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مشاور كنترل عفونت معاونت درمان
دانشگاه

عفونت بیمارستانی

- عفونت‌هایی که **حداکثر تا ۴۸ ساعت پس از پذیرش** در بیمارستان یا مراکز بهداشتی و درمانی رخ دهد، یا **ظرف ۳۰ روز پس از دریافت مراقبت‌های بهداشتی درمانی** ظاهر می‌شوند.

(Revelas, 2012)

- این عفونت‌ها می‌توانند ناشی از **باکتری‌ها**، **ویروس‌ها** یا **قارچ‌ها** باشند و در هر قسمت از بدن بیمار ایجاد شوند.

- **۷ درصد بیماران** در کشورهای با درآمد بالا و **۱۵ درصد بیماران** در کشورهای با درآمد پایین و متوسط حداقل یک **عفونت مرتبط با مراقبت‌های بهداشتی درمانی** را در طول اقامت خود در بیمارستان دریافت می‌کنند. (WHO., 2022)
- یک مطالعه مرور نظام‌مند میزان عفونت‌های بیمارستانی را در **کشورهای در حال توسعه** حدود **۱۵/۵ درصد** گزارش کرد. میزان شیوع عفونت‌های بیمارستانی در **ایران ۸/۸ درصد** برآورد شد.(Allegranzi, et al., 2011)
- تخمین زده می‌شود که **سالانه ۱۳۶ میلیون مورد عفونت‌های مقاوم به آنتی‌بیوتیک** مرتبط با مراقبت‌های بهداشتی و درمانی در سراسر جهان رخ می‌دهد.(Balasubramanian , et al., 2023)
- در اروپا، سالانه **حدود ۹ میلیون مورد عفونت‌های بیمارستانی** رخ می‌دهد که منجر به **۲۵ میلیون روز بستری اضافی** در بیمارستان می‌شوند و **۱۳ تا ۲۴ میلیارد یورو هزینه** دارند. (WHO., 2024)
- به طور متوسط **۱۰ درصد بیماران مبتلا** به این عفونت‌ها می‌میرند.(WHO., 2022)

اهمیت کنترل عفونت‌های بیمارستانی

- **افزایش طول مدت بستری:** عفونت‌های بیمارستانی باعث افزایش طول مدت بستری بیماران می‌شود. 5 تا 29 روز
- **افزایش مرگ و میر:** این عفونت‌ها می‌توانند منجر به بروز عوارض جدی و حتی مرگ بیمار شوند. 18 تا 29 درصد
- **مقاومت آنتی‌بیوتیکی:** استفاده بی‌رویه از آنتی‌بیوتیک‌ها برای درمان عفونت‌های بیمارستانی باعث ایجاد باکتری‌های مقاوم به آنتی‌بیوتیک می‌شود.
- **کاهش رضایت بیماران:** عفونت‌های بیمارستانی به طور قابل توجهی رضایت بیماران از خدمات سلامت را کاهش می‌دهند.
- **افزایش هزینه‌ها:** عفونت‌های بیمارستانی منجر به افزایش هزینه‌ها برای بیماران، بیمه ها، بیمارستان‌ها و نظام سلامت می‌شود.

Hospital-acquired infections

- nosocomially acquired infections that are not present or incubating at the time of admission to a hospital.

- These infections include :

- catheter-associated urinary tract infections
- central line-associated bloodstream infections
- surgical site infections
- ventilator-associated pneumonia
- hospital-acquired pneumonia
- Clostridium difficile infections

Transmission of infection within a health care setting requires three elements:

- a source of infecting microorganisms
- a susceptible host
- transmission for the microorganism to the host

- The risk for hospital-acquired infections depends on:
- the facility's infection control practices
- the patient's immune status
- the prevalence of the various pathogens within the community

Source of Microorganisms

- During the delivery of health care, patients can be exposed to a variety of exogenous microorganisms (bacteria, viruses, fungi, and protozoa) from other patients, health care personnel, or visitors.

- Other reservoirs include the patient's endogenous flora (e.g., residual bacteria residing on the patient's skin, mucous membranes, gastrointestinal tract, or respiratory tract) which may be difficult to suppress and inanimate environmental surfaces or objects that have become contaminated (e.g., patient room touch surfaces, equipment, medications).

Host Susceptibility

The risk factors for HAI include:

- immunosuppression
- older age
- length of stay in the hospital
- multiple underlying comorbidities
- frequent visits to healthcare facilities
- mechanical ventilatory support
- recent invasive procedures
- indwelling devices
- stay in an intensive care unit (ICU)

- Extrinsic risk factors include :

- surgical or other invasive procedures
- diagnostic or therapeutic interventions (e.g., invasive devices, implanted foreign bodies, organ transplantations, immunosuppressive medications), and personnel exposures
- According to one review article, at least 90 percent of infections were associated with invasive devices.

- Prolonged hospitalization, due to a higher acuity of illness:
- contributes to host susceptibility as there is more opportunity to utilize invasive devices and more time for exposure to exogenous microorganisms.
- These patients are also more susceptible to rapid microbial colonization as a consequence of the severity of the underlying disease, depending on the function of host defenses and the presence of risk factors (e.g., age, extrinsic devices, extended length of stay)

Exposure to these colonizing microorganisms is from such sources as :

(1) endemic pathogens from an endogenous source

(2) hospital flora in the health care environment

(3) hands of health care workers

A study related to length of hospitalization examining adverse events in medical care indicated that the likelihood of experiencing an adverse event increased approximately 6 percent for each day of hospital stay.

The highest proportion of adverse events (29.3 percent) was not related to surgical procedures but linked instead to the subsequent monitoring and daily care lacking proper antisepsis steps

Transmission

- **Means of Transmission**
- Among patients and health care personnel, microorganisms are spread to others through four common routes of transmission:
- contact (direct and indirect)
- respiratory droplets
- airborne spread
- common vehicle.
- Vectorborne transmissions (from mosquitoes, fleas, and other vermin) are atypical routes in U.S. hospitals and will not be covered in this text.

Contact transmission

- This is the most important and frequent mode of transmission in the health care setting.
- Organisms are transferred through direct contact between an infected or colonized patient and a susceptible health care worker or another person.
- Microorganisms that can be spread by contact include those associated with impetigo, abscess, diarrheal diseases, scabies, and antibiotic-resistant organisms (e.g., methicillin-resistant *Staphylococcus aureus* [MRSA] and vancomycin-resistant enterococci [VRE]).

Respiratory droplets

- Droplet-size body fluids containing microorganisms can be generated during coughing, sneezing, talking, suctioning, and bronchoscopy.
- They are propelled a short distance before settling quickly onto a surface.
- They can cause infection by being deposited directly onto a susceptible person's mucosal surface (e.g., conjunctivae, mouth, or nose) or onto nearby environmental surfaces, which can then be touched by a susceptible person who auto inoculates their own mucosal surface.
- Examples of diseases where microorganisms can be spread by droplet transmission are pharyngitis, meningitis, and pneumonia

Airborne spread

- When small-particle-size microorganisms (e.g., tubercle bacilli, varicella, and rubeola virus) remain suspended in the air for long periods of time, they can spread to other people.
- Proper use of personal protective equipment (e.g., gloves, masks, gowns), aseptic technique, hand hygiene, and environmental infection control measures are primary methods to protect the patient from transmission of microorganisms from another patient and from the health care worker.
- Personal protective equipment also protects the health care worker from exposure to microorganisms in the health care setting.

Common Vehicle

- transmission applies when multiple people are exposed to and become ill from a common inanimate vehicle of contaminated food, water, medications, solutions, devices, or equipment.
- Bacteria can multiply in a common vehicle but viral replication can not occur.
- Examples include improperly processed food items that become contaminated with bacteria, waterborne shigellosis, bacteremia resulting from use of intravenous fluids contaminated with a gram-negative organism, contaminated multi-dose medication vials, or contaminated bronchoscopes.
- Common vehicle transmission is likely associated with a unique outbreak setting and will not be discussed further in this document

- Symptoms that favor an infection include:

- productive cough, shortness of breath, abdominal pain, rebound tenderness, altered mental status, palpitations, suprapubic pain, polyuria, dysuria, and costovertebral angle tenderness.

Risk factors for the development of *Clostridium difficile* infections :

- recent antibiotic use
- gastric acid suppressants
- nonselective non-steroidal anti-inflammatory drugs (NSAIDs)
- some comorbidities

Risk factors for SSI include both patient factors such as :

age, diabetes, obesity, nutritional status, colonization, co-existing infections, and operative factors such as :

duration of the procedure, skin antisepsis, surgical technique, antimicrobial prophylaxis.

- Obtaining thorough details in history and a comprehensive physical examination is important in determining whether the infection was acquired before admission or is a hospital-acquired infection.

- Important pieces of history, such as subjective fever, chills, and night sweats, may indicate that the infection was not hospital-acquired.

- Common infectious symptoms include fever, chills, altered mental status, productive cough, shortness of breath, palpitations, abdominal pain, flank pain, suprapubic pain, polyuria, dysuria, and diarrhea.

- Vital signs can reflect signs of systemic inflammatory response or sepsis. These include hypothermia or hyperthermia, tachypnea, tachycardia, and hypotension.
- Examination of external devices such as tracheostomies, endotracheal tubes, foley catheters, intravascular lines, insulin pumps, and pacemakers/ defibrillators is essential.
- Supplementing the examination of external devices is the information on the location and placement of the device (duration and setting).

Prevention and Control

- Hand Hygiene
- Isolation
- Sterilization
- Education