Overview of Healthy Hospital Environment

By

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The risk of infection in hospitals is always present.

- Patient may acquire infection before admission to the hospital = Community acquired infection.

- Patient may get infected inside the hospital = Nosocomial infection.

- It includes infections
  - not present nor incubating at admission,
  - infections that appear more than 48 hours after admission,
  - those acquired in the hospital but appear after discharge
  - also occupational infections among staff.
IMPACT OF NOSOCOMIAL INFECTIONS

- They lead to functional disability and emotional stress to the patient.
- They lead to disabling conditions that reduce the quality of life.
- They are one of the leading causes of death.
- The increased economic costs are high: Increased length of hospital stay (SSI - 8.2 days), extra investigations, extra use of drugs and extra health care by doctors and nurses.
Organisms causing N.I. can be transmitted to the community through discharged patients, staff and visitors.

If organisms are multi-resistant they may cause significant disease in the community.
FACTORS INFLUENCING N.I.

- The microbial agent
- Patient susceptibility
- Environmental factors
Many sick people are treated in a closed area; micro-organisms, frequent contact between carriers & susceptible, contaminated waste, equipment and supplies to be handled.

Developing of clinical disease depends on organism s virulence, infective dose and patient resistance
**Viruses:** HIV, HBV, HCV can be also be transmitted through blood & B F (transfusion, injections, dialysis) respiratory syncytial virus, rota virus, ebola, influenza, herpes simplex viruses.

**Parasites & Fungi:** e.g. Giardia lamblia is easily transmitted between adults or children, Aspergillus sp. affecting immunocompromised.

**Scabies** an ectoparasite causing outbreak.
ENVIRONMENTAL FACTORS

- Healthcare settings are environments where both infected persons and persons at high risk of infection congregate.
- Crowded conditions within hospital, frequent transfers of patients between units.
- Microbial flora may contaminate objects, devices and materials which subsequently contact susceptible body sites of patients.
• Where do nosocomial infection come from?

✓ **Endogenous infection:** When normal patient flora change to pathogenic bacteria because of change of normal habitat, damage of skin and inappropriate antibiotic use. About 50% of N.I. are caused by this way.

✓ **Exogenous cross-infection:** Mainly through hands of healthcare workers, visitors, patients.
Exogenous environmental infections: several types of micro-organisms survive well in the hospital environment (hospital flora):

* In water, damp areas and occasionally in sterile products or disinfectants eg pseudomonas, Acinetobacter, Mycobacterium.
* On items such as linen, equipment and supplies
* In food.
* In fine dust and droplet nuclei

Some procedures that save life may increase risk of infection e.g urinary catheters, I.V.L inhalation therapy, surgery.

Inappropriate use of antibiotics.
BASICS OF INFECTION CONTROL

- Prevention of nosocomial infection is the responsibility of all individuals and services provided by healthcare setting.
- To practice good asepsis, one should always know: what is dirty, what is clean, what is sterile and keep them separate.
- Hospital policies & procedures are applied to prevent spread of infection in hospital.
Every Hospital should have a nosocomial infection prevention manual compiling recommended instructions and practices for patient care.

This manual should be developed and updated in a timely manner by the infection control team.

It is to be reviewed and accepted by infection control committee.
SCOPE OF INFECTION CONTROL

Aiming at preventing spread of infection:

*Standard precautions*: these measures must be applied during every patient care, during exposure to any potentially infected material or body fluids as blood and others.

*Components:*
A. Hand washing.
B. Barrier precautions.
C. Sharp disposal.
D. Handling of contaminated material.
B. BARRIER PRECAUTIONS

1. **Gloves:**

   *Disposable gloves must be worn when:*

   a) Direct contact with B/BF is expected.
   b) Examining a lacerated or non-intact skin e.g wound dressing.
   c) Examination of oropharynx, GIT, UIT and dental procedures.
d) Working directly with contaminated instruments or equipment.

e) HCW has skin cuts, lesions and dermatitis

*Sterile gloves are used for invasive procedures.*

*GLOVES MUST BE of good quality, suitable size and material. Never reused.*
2) **Masks & Protective eye wear:**

- MUST BE USED WHEN: engaged in procedures likely to generate droplets of B/BF or bone chips.

- During surgical operations to protect wound from staff breathings, ...

- Masks must be of good quality, properly fixed on mouth and nasal openings.
3) **Gowns/Aprons:**

Are required when:

- Spraying or spattering of blood or body fluids is anticipated e.g. surgical procedures.

- Gowns must not permit blood or body fluids to pass through.

- Sterile linen or disposable ones are used for sterile procedures.
C.SHARP PRECAUTIONS

- Needle stick and sharp injuries carry the risk of blood born infection e.g AIDS, HCV, HBV and others.
- Sharp injuries must be reported and notified
- NEVER TO RECAP NEEDLES
- Dispose of used needles and small sharps immediately in puncture resistant boxes (sharp boxes).
- Sharp boxes: must be easily accessible, must not be overfilled, labeled or color coded.
- Needle incinerators can be another safe way of disposal.
- Reusable sharps must be handled with care avoiding direct handling during processing.
D. HANDLING OF CONTAMINATED MATERIAL

1. Cleaning of B/BF spills:
   a- wear gloves.
   b- wipe-up the spill with paper or towel.
   c- apply disinfectant.

2. Cleaning & decontamination of equipment:
   protective barriers must be worn.

3. Handling & processing lab specimens:
   must be in strong plastic bags with biohazard label
4. **Handling and processing linen:**
   Soiled linen must be handled with barrier precautions, sent to laundry in coded bags.

5. **Handling and processing infectious waste:**
   a. must be placed in color coded, leakage proof bags, collected with barrier precautions
   b. contaminated waste incinerated or better autoclaved prior to disposal in a landfill.
Environmental control:

1. Including physical facility plans must meet quality of infection control measures.
2. Patient equipment positioning and installation, traffic flow.
3. Cleaning of hospital environment and disinfection according to policies.
• Cleaning staff has to be trained and instructed. Surveillance at regular intervals has to be ensured.
• In risk areas with increased hazards (e.g. OR, intensive care therapy ward etc) special requirements have to be made for the deployment of cleaning staff which have to be defined in the infection control policy. Depending on size, risk areas and treatment frequency of each department it can be necessary to assign special qualified personnel solely responsible for this particular area.
• Cleaning bucket and other containers for the storage of cleaning and disinfectant solutions and cleaning utensils have to be properly processed following cleaning and disinfection procedures.
• The patient’s environment has to be clean, free of dust and soiling and should be in an optical acceptable and appealing condition for patient and medical personnel.

• Cleaning and disinfection procedures have to lead to a reduction in the microbial count and to the death of pathogenic or facultative pathogenic microorganisms.

• By definition, cleaning procedures with detergents do not kill facultative pathogenic microorganisms. They only remove soil and their killing effect on surface microorganisms is insufficient. Detergents can partly stabilize non-enveloped viruses and promote the formation of spores, e. g. of *Clostridium difficile*. 
• Furthermore, when solely using cleaning procedures without disinfectants this practice actually contributes to the spread of pathogens. Therefore the aim must be to prevent contamination of the solution and the cleaning utensils by applying the appropriate procedures and products for cleaning and disinfection, to achieve the killing/inactivation of microorganisms in risk areas, to prevent the spread of pathogens and to ensure the interruption of potential infection chains.

• Cleaning and disinfection procedures must neither promote an increase in the microbial count nor a spread of facultative pathogenic microorganisms (Pseudomonads, Enterobacteriaceae, Acinetobacter) on the treated surfaces.
• Surfaces e.g. of medical appliances as well as all other horizontal surfaces should be relatively smooth, with sealed joints, without seams, washable and disinfectable with a disinfectant.

• Due to the difficulties in cleaning and disinfection of textile floor coverings, these should not be used wherever regular cleaning and disinfection is necessary for reasons of infection prevention.

• Any clothes used in cleaning floors have to be disinfected by washer machine at high temperature and the used stick should placed in active chlorine for 5 minutes.

• The rooms for processing and storage of cleaning materials and utensils have to be sufficiently large and air conditioned. According to need appropriate washer disinfectors for the processing of cleaning utensils and devices as well as drying appliances should be available.
• The surface to be disinfected has to be rubbed with slight pressure (wet mopping) using a sufficient amount of disinfectant.

• Open disinfection solutions should not be used for more than one day.

• In the event of severe contamination with organic material (blood, secretions, feces etc.) the visible material should be taken up with a cloth soaked in disinfection solution that has to be discarded afterwards. For this activity disposable gloves should be used. Subsequently the surface must be disinfected
• **Area without infection risk** Examples Staircases, floors, Administration, offices, Dining areas, Lecture halls, Classrooms, technical areas: The appropriate method is cleaning only.

• **Areas with possible infection risk** Examples General wards, Outpatient areas, Radiology, Physical therapy, Sanitary rooms, Dialysis, Accouchement, Intensive therapy/-surveillance

• **Surfaces with frequent hand / skin contact:** cleaning and Disinfection (most appropriate is cidex).
  floors, doors, ceilings other surfaces: cleaning
• **Areas with special infection risks** Examples OR departments, Intervention/OR rooms, Units for:
  – special intensive therapy, e. g.: (patients receiving long-term artificial respiration (> 24),
  – transplantations (e. g. BMT, stem cells)
  – haemato-oncology (e. g. patients under aggressive chemotherapy) premature infants

**Surfaces with frequent hand/skin contact:**
Disinfection

**floors:**
Disinfection

**other surfaces:**
Cleaning
• Areas with patients who carry pathogens in them or on them so that in individual cases there may be the risk of dissemination, TB, MRSA.

**Surfaces with frequent hand/skin contact:**
Disinfection

**Floors:**
Disinfection

**Other surfaces:**
Cleaning

• Areas in which there is an infection risk, particularly for personnel Examples
Microbiology laboratories, Pathology, Disposal, Dirty areas of: laundries
function units, e.g. central sterilization
Cleaning and disinfection
• Control and Quality Assurance
• Disinfection and cleaning procedures and procedures for processing cleaning utensils have to undergo regular hygiene inspections, including the cleaning and disinfection of utensils and solutions. By means of hygienic, microbiological examinations the efficacy of cleaning and disinfection procedures as well as the possible spread of facultative pathogenic microorganisms can be monitored.
3. Proper air ventilation.


5. Proper waste collection and disposal.

6. Cleaning and dis-infection of equipment.

7. Proper linen collection, cleaning, distribution.

9. Sterilization:
   Central sterilization department serving all hospital departments compiling with infection control precautions.
Patient protection:

* corrective measures before major procedure, vaccination, proper use of antibiotics.

* Isolation precautions.

* Limiting endogenous risk
Staff health promotion and education:

1. HCW are at risk of acquiring infection, they can also transmit infection to patients and other employee.
2. Employee health history must be reviewed, immunizations recommendations to be considered.
3. Release from work if sick, occupation injury must be notified.
Enjoy Good Health

THANK YOU