Nosocomial Infections: Measures for Prevention and Control

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Nosocomial infections are the infections acquired during hospital stay. These infections concern 5-15% (estimated 2 million cases annually) of hospitalized patients and can lead to complication in 25-33% of those admitted in ICU. Despite overall progress, hospital acquired infections (HAI) are problem in both developed and developing countries. These are an important cause of death (80,000 deaths annually) and economic costs are considerable which include cost of additional stay in hospital, drugs, delayed discharge etc. About 25% of the infections can be prevented by health care workers taking proper precautions when caring for patients.

Definition
A localized or systemic condition that results from adverse reactions to the presence of an infectious agent(s) that was not present or incubating at the time of admission to the hospital from the center for disease control (CDC)

Causes
Any type of invasive procedure can expose patient to the possibility of infection. Common causes of HAI include:
- Urinary catheterization
- Respiratory procedures
- Surgery and wounds
- Intravenous procedures

Risk Factors
All hospitalized patients are susceptible to contracting a nosocomial infection. Some patients are at greater risk than others: young children, the elderly and persons with compromised immune system are more likely to get an infection.

Other risk factors are:
- Long hospital stay
- Use of indwelling catheters
- Failure of health care workers to wash hands
- Overuse of antibiotics
- Mechanical ventilation
- Intravenous catheters
- Serious disease

Route of Transmission
There are mainly three routes of transmission of nosocomial infections.

1. Contact route: There are two types of contact routes:
- Direct Contact: It requires physical contact between the infectious individual or contaminated object and the susceptible host.
- Indirect contact: This requires mechanical transfer of pathogens between patients through a health care worker or a medical kit.

2. Air borne droplet route: Droplets are particles of respiration, secretion that can carry pathogens through the air but can only remain in the air for short period of time.

3. Air borne dust route: Dust particles are particles that carry dust and can remain in the air for long periods of time.

Various Hospital Infections
- Surgical wounds: Infection of surgical wounds is important numerically and as a cause of morbidity and prolonged hospital stay. In a prevalence survey by Emerson et al 1996 it is accounted for 12.3% of HAI. In USA incidence study of surgical wound accounted for 24% of nosocomial infection. Several factors influence the occurrence of surgical wound infections, such as the site, duration of surgery, health of patient and skill of the operator.

- Respiratory tract infections: These represent significant proportion of hospital acquired infections. About 15-20% of all hospital acquired infections are of the lower respiratory tract which are the leading causes of mortality. Aspiration in unconscious patients and pulmonary ventilation or instrumentation may lead to nosocomial pneumonia. Gram negative bacilli and Staphylococcus aureus are the common pathogens.

- Urinary tract infections: Most of the hospital acquired UTI (80%) is catheter associated. Even the single passage of catheter is associated with a definite though usually low infection risk (Kunit 1987). Even with adequate precautions, catheterization in hospitals leads to UTI in about 2%; with indwelling catheters the rate goes up to 50% or more.

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Mixed infection is common. Infection can be prevented by strict asepsis during catheterization. Indwelling catheters are to be used only when unavoidable, and only with proper closed drainage.

Bacteremia & septicemia: Although bacteremia is not the most common hospital acquired infection or the most significant in adding to costs, it is of greatest importance as it is a cause of serious illness and death. These may be consequences of infections at any site but are commonly caused by infected intravenous cannula. Extensive studies in USA have reported hospital acquired bacteremia in 0.2-0.4% of hospital admissions. Much higher rates have been reported for tertiary care referral centres than for general hospitals.

Prevention and Control of Hospital Acquired Infections
- Infection control practices need to be integrated into the nursing procedures of each hospital.
- Nursing care must be planned with an awareness of the measures that increase infection risk and the use of these techniques balanced against the possible benefits.
- Emphasis on hand-washing, use of aseptic techniques in invasive procedures, care of catheters, intravenous sites, surgical wounds and improvement of disinfection and sterilization procedures in respective areas.
- Routine cleaning of environment including floors, toilets, bathrooms, wash basins, locker tops and other furniture by adequately trained and supervised staff.
- Wear gown, cap and mask in high risk areas such as ICU’s etc. There is need to discontinue common practice of hanging mask around the neck.
- No brooming. Only wet mopping and damp dusting must be done.
- Detection and treatment of nasal carriage of all the healthcare workers for Staphylococcus aureus.
- Regular screening of kitchen staff and food handlers for carriage of pathogens.
- Proper waste disposal management.
- Compliance and adherence to infection control practices by everyone.
- Isolation of patients constituting an infection risk e.g. patients with smear +ve for pulmonary tuberculosis.
- A continuous training programme for all categories of healthcare workers to train them in safe healthcare practices and hospital acquired infection control measures.

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