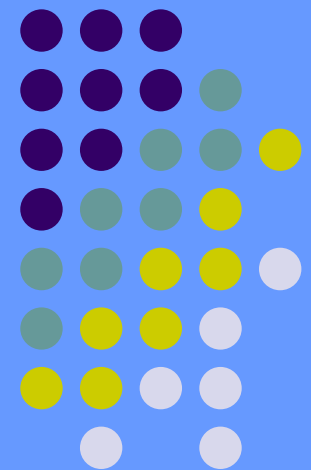
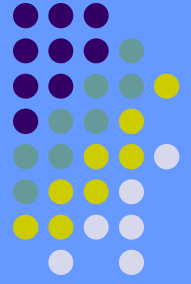


BASIC CONCEPTS OF INFECTION CONTROL

Epidemiology of Healthcare-Associated Infections

International Federation of
Infection Control

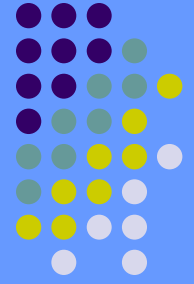




Objectives

- Risk factors associated with HAIs
- Use of the information to reduce infection rates
- Infection prevention and control programs





Introduction

- In US, more than one out of every 20 patients develops a HAI
- 2 million patients become infected every year
- Most HAIs occur at four sites
 - Blood
 - Respiratory tract
 - Surgical site
 - Urinary tract

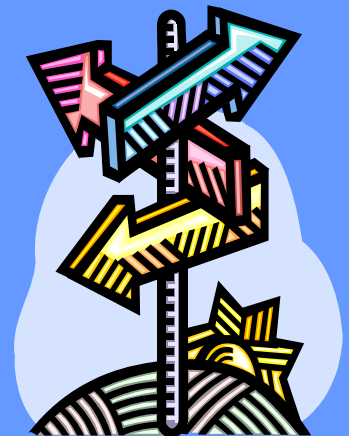


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Introduction

- HAIs occur in all types of hospitals
- Risk factors
 - Intrinsic (susceptibility to infection)
 - Extrinsic (hospital environment and devices)
 - Microorganisms involved





Surveillance of HAI

- CDC has been collecting data on HAIs in the U.S. since the late 1960s
- Other countries and regions have begun surveillance
 - Europe <http://helics.univ-lyon1.fr/>
 - England
http://www.hpa.org.uk/infections/topics_az/hai.htm
 - Australia <http://www.vicniss.org.au/>
 - Canada http://www.phac-aspc.gc.ca/nois-inp/cnisp_e.html
 - Chile <http://www.minsal.cl>



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Surveillance of HAI



- Most hospitals collect some data on HAIs
- Comparing rates of HAI is difficult
 - Differences in surveillance methods
 - Ongoing changes



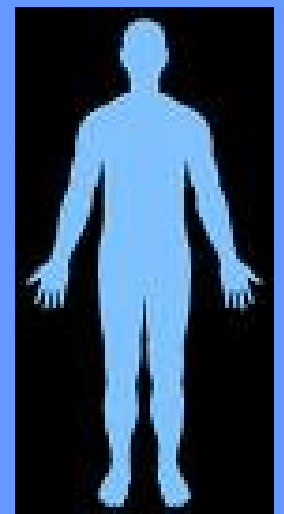
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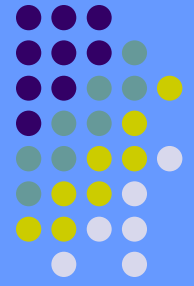




Intrinsic Risks

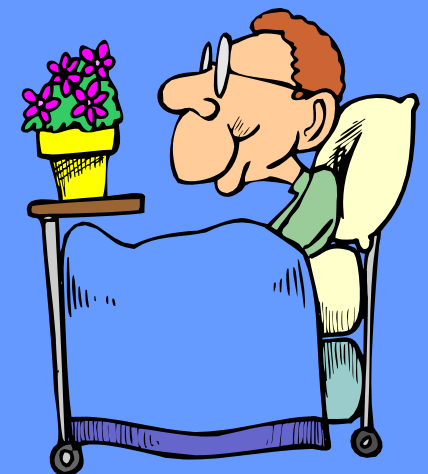
- Normal human body has defences against infection
- These defences may be compromised
 - Old age
 - Underlying disease or injury
- Special precautions must be taken to protect patients susceptible to infections
- Infections in low risk patients is an alert to new problems

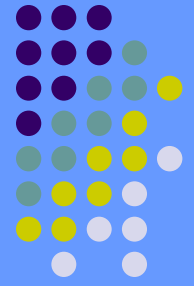




Extrinsic Risks

- People, patients, caregivers, and visitors
- Equipment and supplies
- Invasive procedures
- Caregivers may also become infected
 - AIDS
 - Viral hepatitis
 - Tuberculosis
 - Viral hemorrhagic infections (in some countries)





Extrinsic Risks

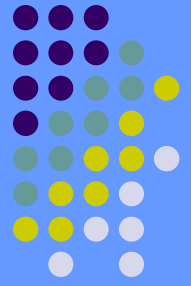
- High-risk medical devices
 - Invasive devices
 - HAI rates significantly greater among patients when a invasive device is used
 - Invasive device use especially high in the intensive care unit (ICU) where the risk of infection is increased



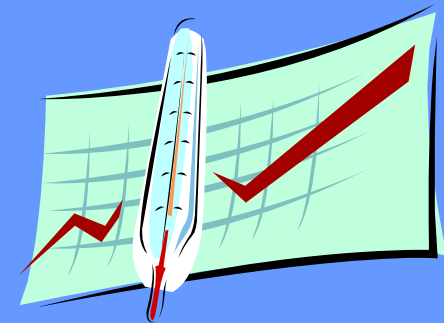
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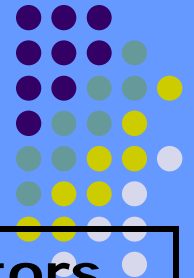
Extrinsic Risks



- About one-fourth of the HAIs in the U.S. are in ICUs (5-10 times greater than on the general wards)



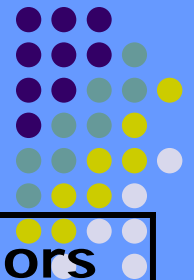
Risk Factors Associated with HAI



Site of Infection	Intrinsic Risk Factors	Extrinsic Risk Factors
Bloodstream Infection	Immunosuppressive therapy Loss of skin integrity Underlying disease Very young or very old	Arterial pressure monitor Haemodialysis Intravenous line, Parenteral fluids or blood Antimicrobial therapy
Pneumonia	Chronic lung disease Immunosuppressive therapy Long duration of surgery Surgery (especially abdominal or thoracic) Very old	Enteral feeding Nasogastric tube Respiratory therapy equipment Tracheal suctioning



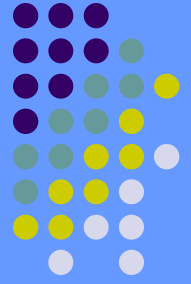
Risk Factors Associated with HAI



Site of Infection	Intrinsic Risk Factors	Extrinsic Risk Factors
Surgical Site Infection	Loss of skin integrity Obesity or malnutrition Infection at another site Underlying disease (e.g., ASA score, diabetes mellitus) Trauma	OR asepsis OR equipment and supplies Skin antiseptics Surgeon's experience Tissue perfusion Type of operation Length of operation
Urinary Tract Infection	Female Underlying disease, e.g., diabetes mellitus Very old	Indwelling urinary catheter Urinary instrumentation



Objectives of Infection Prevention and Control Programs



- Maintain a safe environment
 - Clean food, water and air
 - Adequate sanitation
- Infection prevention and control
- Appropriate antibiotic use



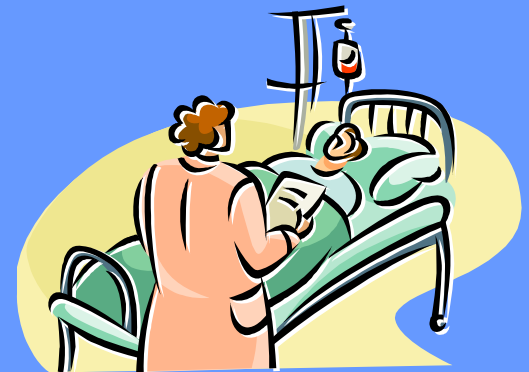


Use of Technology

- Information about safe use
 - Sterile or clean?
 - How are they reprocessed?
- Patients should be examined for any evidence of infection related to devices
- Non-invasive approach is an effective infection prevention measure

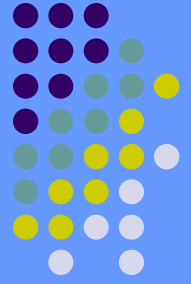


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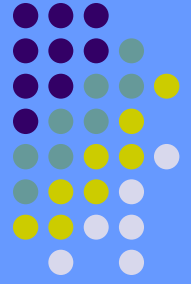


Surgical Site Infection (SSI)

- Prolongs hospital stay by eight days
- Doubles the risk of death
- Increases re-admissions to hospital 5-fold
- Imposes a huge extra cost of care



Surgical Site Infection (SSI)



- Risk associated with bacterial contamination
 - Have been grouped by wound class
 - Recently grouped according to the operation, the length of surgery, and the general condition of the patient
 - More precise risk groups allows comparison of infections rates



Infectious Agents

- Microorganisms are everywhere in the hospitals
- Some will become resistant to antibiotics
- About half of all HAIs are caused by four pathogens (*E. coli*, Enterococci, *P. aeruginosa*, and *S. aureus*)
- Microorganisms are different for each kind of infection
 - *E. coli* commonly found in UTIs
 - *S. aureus* in wounds, pneumonia and bloodstream infections



Antimicrobial-resistant Microorganisms



- One of the greatest challenges facing infection prevention and control
- Inappropriate use of antibiotics an important factor in promoting antimicrobial resistance
- Patients need to be trained not to expect an antibiotic for every possible infection and to follow instructions on taking an antibiotic when one is ordered



Using Epidemiologic Data to Reduce Infection Rates



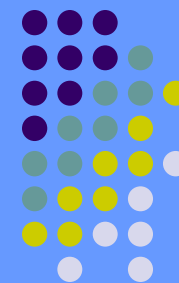
- A surveillance system is essential
 - to identify high-risk areas
 - to provide objective data to patient care staff
 - to assist in developing prevention plans
 - to measure the program's effectiveness



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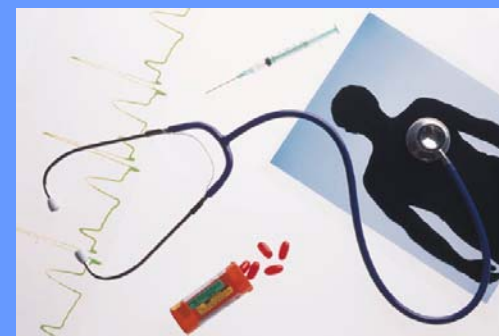
Success in an Infection Prevention and Control Program



- Surveillance system
- Careful attention to factors that increase infection risk in patients
- Institute specific prevention and control measures
- Monitor compliance with guidelines and recommendations
- Appropriate antibiotic use



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Conclusions

- Healthcare-associated infections are frequent and increase morbidity, mortality and cost within hospitals
- Each HAI has specific risk factors that must be known to develop prevention and control measures
- Infection risk is highest when patients are treated with invasive medical devices, undergo surgical operations and are placed in an ICU



Conclusions

- Pathogens resistant to antimicrobial drugs are continuing to increase
- A successful infection prevention and control program considers information, risk factors and evidence based measures



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Key Points

- Healthcare-associated infections (HAI) occur in all types of hospitals
- Understanding the risk factors associated with specific types of HAI is important in developing prevention and control measures
- HAI risk is high when invasive medical devices are used on patients
- Antimicrobial resistance among hospital pathogens is increasing



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