

HOSPITAL ACQUIRED • INFECTIONS

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• LEARNING OBJECTIVES

- Discuss the common routes of spread of infection in hospital setting
- Discuss common hospital acquired infections and common pathogens causing these infections
- Discuss briefly the pathogenesis of hospital acquired infections
- Describe laboratory diagnosis of hospital acquired infections

• HOSPITAL ACQUIRED INFECTIONS

- “Infections acquired while in the hospital”
- The infection is not for which patient is admitted
- Excludes all disease that patient is incubating during admission (e.g. Chicken pox incubation period is 10-21 days)
- 1/3rd of all HAI are preventable
- In USA alone 2 million infections & 100,000 deaths/ year

- **HAI-COMMON ROUTES OF SPREAD**

- **RESPIRATORY ROUTE**

- Common route of infection
- Inhalation of environmental pathogens
- Through instrumentation e.g. airway, ET tube etc.
- Mostly viral pathogens e.g. Influenza virus, RSV
- Pneumonia, lung abscesses etc.

- **URINARY SYSTEM**

- Usually through instrumentation e.g. cystoscopy
- Foley catheterization
- Rarely from patient's own flora- poor hygiene
- Most frequent HAI

- **HAI-COMMON ROUTES OF SPREAD**

- **DIRECT INOCULATION**

- Direct inoculation of org on wound
- From healthcare providers, patient's own flora etc.
- Usually due to improper antisepsis, poor hand hygiene and inappropriate dressing technique
- Surgical site infection, Blood stream infection

- **GIT**

- Through ingestion or alteration of gut flora
- Intake of antimicrobial disturb flora

- E.g. Pseudomembraneous colitis, Norovirus diarrhea

- **HOSPITAL ACQUIRED INFECTIONS**

- **HOSPITAL PATHOGENS**

- Pathogens from other patients, healthcare staff, environment etc.
- Opportunistic pathogens of own flora
- Pathogens are multiple antimicrobial resistant
- MRSA, VRE, MDR pathogens
- Organisms select out due to antimicrobial use

- **HOSPITAL ACQUIRED INFECTIONS**

- **HOSPITAL ACQUIRED UTI**

- Mostly catheter related e.g. foley catheter
- Cystoscopy also increase risk
- Enterococcus sp.*, *Pseudomonas aeruginosa.*, *E coli*, *Staphylococcus sp.*, *Candida spp.*

- Multi-drug resistant due to use of broad spectrum antimicrobial
- Both male and female

- **HOSPITAL ACQUIRED INFECTIONS**

- **HOSPITAL ACQUIRED RTI**

- Micro-aspiration of upper airway secretions
- Ventilator/ET intubation associated
- Pseudomonas aeruginosa, Staph aureus, E coli, Klebsiella spp., Acinetobacter baumannii, Haemophilus influenzae, etc.*
- Usually multidrug resistant
- Poor cough reflex also predispose

- **HOSPITAL ACQUIRED INFECTIONS**

- **SURGICAL SITE INFECTIONS**

- Infection of surgical incision

- Mostly by *Staph aureus*, *Enterococcus*, *Pseudomonas aeruginosa*, *E. coli*, Anaerobes etc.
- Pathogens transmitted by healthcare staff hands, dirty equipment, etc.
- Poor hand hygiene of healthcare
- Poor technique for dressing
- Failure to use sterilized equipments

- **HOSPITAL ACQUIRED INFECTIONS**

- **BLOOD STREAM INFECTION**

- Usually through I/V catheters, CVP lines
- Org from staff/ own flora
- Enter through gap b/w skin & catheter
- Contaminated I/V fluids
- Also from other focus e.g. UTI org can enter blood stream
- Staph aureus*, Co Neg *Staph*, *Enterococci*, *Candida*

- **HOSPITAL ACQUIRED INFECTIONS**

- **GASTROENTERITIS, COLITIS**

- Cl. Difficile* spores in hospital wards
- Norovirus from healthcare members
- Use of broad spectrum antimicrobials
- Disturbs normal flora
- Pseudomembraneous colitis

- **HOSPITAL ACQUIRED INFECTIONS-PATHOGENESIS**

- Three factors play role in HAI
- Host factors, Environmental factors and chain of transmission

- **HOST FACTORS**

- Extreme age
- Underlying dis e.g. DM, CLD, CKD, Cancer
- HIV infection
- Special medications e.g. cytotoxic drugs, steroids intake

- Trauma e.g. burns, lacerated wounds etc.
- Instrumentation e.g. foley catheter, endoscopy, ET intubation etc.

- **HOSPITAL ACQUIRED INFECTIONS-PATHOGENESIS ENVIRONMENTAL FACTORS**

- Hospital pathogens
- Pathogens from other patients, healthcare staff, environment etc.
- Opportunistic pathogens of own flora acquired in hospital
- Multiple antimicrobial resistant
- MRSA, VRE, MDR
- Lack of lamellar air current
- Frequent visitors

- **HOSPITAL ACQUIRED INFECTIONS-PATHOGENESIS**

CHAIN OF TRANSMISSION

- Direct contact b/w patients, visitors, healthcare staff
- Indirect contact-through dust, environment, equipment etc.
- Indwelling equipment most imp source- urinary or I/V catheters, ventilators, N/G tube, etc.
- Manipulation of wound, dressings etc.

VIDEO •

• **HOSPITAL ACQUIRED INFECTIONS-LAB DIAGNOSIS**

Collection of specimen

- Collect the primary specimen
- Also other specimens e.g. blood, sputum, urine, stool etc. for routine examination & for C/S
- Blood for CRP, serology

Blood count

Show leucocytosis-indicate infection

CRP

Elevated in bacterial infection

URINE RE

Show WBC/ RBC/ Protein etc.-points to UTI

• **HOSPITAL ACQUIRED INFECTIONS-LAB DIAGNOSIS**

Specimen for direct microscopy

- Direct Gram stain of blood, sputum, urine, stool, pus
- Gram reaction helps in guiding empirical therapy
- May save time and life
- Very helpful in Meningitis, blood stream infections etc.

Toxin detection

Rapid toxin detection kit of *Cl. difficile*

- **HOSPITAL ACQUIRED INFECTIONS-LAB DIAGNOSIS**

SPECIMEN FOR C/S

- Blood, sputum, urine, stool, pus etc.
- Culture for bacteria & fungi
- Antimicrobial and antifungal sensitivity testing
- Helps identify pathogen & guide in antimicrobial therapy
- Primary antimicrobial sensitivity testing

- **HOSPITAL ACQUIRED INFECTIONS-LAB DIAGNOSIS**

Molecular tests

- PCR, DNA probes
- Rapid and sensitive
- Saves time and life
- Expensive

