Control of nosocomial Infection in pediatrics

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Learning objective

What is the nosocomial infection/Health care associated infection(HCAIs)?

What is the Impact of HCAIs on Health system?

what are the risk factors?

How to minimize the risks of contamination?

Definition

Nosocomial infection defined by experts as:

HCAIs are infections that are first appear in 48 hours or more after hospitalization or within 30 days after having received health care in patient who was admitted for a problem likely not related to the microbial pathogen and not in incubation period.

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HAIs

- device related
- surgical site infections (SSIs)
- transmissible/infectious diseases or pathogens of concern(viral, bacterial, fungal, and MDRo)

do not discriminate between age, gender, religion, or ethnicity

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Rate of Nosocomial

in Europe, incidences vary from 1% for all types of nosocomial infections and up to 23.6% in PICU.

In USA the total rate around 4%.

Study from Southeast Asian countries reported overall prevalence rate of 9.1% .

Overally in high-income countries HCAIs rate is 5%–15% of the hospitalized patients

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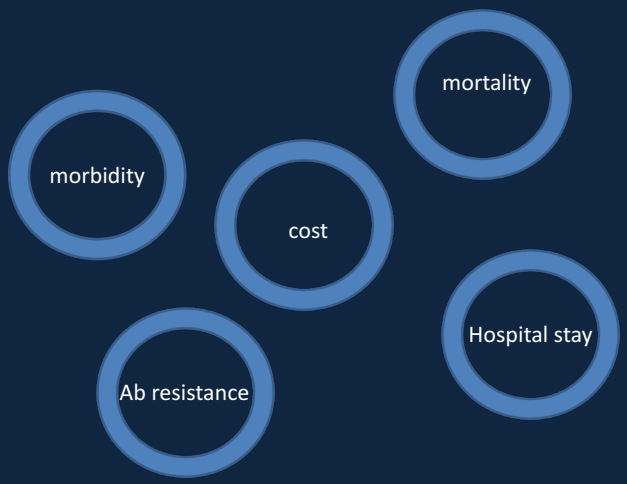
Impact of HCAIs



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Impact of HCAIs

CDC calculated approximately 1.7 million nosocomial infections from all types of microorganisms resulting in 99,000 deaths annually in USA.

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Impact of HCAIs

Study shows that severely immunocompromised hospitalized patients are at the highest risk of HAIs.

A mortality rate due to BSI in pediatric population and neonates were 3% and 11% ,respectively especially in very low-birth weights

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Impact of HCAIs

specialized programs need to be developed and tailored to meet the needs of the pediatric population based on :

age-related factors that prevent the child from adhering to IP&C standards

Effect of caregivers on prevention and transmission

immature immune systems

Developmental stage

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General risk factor

close physical contact with health-care workers

stay in environments where antibiotic-resistant organisms are endemic

Stay in intensive care with indwelling devices

Hyper alimentation

mechanical ventilation

Comorbidities

neutropenic patients

transplantation

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Children are not little adult

They refuse to follow isolation percussions

Child life - making isolation feel so lonely

Need t5o ply room in hospital ,which child is infectious in there and cleaned is very important

Child is more expose to hand on than adult

Hand hygiene difficult to reinforce for them

PPE may not fit or available for them

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Risk factors for NI

- The immunological naivety of young children
- congenital /acquired ID
- congenital syndromes
- Close physical contact between children and visitors and uncontrolled fluids and bodily secretions
- Children are susceptible to infections that are prevented in older by vaccination or previous natural exposure
- Age make variety in causative organisms
- chronic or degenerative organ system disorder

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HIGH RISK AREA

Infection rates are the highest in neonatal and PICU (where bloodstream infections are the most frequent), and are usually associated with intravascular devices.

Premature infants may have immature defense mechanisms (including skin, gastrointestinal systems, lungs or be born with severe medical conditions

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On general pediatric wards:

respiratory and gastrointestinal infections predominate

reflecting the occurrence in the community.

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pathophysiology

For the development of a NI, two pathophysiologic factors must be present:

1-impaired host defenses

2- colonization by pathogenic or non-pathogenic bacteria

Most nosocomial infections arise from the *endogenous bacterial flora* although many critically ill patients eventually become *colonized with resistant bacterial strains.*

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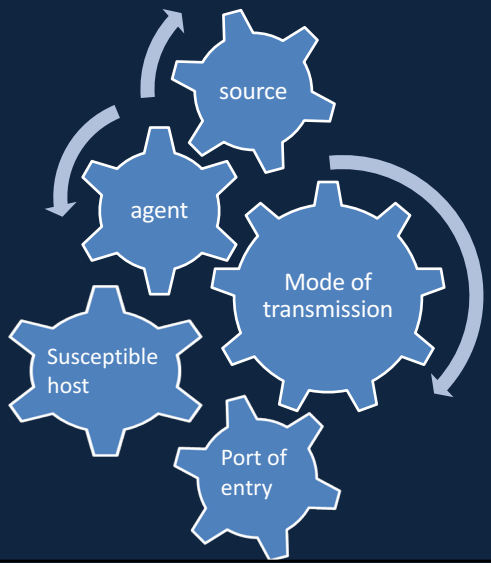
Chain of infection



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Portal of entry into the host

Portal of entry is the way the infectious agent can enter a new host

Common portals of entry include:

- Respiratory tract
- Gastrointestinal tract
- Mucosa (e.g., conjunctiva, nose, mouth)
- Genitourinary tract
- Breach of skin integrity

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Three types of infection account for more than 60% of all nosocomial infections:

pneumonia (usually ventilator-associated)

urinary tract infection (usually catheter-associated)

primary bloodstream infection (usually associated with the use of an intravascular device)

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Germs acquire ways

person-person via hands of health-care providers ,patients and visitors

personal equipment (stethoscopes, personal digital assistants) and clothing

airborne transmission

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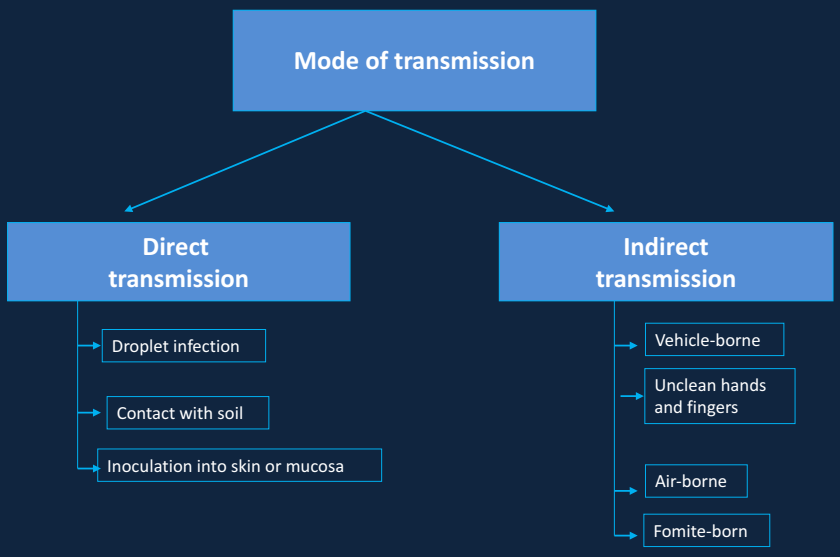

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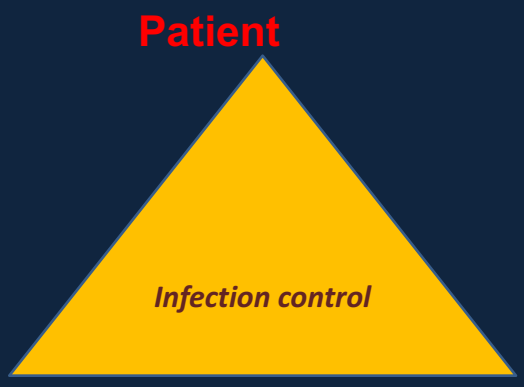
Human source of microorganisms

those who already have a disease, or those who are considered to be chronic carriers of an infectious agent.



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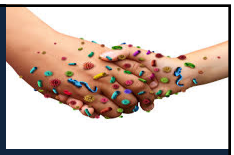
Modes of transmission



Direct contact : consist of direct body surface to body surface contact and physical transfer of bacteria between a susceptible host and an infected or colonized individual.

In direct contact : involves contact of a susceptible host with a contaminated object such as medical instruments, dressings, gloves that are not changed between patients .

hand hygiene

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Modes of transmission

Droplet: distance from the source >1 m,

Infectious droplets are generated during coughing, sneezing, talking and through procedures such as bronchoscopy and suctioning.

Transmission occurs when these droplets are propelled a short distance through the air and deposited on a host's mouth, nasal mucosa or conjunctivae.

Wear a surgical mask while in the room

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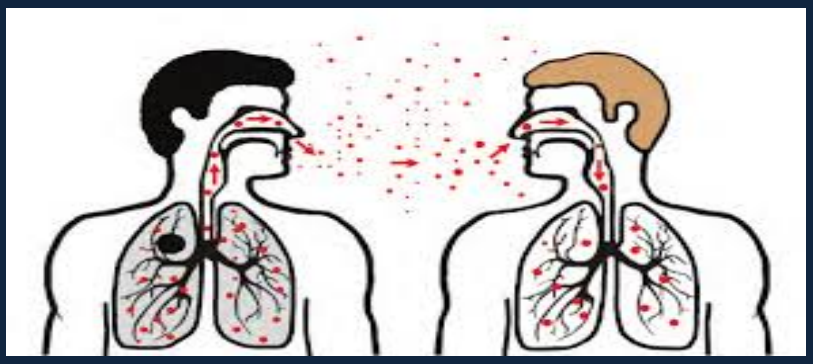
Droplet contact



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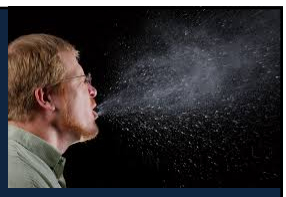

Airborne: consist of dust particles containing bacteria or airborne droplet nuclei of evaporated droplets containing microorganisms that are suspended in the air for longer durations of time.

Microorganisms transmitted in this manner can be inhaled by a susceptible host

ventilation of the space

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Strict policies

Education of all caregivers increase the adherence and compliance to policy

Monitoring compliance of hand, personal and environmental hygiene

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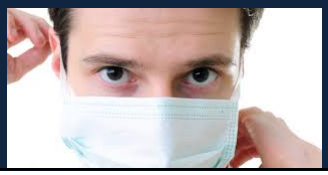
Centers for Disease Control and Prevention. CDC twenty four seven. Saving Lives, Protecting People

Recommendations for Application of Standard Precautions for the Care of All Patients in All Healthcare Settings



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HAND HYGIENE

In neonates , ongoing research focuses on :

reducing contaminating periods (eg, less handling of neonates)

sequencing types of infant care (eg, moving from clean to dirty sites during infant handling,

Grouping one type of infant care to one handling period

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Encourage others to participate in infection control

students may routinely observe staff who:

- fail to wash hands
- apply inadequate technique in handwashing
- routinely violate correct infection control procedures

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barriers to hand hygiene can be overcome when role models promoting the procedure are clearly identified

education of the visitor to ensure that he or she doesn't transmit pathogens to his or her child or to other

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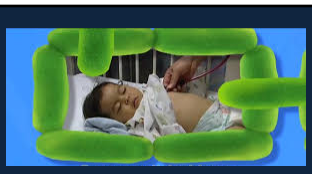
Susceptible host



Severely immunocompromised children require extra protection :

ventilation systems that reduce the risk of exposure to filamentous fungi

Treatment of under laying disease

Immunization

Prophylactic antibiotic therapy

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Susceptible host ,health care worker

AAP:

- Healthcare workers should receive the influenza vaccine annually
- When transporting a contagious patient, facilities should communicate information about the patient's diagnosis and isolation
- appropriate management of invasive procedures and devices, sterilization and disinfection of equipment, provision of a clean environment and adequate staffing.

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Standard Personal Protective Equipment (PPE)

IF direct contact with blood & body fluids, secretions,excretions, mucous membranes, non-intact skin

Gloves PLUS gown

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The appropriate use of prophylactic antimicrobials therapy prevents some nosocomial infections, especially in high-risk patients .

BUG OFF
Antibiotic Stewardship Program

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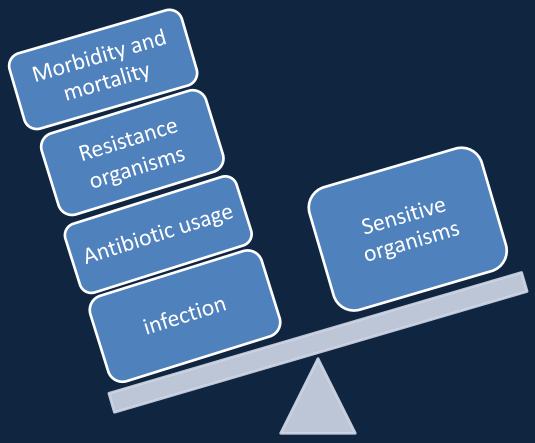
The impact of infection control on antimicrobial resistant infections



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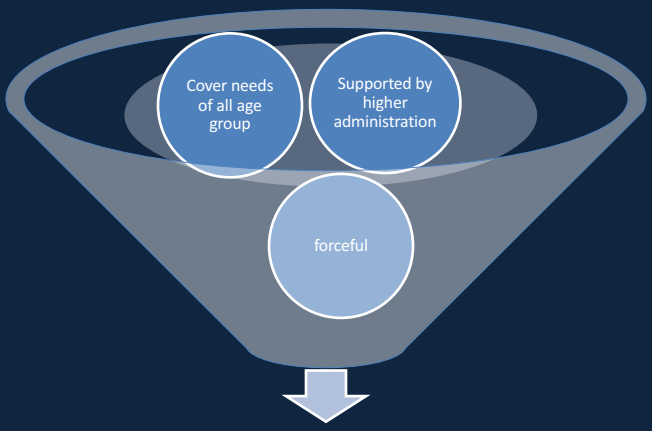
goals



Effective IP&C Program

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Continue and Surveillance

Focus on:

staffing numbers and levels of experience

early detection and intervention in outbreak situations

environmental controls ,adequate supplies

programs for education.

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Notice to high risk group:

Immuno-deficient patients

Cancers

Transplants

certain lung diseases

immaturity/ VLBW newborn

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The family is a core component in pediatric ward

it is important to recognize Knowledge and compliance of them as a potential source for infection spread.

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goal of infection control programs

decrease the incidence of infections in patients and staff

Considerations relevant to antimicrobial resistant organisms

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July 25, 2019	DIAGNOSTIC STEWARDSHIP: MODIFIED CULTURE TESTING TO ENHANCE ANTIBIOTIC STEWARDSHIP Speaker: **Robert Garcia**, Stony Brook University Medical Center, New York City
August 15, 2019	*(FREE Teleclass)* BED BUG PREVENTION IN THE HEALTHCARE SETTING Speaker: **Dr. Marcia Anderson**, Environmental Protection Agency, United States
August 22, 2019	HOW TO ENGAGE AND EDUCATE NURSES IN EVIDENCE-BASED PRACTICE Speaker: **Eileen J. Carter**, Columbia University School of Nursing
September 5, 2019	MEASURES TO PREVENT AND CONTROL VRE: DO THEY REALLY MATTER? Speaker: **Dr. Hilary Humphreys**, The Royal College of Surgeons in Ireland
September 12, 2019	*(FREE Teleclass)* MEAT, MONKEYS, AND MOSQUITOES: A ONE HEALTH PERSPECTIVE ON EMERGING DISEASES Speaker: **Prof. Laura Kahn**, Woodrow Wilson School of Public and International Affairs, Princeton University
September 22, 2019	*(FREE European Teleclass – Broadcast live from the Infection Prevention Society conference)* Cottrell Lecture ... CHALLENGES AND OPPORTUNITIES IN INFECTION PREVENTION AND CONTROL Speaker: **Prof. Brett Mitchell**, Avondale College of Higher Education, Australia

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