

1. Nosocomial or Iatrogenic Infections

## **Nosocomial or Iatrogenic Infections**

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**Definition: An infection acquired in hospital which was not present or incubating at admission.**

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2. Nosocomial Infections

## **Nosocomial Infections**

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**Incidence related to severity of underlying illness.**

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3. Sites of Nosocomial Infections

### Sites of Nosocomial Infections

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<b>Urinary Tract</b>	<b>40%</b>
<b>Surgical Wound</b>	<b>25%</b>
<b>Respiratory Tract</b>	<b>20%</b>
<b>Bacteremia</b>	<b>3%</b>
<b>Other</b>	<b>12%</b>

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4. Agents of Nosocomial Infections

### Agents of Nosocomial Infections

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<u>Type of Infection</u>	<u>Most Common Organism</u>
<b>Surgical Wounds</b>	Staphylococcus aureus Escherichia coli
<b>Pneumonia</b>	Streptococcus faecalis Klebsiella pneumoniae Pseudomonas aeruginosa Staphylococcus aureus Enterobacter spp.
<b>Intravenous Catheter</b>	Escherichia coli Staphylococcus epidermidis Staphylococcus aureus Streptococcus faecalis
<b>Urinary Catheter</b>	Candida spp. Escherichia coli Streptococcus faecalis Pseudomonas aeruginosa Klebsiella spp.

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5. Antibiotic Resistant Organisms in Nosocomial Infections

## Antibiotic Resistant Organisms in Nosocomial Infections

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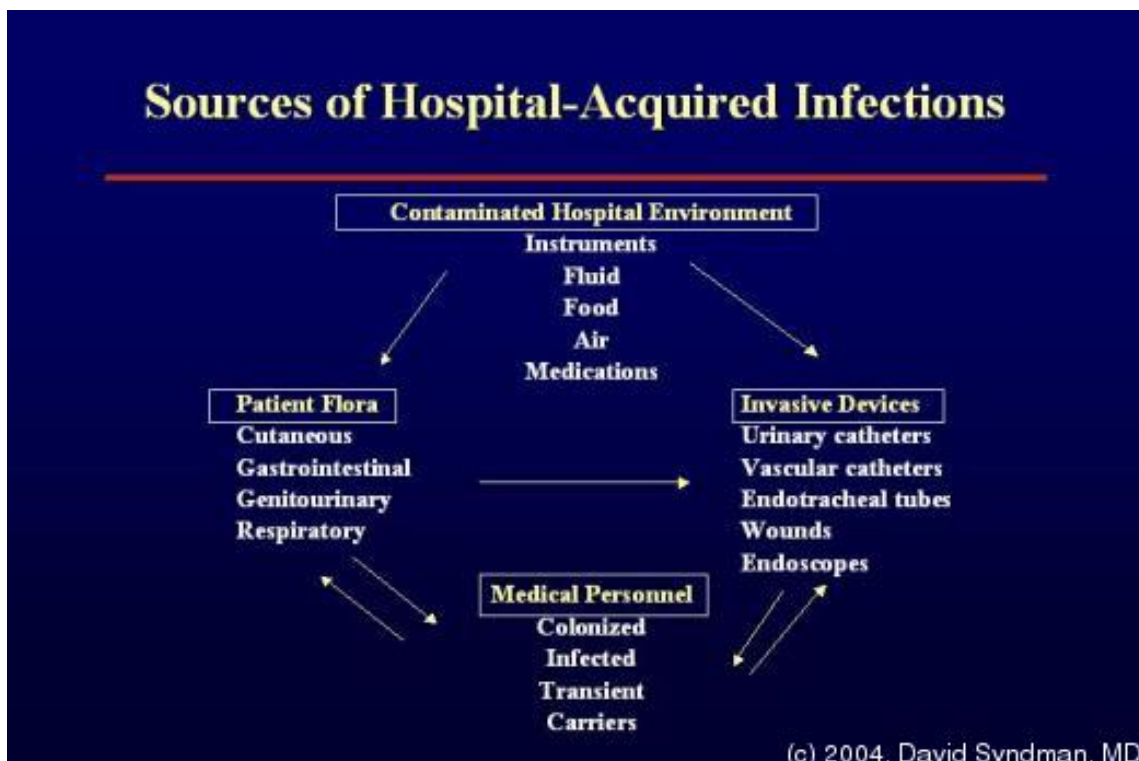
**MRSA** - Methicillin Resistant *S. aureus*

**VRE** - Vancomycin Resistant Enterococci

**ESBL** - Extended spectrum Beta-Lactamase Producing *E. coli* or Klebsiella

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6. Sources of Hospital-Acquired Infections



7. Entry of Organisms into Patient

**Entry of Organisms into Patient**

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- Colonization of GI tract
- Breach of Barriers
  - Skin**
- Ingestion
- Inhalation
- Environmental Contact

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8. Risk Factors for Nosocomial Infection

**Risk Factors for Nosocomial Infection**

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- Endotracheal intubation
- Bladder catheter
- Intravenous catheter
- Hyperalimentation
- Immunosuppression
- Operative procedures

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9. Case 1: Urinary Tract Infection

## Case 1: Urinary Tract Infection

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Mr. H., a 67-year old man, underwent a transurethral prostatectomy for cancer of the prostate. He had a Foley catheter placed into the bladder. Three days later, Mr. H. developed a urinary tract infection with low-grade fever, some pain, and pyuria. Quantitative urine counts yielded  $3 \times 10^5$  colonies of *Escherichia coli* per ml of urine. The organisms were resistant to all tested antibiotics except for the aminoglycosides. Within 2 days, Mr. H. developed bacteremia with hypotension and shock.

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10. Nosocomial Urinary Tract Infections

## Nosocomial Urinary Tract Infections

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- Cumulative risk per day of catheterization about 5% per day
- Adequacy of Foley care
- Organisms may enter bladder  
extraluminally or intraluminally
- Prevention = Removal of catheter sterile technique

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11. Case 2: Nosocomial Wound Infection

## Case 2: Nosocomial Wound Infection

Ms. Z., an 82-year old woman with rheumatic heart disease, underwent a mitral valve replacement along with surgery for a coronary artery bypass graft. Her postoperative course was complicated by bleeding in the mediastinum, which required more surgery. Three weeks post discharge, Ms. Z. noticed some purulent drainage along the wound site on her chest. When she returned to see the surgeon 1 month later, she reported her pain and low-grade fever. The surgeon noted that there was considerable drainage at the wound site. Probing the wound, he noticed a lot of pus.

Ms. Z., was hospitalized again for radical debridement (cleaning) of her chest wound. Cultures of the pus yielded *S. epidermidis*.

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12. Nosocomial Post Surgical Wound Infection

## Nosocomial Post Surgical Wound Infection

### Definitions:

Clean -	Entrance in sterile site
Clean -	Contaminated - Entrance into low level colonization – GU or respiratory
Contaminated -	Accidental wounds, spillage GI contents
Dirty -	Grossly contaminated

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### Case 3: Nosocomial Pneumonia

## Case 3: Nosocomial Pneumonia

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Ms. J. was hospitalized for therapy of acute leukemia. Over a 3-week period, her blood cell count remained low as a result of her chemotherapy. At the end of this period, she developed a pulmonary infiltrate and sinusitis. She was treated with broad-spectrum antibiotics but failed to respond. Her lung involvement progressed and an open lung biopsy was performed. A species of *Aspergillus* (*A. fumigatus*) was cultured from this material. She was started on amphotericin B but became progressively more ill and died within a week.

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### Nosocomial Pneumonia

## Nosocomial Pneumonia

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- Usually caused by Gram negatives
- Colonization of airway
- Risk factors
  - Intubation
  - Coma
  - Thoracoabdominal surgery
  - Renal failure
  - Age >70
  - Decreased gastric acidity
- Prevention
  - Prone ventilation
  - ET tube management

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## Case 4: Primary Bacteremia

### Case 4: Primary Bacteremia

Fifty-nine-year-old Mr. S. was hospitalized with acute myocardial infarction. His disease was so severe that he required a catheter to measure his cardiac pressure and output. Unfortunately, the catheter was left in place for several more days than necessary. Six days after his infarction, Mr. S. developed fever, leukocytosis, and inflammation at the site of insertion of the catheter. Four blood cultures all revealed the presence of *S. aureus*. He was treated with intravenous antibiotics; however, a new cardiac murmur was noted 7 days into therapy. An echocardiogram revealed the development of a tricuspid valve vegetation.

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## Nosocomial Bacteremia

### Nosocomial Bacteremia

- May be primary or secondary
- Primary - no focus apparent, usually due to IV catheter or neutropenia
- IV Catheters
  - Source - extra luminal (66%)
  - Intraluminal (20%), occ. IV fluid contamination
- Rate related to catheter type and length of placement
- Prevention-removal; local site maintenance

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17. Prevention of Nosocomial Infections

**Prevention of Nosocomial Infections**

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- **Removal of Devices**
- **Environmental Cleaning**
- **Hand washing**
- **Surveillance**
- **Education**

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18. Key Points

**Key Points**

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- **Nosocomial Infection Definition**
- **Steps for Prevention**
- **Risk Factors**
- **Impact**

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