Pathogens Most Commonly Associated with Nosocomial Infections

The following seven bacteria are the most common causes of nosocomial infections:

## Gram Positive Bacteria

- *Staphylococcus aureus*.
- *Coagulase-negative Staphylococci (CNS)*.
- *Enterococcus spp.*

## Gram Negative Bacteria

- *Escherichia coli (E. coli)*.
- *Pseudomonas aeruginosa*
- *Enterobacter spp.*
- *Klebsiella spp.*



# Pathogens Most Commonly Associated with Nosocomial Infections

## Viruses

- Herpes simplex virus (HSV)
- Cytomegalovirus (CMV)
- Hepatitis B & Hepatitis C
- HIV

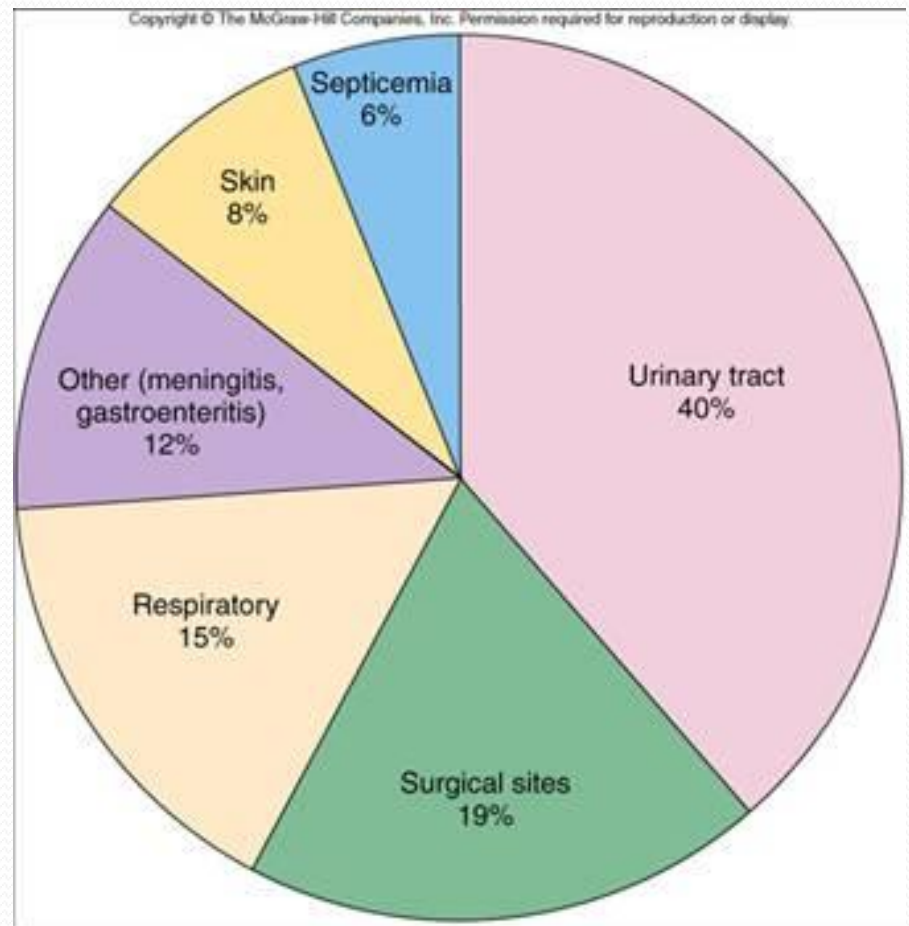
## Fungi

- Aspergillus spp.
- Candida spp.



# Sites of the most common nosocomial infections

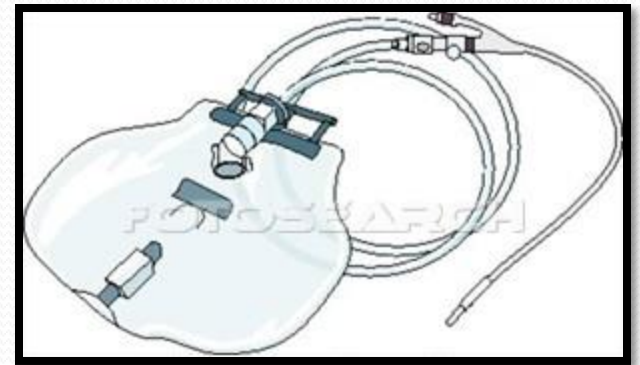
- 1- Urinary tract Infection
- 2- Respiratory tract Infection
- 3- Surgical sites



# Sites of the most common nosocomial infections

- 1-Urinary tract infections:

This is the most common nosocomial infection **80%** of infections



The bacteria responsible arise from the gut flora either normal or acquired in hospital

# Sites of the most common nosocomial infections

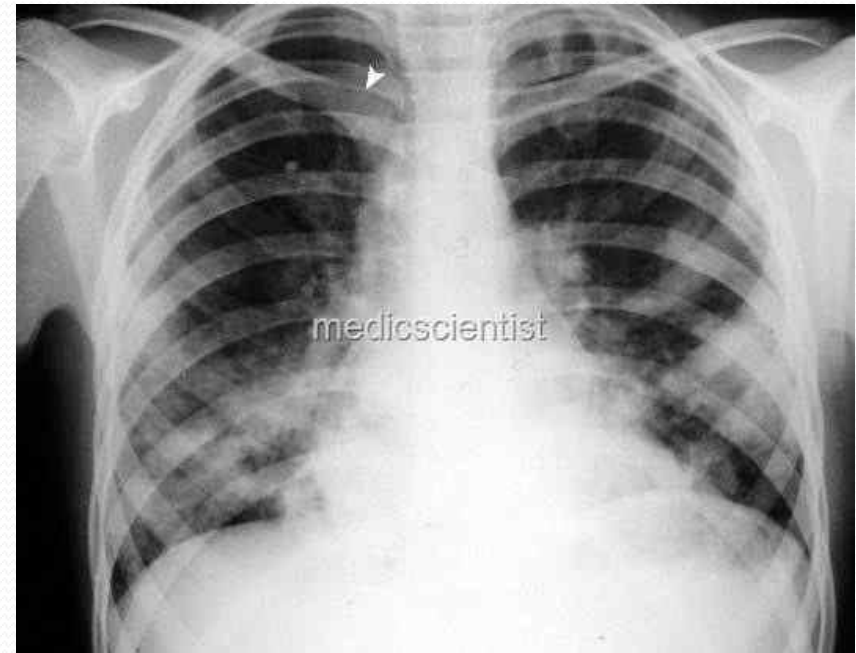
- 2-Surgical site infections:

Depending on the type of operation and underlying patient status.



# Sites of the most common nosocomial infections

- 3- Respiratory tract infections:
- The most important are patients in intensive care units



# Problems of nosocomial infections:

Nosocomial infections will become more important as public health problem , as it causes :

- 1- Additional suffering.
- 2- Prolong hospital stay.
- 3- Increase the cost of care significantly.

- *Nosocomial infections are important contributors to morbidity and mortality.*

# Major Factors Causing Nosocomial Infections

## 1. Increase number of drug resistant pathogens (due to misuse of antibiotics)

- About 70% of nosocomial infections involve drug-resistant bacteria  
(**VRE**: Vancomycin Resistant Enterococcus,  
**MRSA**: Methicillin Resistant *S. aureus*,  
**MRSE**: Methicillin Resistant *S. epidermidis* ,  
**MDRTB**: Multi-Drug Resistant *Mycobacterium Tb*),
- Drug resistant microbes can be other than bacteria like: viruses (HIV), fungi (*Candida spp.*), or protozoa (malaria).





# Major Factors Causing Nosocomial Infections

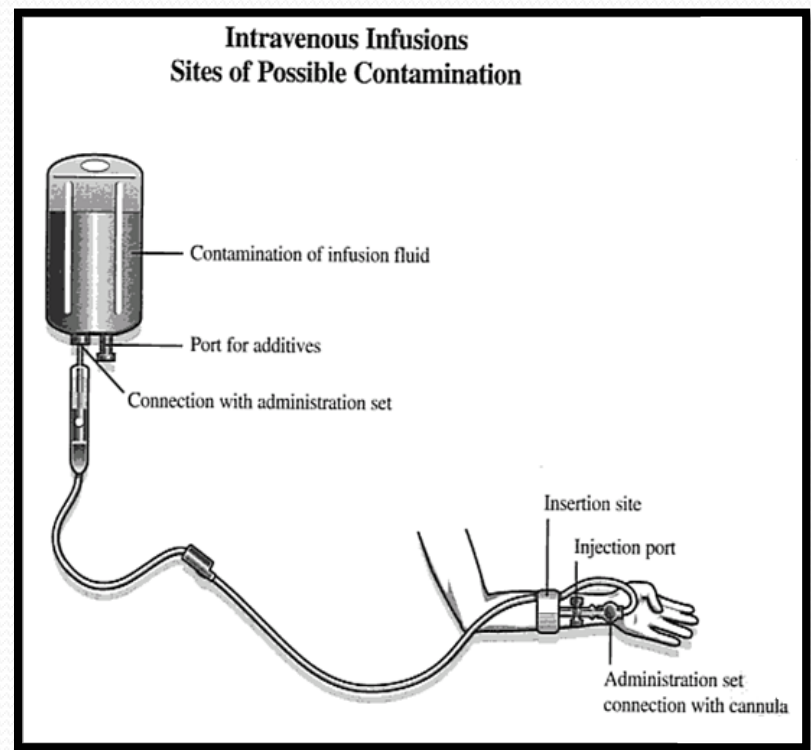
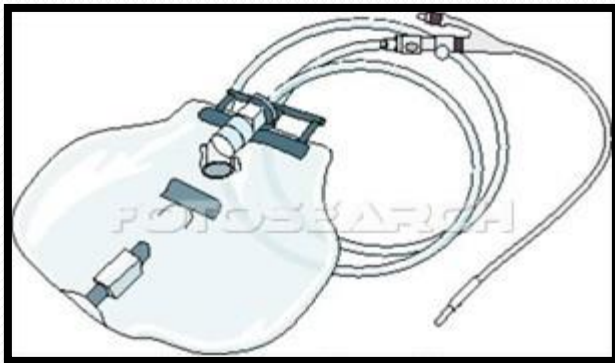
2. Increase number of immunocompromised patients.





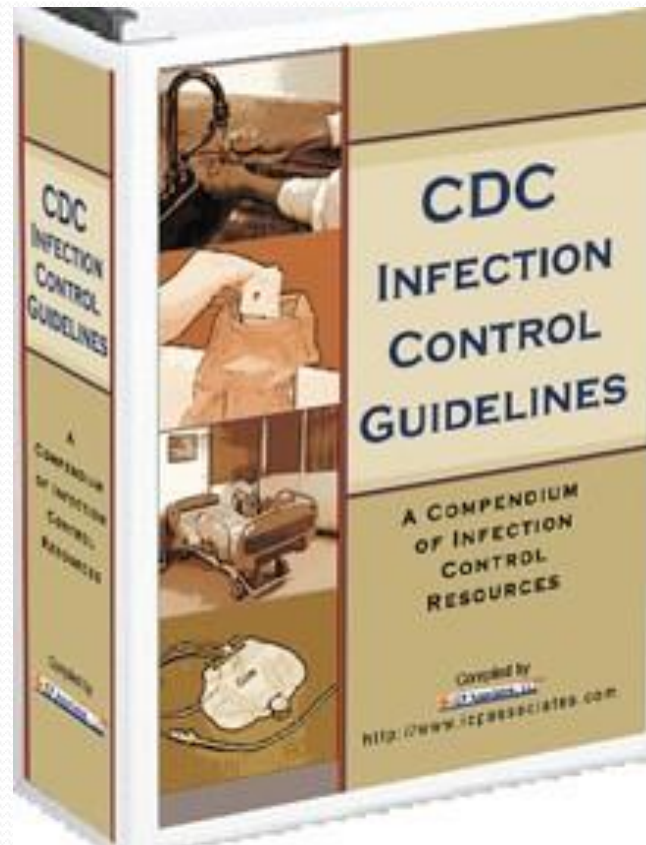
# Major Factors Causing Nosocomial Infections

## 3. The performance of invasive medical and therapeutic procedures

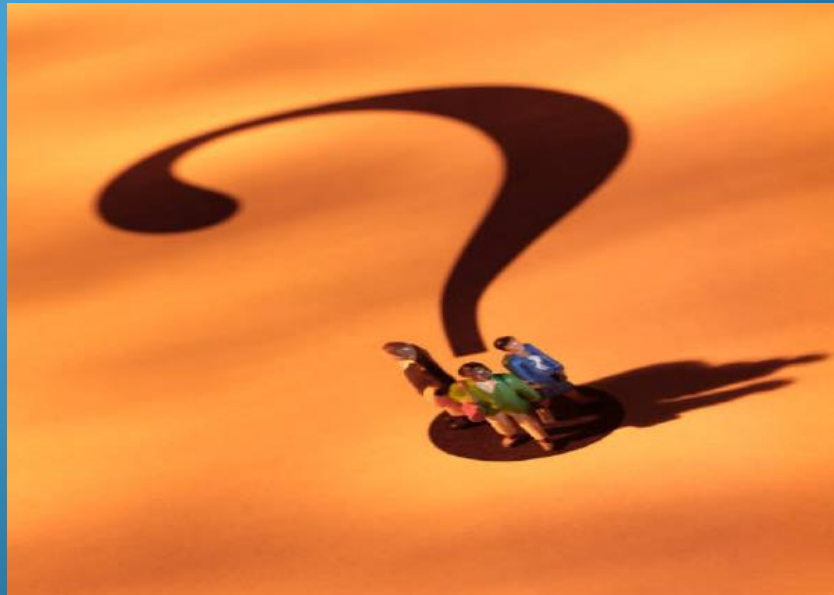


# Major Factors Causing Nosocomial Infections

4. Not following infection control guidelines.



# What can we do??



# The most important steps in preventing nosocomial infections are to:

First detect their occurrence.

Then establish policies and guidelines to prevent their development.

Each hospital should have an  
**Infection control committee**

# Hand Hygiene

**Hands are the most common vehicle of transmission of organisms**





## Six stage handwashing technique



1. Palm to palm



2. Backs of hands



3. Interdigital spaces



4. Fingertips



5. Thumbs and wrists



6. Nails

# Personal Protective Equipment

Wearing protective measures when needed:

- **Gloves.**
- **Masks.**
- **Gowns.**





# Disinfection and Sterilization Techniques

- All equipments, instruments, and hospital facilities should be kept sterile at all times.
- Use of disposable syringes, needles, catheters and drainage bags then proper disposal of them.
- Disinfection of surgical instruments, walls, floors, and furniture by appropriate chemicals.
- Basic cleaning, waste disposal, and laundry should be carried out regularly.

# Isolating Infectious Patients

- Isolation of the source of infection to protect the susceptible or immunocompromised.



# Air filtration

In se critical situations such as bone marrow transplant units, where air borne contamination with environmental fungal spores is a problem the efficiency of an air filtration may be increased and laminar airflow maintained as barrier around the patient.