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AMENDMENT SHEET

S.no	Section no & page no	Details of the amendment	Reasons	Signature of the preparatory authority	Signature of the approval authority

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1. INTRODUCTION

Background:

Malabar Medical College Hospital & Research Centre, is a multi-specialty hospital located at Modakkallur of Atholi district in Kozhikode, and the institute initiated its Hospital Infection Control Committee (HICC) in 2014. The institute has developed an efficient Core-team of Doctors, Microbiologists, Intensivists, Nursing Staff and Office staff, who meet regularly to discuss and monitor the various Infection Control Programmes, and carryout Surveillance Rounds, organize Training Programmes for nursing and medical staff and are actively involved in preventing and controlling Healthcare Associated Infections (HAI). The hospital follows a rational disinfection and waste disposal policy, and has implemented policies for the safeguard of the patient and health care workers, in general.

Many factors contribute to the frequency of healthcare associated infections:

- Hospitalized patients are often Immunocompromised
- Undergo invasive examinations and treatments
- Patient care practices and the hospital environment may facilitate the transmission of microorganisms among patients

Bacteria that cause nosocomial infections can be acquired in several ways like autoinfection (endogenous), exogenous cross infection (from other patients or staff) and from the health care environment. The best way to prevent infections is by following standard precautions, these are a set of recommendations designed to help minimize the

risk of exposure etc. infectious materials by both clients and staff. With the emergence of life-threatening infections, there is a need for implementation of efficient infection control programme in all health care centers and in different capacities should be of paramount importance. An infection control programme puts together various practices which, when used appropriately ,restrict the spread of infection. A breach in infection control practices facilitates transmission of infection from patients to health care workers, other patients and attendant so It is therefore important for all health care workers, patients, their family member's friends and close contacts to adhere to the infection control guidelines strictly. It is also imperative for health care administrators to ensure implementation of the infection control programme in health care facilities

Need for an Infection Control Programme

The primary need for an infection control programme is

- To support hospitals in reducing the risk of health-care-associated Infections
- Set relevant objectives consistent with other national health care objectives
- Develop and continually update guidelines for recommended health care surveillance, prevention and practice.
- Develop system to monitor selected infections and assess the effectiveness of interventions.
- Harmonize initial and continuing training programmes for health care professionals.
- Facilitate access to materials and products essential for hygiene and safety.
- Encourage health care establishments to monitor health-care associated infections and to provide feedback to the professionals concerned.

2. PURPOSE

The South-East Asia and Western Pacific Regional Offices of the World Health Organization (WHO) have jointly developed these guidelines to provide comprehensive information to health care workers in the prevention and control of transmissible infections. These are built on current infection control guidelines, which have recently been developed by WHO. They place special emphasis on standard and additional (transmission-based) precautions. The guidelines have been prepared specifically to assist infection control practitioners in the integrated management of healthcare associated infections prevention and control (for both curative and preventive activities such as good environmental practices like proper disposal of health care waste, water quality control etc.) and to ensure that health care administrators understand the significance of infection control programmes.

3. OBJECTIVES

The general objective of these guidelines is to provide administrators and health care workers with the tools to enable them to implement the infection control programme effectively in order to protect themselves and others from the transmission of infections. The specific objectives of these guidelines are to provide directions and information in relation to:

- Facilities, equipment, and procedures necessary to implement standard and additional (transmission-based) precautions for control of infections,

- Cleaning, disinfecting and reprocessing of reusable equipment
- Waste management.
- Protection of health care workers from transmissible infections.
- Infection control practices in special situations.

Use of the guidelines

The guidelines are generic in nature and can-be used in any health care facility, Healthcare facilities need to adapt them to suit their needs, context and resources. Health care providers should periodically refer to WHO Websites for up-to-date information on infectious diseases and their control Malabar Medical College Hospita & Research Centre Infection Control Team has developed Policies and Procedures based on the **WHO, NÀBH Guidelines**

4. HOSPITAL INFECTION COMMITTEE STRUCUTRE & FUNCTIONS

COMMITTEE MEMBERS:

SL.NO		
1	**Professor/HOD Microbiology**	Chairman
2	**Deputy Medical Superintendent**	Convener
3	**Microbiologist**	Infection control officer
4	**Infection Control Nurse**	Secretary
5	**Director- Medical operations**	Member
6	**Deputy Medical Director**	Member
7	**Cheif Administrative Officer**	Member
8	**Cheif Operation Officer**	Member
9	**Cheif Nursing Officer**	Member
10	**Head Of Supply Chain Management**	Member
11	**Maintenance Manager**	Member
12	**Assistant Manager Of Quality**	Member
13	**CSSD Incharge**	Member
14	**MICU Incharge**	Member
15	**ICCU Incharge**	Member
16	**OT Incharge**	Member
17	**Laundry Incharge**	Member
18	**House keeping Incharge**	Member
19	**Epidemiologist**	Member
20	**Health Inspector**	Member

4.1 Responsibilities of the HIC committee:

- To review, approve and implement a yearly programme of activity for surveillance and prevention of infection
- To review epidemiological surveillance data and identify areas for intervention - technology and/or training needs assessment
- To assess and promote improved practice at all levels of the health facility
- To ensure appropriate staff training in infection control and safety
- To review risk associated with new technologies and monitor infectious risk of new devices and products, prior to their approval for use
- To review and provide input into investigation of epidemics
- To develop and implement a hospital antibiotic policy .e To regularly meet once every month to discuss issues and develop outcomes
- To communicate and cooperate with other committees of the hospital with common interests such as Pharmacy and therapeutics or Antimicrobial Use Committee, Biosafety or Health and Safety Committee and Blood Transfusion Committee

4.2 Functions of the HICC Chairperson:

- HICC chairperson is an expert in the field of infection control and is always available to advice on all the aspects of infection-control
- To co-ordinate between the infection control committee members and the hospital administration
- To receive all the surveillance reports and information pertaining to healthcare associated infections, and to initiate necessary action based on the reports
- To initiate research activities and surveillance programme in the institution
- To keep oneself abreast with the recent developments in the field
- To educate and provide feedback to the clinicians using surveillance and antibiogram data
- To conduct monthly meetings of the infection control committee

4.3 Functions of the HIC Coordinator:

- To take hospital visits periodically to ensure all the infection control practices are being practiced
- To co-ordinate with the chairperson in planning infection control programme and measures
- To keep a track of any developing outbreaks
- To participate and guide in research activities

- To manage proper isolation techniques
- To ensure provision of hand washing or alcohol based hand-cleansing solutions
- To develop standards of proper insertion of and maintenance of all medical devices

4.4 Functions of the Infection Control Nurse:

- To work as a clinical supervisor by ensuring that all the established policies and protocols are practiced e.g. hand washing procedure, use of hand rub, isolation policies, care of vascular access and urinary catheters, standard precautions, terminal cleaning / disinfection and follow up of needle-stick injuries.
- To work as an investigator along with the infection control committee to track down outbreak
- To evaluate equipments to detect risks leading to infection hazards
- To work as an educator by participating in formal and in informal teaching programme for nurses and other healthcare workers .
- To attend appropriate courses and workshops
- To work as a researcher in co-ordination with the other members of the committee

- To ensure adequate isolation precautions based on the reports of microbiology especially about nosocomial strains eg. MRSA, ESBL etc.
- To performs Surgical site infection surveillance for clean and selected clean contaminated cases
- To spot surveillance once a month to assess the peripheral line, urinary catheter, CVC, waste disposal etc.
- To inform the nurse on the floor for immediate discharge or transfer the patient to isolation room .

4.5 Role of the Hospital Management:

- To provide leadership by supporting the hospital infection control programme
- Is responsible for establishing a multi-disciplinary Infection Control Committee, identifying appropriate resources for a programme.
- To monitor infections and apply the most appropriate methods for preventing infection.
- To ensure education and training of all staff through support of programmes on the prevention of infection, disinfection and sterilization techniques.
- To delegate technical aspects of hospital hygiene to appropriate staff, such as

    - Housekeeping
    - Maintenance

- Clinical microbiology laboratory
- Nursing

- To periodically review the status of nosocomial infections & effectiveness of interventions to contain them.
- To review, approve and implement policies approved by the Infection Control Committee.
- To ensure that the infection control team has authority to facilitate appropriate programme and to participate in outbreak investigation.

4.6 Role of the Physician:

- Physicians have unique responsibilities for the prevention and control of hospital infections:
- To provide direct patient care using practices which minimize infection
- To follow appropriate practice of hygiene (e.g. hand washing, isolation)
- To protect their own patients from other infected patients and from hospital staff who may be infected
- To comply with the practices approved by the Infection Control Committee
- To obtain appropriate microbiological specimens when an infection is present or suspected
- To notify cases of hospital-acquired infections to the team, as well as the admission of infected patients
- To comply with the recommendations of the Antimicrobial Use Committee regarding the use of antibiotics
- To advise patients, visitors and staff on techniques to prevent the transmission of infections

- To institute appropriate treatment for any infections they themselves have, and to take appropriate steps to prevent such infections being transmitted to other individuals, especially patients

4.7 Role of the Microbiologist:

- Handling patient and staff specimens to maximize the likelihood of a microbiological diagnosis
- Developing guidelines for appropriate collection, transport, and handling of specimens
- Ensuring laboratory practices meet appropriate standards
- Ensuring safe laboratory practice to prevent infections in staff
- Performing antimicrobial susceptibility testing following internationally recognized methods
- Providing summary reports of prevalence of resistance
- Monitoring sterilization, disinfection and the environment where necessary
- Timely communication of results to the Infection Control Committee
- Epidemiological typing of hospital microorganisms where necessary

4.8 Role of the Infection Control Team:

- Organizing an epidemiological surveillance programme for nosocomial infections
- Participating with pharmacy in developing a programme for supervising the use of anti-infective drugs
- Ensuring patient care practices are appropriate to the level of patient risk
- Checking the efficacy of the methods of disinfection and sterilization and the efficacy of systems developed to improve hospital cleanliness
- Participating in development and provision of teaching programme for the medical, nursing, and allied health personnel, as well as all other categories of staff
- Providing expert advice, analysis, and leadership in outbreak investigation and control
- Participating in the development and operation of regional and national infection control initiatives

5. INFECTION CONTROL TEAM

The infection control team is responsible for the day-to-day activities of the infection control programme. Health care establishments must have access to specialists in infection control, epidemiology, and infectious disease, including physicians and infection control practitioners.

The reporting structure must, however, ensure that the infection control team has appropriate authority to manage an effective infection control programme. The infection control team or individual is responsible for the day-to-day functions of infection control as well as preparing the yearly work plan for review by the infection control committee and administration. These teams or individuals have a scientific and technical support role, eg. surveillance and research, developing and accessing policies and practical supervision, evaluation of material and products, overseeing of sterilization and disinfection, ensuring sound management of medical waste and implementation of training programmes. They should also support and participate in research and assessment programmes at the national and international levels. The infection control team shall consist of

a. Infection control officer
b. Physician / Paediatrician
c. Infection control Nurse
d. Clinical Microbiologist
e. Head of Department Medicine
f. Head of Department Surgery
g. C.S.S.D Incharge
h. Pharmacy Incharge

i. Maintenance

j. House keeping supervisor

k. Infection control committee Secretary

5.1 The infection control team should:

- Consist of at least an infection control practitioner who should be trained for the purpose of carrying out the surveillance programme
- Develop and disseminate infection control policies.
- Monitor and manage critical incidents.
- Coordinate and conduct training activities.

5.2 Infection Control Team Functions:

- To review and approve a yearly programme of activity for surveillance and prevention.
- To develop a system of identifying, reporting, investigating and controlling Healthcare associated infections.
- Develop a Hospital Antibiotic Policy.
- Regular meetings on second wednesday of every month.
- To assess and promote improved practice at all levels of the health facility.
- To ensure appropriate staff training in infection control and safety management, provision of safety materials such as personal protective equipment and

products.

- Training of health workers.

The infection control programme will be effective so long as it is comprehensive and includes surveillance and prevention activities, as well as staff training.
The responsibilities of the central sterilization service are –

- To clean, decontaminate, test, prepare for use, sterilize, and store aseptically all sterile hospital equipment.

- To develop and monitor policies on cleaning and decontamination of reusable equipment and contaminated equipment.

The Incharge of this service must:

a. Monitor sterilization methods, according to the type of equipment
b. Monitor sterilization conditions (e.g. temperature, duration, pressure, humidity)
c. Monitor the use of different methods physical, chemical and bacteriological indicators to monitor the sterilization process.
d. To ensure technical maintenance of the equipment according to national standards and manufacturers recommendations.
e. To report any defect to administration, maintenance, infection control and other appropriate personnel.
f. To maintain complete records of each autoclave run and ensure long-term availability of records.

g. To collect or have collected, at regular intervals, all outdated sterile units.

h. To communicate, as needed, with the Infection Control Committee, the nursing service, the operating and hospital transport service departments.

5.3 Role of the Housekeeping Service:

The In-charge is responsible for-

- Classifying the different hospital areas by varying need for cleaning and developing policies for appropriate cleaning techniques.
- To develop policies for collection, transport and disposal of different types of waste.
- To ensure that liquid soap and paper towel dispensers are replenished regularly.
- Informing the maintenance service of any building problems requiring repair, cracks, defects in the sanitary or electrical equipment, etc.
- To ensure cleaning in public areas and deal with problems of pest control (insects, rodents).
- To provide appropriate training for all new staff members and, periodically, for other employees, and specific training when a new technique is introduced

5.4 Role of Maintenance Department:

Maintenance department is responsible for-

- Inspections and regular maintenance of the plumbing, heating, and refrigeration equipment, electrical fittings and air conditioning
- Records should be kept of this activity collaborating with housekeeping, nursing staff for other appropriate groups in selecting equipment
- Ensuring early identification and prompt correction of any defect and developing procedures for emergency repairs in essential departments
- Ensuring environmental safety outside the hospital, e.g. waste disposal, water sources

6. SURVEILLANCE OF HEALTHCARE ASSOCIATED INFECTIONS

Surveillance is defined as continuous monitoring, data collection, analysis and interpretation of da essential to prevent Healthcare Associated Infections and to plan and implement better healthcare services.

6.1 Specific objectives of a surveillance programme include:

- To improve awareness of clinical staff and other hospital workers (including administrators) about healthcare associated infections and antimicrobial resistance so that they appreciate the need for preventive action
- To monitor trends: incidence and distribution of nosocomial infections, prevalence and, where possible, risk-adjusted incidence for intra- and interhospital comparisons

- To identify the need for new or intensified prevention programme, and evaluate the impact of preventive measures
- To identify possible areas for improvement in patient care, and for further epidemiological studies (i.e. risk factor analysis)
- To judge whether efficient measures are taken to prevent avoidable infections
- To provide a feedback to further evaluate and improve the system on regular basis.

6.2 Surveillance Rounds Schedule format

TEAM MEMBERS

1. Infection Control Officer
2. Microbiologist
3. Nursing Superintendent
4. Infection Control Nurse
5. Quality Team

6.3 AREAS COVERED FOR SURVEILLANCE

a. Out Patient Department

b. Emergency Department

c. Laboratory Medicine

d. MICU, NICU, Dialysis, CCU, Cath-Lab, PICU, SICU

e. Operation Theater, Labour Room

f. All Wards

g. CSSD

h. Blood Bank

i. Canteen, Diet, Kitchen

j. Laundry

- The Nursing In-charge of each Ward will accompany the team and shall be accountable to ensure that all suggestions are followed and deficiencies pointed out, (if any) are rectified. These exercises will ensure that hospital acquired infections are kept at the minimum level if not eliminated completely.
- Surveillance Rounds reports are deposited with the HIC Secretary in order to expedite the paper work for the next HIC meeting.

- Verification of the data is done on regular basis by infection control team.
- Form C is collected for all identified infections and infections which are serious are verified.
- In case of notifiable diseases, information is sent through appropriate authorities.

6.4 List of Notifiable Diseases:

1. Cholera
2. Plague
3. Polio
4. Influenza
5. Malaria
6. Rabies
7. HIV/AIDS
8. House-borne types
9. Tuberculosis
10. Leprosy
11. Leptospirosis
12. Anthrax
13. Viral hepatitis
14. Dengue Fever
15. Nipa
16. H1N1

Surveillance activities of the team will ensure tracking and analyzing of infection risk,

rates and trends. Prevalence rate of infection is studied at regular intervals and produced in an annual report. Organization shall take suitable steps based on the

analysis. Surveillance activities include monitoring the effectiveness of housekeeping services as following aspects in hospital

Key points in the process of surveillance for healthcare associated infections

- Active surveillance (prevalence and incidence studies)
- Targeted surveillance (site-, unit-, priority-oriented)
-
- Standardized methodology
- Appropriately trained investigators

6.5 Active Surveillance:

Rates of HAIs are obtained by dividing a numerator (number of infections of infected patients observed) by a Denominator (population at risk, or number of patient-days of risk). The frequency of infection can be estimated by prevalence and incidence indicators.

6.6 Prevalence and incidence indicator:

1. **Symptomatic urinary tract infection rate**:

   Number of urinary catheter associated UTIs in a month/ Number of urinary catheter days in that month x 1000

2. **Respiratory infection rate (VAP)**:

   Number of ventilator associated pneumonias in a month/ Number of ventilator days in that month x 1000

3. **Surgical Site Infection rate**:

Number of surgical site infections in a given month/ Number of surgeries performed in that month x 100

4. **Incidence of bed sores after admission:**

   Number of patients who develop new/worsening of pressure ulcer in a given month / Number of discharges and deaths in that month x 100

5. **Incidence of needle stick injury:**

   Number of parenteral exposures in a month (Injury due to any sharp) / Number of inpatient days in that month x 100

6. **Incidence of phlebitis:**

   Number of phlebitis cases in a given month / Total number of IV cannulation in a given month x 100

7. **Central Line Associated Blood Stream Infection (CLABSI) rate,**

   Number of central line associated blood stream infection in a month / Number of central line days in that month x 1000

6.7 Targeted Surveillance:

Targeted surveillance activities are the most cost-effective and manageable and are used at Malabar Medical College Hospital & Research Centre. These activities are aimed at —

- High-risk areas (e.g. Intensive Care Unit, Neonatal Intensive Care Unit etc)
- Type of infections (Surgical Site Infections, Blood Stream Infections etc)
- Procedure Directed (Central Line Associated, Urinary Catheter Associated)

7. PREVENTION OF HEALTHCRE ASSOCIATED INFECTIONS

Healthcare Associated Infection (HAI) or Nosocomial Infection is acquired in a hospital by a patient, that is, it was not present or incubating at the time of admission. This also includes infections acquired in the hospital but appearing after discharge. Nosocomial infection rate in patients in a healthcare facility is an indicator of the quality and safety of the care. The development of a surveillance process to monitor this rate is an essential first step to identify local problems, priorities, and evaluate the effectiveness of infection control activity. Surveillance by itself, is an effective process to decrease the frequency of hospital-acquired infections.

The following healthcare associated infections are monitored at Malabar Medical College Hospital and Research Centre.

Urinary Tract Infections

Ventilator Associated Pneumonia

Surgical Site infections

Blood Stream Infection

7.1 Guidelines for The Prevention of Catheter-Associated Urinary Tract Infections

Of hospitalized patients in acute care, about 40% of nosocomial infections are urinary tract related. Most of these infections follow instrumentation of the urinary tract, mainly Urinary catheterization. Although not all catheter-associated urinary tract infections can be prevented, it is believed that a large number could be avoided by proper management of the indwelling catheter.

The following guidelines pertain to the care of patients with temporary indwelling urethral catheters. Patients who require long-term indwelling catheters or individuals who can be managed with intermittent catheterization may have different needs and require separate consideration.

I. Catheter Use

- Urinary catheters should be inserted only when necessary and left in place for as long as necessary. They should not be used solely for the convenience of patient-care.
- For selected patients, other methods of urinary drainage such as condom catheter drainage or suprapubic catheterization can be useful alternatives to indwelling urethral catheterization.
- The silver and hydrogel-coated Foley s catheter is recommended to reduce the risk of urinary tract infections**.**

II. Catheter Insertion

- Thoroughly wash hands or use antimicrobial hand gel before inserting the catheter.
- Catheters should be inserted using aseptic technique and sterile gloves and equipment.

- Gloves, drapes, sponges, an appropriate antiseptic solution for peri-urethral cleansing, and a single-use packet of lubricant jelly should be used for insertion.
- As small a catheter as possible, consistent with good drainage, should be used to minimize urethral trauma.
- Indwelling catheters should be properly secured after insertion to prevent movement and urethral traction.

III. Closed Sterile Drainage

- A sterile, continuous, closed drainage system should be maintained.
- The catheter and the drainage tubing should not be disconnected unless the catheter must be irrigated,
- If breaks in aseptic technique, disconnection, or leakage occur, the collecting system should be replaced using aseptic technique after disinfecting the catheter-tubing junction.

IV. Irrigation

- Irrigation should be avoided unless obstruction is anticipated (e.g., as might occur with bleeding after prostatic or bladder surgery); closed continuous irrigation may be used to prevent obstruction.
- Intermittent irrigation should only be used to relieve obstruction due to clots, mucus, or other causes. A large-volume sterile syringe an sterile irrigate should be used and then discarded. As ep technique should be used. The catheter-tubing junction should be disinfected before disconnection,

- If the catheter becomes obstructed, the catheter should be changed if it is likely that the catheter is contributing to the obstruction (e.g., formation of concretions).

V. Specimen Collection

- Small volumes of fresh urine for •examination can be obtained from the sampling port. The port should be disinfected and urine aspirated with a sterile needle and syringe or other collection device
- Larger volumes of urine for special analyses should be obtained aseptically from the drainage bag.

VI. Urinary Flow

- Unobstructed flow should be maintained. (Occasionally, it is necessary to temporarily obstruct the catheter for specimen collection or bladder training).
- To achieve free flow of urine.
    1. The catheter and drainage tube should be kept from kinking.
    2. The collecting bag should be emptied regularly using a separate collecting container for each patient. (The drainage spigot and the non-sterile collecting container should never come in contact.)
    3. Poorly functioning catheters should be replaced,
    4. Collecting bags should always be kept below the level of the bladder. Never place the drainage bag in a place that can contaminate it. e.g., the floor.

VII. Perineal Care

- Special meatal care is not required. Daily soap and water cleansing of the perineal area is an important part of the hygiene for all patients.
- Do not use powder because it will cause drying of the meatus.
- Clean catheter-meatal junction after every incontinent stool.

VIII. Other Issues

- Urine measuring devices and specific gravity manometers should be:
    1. Rinsed well after each use and stored dry.
    2. For individual patient use - labeled with the patient's name and bedroom number.

- Avoid changing the indwelling catheter unnecessarily. If the catheter is draining well, leave it in place. Removal of the catheter will not remove organisms from the bladder. Never culture the catheter tip when the catheter is removed as it does not predict organisms causing the UTI and may lead to unnecessary treatment.
- Change the drainage bag when you insert a new catheter. Also, change the drainage bag

  When it becomes stained, clouded by sediment, or leaks.

- Encourage fluids within limits the patient can medically tolerate, Flush the urinary system from the inside out, the so-called "natural flush," Normal fluid intake should be around 2000 ml daily.

8. Guidelines for The Prevention Of Nosocomial Pneumonia

Pneumonia is the second most common nosocomial infection reported in the world and is associated with substantial morbidity and mortality. Most patients with nosocomial pneumonia are those with extremes of age, severe underlying disease, immunosuppression, depressed sensorium, and cardiopulmonary disease, and those who have had thoraco-abdominal surgery. Although patients with mechanically assisted ventilation do not comprise a major proportion of patients with nosocomial pneumonia, they have the highest risk of developing the infection.

Most bacterial nosocomial pneumonias occur by aspiration of bacteria colonizing the oropharynx or upper gastrointestinal tract of the patient. Intubation and mechanical ventilation greatly increase the risk of nosocomial bacterial pneumonia because they alter first-line patient defenses.

Pneumonias due to Legionella spp., Aspergillus spp., and influenza virus are often caused by inhalation of contaminated aerosols. Respiratory syncytial virus (RSV) infection usually follows viral inoculation of the conjunctivae or nasal mucosa by contaminated hands.

Traditional preventive measures for nosocomial pneumonia include decreasing aspiration by the patient, preventing cross-contamination or colonization via hands of personnel, appropriate disinfection or sterilization of respiratory therapy devices, use of available vaccines to protect against particular infections, and education of hospital staff and patients.

The following guidelines are based on recommendations from the Centers for Disease Control and prevention.

a. Compliance with Standard Precautions e.g., hand-washing, PPE.

b. Perioperative Measures for Prevention of Post operative Pneumonia

1) Patients at risk should receive pre-and postoperative instruction and therapy designed to prevent postoperative pulmonary complications such as pneumonia.
2) Pain that interferes with coughing and deep breathing should be controlled.
3) Systemic antibiotics should not be routinely used to prevent postoperative pneumonia.

c. Fluids and Medications

1) Only sterile fluids, dispensed aseptically, should be nebulized or used in a humidifier.

2) If multi-dose vials of medication are used, they should be stored according to the manufacturer's directions, dispensed aseptically, and used no longer than the expiration date on the vial.

d. Maintenance of In-use Respiratory Therapy Equipment

1) Fluid reservoirs should be filled immediately before use. Fluid should not be added to replenish partially filled reservoir Residual fluid should be discarded and the reservoir filled with fresh fluid.
2) Water that has condensed in tubing should be discarded and not allowed to drain back into the reservoir ,
3) Disposable nebulizers, breathing circuits for IPPB9 and hand-held nebulizers should be replaced every 24 hours.
4) Disposable humidifiers for use with wall oxygen should be replaced when depleted.
5) Disposable supplies such as nasal prongs, tubing, masks, ventilator and breathing circuits are for single patient use only
6) Ventilator circuits and accompanying valves and probes should be changed and replaced every 7 days and as needed
7) When a respiratory therapy machine is used to treat multiple patients, the breathing circuit must be changed between patients

e. Anesthesia Machines, and Breathing Systems or Patient Circuits

Clean and then sterilize or subject to high-level liquid chemical disinfection or pasteurization reusable components of the breathing system or patient circuit (e.g., tracheal tube or face mask; inspiratory and expiratory breathing tubing; y-piece; reservoir bag; humidifier and tubing) between uses on different patients, by following the device manufacturer's instructions for their reprocessing.

f. Pulmonary-Function Testing Equipment

Sterilize or subject to high-level liquid chemical disinfection or pasteurization reusable mouthpieces and tubings or connectors between uses on different patients, OR follow device manufacturer's instructions for their reprocessing.

g. Patients with Tracheostomy

1) Tracheotomy should be performed under aseptic conditions in an operating room, except when there are clinical indications for emergency bedside tracheotomy.

2) Tracheotomy care requires clean technique (unless otherwise ordered) with both hands gloved. Use sterile water, NOT tap water

h. Suctioning of the Respiratory Tract

1) Risk of cross-contamination and excessive trauma increases with frequent suctioning. Suctioning should not be done routinely but only when needed to reduce substantial secretions.
2) Suctioning should be performed using gloves on both hands. Use of protective eyewear and mask are strongly encouraged.
3) A sterile catheter should be used for each series of suctioning (defined as a single suctioning or repeated suctioning done with only brief periods intervening to clear of flush the catheter).
4) If flushing of the catheter is required, sterile fluid should be used. Fluid that is contaminated by use for one series of suctioning should be discarded.
5) Suction connecting tubing and suction canisters should be changed between patients, and daily for ongoing patients.
6) Unless disposable, suction canisters should be thoroughly cleaned to remove organic material, then receive high-level disinfection or be sterilized.

i. Bacterial Pneumonia

1) Educate healthcare workers regarding nosocomial bacterial pneumonias and infection control procedures to prevent their occurrence.
2) Conduct surveillance for bacterial pneumonia in ICU patients at high risk for nosocomial bacterial pneumonia (e.g., patients with mechanically assisted ventilation to determine trends and identify potential problems. Include data regarding the causative microorganisms and their antimicrobial susceptibility patterns. Express data as rates (e.g., number of infected patients or infections per 100 ICU days or per 1,000 ventilator-days) to facilitate intra-hospital comparisons and determine trends,
3) Do not routinely perform surveillance cultures of patients or of equipment or devices used for respiratory therapy, pulmonary-function testing. or delivery of inhalation anesthesia.

j. Prevention of Aspiration Associated with Enteral Feeding

1) If there is no contraindication to the maneuver, elevate at an angle of 30-45 degrees, the head of the bed of a patient at high risk of aspiration pneumonia (e.g., person receiving mechanically assisted ventilation and/or has an enteral tube in place).
2) Routinely verify appropriate placement of the feeding tube.
3) Routinely assess the patient's intestinal motility (e.g., by auscultating for bowel sounds and measuring residual gastric volume or abdominal girth) and adjust the rate and volume of enteral feeding to avoid regurgitation.

k. Prophylactic Vaccination for Pneumococcal Pneumonia

Recommend vaccination of patients at high risk for complications of pneumococcal infections with pneumococcal poly-saccharide vaccine. High-risk patients include persons >65 years old; adults with chronic cardiovascular or pulmonary disease, diabetes mellitus, alcoholism, cirrhosis, or cerebrospinal fluid leaks; and children and adults with immunosuppression, functional or anatomic asplenia, or HIV infection.

9. Guidelines for Wound Care and Prevention Of Surgical Site Infections

Surgical wound infections present a serious hazard to patients. Local complications include tissue destruction, wound dehiscence, incisional and deep hernias, septic thrombophlebitis, recurrent pain, and disfiguring and disabling scars. Systemic complications include toxemia, bacteremia, shock, metastatic infection, failure of vital organs remote from the infection, and death. The severity of each complication depends in large part on the infecting pathogen and on the site of infection. Surgical Site Infections (SST) are the third most frequent nosocomial infections in most hospitals and are an important cause of morbidity, mortality, and excess hospital costs.

In general, a wound can be considered infected if purulent material drains from it, even without the confirmation of a positive culture. Infected wounds may not yield pathogens by culture because some pathogens are fastidious, culture techniques are inadequate, or the patient has received antimicrobial therapy.

On the other hand, infections, for example, those in the granulocytopenic patient, may not always produce **purulent material. Unless** the incision is involved, stitch abscesses should not be counted as surgical wound infections; they can be counted as skin or cutaneous infections.

1. RISK FACTORS:

It is important to be aware of the risk factors associated with wound infection so as to apply those preventive measures, which will have the most impact.

SSI risk factors are based on considerations of the factors listed below:

- The patient's wound class
- The patient physical condition
- The duration of the procedure

The degree of operative contamination of wounds (according to the traditional wound classification system) is an important risk factor. In general, the more dirty the wound/surgery, the higher the risk of infection.

2. Surgical Wound Classification

a. Class I - Clean:

An uninfected operative wound in which no inflammation is encountered and the respiratory, alimentary, genital, or urinary tract is not entered. In addition, clean wounds are primarily closed and, if necessary. drained with closed drainage. Operative incisional wounds that follow non penetrating (blunt) trauma should be included in this category if they meet the criteria.

b. Class II - Clean-Contaminated:

An operative wound in which the respiratory, alimentary, genital, or urinary tracts are entered under controlled conditions and without unusual contamination, Specifically, operations involving the biliary tract, appendix, vagina, and oropharynx are included in this category, provided no evidence of infection or major break in technique is encountered.

c. Class III - Contaminated:

Open, fresh or accidental wounds. In addition, operations with major breaks in sterile technique (e.g., open cardiac massage) or gross spillage from the gastrointestinal tract, and incisions in which acute, non-purulent inflammation is encountered are included in this category.

d. Class IV - Dirty-Infected:

These include old traumatic wounds with retained devitalized tissues, and those that involve existing clinical infections or perforated viscera. This definition suggests that the organisms causing postoperative infection were present in the operative field before the operation. Host factors such as age, presence of preoperative infection, diabetes, nicotine use,

steroid use, obesity, extremes of age, severe poor nutritional status, and perioperative transfusion of certain blood products are also important. Local wound

factors, such as the presence of devitalized tissue or foreign bodies, and poor blood supply to the wound are also significant.

e. RECOMMENDATIONS:

The following recommendations concern actions that can reduce the risk of surgical site infection.

A. Preoperative

1. Preparation of the patient

a. Whenever possible, identify and treat all infections remote to the surgical site before elective operation and postpone elective operations on patients with remote site infections until the infection has resolved.

b. Do not remove hair preoperatively unless the hair at or around the incision site will interfere with the operation.

c. If hair is removed, remove immediately before the operation.

d. Adequately control serum blood glucose levels in all diabetic patients and, particularly avoid hyperglycemia peri operatively.

e. Encourage tobacco cessation. At minimum, instruct patients to abstain for at least 30 days before elective operation from smoking cigarettes, cigars, pipes, or any other form of tobacco consumption (e.g., chewing/dipping).

f. Advice the patients to shower or bathe the night before the operative day.

g. Thoroughly wash and clean at and around the incision site to remove gross contamination before performing antiseptic skin preparation,

2. Hand/forearm antisepsis for surgical team member

a. Keep nails short and do not wear artificial nails.
b. Clean underneath each fingernail prior to performing the first surgical scrub of the day.
c. Perform a preoperative surgical scrub for at least 2 to 5 minutes using an appropriate antiseptic. Scrub the hands and forearms up to the elbows.
d. After performing the surgical scrub, keep hands up and away from the body (elbows in flexed position) so that water runs from the tips of the fingers toward the elbows. Dry hands with a sterile towel and don a sterile gown and gloves.
e. Do not wear hand or arm jewelry

1) Management of infected or colonized surgical personnel

a. Educate and encourage surgical personnel who have signs and symptoms of a transmissible infectious illness to report conditions promptly to their supervisory and employee health service personnel.
b. Follow work restriction policies concerning patient-care responsibilities when personnel have potentially transmissible infectious conditions. These policies should govern a) personnel responsibility in using the health service and reporting illness, (b) work restrictions, and (c) clearance to resume work after an illness that required work restriction. The policies also should identify persons who have the authority to remove personnel from duty.
c. Obtain appropriate cultures from, and exclude from duty, surgical personnel who have draining skin lesions until infection has been ruled out or personnel have received adequate therapy and infection has resolved.

d. Do not routinely exclude surgical personnel who are colonized with organisms such as S. *aureus* (nose, hands, or other body site) or group A streptococcus, unless such personnel have been linked epidemiologically to dissemination of the organism in the healthcare setting.

2) Antimicrobial prophylaxis

a. Administer a prophylactic antimicrobial agent only when indicated, and select it based on its efficacy against the most common pathogens causing SSI for a specific operation and published recommendations. Administer by the intravenous route the initial dose of prophylactic antimicrobial agent, timed such that a bactericidal concentration of the drug is established in serum and tissues when the incision is made. The first antibiotic dose can begiven any time within 60 minutes preceding the surgical incision but preferably just before the induction, of anaesthesia. For surgery lasting, for more than 4 hours the antibiotic dose should be repeated. Prophylactic antibiotics should be discontinued within 24 hours after the end of surgery.

b. Maintain therapeutic levels of the agent in serum and tissues throughout the operation and until, at most, a few hours after the incision is closed in the operating room.

c. Before elective colorectal operations in addition, mechanically prepare the colon by use of enemas and cathartic agents. Administer non-absorbable oral antimicrobial agents in divided doses on the day before the operation.

d. Do not routinely use Vancomycin for antimicrobial prophylaxis.

A. INTRA OPERATIVE

1) Ventilation

a. Maintain positive-pressure ventilation in the operating room with respect to the corridors and adjacent areas.

b. Maintain a minimum of 15 air changes per hour, of which at least 3 should be fresh air.

c. Filter all air, recirculated and fresh, through the appropriate filters

d. Introduce all air at the ceiling and exhaust near the floor.

e. Keep operating room doors closed except as needed for passage of equipment, personnel, and the patient.

f. Limit the number of personnel entering the operating room to necessary personnel.

2) Cleaning and disinfection of environmental surfaces

a. When visible soiling or contamination with blood or other body fluids of surfaces or equipment occurs during an operation, use an approved hospital disinfectant to clean the affected areas before the next operation.

b. Do not use tacky mats at the entrance to the operating room suite or individual operating rooms for infection control.

c. Wet vacuum the operating room floor after the last operation of the day or night with an approved hospital disinfectant.

3) Microbiologic sampling

Perform microbiologic sampling of operating room environmental surfaces or air only as part of an epidemiologic investigation.

4) Sterilization of surgical instruments

Sterilize all surgical instruments according to published guidelines.

5) Surgical attire and drapes

a. Wear a surgical mask that fully covers the mouth and nose when entering the operating room if an operation is about to begin or already under way, or if sterile instruments are exposed. Wear the mask throughout the operation.

b. Wear a cap or hood to fully cover hair on the head and face when entering the operating room. operation, use an approved hospital disinfectant to clean the affected areas before the next operation.

c. Do not use tacky mats at the entrance to the operating room suite or individual operating rooms for infection control.

d. Wet vacuum the operating room floor after the last operation of the day or night with an approved hospital disinfectant

e. Wear sterile gloves if a scrubbed surgical team member. Put on gloves after donning a sterile gowne.

f. Use surgical gowns and drapes that are effective barriers when wet (i.e., materials that resist liquid penetration)

g. Change scrub suits that are visibly soiled, contaminated, and/or penetrated by blood or other potentially infectious materials

6) Asepsis and surgical technique

a. Adhere to principles of asepsis when placing intravascular devices e.g., central venous catheters), spinal or epidural anesthesia catheters, or when dispensing and administering intravenous drugs.

b. Assemble sterile equipment and solutions immediately prior to use

c. Handle tissue gently, maintain effective hemostasis, minimize devitalized tissue and foreign bodies (i.e., sutures, charred tissues, necrotic debris), and eradicate dead space at the surgical site

d. Use delayed primary skin closure or leave an incision open to heal by second intention if the surgeon considers the surgical site to be heavily contaminated (e.g., Class Ill and Class IV),

e. If drainage is necessary, use a closed suction drain, Place a drain through a separate incision distant from the operative incision. Remove the drain as soon as possible.

7) **Postoperative incision care**

a. Protect with a sterile dressing for 24 to 48 hours postoperatively an incision that has been closed primarily.
b. Wash hands before and after dressing changes and any contact with the surgical site.
c. When an incision dressing must be changed, use sterile technique.
d. Educate the patient and family regarding proper incision care, symptoms ofSSI, and the need to report such symptoms

4. Guidelines for Prevention of Intravenous Therapy-Related Infections

Intravenous (IV) therapy refers to the parenteral administration of fluids & medications, nutritional support & transfusion therapy. IV therapy is a technically highly specialized form of treatment and IV nursing requires advanced clinical knowledge & technical expertise. It is a process and not just a procedure. The intravenous (IV) cannula offers direct access to a patient's vascular system and provides a potential route for entry of microorganisms into that system. These organisms can cause serious infection if they are allowed to enter and proliferate in the IV cannula, insertion site, or IV fluid. IV therapy-related bacteremia is a potential cause of serious illness or death for patients. Additional cannula-related complications which can occur with or without fever or bacteremia include the following:

a. Phlebitis:

Warm, erythematous skin over an indurated or tender vein and often precedes or is associated with the more severe infections.

b. Occult IV-Site infection

Does not produce much (if any) pus or inflammation at the IV site. This is the most common cannula-related infection, may be the most difficult to identify, and is probably associated with more bacteremia as than cellulitis or purulent thrombophlebitis.

c. Cellulites:

Warm, erythematous, and often tender skin surrounding the site of cannula insertion; pus is rarely detectable.

d. Purulent Thrombophlebitis:

Warm, erythematous skin over an indurated or tender vein with purulent drainage from the cannula wound. Pus may drain spontaneously or be expressed with pressure, This infection is dangerous and frequently leads to bacteremia Protocol for inserting Peripheral Line:

- Only head nurse or assigned staff nurses will insert a peripheral cannula
- All peripheral lines should be replaced according to VIP score and sos
- Sterile dressing should be reinforced as and when necessary
- Make a record of the person inserting peripheral line, including time and , date of insertion

A. Steps of the cannula Inserting procedure:

1) Preparation óf equipment (Tray)
2) Preparation of environment
3) Preparation of patient

B. Preparation of the Equipment (Tray):

1) Examination Gloves
2) Surgical Scissors
3) Cotton Swabs
4) Spirit Swabs
5) 5ml / 10ml Syringe
6) IV canula
7) Normal saline flush (10ml)
8) Easy fix
9) Site label (to record time & date of insertion)
10) IV sets (as required)
11) IV Bottles

C. Preparation of the Environment:

1. Provide privacy
2. Well lit room

D. Preparation of the Patient:

1) Inform the patient about the procedure.
2) Site Selection
3) Vein should be visible, soft, elastic, straight, palpable and without valve (metacarpal, basilic, cephalic)
4) Observe skin for abrasions, haematoma, local skin infection etc.
5) Vein visibility

i. Clip the selected site if required
ii. Apply tourniquet 6-8 inches above the site
iii. Palpate the selected vein
iv. Instruct the patient to pump his fist 2-3 times

E. Procedure of IV cannulation

1) Assemble all articles at patient bedside
2) Thorough hand washing (Follow steps)
3) Wear sterile gloves
4) Support the chosen limb
5) Apply the tourniquet
6) Assess and select the vein by gently tapping the site
7) Cleaning the site

a) Clean the chosen area radius; with 70% alcohol, and let it dry

b) Thereafter, chlorhexidine / spirit solution is used to clean the same area in circular motion and allowed to dry

c) Do not repalpate or touch the site after cleaning

8) Iv canula should be selected according to the purpose, vein size and fluid requirement

9) Insertion

a) Disinfect the injection site as explained above

b) Remove the catheter from the packaging and lower the wings

c) Adopt your preferred grip and remove the needle cover

d) Insert the catheter at 15 — 30^0 angle

e) Upon primary flashback (back flow), lower the angle to 100^0 almost parallel to the skin

f) Advance the catheter slightly, 2 — 3 millimeters, to ensure catheter tip is in vein

g) Consider stabilizing the catheter by holding one of the wings

h) Ease the needle back 2 — 3 millimeters

i) Secondary flashback between the needle & catheter will confirm correct placement of the catheter in the vein

j) Advance the catheter completely into the vein

k) Remove the tourniquet

l) Stabilize the catheter by holding one wing

m) Occlude the vein just above catheter tip & withdraw the needle holding the needle grip or grip plate

10) Recording — Upon insertion of the catheter one should always

- Record the date of insertion
- Record the site of insertion
- Record the name of the person who has inserted the catheter
- Signature of the person who has entered the catheter

11) Line Management

- Use aseptic technique at all times
- All IV ports should be closed
- Verify patency of line by gently flushing with normal saline
- Ensure that lines are labeled (date, time, signature)
- Remove line on any sign of redness, swelling, pain
- Change IV set after every 24— 48hrs
- Inspect the canula every 6-8 hrs in adults (every 2 hrs in Neonates) and document VIP score (Visual Infusion Phiebits)
- For giving antibiotics SAS (Saline followed by Åntibiot1c followed by Saline) must be followed

F. Dressings and After Care of Catheter

1) The purpose of a dressing is .

2) To minimize the potential for micro-organisms to breed

3) To protect the puncture site

4) To secure the catheter in place

5) To prevent catheter movement which could damage the vesse

G. After care of the IV Catheter

1. Documentation

- Date and Time, when therapy is initiated
- Type and amount of solution
- Additives and dosages
- Flow rate
- Gauge, length and type of venipuncture device or catheter used
- Insertion site
- Patient's response to the procedure

2. Site Inspection-

Assess site and surrounding area for signs of local complications and other complications like

- Infiltration
- Extravasation
- Phlebitis
- Haematoma
- Thrombosis
- Fragmented or broken cannula
- Occluded cannula

3. Canula site care

- Assess dressing for dryness and occlusiveness
- Frequency of inspection
- In adult patient every 6-8 hours
- pediatric patient every 1 - 2 hour

- Flush the canula with normal saline 2ml before and 3ml after each injection &flush the canula every 8 hrs if it is not in use

H. Termination of Infusion Therapy

- Assessment
- Determination
- Patient need
- Patient response to therapy
- Achievement of expected outcome
- Patient refuses to continue therapy
- Physician's orders
- Order must be clearly written and signed
- Verbal orders to be signed within 24hrs

Recommendations:

1. Gloves must be worn for all vascular procedures.
2. Indications for Use: intravenous (IV) therapy should be used only for definite therapeutic or diagnostic indications.
3. Choice of Cannulas

- Plastic cannulas may be used for routine peripheral IV infusions.
- For central lines, cannulas with the least number of lumens consistent with the

therapeutic needs of the patient should be used, due to the higher risk of infection associated with multi-lumen canulas. A multi-lumen cannula should be

- replaced by single-lumen canula as soon as the patient's condition allows or certain devices like clave connectors can be used for the lumens.
- Peripherally inserted catheters should be used for long term IV therapy (usually greater than 14 days). Sterile technique must be used during insertion.

4. Choice of Site

- In adults, an upper extremity site (or if necessary, subclavian and jugular sites) should be used in preference to a lower extremity site for IV cannulation. All cannulas inserted into lower extremity should be changed as soon as a satisfactory site can be established elsewhere.
- Cannulas inserted under emergency condition and with less than optimal asepsis should be changed as soon as the patient's condition is stabilized and a satisfactory site can be established elsewhere

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5. Site Preparation

- The IV, site should be scrubbed witli an antiseptic prior to venipuncture.
- Alcohol (70%), iodophors, or chlorhexidine can be used. The antiseptic should be applied liberally, with friction, and allowed to remain in contact with the skin for a minimum of 30 seconds prior to venipuncture.

6. Procedures Accompanying Insertion

- A sterile gauze or transparent dressing should be applied to cover the insertion site.
- The cannula should be secured to stabilize it at the insertion site.
- Date of insertion should be recorded in the medical record, and on the dressing or tape.

7. Maintenance of IV Site

- Patients with intravenous devices should be evaluated at least daily for evidence of cannula-related complications, This evaluation should include gentle palpation of the

  insertion site through the intact dressing. If a transparent dressing is used, a visual inspection of the site should accompany palpation. If the patient has an unexplained fever or there is pain or tenderness at the insertion site, the dressing should be removed and the site inspected.
- Peripheral site dressings may remain in place unless they become moist or soiled or must be removed for other reasons
- Central line dressing should be changed when the dressing becomes moist or soiled and should be changed at least twice a weeke This applies , to pic catheters as well.

8. Removal and Replacement of a Cannula

- Peripheral cannula site, , should be changed according to VIP score
- If for any reason a peripheral cannula cannot be removed and replaced the

physician should be notified and the physician should document the indications for prolonged cannulation of a peripheral vein. If the need for vascular access remains and other peripheral sites are not available, a central cannula may be indicated.

- Central cannulas should be removed when cannula associated infection (local or systemic) is suspected.

9. Special Procedures for Central Cannulas (those whose tips lie in the large central vessels or are threaded into or through the chambers of the heart)

- Central cannulas should be inserted with aseptic technique and sterile equipment. Sterile gloves and drapes should be used to achieve this objective. A mask should also be worm
- Central cannulas should be removed when they are no longer medically indicated or if they are suspected of causing sepsis.
- Central cannulas that are inserted through a subclavian or jugular approach need not have the site routinely changed. If prolonged cannulation at a single site is indicated, cannulas may be changed over a guide wire. This is appropriate when there is a change in the number of lumens required
- Central cannulas that are inserted through a peripheral site pose a greater risk of cannula-related infection and should be monitored closely and removed at any sign of infection (local or systemic)

I. Actions for Infection or Phlebitis

- For purulent thrombophlebitis, cellulitis, or IV-related bacteremia, the entireIV system (cannula, administration set, and fluid) should be changed,
- For phlebitis without signs of infection, the cannula should be changed.

J. Culturing for Suspected IV-related infections

- If an IV system is to be discontinued because of suspected IV-related bacteremia/sepsis, the skin at the skin-cannula junction should be cleaned with alcohol and the alcohol allowed to dry before cannula removal. The cannula tip should be sent for culture using semi-quantitative technique, send 3-4 inches of the cannula tip, cut with sterile scissors, in a dry specimen container. **DO NOT** place tip in culture media of any kind.
- Blood cultures (2 sets) should be obtained in conjunction with a cannula tip culture. Whenever possible, blood cultures should not be obtained through the cannula suspected to be related to infection.
- Cannula entry site cultures are not recommended because they are a poor predictor of the organism responsible for cannula related sepsis
- If an IV system is discontinued because of suspected fluid contamination, the fluid should be cultured and the implicated container (bottle or bag) saved in the unit's specimen refrigerator.

  If contamination of fluid is confirmed, the implicated container and the remaining units of the implicated lot should be saved, and the lot number of fluid and additives should be recorded. Notify Infection Control and Pharmacy

K. Guidelines for use of multiple-dose medication vials (MDV)

Single-dose vials are preferable to multiple-dose vials. When the use of multiple dose medications is considered necessary, it is important to take the following precautions against contamination of that medication:

1) Store the medication under the conditions recommended by the manufacturer and/or the pharmacy service.

2) Before use, inspect the container for integrity of packaging and inspect solution for visible contamination.
3) Before each needle puncture of rubber diaphragms, thoroughly disinfect the surface with isopropyl alcohol
4) With each withdrawal of medication, maintain strict aseptic technique (new sterile needle and syringe) to avoid contaminating the remaining medication.
5) MDVs shall be discarded when contaminated (user has knowingly contaminated the MDV or solution has visual evidence of contamination) or before the expiration date indicated on the label., open vial used for 28 Days.

HEALTHCARE WORKER'S SAFETY

- Health-care workers (HCWs) are at risk of many infections at their workplace through airborne, blood borne, faecal-oral transmission and direct contact Exposures to blood borne pathogens have received increased attention since the HIV pandemic. The transmission of blood borne pathogens may occur through percutaneous and mucocutaneous (i.e. contact with intact or non-intact skin and contact with mucous membranes) routes. and sometimes through exposure to other body fluids.

Estimated risk of infection following a needle sticks injury from a positive source blood is as follow

- Hepatitis B Virus — 30%
- Hepatitis C Virus — 3%
    - Human Immunodeficiency Virus — 0.3%

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An exposure that might place HCW at risk for FIBV, HCV or I-HV infection is defined as

NSI: A percutaneous injury (e.g., a needle-stick or a cut with a sharp object)

BBF: Contact of mucous membrane or non-intact skin (e.g., exposed skin that is chapped, abraded or afflicted with dermatitis) - Contact with blood, tissue, or other body fluids that are potentially infectious

Needle Stick Injury (NSI) occurs —

- During and after an IV insertion
- Recapping needles
- Patient movement (children)
- Inappropriate disposal of sharps
- Transferring a body fluid between containers and syringe
    - Failure to clean blood splashes off lid of sharps containe

Precautions for prevention of NSI

- Proper hand hygiene
- Use personal protective equipment
- Avoid the use of needles where safe and effective alternatives are available

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- Avoid recapping needles e Plan for safe handling and disposal before beginning any procedure using needles
- Dispose of used needles promptly in appropriate puncture proof sharps disposal containers
- Use devices with safety features
- Report all needle stick / sharps related injuries and blood & body fluid exposure promptly to ensure that you receive appropriate follow up care
- Tell the hospital about hazards from needles that you observe in your work environment.
- Participate in blood-borne pathogen training
- Follow recommended infection prevention practices, including hepatitis B vaccination
- Regard all waste soiled with blood/body substances as contaminated and dispose of according to relevant standards

Immediate management of NSI/BFE

- Bleeding should be encouraged and the wound washed in warm running water with soap
- It should not be squeezed (The most important part of PEP)
- Skin wounds should be washed with soap and running water (No evidence that antiseptics are useful) and caustic agents (bleach) may do more harm than good
- Mucous membranes should be flushed thoroughly with water (no soap)
- Eyes should be irrigated with a liter of saline.

Post exposure management to prevent Hepatitis B:

Vaccination & Antibody status of the exposed person		Treatment		
		Source HBsAg +ve	Source HBsAg -ve	Source Unknown/not available for testing
Unvaccinated		HB1g (0.06m1/Kg1M) and initiate HB vaccine series(0,1,6)	Initiate HB vaccine series (0,1,6)	Initiate HB vaccine series (0,1,6)
Previously Vaccinated	Known responder (Anti-HBs>10mlU/ml	No Treatment	No Treatment	No Treatment
	Known non-responder(Anti-HBs>10,mlU/ml)	HB1g (0.06m1/Kg 1M) and initiate revaccination	No Treatment	If known high risk source,treat as if source were HBs Ag+ve
	Antibody Response Unknown	Test exposed person for anti HBs 1.1f adequate no treatment 2.If inadequate, administer HB1g and HB vaccine booster dose	No treatment	Test exposed person for anti HBs 1 .1f adequate no treatment 2. If inadequate administer HB vaccine booster dose and then recheck titer in 1-2 month

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Post exposure management to prevent Hepatitis C:

- Determine the status of Source (Anti-HCV)
- No active prophylaxis — Immunoglobulin is not effective
- Interferon is not recommended for prophylaxis
- Blood Test — immediately and at 6 month
- LFT and Anti-HCV at4-6 month

Post Exposure Prophylaxis of HIV (as per NACO):

HIV Classification of Exposure & Source (NACO)

Exposure Code (EC)	Exposure
EC 1	Mucous membrane / skin integrity compromised, small volume (few drops/ short duration) A. Mucous membrane /skin integrity compromised, large volume (several drops/large splash for longer duration, several minutes or longer) 2. Percutaneous exposure, less severe (solid needle / superficial scratch
EC -3	Percutaneous, more severe (large bore hollow needle, deep puncture, visible blood On device or needle used in patients artery or vein)
Source Code (SC)	HIV status of the Source
SC-I	HIV -eve, Low Titer Exposure (asymptomatic / High CD4 Counts)

SC-2	HIV +ve, High Titer Exposure (Advanced AIDS, Primary HIV infection/Hi h Viral load or Low CD4 Counts)
Unknown	Status or Source is Unknown

PEP-HIV Treatment-NACO

Exposure Code	Source Code	Treatment
EC — 1	SC- I	PEP may not be warranted
EC — 1	SC-2	Consider Basic Regimen
EC — 2	SC- I	Recommended Basic Regimen
EC — 2	SC-2	Recommended Expanded Regimen
EC — 3	SC- I or 2	Recommended Expanded Regimen
EC-2 or 3	Unknown	If epidemiological risk factors are present and EC-2 or 3 consider Basic Regimen
Basic Regimen	ZIDOVIDINE 200 mg tid + LAMIVUDINE t 50 mg bid for 4 weeks	
Expanded Regimen	Basic regimen + INDINAVIR 800 mg tid or NALFINAVIR 750 mg tid or SELQUINAVIR (SOFTGEL) 1200 mg tid	

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Reporting protocol in cases of NSI / BBF exposure

- It is important to document the needle stick injuries that happen in an institution
- Do not squeeze the area, allow free bleeding. Wash the injured site with soap and water (antiseptics may be used)
- Check patient's status for HIV, HBs Ag and if not known, get it done
- Immediately go to CASUALTY or any designated area in the healthcare setup
- The needle stick injury protocol form should be filled and signed with the help of the CMO and provide pretest counseling to the healthcare worker
- Inform Infection Control Nurse during working hours and thereafter on next working day
- Inform Night supervisor on duty
- Give your blood sample for HIV, HBs Ag testing in the main Laboratory (needle stick injury protocol form to be filled)
- If source patient is HIV or HBs Ag +ve, then follow up treatment regimen within 2 hrs of the injury
- If source patient is HIV +ve, then repeat blood test of the HCW after 6 wks & 12 wks
- If source patient is HBs Ag-ve, then
- If HCW is vaccinated for HBV and vaccination is within 3 yrs, then HCW blood test should be repeated after 3 months
- If HCW is not vaccinated, then HCW is vaccinated for 1-1BV full course i.e. 0, 1,6 months

Necessary documentation post exposure

- Name and data of source
- Time and date of exposure
- Nature of exposure (percutaneous, non intact skin or mucous membrane)
- Body site exposed and contact time
- Infective state of the source, if documented
- Hollow. For percutaneous injuries, a description of the injury (depth of wound, solid vs needle, sharps etc.)
- Circumstances under which the exposure incident occurred
- Previous testing and immune status of the exposed HCW

Immunization for Health care workers:

- Employees enrolled
- Follow—up

HEPATITIS B VACCINE PROGRAM

a. Vaccine offered/Potential exposure

All employees whose jobs involve tasks with potential exposure to blood borne pathogens shall be offered the vaccine series. Any person, who, at the time of recruitment claims to be fully vaccinated against HBV) shall get anti I-IBS titers done at the time of recruitment

b. Contractual Staff

All contract workers shall be vaccinated against EBV before being assigned any job work in the hospital. A list of all such workers working anywhere in the hospital at a given time shall be available with the Personnel departments.

c. Pre-vaccination screening

Generally pre-vaccination screening is not offered, but may be provided for employees with a reasonable possibility of being immune, e.g. stating a history of hepatitis but not knowing the type, etc.

d. Information provided

Information on the risk of occupational Hepatitis B, as well as other blood borne pathogens, will be provided to all employees at risk.

Declining vaccination

Should an employee choose to decline the vaccine, a declination form will be completed and the employee informed that they may be vaccinated at any time in the future. (See attached Hepatitis consent form.)

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e. Post-vaccination screening

Post-vaccination screening is not done routinely with the exception of dialysis staff Should an exposure to blood or other body fluids occur, antibody screening will be obtained and the immunization repeated if needed. Current standards do not provide an interval after which a vaccine booster should be given. Studies of vaccines have shown that the antibody may persist for a number of years after the series has been taken.

f. Screening of Dialysis Staff

Susceptible Staff: Includes staff who are I-BsAg (-) and/or HBsAb G), should be tested semiannually, or those who are in process of receiving vaccine series.

Vaccinees : Anti-HBs after completing series (if positive-no further screening unless an exposure occurs)

New Hires: HBsAg, anti I-IBS if no history of vaccination, anti I-IBS only if vacc

Employees With Infections

Introduction:

Employees cannot work with acute infections due to the risk of transmission to patients. Early signs of infections (i.e., fever, diarrhea, nausea, productive cough, rhinitis, conjunctivitis, etc.) often mean large amounts of virus or other pathogens are being shed A draining wound is a contraindication for caring for patients. When in doubt, speak with your supervisor. Infection Control or Employee Health staff is available for consultation in those circumstances which are uncertain.

Policy:

Illness/infection	Work Restriction	Duration
Acute illness with fever caused by any infection	May not work	Until fever and other symptoms resolve
Conjunctivitis	May not work	Until discharge ceases
Dermatitis of hands/ forearms	May not work on atient care)	Until cleared by EH

Diarrhea: acute onset with other symptoms a. Patient Care personnel b. Food Handlers	a. May not work b. May not work	a. Until cleared by EH be Duration of illness (see Nutrition & Dietetics policy
	a.	
Draining wounds: a. Hands, arms, face b. Other areas if covered b clothing	b. Remove from patient care or food handling c. May work	a. Until cleared by EH b Keep area well covered
Group A Strep Infection	May not work	24 hours after treatment started and with symptom improvement

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Employees cannot work with acute infections. Work restrictions shall be enforced in accordance with the Table of Illness/infections (see attached Table). Employees infected with blood borne pathogens may seek confidential counseling regarding their professional activities and safe practice through the Employee Health Service, Infection Control, or the Medical Superintendent's Office

A Table of Illnesses/Infections and Related Work Restrictions
[Key: EH = Employee Health, N/A = Not Applicable]

Hepatitis A	May not work	7 days after onset of jaundice
Hepatitis B 1. Acute 2. Chronic active/carrier	a. EH evaluation & counseling b, EH counseling is available	a. Per evaluation by EH b. N/A
Hepatitis C a. Acute b. Chronic active/carrier	a. EH evaluation. & counseling b. EH counseling is available	a. Per evaluation by EH
Herpes simplex: a. Genital b. Hands (whitlow) c. Facial	a. Good handwashing b. No direct patient care (<1 yr children with exema/burns, immunocompromised pts of any age) c. Mask for direct patient care	b. Until lesions dry and crustedco While lesions are draining

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HIV/AIDS related infections	None unless otherwise noted in this table. Confidential counseling available through EH and (Dentistry) Dean's Advisory Committee on Health and Safety	N/A
Measles: a. active b. exposure in susceptible host or status unknown (pending titer)	a. May not work b. May not work	a. Until 4 days after rash appears and afebrile b. From day 5 through day 21 after exposure regardless of whether Immune Globulin or vaccine given post exposure
Mumps: a. active b. post exposure in susceptible host	a. May not work b. May not work	a.Until 9 days after onset of parotitis b. From day 12 through day 25 after exposure
Tuberculosis (active pulmonary or laryngeal disease)	May not work	Until completion of a minimum of 14 days of 4 drug therapy, with clinical (cough resolved, afebrile) and bacteriologic (3 sputum smears neg for AFB) improvement.
Respiratory infection (cold/flu, pneumonia, bronchitis, persistent cough	May not work if febrile or with other symptoms of infection	Until afebrile and symptoms improving

BIO-MEDICAL WASTE MANAGEMENT

Waste Management

Waste generated in healthcare facilities include different kinds of infectious and noninfectious waste. The latter tends to be of smaller volume than non-infectious waste, but once mixed the total unsegregated waste is deemed as infectious.

Hospital waste is a potential reservoir of pathogenic micro-organisms and requires appropriate, safe and reliable handling. The main risk associated with infection is sharps contaminated with blood. Under the Environmental Protection Act the Bio-Medical Waste Management Rules were introduced. These Rules are directly relevant to the health sector The salient features of these Rules are as follows:

Bio-medical waste means waste that is generated during the diagnosis, treatment or immunization of human beings or animals or in research activities pertaining thereto or in the production or testing of biologicals.

It is the duty of every occupier of an institution generating bio-medical waste which includes a hospital, nursing home, clinic, dispensary veterinary institution, animal house, pathological laboratory, blood bank by whatever name called, to take all steps to ensure that such waste is handled without any adverse effect to human health and the environment.

Bio-Medical Waste shall not be mixed with other waste

Bio-Medical waste shall be segregated into containers/bags at the point of generation in accordance with Schedule II of these Rules prior to its storage, transportation, treatment and disposal. The containers shall be labeled according to Schedule III of these Rules.

Bio-Medical Waste shall be treated and disposed of in accordance with Schedule I of these Rules, which gives the categories of waste and methods for treatment and disposal.

The Rules also require compliance with the standards prescribed in Schedule V which

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gives standards for different treatment technologies. These are covered in the Operational Framework of this IMEP Policy Framework.

Every occupier of an institution generating, collecting, receiving, storing, transporting, treating, disposing and/or handling bio-medical waste in any other manner shall make an application in Form

I to the prescribed authority for grant of authorisation. This is NOT required for clinics, dispensaries, pathological laboratories and blood banks that provide treatment / service to less than 1000 (one thousand) patients per month.

Each state or union $erritory in India is responsible for implementing the Bio-Medical Waste Management Rules and State Pollution Control Boards in states or Pollution Control Committees in the union territories are designated as the prescribed authorities.

Waste management is conducted in coordination with the infection control team.

Steps in the management of hospital waste include:

- Generation
- Segregation / separation
- Collection
- Transportation
- Storage
- Treatment
- Final disposal

Waste management practices must meet national and local requirements.

The following principles are recommended as a general guide

Categories of Bio-Medical Waste:

Schedule I — Categories of Bio-Medical Waste, India		
Option	**Waste Category**	**Treatment & Disposal**
Category No.— 1	Human Anatomical Waste	Incineration ; Deep Burial
Category No	Animal Waste	Incineration ; Deep Burial
Category No. — 3	Microbiology, Biotechnology & other Laboratory Waste	Local Autoclaving/Microwaving or Incineration
Category No	Waste Sharps	Disinfection (chemical Treatment/autoclaving/microwaving) and mutilation/shredding
Category No	Discarded Medicines & Cytotoxic drugs	Incineration ; destruction and drugs disposal in secured landfill
Category No. — 6	Soiled Waste	Local Autoclaving/Microwaving or Incineration
Category No	Infectious Solid Waste (Disposable tubing, catheters, iv sets etc.)	Disinfection by chemical treatment; autoclaving/microwaving and mutilation /shredding
Category No	Chemical Waste	Chemical treatment; and discharge into drains for liquids and secured landfill

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Segregation of waste is very important, as if it is mixed, non-infectious waste also becomes infectious and becomes a greater risk for the people who are handling it Segregation should be done at the source with proper containment With proper segregation scheme one can:

- Reduce the risk of infecting workers
- Reduce costs of treatment of wast

Color Code	Yellow	Red	BLUE	PP White (Metal)
Type of Container	Plastic bag	Plastic bag	Plastic bin	Puncture proof
Waste	Human Anatomical waste, Animal waste, Postoperative body parts, POP, Placenta, Pathological Waste, Cotton waste, dressing material, blood, body fluids, contaminated paper, clothes, face masks, caps	Microbiological Waste set, catheters gloves, urine bags, blood bags, dialysis kit	Broken glass, Ampoules, Vials, Slides etc.	Needles, syringes, scalpels, blade, etc...
Treatment / Disposal	Incineration/Deep burial	Autoclaving/Microwaving/Chemical treatment		Autoclaving/Microwaving/Chemical treatment & Destruction and shredding

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Hospital segregation scheme:

Yellow-Infectious waste for incineration

- Human tissues
- Animal Wastes-Tissues, -cell cultures
- Organs
- Body parts
- Placenta
- Any pathological/Surgical waste.
- Microbiology and Bio-technology waste
- Solid wastes like swabs, bandages, mops etc.

Red-Infectious waste for disinfection

- Tubing
- Catheters
- IV tubes
- Drains
- Blood bags Gloves
- Aprons
- Endotracheal tubes

Puncture Resistant Containers (PRC) for sharps

Sharps need to be collected in PRC and not in plastic bagse Waste sharps include —

- Needles
- Scalpels
- Blades
- Saws
- Nails
- Broken glass
- Any other items that cuts or punctures

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- Black-For secured landfill
- Discarded/contaminated drugs
- Date expired drugs e Solid chemical waste

Green-Non-infectious waste

- General waste
- Paper
- Packaging material
- Disposable cups
- Tea bags
- Kitchen and food waste

Handling & Transportation of Bio-Medical Waste:

- Minimum handling is the motto
- Segregation should be done at source
- Transfer and repeated handling should be avoided
- Infectious should never be mixed with non-infectious waste
- All bags should be tied securely and labeled
- All bags should have international Bio-hazard symbol

Handling of Sharps:

- Always wear gloves
- Segregate sharps from rest of the waste at the point of generation
- Clipping, bending, recapping or breaking of needles must not be practiced
- Needles and syringes must be destroyed using a needle cutter/needle burner

- The tips of needles and nozzles of syringes must be emptied into a puncture proof container containing disinfectant
- Sharps should be put into a disinfectant or autoclaved before disposal
-

Do's

1. Do minimize use of injections
2. Do segregate infectious sharps waste
3. Do collect in a white transparent colour coded container
4. Do decontaminate all sharp & plastic waste
5. Do train & educate all categories of staff in proper segregation & handling of waste
6. Do use Hub cutters & needle destroyers
7. Do use authorized persons/agencies to handle/dispose the needles

Don'ts

- Don't mix the infectious & noninfectious waste
- Don't throw sharps in the trash/non puncture proof containers
- Don't recap the needle
- Don't disconnect the needle from syringe by hand
- Don't use open buckets for infectious waste/sharps

Be Needle Smart
DO NOT recap
DO NOT bend
DO NOT remove
DO NOT transport
DO NOT re-use

Handling non-infectious waste:

' Non-infectious waste can be treated like normal household waste

- There are two categories of Non-infectious Waste o Bio-degradable: Food waste peels, skins, teabags etc. o Non-Bio-degradable: Wrappings, foils, cups, paper etc.
- Non-biodegradable waste can be put into green bags and treated like any municipal waste
- Crushing is a good method to reduce volume of the waste
- Disposal of Bio-degradable waste should be done by composting and used as manure thereafter

Transport of Bio-Medical Waste:

- Bio-medical waste has to be transported both within the health facility and from the facility to the final disposal location
- Properly designed carts, trolleys and other wheeled containers should be used for the transportation of waste inside the facilities
- Wheeled containers should be so designed that they have no sharp edges
- Ergonomics must be taken into account in designing these wheeled containers by considering the different tasks, i.e. loading, securing and unloading
- Transportation of waste has to be done in line with the Bio-Medical Waste
- Management Rules
- One of the requirements is labeling and the typical contents of the label are included in table below
- Waste handlers must be provided with uniform, apron, boots, gloves and masks, and these should be worn when transporting the waste

LABEL FOR TRANSPORT OF BIO-MEDICAL WASTE CONTAINERS / BAGS		
	Month	Year
Date of Generation		
Waste Cate o Number		
Waste Description		

Sender		Receiver	
Name & Address		Name & Address	
Phone No.		Phone No.	
Contact Person		Contact Person	
In case of emergency— Contact			
Name & Address		Phone Number	

Maintenance of record

1) Every authorized person shall maintain records related to the generation, collection, storage, transport, treatment, disposal and any form of handling of bio medical waste in accordance with the rules and guideline issued.

2) All records shall be subject to inspection and verification by prescribed authority any point of time.

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Annual Report

1. **Particulars of the applicant**

   a. Name of the authorizes person
   b. Name of the institution
      Address:

      Tel No: Fax No:

2. Category of the waste generated and quantity on monthly average basis
3. Brief details of treatment facility

   In -case of off-site facility:

   a. Name of the operator
   b. Name and address of the facility
   c. Tel No/Fax No

4. Category-wise quantity of waste treated:
5. Mode of treatment in detail:
6. Any other information:
7. Certified that the above report is for the period from

   Date

   Place

   S signature

   Designation

(To be submitted to the prescribed authority by 31 Jan every year)

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Principles of waste management

- Segregate clinical (infectious) waste from non-clinical waste in dedicated Containers
- Transport waste in a dedicated trolley
- Store waste in specified areas with restricted access
- Collect and store sharps in sharps containers. Sharps containers should be made of plastic or metal and have a lid that can be closed. They should be marked with the appropriate label or logo, e.g. a biohazard symbol for clinical (infectious) waste (see picture below)
- Mark the storage areas with a biohazard symbol
- Ensure that the carts or trolleys used for the transport of segregated waste collection are not used for any other purpose — they should be cleaned regularly
- Identify a storage area for waste prior to treatment or being taken to final disposal area

Treatment of hazardous and clinical / infectious waste

Each health care facility should identify a method for the treatment of clinical / infectious waste. This may consist of transportation of infectious waste to a centralized waste treatment facility or on-site treatment of waste.

Methods of disposal

Sharps: Autoclave, shred and land-fill or microwave, shred and land-fill or treat by plasma pyrolysis of puncture-proof containers storing discarded sharps;

- Deep burial in a secure area. Burial should be 2 to 3 meters deep and at least I .5 meters above the groundwater table.

Waste requiring incineration:

- Anatomical parts and animal carcasses e Cytotoxic drugs (residues or outdated)
- Toxic laboratory chemicals other than mercury

Waste that may be incinerated:

- Patient-contaminated non-plastics and non-chlorinated plastics.

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Waste that should not be incinerated:

Chlorinated plastic

- Volatile toxic wastes such as mercury;
- Plastics, non-plastics contaminated with blood, body fluids, secretions and excretions and infectious laboratory wastes. (Such wastes should be treated by steam sterilization in auto claveble bags or microwave treatment. Shredding may follow both these methods. If neither method is available, chemical treatment with 1% hypochlorite or a similar disinfectant is recommended. However, excessive use of chemical disinfectants should be avoided as it may be a health and environmental hazard).
- Radioactive waste (should be dealt with according to national laws),

DISINFECTION & STERILIZATION

Cleaning:

Cleaning is physical removal of organic matter to reduce microbial growth prior to killing the microbes. Organic material can interfere with the action of antiseptics, disinfectants, and sterilants, and prevent adequate penetration. Soap and water with friction is still the standard. Cleaning must precede disinfection/ sterilization.

Sterilization:

Sterilization is defined as removal or destruction of all microorganisms and their spores. All items that enter sterile tissue or vascular system must be sterile, i.ee implants, scalpels, needles, surgical instruments, etc.

Disinfection:

Disinfection is defined as reduction in the number and type of microorganisms.
High level disinfection is defined as complete elimination of all microorganisms in or on an instrument, except for small numbers of bacterial spores. The FDA definition of high-level disinfection is a sterilant used for a shorter contact time to achieve a 6-10g10 kill of an appropriate Mycobacterium species.
Items (except dental) that touch mucous membranes should receive high-level disinfection i.e. flexible endoscopes, laryngoscopes and other similar instruments. (Semi-critical items)
Intermediate level hospital-grade disinfectant - an EPA approved Tuberculocidal cleaner/disinfectant Items that touch mucous membranes or skin that is not intact should receive intermediate-level disinfection i.e. thermometers, hydrotherapy tanks.

Low-level sanitizers reduce bacteria to a "safe level", Items that touch intact skin should receive low-level disinfection, iøeø stethoscopes, beds, whirlpools, and equipment which are NON-INVASIVE to patients. (Non-critical items)

Antisepsis:

Antisepsis is inhibition of microorganism's growth on living tissue such as skin preparation before vascular line insertion or other invasive procedure. Alcohol, chlorhexidine, and iodophors, i.e., betadine are most frequently used solution for antisepsis.

Germicidal chemicals used for antisepsis are not generally adequate for decontaminating environmental surfaces,

Spaulding Classification:

EH Spaulding believed that an object should be disinfected depending on its intended use. Objects can be classified into three categories:

1. Critical Objects
2. Semi-critical Objects
3. Non-critical Objects

1. Critical Objects: Objects which enter normally sterile tissues or the vascular system should be sterile.

Chemical Sterilization of 'Critical Objects'

- Glutaraldehyde (>2.4%)
- Hydrogen peroxide-HP (7.5%)

Exposure time as per manufacturers' recommendations

2. Semi-critical Objects: Objects that touch mucous membranes or skin that is not intact require a disinfection process (high-level disinfection, HLD) that kills all microorganisms and high numbers of bacterial spores too.

Semi-critical Objects include —

- Endoscopes
- Respiratory therapy equipment
- Anesthesia equipment
- Endocavitary probes
- Tonometers
- Diaphragm fitting rings

High Level Disinfection of 'Semi-critical objects	
Exposure Time: 12 — 30 minutes	
Germicide	Concentration
Glutaraldehyde	> 2.0%

Ortho- phthaladehyde	0.55%
Hydrogen Peroxide	7.5%
Hypochlorite (free Chlorine)	650-675 p m

3. Non-Critical Objects: Objects that touch only intact skin require only low level disinfection.

Low Level Disinfection of 'Non-critical objects	
Exposure Time: > I minute	
Germicide	Concentration
Ethyl or isopropyl Alcohol	70.0%
Chlorine	100 m 1:500 dilution
Phenol	
Iodophor	
UD — Manufacturer's recommended use dilution	

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Methods of Sterilization:

Classification	Item Use	Goal	Appropriate Process
Critical Items	Items entering sterile tissue, the body cavity, the vascular system and non -intact mucous membranes E.g. surgical instruments	Objects will be sterile (free of all microorganisms including bacterial spores)	Sterilization (or use of single use sterile products) steam sterilization low temperature methods (ethylene oxide, peracetic acid, hydrogen peroxide or plasma)
Semi-critical Items	Items that make contact directly or indirectly, with intact mucous membranes or non-intact skin. E.g. endoscopes, Anaesthetic equipments Respiratory therapy equipment Endocavitary probes, Tonometer, Diaphragm fitting rings	Objects will be free of all microorganisms, with the exception of high numbers of bacterial spores	High level disinfection Thermal disinfection Chemical disinfection (glutaraldehyde, OPA) It is always preferable to sterilize semi critical items whenever they are compatible with available sterilization processes
Non-critical Items	Objects that come into contact with intact skin, but not mucous membranes Egg. crutches, BP cuffs, Tabletops, Bedpans, bed rail, bedside table, ECG leads etc.	Objects will be clean	Low level disinfection Cleaning (manual or mechanical)

Flexible endoscopes are particularly difficult to disinfect and easy to damage because of their intricate design and delicate materials. Meticulous cleaning must precede any sterilization or high- level disinfection of

these instruments. Failure to perform good cleaning can result in sterilization or disinfection failure, and outbreaks of infection can occur.

Endoscope Disinfection:

In general, endoscope disinfection or sterilization with a liquid chemical sterilant involves five steps after leak testing.

1. **Clean**:

Mechanically clean internal and external surfaces including brushing internal channels and flushing each internal channel with water and a detergent or enzymatic cleaners (leak testing is recommended for endoscopes before immersion).

2. **Disinfect:**

Immerse endoscope in high-level disinfectant (or chemical sterilant) and perfuse (eliminates air pockets and ensures contact of the germicide with the internal channels) disinfectant into all accessible channels such as the suction/biopsy channel and air/water channel and expose for a time recommended for specific products.

3. **Rinse:**

Rinse the endoscope and all channels with sterile water, filtered water (commonly used with AERs) or tap water (i.e. high-quality potable water that meets federal clean water standards at the point of use).

4. **Dry:**

Rinse the insertion tube and inner channels with alcohol, and dry with forced air after disinfection and before storage,

5. **Store:**

Store the endoscope in a way that prevents recontamination and promotes drying (e.g. hung vertically).
Automated Endoscope Reprocessors (AERs):

Advantages:
Automated and standardized reprocessing steps Reduce personnel exposure to chemicals

Disadvantages:
- Failure of AERs linked to outbreaks
- Does not eliminate pre-cleaning
- Does not monitor HLD concentration

Problems:
- Incompatible AER (side-viewing duodenoscope)
- Biofilm buildup
- Contaminated AER
- Inadequate channel connectors
- Must ensure exposure of internal surfaces with HLD/sterilant

High-Level Disinfectants:

In most settings, the only chemicals appropriate for HLD are —

- Chlorine
- Glutaraldehyde
- Ortho-phthalaldehyde (OPA)

Chlorine:

Chlorine is available in liquid (sodium hypochlorite), powder (calcium hypochlorite or chlorinated lime), and tablet (sodium dichloroisocyanurate) form.

Uses:

- Disinfection during housekeeping
- Decontamination (by soaking for 10 minutes).
- HLD (by soaking for 20 minutes)

(Note: Should not be used on endoscopic equipment)

Disadvantages:

- Because chlorine leaves a residue, items should be rinsed thoroughly with boiled water after HID
- Chlorine can be corrosive to metals with prolonged contact and can be irritating to the skin, eyes and respiratory tract
    - A new solution should be prepared daily (or whenever it becomes heavily contaminated

Glutaraldehyde:

Available as Cidex and Cidex Plus

Uses:

- Commonly used for processing equipment, such as endoscopes, that cannot be sterilized with heat
- Used for HID (by soaking for 20 minutes) and sterilization (by soaking for 10 hours)

Disadvantages:

Because glutaraldehyde leaves a residue, items should be rinsed thoroughly with boiled water after HLD and with sterile water after sterilization Glutaraldehyde can be irritating to the skin, eyes, and respiratory tract (When using it, wear gloves, limit your exposure time and keep the area well- ventilated)

Ortho-phthalaldehyde (OPA):

Available as Cidex OPA and Metricide OPA

Advantages:

- Has shorter soaking times than glutaraldehyde, but cannot be used for sterilization. Soaking times vary (ranging from five to 12 minutes)
- Does not need to be activated
- Has a barely perceptible odor
- Not irritating to mucous membranes

Disadvantages:

- OPA products tend to be more expensive than those containing glutaraldehyde.
- Thorough rinsing of items is necessary after they have soaked in OPA.

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- ❖ OPA will cause eye irritation with direct contact and stains skin and mucous membranes a gray color, so gloves and goggles should be worn when handling it.

Low-Level Disinfectants: .

Low level disinfectants are used for cleaning surfaces, such as floors and countertops. These should not be used for instrument processing. Some low-level disinfectants such as phenols (carbolic acid— e.g.,Phenol, Lysol) and quaternary ammonium compounds (such as benzalkonium chloride-e.g., zephiran), are suitable for cleaning and disinfecting surfaces, but most of these products have few advantages over using a disinfectant cleaning solution made with chlorine and detergent, which is less expensive and often readily available.

- ➢ Hydrogen peroxide (3%) is suitable for disinfecting surfaces.
- ➢ Alcohol (70%; ethyl or isopropyl) can be used to disinfect thermometers and stethoscopes, although they should not remain soaking in an alcohol solution

Policy and Procedure for House Keeping

Cleaning of the hospital environment:

- ❖ Routine cleaning is important to ensure a clean and dust-free hospital environment
  ' Administrative and office area with no patient contact require normal domestic cleaning
  ' Most patient care areas should be cleaned by wet mopping ' Dry sweeping is not recommended
- ❖ Any areas visibly contaminated with blood or body fluids should be cleaned immediately with detergent and water

Plan of cleaning – clean to un clean

Category I: Room occupied with high risk patients' immune suppressed also
Category II: Post OP patients with clean wound
Category III: ordinary discharge
Category IV: Patients with infected wounds, communicable discharge

- ➢ Isolation rooms and other areas that have patients with known transmissible infectious diseases should be cleaned with a detergent / disinfectant solution at least daily
- ➢ All horizontal surfaces and all toilet areas should be cleaned daily

Dusting:

It is cleaning operation to remove dirt. The dusting technique is used on furniture, equipment's, ledges, window grills, woodwork and panels. Low dusting is dusting of all places easily reached by standing on the floor, it should be done at least daily to maintain thorough cleanliness. High dusting refers to those areas over windows, doors, overhead pipes, walls and ceilings, and is done periodically.

Procedure:

- Clean cloth or mops are wetted with cleaning solution contained in a basin or bucket
- The double bucket system minimizes he contamination of the cleaning solution s Dry dusting should be avoided and dust cloths and mops should never be shaken (to avoid the spread of microorganisms)
- Dusting should be performed in a systematic way, using a starting point as a reference to ensure that all surfaces have been reached e To prevent overlapping of strokes and skipping corners and edges use long straight strokes. Hold cloth loosely so that it will absorb dust easily e Start with highest point to be dusted and work down towards the floor
- When doing high dusting (ceiling tiles and walls), check for stains that may indicate possible leaks (Leaks should be repaired as soon as possible because moist ceiling tiles provide a reservoir for fungal growth)
- To dust room, commence at entrance and proceed around room
- Inspect work, a properly dusted area will be bright and will appear clean
- Protective equipment's should be used e.g. Mask and gloves.

Dry Vacuuming:

Recommended only for cleaning of carpets

Wet Mopping:

It is the most common and preferred method to clean the floors. For mopping an area which is too soiled, clear water may be used with success. However, where there is much dust dirt, a cleaning solution is often necessary. It is important to know the type of surface to be cleaned since too much may harm wood floor coverings. In order to ensure a good mopping job, mops and solutions must be clean.

The double-bucket technique is practiced which extends the life of the cleaning solution (fewer changes are required), saving both labor and material costs.

Procedure (Double-Bucket Technique):

- Protective equipment's should be used e.g. Mask and gloves
- Fill one bucket two thirds with sodium hypochlorite 2% cleaning solution
- Fill second bucket two thirds with warm water and soap solution
- Dip one mop into cleaning solution and wring slightly to prevent dripping After mopping for about 120 sq. feet, dip second mop in a container of clean water, wring out and rinse floor
- Dip a second mop again into water rinse, wring it thoroughly and dry floor using side to side stroke
- Continue the three steps of mopping, rinsing and drying until the area has been covered, to
- Change solution and water frequently
- Inspect work (a properly mopped floor should have a clean surface)
- After mopping is completed clean mops and buckets

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Disinfectants used

If need high risk areas-Gluteraldehyde 2%(20ml in ltrs)
(Bacillocid)

Scrubbing

It is an operation to remove dirt by rubbing and scouring while it is similar to mopping, more water is used and a brush, hand or electric is employed to scour the surface. Electric floor machine have a disc brush attachment for scrubbing. Some also have special container which automatically discharge the solution to the floor during the cleaning operation. Suction equipment is also available for removal of solution from the floor.

Procedure:

- Sweep floor if necessary
- Dampen area to be scrubbed
- Sprinkle cleanser lightly over area which has been dampened, if necessary
- With scrub brush or scrubbing machine, scrub area with back and front motion Machine scrubs in circular movements Start in corner of room and work towards door.
- For particular soiled area, use steel wool by hand or under brush
- Remove dirty solution with squeegees mop or vacuum Never put soiled solution in clean container
- Dip second mop into container of clean water, wring out, and rinse floor with side to side motion to avoid streaks, overlap strokes
- Continue wetting, scrubbing, picking up soiled solution and rinsing until area has been covered e Change solution and water frequently
- Inspect your work a properly scrubbed floor has no soiled spots, is not streaked and has no water spots remaining on it
- After scrubbing is completed, clean equipment as directed and return them to proper place.

Washing

It is an operation to remove soil by use of water; a cleaning agent is usually employed in this process. The technique includes removing loose dirt, washing, rinsing and drying. The operation is used to clean furniture, fixtures, wood work, equipment and walls. It should be done at least once a week and more frequently if the state of cleanliness desires,

Equipment

1) Cleaning cloths or sponges
2) Two container
3) Cleanser

4) Ladder for high places

Procedure

- Fill one container two-third full with cleaning solution
- Fill second container two-third full with warm solution
- Wipe away loose dirt in area with dry, clean cloth
- Dip cloth into cleansing solution. Wring cloth or squeeze cloth to prevent dripping.
- Wash small area with circular motion
- Dip second cloth into clear water, remove excess water, rinse wash area with up and down motion
- Dip cloth rinse same area with side to side motion
- Continue washing drying over entire area: overlap strokes to prevent streaking.
- Use ladder to wash high places
- Change water frequently
- Inspect work, a properly washed area should be uniformly clean with no streaks, no water spilled on the floor
- Clean equipment as directed and return to proper place

Schedule & Procedure for Specific Areas

Walls, windows, ceilings and doors, including door handles:
In general, routine damp dusting is adequate for these areas (disinfection is unnecessary). These surfaces are rarely heavily contaminated with microorganisms, as long as the surfaces remain dry and intact

- Spot clean when visibly dirty with a damp cloth, detergent and water

Chairs, lamps, tables, tabletops, beds, handrails, grab bars, lights, tops of doors and counters:

- Wipe daily and whenever visibly soiled with a damp cloth, containing disinfectant cleaning solution A disinfectant should be used when contamination is present such as for blood or other body fluid spills as described below

Noncritical equipment (e.g., stethoscopes and blood pressure cuffs):

- Wipe daily and whenever visibly soiled with a damp cloth, detergent and water
- If the equipment is visibly soiled with blood or other body fluids or the patient is under contact precautions, it should be cleaned and disinfected before it is reused

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Floors:

e Clean floors frequently (daily and as needed) with a wet mop, detergent and water

- A disinfectant should be used when contamination is present, such as for blood or other body fluid spills as described below

Sinks:

- Scrub frequently (daily or more often as needed) with a separate mop, cloth or brush and a disinfectant cleaning solution e Rinse with water

Toilets and latrines:

- Scrub frequently (daily and more often as needed) with a separate mop, cloth or brush and a disinfectant cleaning solution

Patient rooms:

- Clean daily and after patient discharge, using the processes described above ' The same cleaning process applies to rooms of patients who are under isolation precautions
- Any cleaning equipment used in the rooms of patients under isolation precautions should be cleaned and disinfected before used in another room

Procedure rooms:

- Wipe horizontal surfaces, equipment and furniture used for the procedures with a disinfectant cleaning solution after each procedure and whenever visibly soiled
- Clean blood or other body fluid spills as described below

Examination rooms:

- Wipe horizontal surfaces with a disinfectant cleaning solution after each procedure and whenever visibly soiled e Linen or paper on the examination table should be changed after each patient s Clean blood or other body fluid spills as described below

Laboratory:

- Wipe countertops with a disinfectant cleaning solution after each shift and whenever visibly soiled
- Clean blood or other body fluid spills as described below

Curtains:

Change and clean curtains according to the routine schedule and when visibly soiled

Carpets:

Vacuum carpets daily in patient rooms, or weekly in offices or conference rooms

Soiled linen:

Collect soiled linen daily (or more often as needed) in closed, leak-proof containers

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Waste Containers:

- Collect waste from all areas at least daily (or more frequently as needed) e Avoid overflowing of waste containers
- Clean contaminated waste containers after emptying each time
- Clean non-contaminated waste containers when visibly soiled and at least once a week e Use a disinfectant cleaning solution and scrub to remove soil and organic material

Schedule & Procedures for Operating Rooms

- At the beginning of each day, all flat (horizontal) surfaces (table, chairs, etc.) should be wiped with a clean, lint-free moist cloth to remove dust and lint that may have collected overnight e Total cleaning is not necessary between each case for surgical procedures
- Total cleaning or terminal cleaning (mopping floors and scrubbing all surfaces from top to bottom) of the operating room should be done at the end of each day

Total Cleaning at the end of each day:

STEP 1:

- Move covered decontamination bucket to the central supply or processing room
- A clean bucket containing a fresh 005% chlorine solution, or other locally available and approved disinfectant; should be provided at the beginning of each day and after each case

STEP 2:

- Remove covered contaminated waste container and replace it with a clean container
- Arrange for burning (incineration) or burial as soon as possible STEP 3:
- Close and remove sharps containers when three quarters full

STEP 3:

- Remove soiled linen in closed leak-proof containers

STEP 4:

- Soak a cloth in disinfectant cleaning solution and wipe down all surfaces including counter tabletops, sinks, lights, etc.
    - Wash from top to bottom, so that any debris that falls on the floor will be cleaned up last

Walls and ceilings:
Wipe with a damp cloth, detergent and water as needed for visible soil

Chairs, lamps, sinks, tabletops and counters:
Wipe with a damp cloth and disinfectant cleaning solution

Operating room lamp:
Wipe with a damp cloth and disinfectant cleaning solution.

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Operating room table:
Wipe with a 0.5% chlorine solution (or other approved disinfectant) to decontaminate. Then clean top, sides, base, legs and any accessories (e.g., leg stirrups) with a damp cloth and disinfectant cleaning solution.

Floors:
Clean with a wet mop using a disinfectant cleaning solution.

Vents (heating or air conditioning):
Wipe with a damp cloth, soap and water

Schedule & Procedures between each case:

Spills:
Clean spills with a 0.5% chlorine solution or other locally available and approved disinfectant.

Operating room bed:
Wipe all surfaces and mattress pads with a disinfectant cleaning solution.

Instrument tables (trolley and Mayo stand) and other flat surfaces:
Wipe all flat surfaces that have come in immediate contact with a patient or body fluids with a disinfectant cleaning solution.

Center of operating room surrounding the operating room bed:
Mop with a disinfectant cleaning solution (if visibly soiled).

Waste:
Collect and remove all waste from the operating room in closed leak-proof containers.

Sharps containers:
Close and remove containers from the operating room when they are three quarters* full.

Containers with a 005% chlorine solution for decontamination:
Remove covered containers with instruments from the operating room and replace them with clean containers with a fresh 005% chlorine solution.

Soiled linen:
Remove soiled linen in leak-proof, covered waste containers.

Procedure for blood and other body fluid spillage

Clean spills of blood, body fluids and other potentially infectious fluids immediately.

For small spills:
While wearing utility or examination gloves, remove visible material using a cloth soaked in a 1% chlorine solution, then wipe clean with a disinfectant cleaning solution.

For large spills: While wearing gloves, flood the area with a 0.5% chlorine solution, mop up the solution and then clean as usual with detergent and water

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Cleaning Procedure for Cleaning Equipment:

STEP 1:
Decontaminate cleaning equipment that has been contaminated with blood or body fluids by soaking it for 10 minutes in a 1% chlorine solution or other locally available and approved disinfectant

STEP 2:
Wash cleaning buckets, cloths, brushes and mops with detergent and water daily, or sooner if visibly dirty.

STEP 3:
Rinse in clean water

STEP 4:
Dry completely before reuse. (Wet cloths and mop heads are heavily contaminated with microorganisms)

Cleaning Procedure for Surgical Instruments:

Decontamination

STEP 1:

- Immediately after use, decontaminate instruments and other items by placing them in a plastic container of 1% chlorine solution
- Let them soak for 10 minutes
- Open or unlock jointed instruments, such as hemostats and scissors
- Disassemble those instruments with sliding or multiple parts

STEP 2:

- After 10 minutes, remove the items from the chlorine solution and either rinse with water or clean immediately
  - Do not leave items in the solution for more than 10 minutes, since excessive soaking in the solution can damage instruments and other items,
- Always use utility gloves when removing instruments and other items from a chlorine solution

Cleaning

Always wear utility gloves, a mask, and protective eyewear when cleaning instruments and other items Avoid using steel wool or abrasive cleansers (These products can scratch or pit metal or stainless steel, resulting in grooves that can become a nesting place for microorganisms. This also increases the potential for corrosion of the instruments and other items).

Step 1

- Using a soft brush or old toothbrush, detergent, and water scrub instruments and other items vigorously to completely remove all blood, other body fluids, tissue, and other foreign matter
- Hold items under the surface of the water while scrubbing and cleaning to avoid splashing
- Disassemble instruments and other items with multiple parts, and be sure to brush in the grooves, teeth, and joints of items, where organic material can collect and stick

Step 2

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- Rinse items thoroughly with clean running water to remove all detergent (Any detergent left on the items can reduce the effectiveness of further chemical processing).

Step 3

- Allow items to air-dry (or dry them with a clean towel)

Note: Instruments that will be further processed with chemical solutions must dry completely to avoid diluting the chemicals

Sterilization:

It describes a process that destroys or eliminates all forms of microbial life and is carried out in health-care facilities by physical or chemical methods. Steam under pressure, dry heat, ETO gas, hydrogen peroxide gas plasma, and liquid chemicals are the principal sterilizing agents used in health-care facilities.

Sterilization Method	Advantages	Disadvantages
Steam	Nontoxic to patient, staff, Environment Cycle easy to control and monitor Rapidly microbicidal Least affected by organic / inorganic soils Rapid cycle time Penetrates medical packing device lumens	Deleterious for heat-sensitive instruments Microsurgical instruments damaged by repeated exposure May leave instruments wet, causing them to rust Potential for burns
Hydrogen Peroxide Gas Plasma	Safe for the environment Leaves no toxic residuals Cycle time is 28-75 minutes (varies with model type) and no aeration necessary Used for heat and moisture sensitive items Simple to operate, install (208V outlet), and monitor Compatible with most medical devices Only requires electrical. outlet	Cellulose (paper), linens and liquids cannot be processed Sterilization chamber size from 1.8-9.4 cubic ft Total volume (varies with Model type) Some endoscopes or medical devices with long or narrow lumens cannot be processed Requires synthetic packaging (polypropylene wraps, polyolefin pouches) and special container tray Hydrogen peroxide may be toxic at levels greater than 1

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100% ETO	Penetrates packaging materials, device lumens Single-dose cartridge and negative pressure chamber minimizes the potential for gas leak and ETO exposure Simple to operate and monitor Compatible with most medical materials	Requires aeration time to remove ETO residue Sterilization chamber size from 4.0-7.9 cubic ft Total volume (varies with Model type) ETO is toxic, a carcinogen, and flammable ETO emission regulated by states; catalytic cell removes 99.9% of ETO and converts it to C02 and H20 ETO cartridge should be stored in flammable liquid storage cabinet Lengthy cycle/aeration time
Peracetic Acid	Rapid sterilization cycle time (30-45 minutes) Low temperature (50-55^{0}C) liquid immersion sterilization Environmental friendly byproducts Sterilant flows through endoscope which facilitates salt, protein and microbe removal	Point-of-use system, no sterile storage Biological indicator may not be suitable for routine monitoring Used for immersible instruments only Some material incompatibility (e.g., aluminum anodized coating becomes dull) One scope or a small number of instruments processed in a cycle Potential for serious eye and skin damage (concentrated solution with contact

Packing & Loading:

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For effective sterilization, selection of packaging material plays important role apart from sterilization parameters. The following are keys in selecting a suitable packaging material.

- The packaging material must be permeable to sterilizing agent
- The packaging material must be impermeable to bacteria and other contaminants
- The packaging material must resist tears and punctures
- It should facilitate aseptic presentation of packaged content.

Packaging Technique:

- Disassemble items so that sterilizing agent reaches every surface
- Fill pouch up to 3/4 of capacity and remove residual air before sealing
- Protect tips so that they do not puncture pouch
- Place item into pouch so that end user can grasp the instrument properly for aseptic removal
- When double peel pouching, seal the inner package first, then, place in second pouch and seal
- Never fold the inner pouch

Proper loading of items inside the sterilizer:

- Excessive dryness may affect steam and ETO processes
- Excessive moisture may affect the vapor of H202 gas plasma process.
- When loading sterilizer there should be space between items to facilitate circulation and penetration of sterilant
- There should be no contact between items and chamber wall
- In mixed load, linen should be kept on top racks and metal on bottom
- Peel pouches should be kept on the edge facing same direction
- Textile should be kept on the edge
- .Instrument sets should be placed flat

Steam sterilization Process:

Of all the methods available for sterilization, moist heat in the form of saturated steam under pressure is the most widely used and the most dependable. Steam sterilization is nontoxic, inexpensive rapidly microbicidal, sporicidal and rapidly heats and penetrates fabrics.

The basic principle of steam sterilization, as accomplished in an autoclave, is to expose each item todirect steam contact at the required temperature and pressure for the specified time. Thus, there are four parameters of steam sterilization: steam, pressure, temperature, and time. The ideal steam for sterilization is dry saturated steam and entrained water. Pressure serves as a means to obtain the high temperatures necessary to quickly kill microorganisms. Specific temperatures must be obtained to ensure the microbicidal activity, the temperature of 12 I ^{O}C must be maintained for a minimal time to kill microorganisms. Recognized minimum exposure periods for sterilization of wrapped healthcare supplies are 30 minutes at 121 ^{O}C in a gravity displacement sterilizer At constant temperature sterilization times vary depending on the type of item (e.g., metal versus rubber, plastic, items with lumens), whether the item is wrapped or unwrapped, and the sterilizer type.

Monitoring of steam sterilization process

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A. Chemical Check

Daily a Bowie and Dick test is carried out in an empty cycle. This cycle is the first cycle of the sterilizer. This is to check the proper air removal by the sterilizer,

Weekly an air leak test is carried out on each of the sterilizers. This is to check the efficiency of the sterilizer.

With every cycle, a class 6 indicator is processed to check the correct exposure time, quality of steam and the accurate temperature.

B. Biological Check

Weekly an ampoule containing spores of B. stearothermophilus is processed in a challenge pack in the sterilizer and thereafter, the ampoule is incubated along with the positive control.

C. Physical Check

Each sterilization cycle gives the printout of temperature and pressure under which the cycle is processed.

Ethylene oxide (ETO) Sterilization Process:

Ethylene oxide (ETO) has been widely used as a low-temperature sterilant. It has been the most commonly used process for sterilizing temperature- and moisture sensitive medical devices and supplies in healthcare institutions.

Two types of ETO sterilizers are available — Mixed gas and 100% ETO.

Alternative technologies to ETO with chlorofluorocarbon that are currently available and cleared by the FDA for medical equipment include 100% ETO; ETO with a different stabilizing gas, such as carbon dioxide or hydro chlorofluorocarbons (HCFC); immersion in peracetic acid; hydrogen peroxide gas plasma; and ozone.

Monitoring of ETO sterilization process

A. Biological Check

In each cycle an ampoule containing B. stearothermophilus is processed in a challenge pack in the sterilizer and thereafter it is incubated along with the positive control, to check the sterilization process.

B. Physical Check

Each sterilization cycle gives the printout of the cycle process that consists of preconditioning, time of gas exposure, gas removal and thereafter completion of the cycle followed by aeration.

C. Chemical Check

A chemical indicator affixed on the peel pouches changes the color once the pouches are subjected to sterilization.

Every cycle class 5 integrating indicator is process to check the correct exposure time, gas penetration and the accurate temperature.

MONITORING OF DISINFECTANTS

In-Use test (Kelsey Syke's test)

The in use test shall be performed to check the end results of disinfection. Samples shall be taken from disinfectant dilutions in use in the hospitals for any purpose,

Procedure

1. Transfer one ml of the disinfectant fluid into a tube containing 9 ml of the diluents.
2. Appropriate diluents are used for different groups of disinfectants (Nutrient broth for alcohols, aldehydes, hypochlorites and phenols)
3. Withdraw a small aliquot with a 50-drops/ml pipette
4. Place 10 drops separately on the surface of nutrient agar in duplicate
5. Incubate both the plates for 72 hrs. — one at room temperature and the other at 37 degree C .
6. Growth from more than 5 of the ten drops in either of the plates indicates a failure of disinfection

Equipment Cleaning, Sterilization Practices & Recall System

1. Reprocessing of instruments and equipment

The risk of transferring infection from instruments and equipment is dependent on the following factors:

(1) The presence of micro-organisms, the number and virulence of these organisms
(2) The type of procedure that is going to be performed (invasive or noninvasive)
(3) The body site where the instrument / and or equipment will be used (penetrating the mucosal or skin tissue or used on intact skin)
(4) The classification of risk of transmission of infection by instruments and equipment has been called the "Spaulding Classification"
(5) Any instrument or equipment entering into a sterile part of the body must be sterilized
(6) Instruments or equipment coming in contact with mucous membranes or non-intact skin, must undergo disinfection
(7) Contact with intact skin, disinfection or cleaning should be used

Staff Training

Staff who work in the sterilizing service department and are responsible for the reprocessing of instruments and equipment must have undergone formal training in how to clean, disinfect and sterilize instruments and equipment. The level of training must be appropriate for the level of responsibility that the staff member is expected to undertake.

2. Appropriate Level of Reprocessing

As desired above it is essential that the correct level of reprocessing of an instrument / equipment is chosen according to its intended use. This decision is made not according to what the instrument or equipment is, but rather what it is intended use is.

Steam sterilization is recommended as the most effective method to achieve sterility. However, this may not always be possible as some instruments may not be able to withstand the temperature or moisture required for sterilization using steam. Other methods may be used to achieve sterility suchas

ethylene oxide or automated low temperature chemical sterilant systems, provided the manufacturer

of the instrument / equipment agrees that this is an effective means to sterilize them.

3. Servicing of instruments and equipment

Prior to sending medical devices for service they should be reprocessed appropriately. If, however they are unable to be reprocessed before being repaired, they should be placed in a fluid resistant plastic bag or container and labeled appropriately before being sent for repair,

4. Selected items that require special reprocessing.

Items that require special treatment include:

- Endoscopes,
- Respiratory and anaesthetic apparatus,
- Diagnostic ultrasonic transducers.

Instruments and equipment like these may not be able to withstand the heat or the moisture of steam or thermal disinfection or even some chemical agents. They therefore may require very delicate measures to reprocess theme It is essential that equipment that will not withstand the regular types of reprocessing must only be reprocessed in a department that has the proper facilities. The manufacturers' instructions must be followed.

Cleaning, Disinfection and Sterilization in CSSD Department Cleaning

- Prior to any reprocessing to achieve disinfection or sterility all instruments and equipment MUST be cleaned.
- After an instrument has been used, prior to it drying, it should be washed to remove any gross soiling. At this stage, detergent and water is appropriate to use.

There are four main methods used for cleaning of instruments and equipment:

1. Manual Cleaning

All surfaces of the instrument / equipment must be cleaned taking care to reach all channels and bores of the instrument. If instruments are being washed manually the following procedure should be followed:

- Wear personal protective equipment (plastic apron, thick rubber gloves, eye protection, surgical mask and / or face shield).
- Remove any gross soiling on the instrument by rinsing in tepid water (15-18 degrees)
- Take instrument apart — fully and immerse all parts in warm water with a biodegradable, non-corrosive, nonabrasive, low foaming and free rinsing detergent or use an enzymatic cleaner if necessary
- Ensure all visible soil is removed from the instrument follow manufacturers' instructions.
- Rinse in hot water (unless contraindicated).
- Dry the instrument either in a drying cabinet, or hand dry with clean lint-free cloth,
- Inspect to ensure the instrument is clean.

2. Disinfection

Disinfection removes micro-organisms without complete sterilization. Disinfection is used to destroy organisms present on delicate or heat-sensitive instruments which cannot be sterilized or when single use items are not available.

3. Chemical disinfection

The performance of chemical disinfectants is dependent on a number of factors including: temperature, contact time, concentration, pH, presence of organic or inorganic matter and the numbers and resistance of the initial bioburden on a surface.

Chemical Disinfectant — Level of disinfection achieved

Level of Disinfection	Activity against microbes
High level chemical disinfectant	Inactivates all microbial pathogens except where there are large numbers of bacterial spores
Intermediate level disinfectant	Inactivates all microbial pathogens except bacterial spores
Low level disinfectant	Rapidly inactivate most vegetative bacteria as well as medium sized lipid-containing viruses, but may not destroy bacterial spores, mycobacteria, fungi or small non-lipid Viruses.

Selection of disinfectant

1. For Medical instruments and equipment

Glutaraldehyde is generally the most appropriate chemical disinfectant that will provide high-level disinfection. This chemical must be used under very strict controlled conditions and in a safe working environment

2. For Scopes

Glutaraldehyde 2% is an appropriate high level disinfectant for endoscopes, respiratory therapy equipment and for material that is destroyed by heat An immersion time of 20 min is required. Flexible endoscopes are very easy to damage and particularly difficult to disinfect. It is extremely important that meticulous mechanical cleaning must always precede sterilization or disinfection procedures.

Sterilization

Sterilization is the destruction of all micro-organisms and can be achieved by either physical or chemical methods. Sterilization is necessary for medical devices penetrating sterile body sites. Cleaning to remove visible soiling in reusable equipment should always precede sterilization. All materials must be wrapped

before sterilization. Only wrapped / packed sterilized materials should be described as sterile. Before any instrument or equipment goes under the process of steam sterilization, the following should be checked.

- Ensure that the instrument can withstand the process (e.g. steam under pressure)
- Ensure that the instrument has been adequately cleaned
- Ensure that the instrument does not require any special treatment

' Ensure that the records of the sterilization process and for the traceability of instruments are kept

Instruments and equipment will only be sterile if one of the following sterilizing processes is used:

- Steam under pressure (moist heat)
- Dry heat
- Ethylene oxide
- Automated environmentally sealed low-temperature peracetic acid, hydrogenperoxide plasma and other chemical sterilant systems or sterilants
- Irradiation

Steam under pressure (moist heat) sterilization

This is the most efficient and reliable method to achieve sterility of instruments and equipment. This method sterilizes and dries the sterile package as part of the cycle. This is recommended in office-based practice. There are several types of steam under pressure sterilizers (also called autoclaves):
Downward (gravity) displacement sterilizers (jacketed and non-jacketed) these are designed for the sterilization of waste, solutions and instruments.
Self-contained, (bench-top) sterilizers these are recommended for office-based practice as they are able to do small quantities or fairly simple items. Bench-top sterilizers do not take wrapped items and therefore items must be used immediately after they are removed from the sterilizer. There will be differences in the models and types of features that are offered may vary. These variations may include: drying stage, ability to take packaged and unwrapped items, systems to monitor temperature, pressure and holding time.
Prevacuum (porous load) sterilizers - these are not suited for liquid sterilization but are optimized for sterilization of clean instruments, gowns, drapes, toweling and other dry materials required for surgery.

1. Dry heat sterilization

Dry heat sterilization is caused by hot air that destroys pathogens by the process of oxidation. Dry heat sterilizes have had limited value because it is difficult to maintain the same temperature throughout the load, while the high temperatures and long time required to achieve sterility makes this method undesirable for many situations. The manufacturers' instructions must be followed; the door to the unit must not be opened while in sterilizing cycle.

Ethylene Oxide (ETO)

Ethylene oxide gas is appropriate to use for sterilization of instruments / equipment made from heat labile materials or those devices that contain electronic components. The time required toprocess the instrument is dependent on the temperature, humidity and concentration level of the gas. The gas must penetrate the packaging and reach all surfaces of the instrument / equipment requiring sterilization. The time for such.a process is between 12 hours to over 24 hours. Because ETO is toxic,this gas is restricted in health care facilities and must be used according to strict guidelines tensure staff safety, The manufacturer's instructions must be followed for the packaging, sterilization process, validation and aeration process.

Automated chemical (low temperature) systems

Hydrogen peroxide plasma in a fully automated cycle can achieve low temperature, low moisture sterilization within a 45-80-minute cycle depending on the model of sterilizer used. The packaging used must be non-woven / non-cellulose polypropylene wraps. Peracetic acid is a low-temperature sterilization method. Peracetic acid 002% is placed in an environmentally sealed chamber and fully automated processing system. The process achieves moist, low temperature sterilization within 25,30 minutes

5. Irradiation

Gamma radiation is available from some commercial gamma irradiation facilities. However, it is not readily available for use in health care facilities,

Only those instruments and equipment that have undergone the entire sterilizing process can be regarded as sterile. Items must be wrapped or packaged appropriately to be considered sterile.

Materials for packaging include:

- Paper — this prevents contamination if it remains intact. It maintains sterility for a long period, can act as a sterile field and can also be used to wrap dirty devices after the procedure.
- Non-woven disposable textiles.
- Containers these can be used only if they contain material intended for a single treatment procedure for a single patient
- The end-user must check the physical integrity of the package before use.

Quality control parameters for the sterilization process which also serve as a check list for the Sterilization Department include:

- Load number
- Load content
- Temperature and time exposure record chart
- Physical / chemical testing
- Biological testing, e.g. using Bacillus subtilis.
- Regular engineering maintenance on sterilization equipment must be performed and documented,

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Processing, Storage & Distribution of Supplies and Equipment

The following list are policies and procedures developed and implemented by the Sterile Processing Department of Material Services to provide safe decontamination, sterilization, disinfection, storage and distribution, as well as monitoring of these activities. They include:

1. Receiving, decontaminating, cleaning, preparing, and disinfecting procedures
2. Assembly, wrapping, storage, distribution and quality control of sterile equipment and medical supplies
3. Use of sterilization process monitoring, including: temperature, pressure, chemical and live spore tests
4. Packaging, storage and distribution safety
5. Shelf-life standards for in-house processed items and for commercially prepared articles/items, including those not designated with an expiration date
6. Preventative maintenance of all processing equipment
7. Recall and reprocessing or disposal of outdated items
8. Emergency notification and disposition of items or supplies when warnings have been issued by the manufacturer or a government agency or when an internal recall is needed due to possible processing failure
9. Mechanism for timely reporting to Infection Control department) attending physician, and hospital risk management of any emergency collection of possible contaminated or hazardous items.Workflow, traffic and worker education provide for the separation of soiled and contaminated supplies from those, which are clean and sterile.

   Processing staff are in serviced on the above policies and procedures, and how to perform thesefunctions with safe work practices and appropriate personal protective equipment, in order to prevent exposure to pathogens and protect patients from nosocomial infection. All the above policies and procedures available in the CSSD Policy and Procedure Manual

ANTIBIOTIC POLICY

Introduction:

This manual has been developed in an attempt to standardize the use of antibiotics and to reduce the risk of emergence of drug resistant organisms. The recommendations are for initial empiric treatment, based on the likely microbial etiology and antimicrobial susceptibility patterns observed in our setting. The antimicrobial agent with the narrowest spectrum, least toxicity and cost should be chosen once culture reports are available when performed .

The primary aim of the hospital antimicrobial policy is to minimize the morbidity and mortality due to antimicrobial resistant infection and to preserve the effectiveness of antimicrobial agents in the treatment and prevention of communicable disease.

By following the guidelines, it will be possible to maintain a high standard of patient care, delivered in a consistent way across Malabar Medical College hospital.

A guide to Empirical Antibiotic Therapy:

Infections remain important threat to humans, especially in health care settings. Despite advances in medicine there is emergence of antimicrobial resistance both in community as wee as in the hospital. One of the key factors contributing to antibiotic resistance is inappropriate use of antibiotics. The latest available evidence backed guideline and recommendations were to be

followed with due modification to the antibiotic choices where it was warranted by local antiprogram.The list of drugs includes commonly used antibiotics in the OPD and inpatients. We believe that by following the guidelines it will be possible to maintain a high standard of patients care, delivered in a consistent way across Malabar Medical College Hospital. This manual will be revised as and when new recommendations come or with the change in the local antibiogram.

This general guidance is not applicable to all patients. The choice of antimicrobial may need to be modified in the following situations:

- Hypersensitivity to first choice antimicrobial.
- Recent antimicrobial therapy or preceding cultures indicating presence of resistant organisms.
- In pregnant or lactating patients
- In renal or hepatic failure (See data for individual antimicrobials)
- Where significant drug interactions may occur

Though the manual only provides a general guideline in choosing the antibiotic, it incorporates the best in antimicrobial therapy and hence any deviation must be justified in documentation in the case records, as this will be followed by prescription. The compliance to general principles (as mentioned in the section GOOD PRACTICE) is especially subjected to clinical audit as deviation in these aspects without an evidence backed and peer approved reason will be considered as endangering the patient safety.

Purpose of Antibiotic Policy:

- Improve patient care by promoting the best practice in antibiotic prophylaxis and therapy.
- Make better use of resources by using cheaper drugs where possible
- Retard the emergences and spread of multiple antibiotic resistant bacteria
- Improve education of junior doctors by providing guidelines for appropriate therapy
- Eliminate the use of unnecessary or in – effective antibiotics and restrict the use of expensive or unnecessarily powerful ones

Scope of Antibiotic Policy:

The antibiotic is essential for prophylaxis, empirical and definitive therapy. The policy shall incorporate specific recommendations for the treatment of high risk/special groups such as immune compromised hosts & hospital associated infections.

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Policies:

The selection of resistant bacteria is minimized by adherence to a few basic principles:

- Consider whether or not the patient actually requires an antibiotic
- Avoid treating colonized patients who are not actually infected
- Use antimicrobials that are most appropriate for the cause of infection and the prevalence of local resistance
- Target the pathogen obtains cultures from the patient's target empiric therapy to likely pathogens, target definitive therapy to known pathogens
- In simple infection example UTI, superficial skin infections etc. lower antibiotics should be used.
- In serious infections, higher grade antibiotics should be used. All attempts should be made to obtain culture and sensitivity report
- Combination of antibiotics: In serious infections, only two antibiotics of different groups should be given. If a third generation antibiotic is required, a proper justification for the same must be there.

Dose and duration:

- use adequate dosed
- Ensure that the treatment courses is completed
- give the antibiotic for the minimum length of time that is effective
- Review the duration of antibiotic therapy after 5 days

Changing the antibiotic therapy:

- In general, do not change antibiotic therapy if the clinical condition is improving
- Consider de- escalation for targeted therapy after microbiology reports are available
- If there is no clinical responses within 72 hours, the clinical diagnosis, the choice of antibiotic or the possibility of a secondary infection should be reconsidered

Prophylactic antibiotic policy:

- Chemoprophylaxis in surgery should be limited to the minimum number of doses required to ensure efficacy, usually one or two

- The antibiotics selected for prophylaxis should not be used therapeutically; as this may lead to emergence of antimicrobial resistance

Level of Prescribing:

- First choice antibiotics can be prescribed by all doctors

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- Restricted choice antibiotics can only be prescribed after consulting the head of the department or the antimicrobial team (AMT) representative
- Reserve antibiotics, can be prescribed only by designated experts

Culture and sensitivity testing:

- Regular cultures from OT, I.C.U and post OP recovery as per standard must be performed and proper record of the reports must be maintained. Corrective and preventive action taken
- Culture from Neck lines/ Tracheostomy/ Cather Tips must be obtained in cases suspected to have nosocomial infections. Use catheters only when essential remove when no longer essential
- Post-operative infections must be subjected to culture and sensitivity

Antimicrobial prescribing – Good practices:

1. Before prescribing consider following:

a) Which organism is likely to cause the syndrome?

- Send for the appropriate investigations in all infections as recommended. These are the minimum required for diagnosis, treatment (if needed), prognosis and follow up of these infections Microbiological samples must always be sent prior to initiating antimicrobial therapy. Rapid tests, such as Gram stain, can help determine therapeutic choices when empiric therapy is required
- Differentiation between contamination, colonization and infection is important to prevent overuse of antibiotics

b) What is the clinical diagnosis and what other steps should be taken to further diagnostic precision?

Clinical Diagnosis: The antibiotic treatment chosen must be based on some assumption regarding the nature of disease. The treating doctor may not have difficulty in choosing the appropriate antibiotic to treat a disease caused by a single microorganism e.g. typhoid as microbiological

diagnosis is implicit in clinical diagnosis. However, diseases such as pneumonia, meningitis and urinary tract infection can be caused by any number of different bacteria and doctor may be wrong if he has to guess which antimicrobial agent to use. In such instances one should seek a bacteriological diagnosis.

c) Which antimicrobial agents are available and active against the presumed cause of the illness? Is their range of antimicrobial activity appropriate and what information is available about the likelihood of drug resistance?

- Follow Antibiotic policy. If alternatives are chosen, document the reason in the case records.
- Choice of antibiotics: This depends on antibiotic susceptibility of the causative organism. There are some infections which can be treated by one of several drugs. The choice can be based on Toxicity, Efficacy, Rapidity of action, Pharmacokinetics and Cost. Use the most effective, least toxic and least expensive antibiotic for the precise duration of time needed to cure or prevent infection
- Empiric Therapy: If the causative agent is not known and where delay in initiating therapy would be life threatening or risk serious

morbidity, antimicrobial therapy based on a clinically defined infection is justified and the following points should be taken into consideration:

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1. Do not rush to treat if possible

2. Collect the necessary specimens before commencing therapy
3. Cover all possible microbial causes
4. Try to attain synergy
5. Accuracy of diagnosis should be reviewed regularly and treatment altered/stopped when microbiological results become available
6. Use less costly drugs where possible

d) Check for factors which will affect drug choice & dose, e.g., renal and hepatic function, drug- drug interactions, drug- disease interactions, allergy, pregnancy and lactation.

e) Check that the appropriate dose is prescribed. If uncertain, contact Infectious; Diseases Physician or check in the formulary.

f) What is the duration of treatment?
All IV antibiotics may only be given for 48 — 72 hours without review and consideration of oral alternatives. New microbiological or other information (e.g. fever defervescence for at least 24hours, marked clinical improvement; low CRP) should at this stage often permit a switch to oral antibiotic(s), or switch to an IV narrow spectrum alternative, or cessation of antibiotics (no infection present)

g) Is treatment working?
The need for antimicrobial therapy should be reviewed on a daily basis. For most infections 5 — 7 days of antimicrobial therapy is sufficient
(simple UTI can be adequately treated with 3 days of antibiotic).

Where treatment is apparently failing, advice from physician should normally be sought rather than blindly changing to an alternative choice of antimicrobial agent. Antimicrobial drug therapy cannot be considered in isolation and other aspects of therapy must be taken into account in judging the effect of treatment. Even an appropriate antibiotic may be ineffective if pus is not drained, septic shock treated and hypoxia and anemia corrected. There are several conditions in which chemotherapy alone cannot eliminate an infection. Obstructive lesions can cause infection to recur, unless they can be dealt with surgically. Also chemotherapy cannot obviate the necessity for draining an abscess or removing sequestra or calculi. Failure of treatment can also be due to a super-added infection, e.g. phlebitis, development of resistance during therapy or poor tissue penetration.

Laboratory control of the effects of treatment: Whether treatment has been successful or not is best judged by clinical criteria, but it is useful to know whether the infecting organism has been eliminated Repeated cultures are* therefore sometimes indicated.

h) Once culture reports are available, the physician should step down to the narrowest spectrum, most efficacious and most cost effective option. If there is no step down availed, the reason shall be documented and is subjected to clinical audit.

Some guiding principles for de-escalation / escalation:

a. If ESBL +ve: drug choice is monotherapy with carbepenems. Piperacillin—Tazobactum & Cefoperazone—Sulbactum can be used if in vitro sensitive and for mild infections

b. Vancomycin should be used only for confirmed **MRSA** infections and not MS SA

c. In case of **Pan drug resistant Pseudomonas /Acinetobacter sp** combination therapy using Colistin along with lactams (using PK/PD principles) should be discussed with physician/microbiologist.

Treatment with antibiotic combinations:

In order to avoid antagonism between drugs and undesirable side effects of several antibiotics it is advisable to use a single drug wherever possible. There are situations however, when the use of antibiotic combination is desirable. The situations are:

- A temporary expedient during the investigation of an obscure illness
- To prevent the development of bacterial resistance in long term therapy e.g. treatment of tuberculosis.
- To achieve synergistic effect, e.g. in treating infective endocarditis
- Mixed infection, when one drug is not effective against the pathogen
- To permit a reduction of the dose of potentially toxic drug, the choice of drug should be that they act synergistically. The following combinations are synergistic:
- Aminoglycoside and ß—lactam antibiotic
- ß —lactam antibiotic and ß—lactamase inhibitor
- ß—lactam antibiotic and cell wall inhibitor (Vancomycin)
- Sulphamethoxazole and Trimethoprim

2. Reserve Antimicrobials

These reserve antimicrobials will be made available following a recommendation from the Microbiology Department as per culture report or if included in an antimicrobial policy for a clinical specialty that has been agreed with Physician. They are held in reserve to maintain their effectiveness in treating certain difficult infections by reducing the spread of microbial-resistance and to encourage cost effective prescribing

1. The following criteria has been proposed to protect the **Carbapenems** and **Linezolid** from overuse —

a. Severe sepsis as defined by more than one organ failure of new onset and/or elevated serum lactate
b. Clinical failure of other classes of antibiotics over 48 hours in terms of worsening inflammatory markers, un-resolving fever and new/worsening hemodynamic instability
c. Underlying severe immunosuppression Neutropenia, immunosuppressive therapy, or Diabetic Ketoacidosis (DKA)
d. The organism is susceptible to only carbapenems / linezolid, as per culture report

2. The following criteria has been proposed for initiating Colistin—

a. Pan-resistant organism as per culture report with evidence of invasive disease — fever/leucocytosis/elevated procalcitonin (PCT) or culture from a sterile site
b. Clinical failure of all other classes of antibiotics over "72 hours

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3. The following criteria have been proposed for initiating Rifampicin

a. Empiric or proven TB as a part of ATT (4 drug regimen)

b. As anti-bacterial only if prescribed as a combination regimen where the companion drug and Rifampicin, both are proven as susceptible as per culture report.

Rifampicin will not be issued alone as an anti-bacterial

The following criteria has been proposed for initiating Aminoglycosides

a. Only as a part of initial empiric regimen of a combination therapy — shall step down to single drug after culture report

b. Other safer drug options have been ruled out in a culture report

HYPERSENSITIVITY

All patients should be asked about drug allergies. This is the responsibility of the doctor who writes the patient's history. If a patient reports a drug allergy clarify whether this is an allergy or drug intolerance. In some cases, there will be an overlap between drug allergy and drug intolerance.

a. Clinical features suggestive of drug allergy:
   - ❖ One or more symptoms developed during or following drug administration including difficulty breathing, swelling, itching, rash, and anaphylaxis, swelling of the lips, loss of consciousness, seizures or congestion involving mucous membranes of eyes, nose and mouth

b. Clinical features suggestive of drug intolerance:
   - ❖ One or more symptoms developed during or following drug administration including gastrointestinal symptoms e.g. nausea, vomiting, diarrhea, abdominal pain and feeling faint

c. If patients are unable to give an allergy history, the doctor should take reasonable steps to contact someone who can provide a reliable allergy history. It is the prime responsibility of the prescribing doctor to ensure that allergy history is documented in drug chart as
   - ➢ No known allergy (NKA)
   - ➢ History not available

Importance of Infection Control to Control Antimicrobial Resistance:

The use of antimicrobial agents inevitably leads to the emergence of resistant microorganisms. It also destroys the normal flora of the body and renders patients far more susceptible to colonization with micro-organisms introduced from elsewhere in the hospital through the process of cross infection,

- ❖ Hospitals may be considered as reservoirs and breeding grounds within the world of antibiotic resistance
- ❖ Prevention of cross infection and good quality antimicrobial prescribing contribute to the prevention of antimicrobial resistance, Infection Control and Clinical Microbiology are inextricably linked
- ❖ There is no substitute of hand washing in preventing hospital acquired infection and the spread of antibiotic resistant micro-organisms
- ❖ High standards of hospital cleanliness may be important in controlling the spread of resistant organism in the environment e.g. MRSA, Acinetobacter baumannii.

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ISOLATION POLICY

Introduction:

Infection is the result of a complex interrelationship between a potential host and an infectious agent. Most of the factors that influence infection and the occurrence and severity of disease are related to the host However, characteristics of the host-agent interaction as it relates to pathogenicity, virulence and antigenicity are also important, as are the infectious doses mechanisms of disease production and route of exposureo There is a spectrum of possible outcomes following exposure to an infectious agent Some persons exposed to pathogenic microorganisms never develop symptomatic disease while others become severely ill and even dieo Some individuals are prone to becoming transiently or permanently colonized but remain asymptomatica Still others progress from colonization to symptomatic disease either immediately following exposure, or after a period of asymptomatic colonizationø The immune state at the time of exposure to an infectious agent, interaction between pathogens, and virulence factors intrinsic to the agent are important predictors of an individuals' outcome. Host factors such as extremes of age and underlying " disease (e.ge diabetes), human immunodeficiency virus/acquired immune deficiency syndrome [HIV/AIDS], malignancy, and transplants can increase susceptibility to infection as do a variety of medications that alter the normal flora (e.g., antimicrobial agents, gastric acid suppressants,

corticosteroids, anti-rejection drugs, antineoplastic agents, and immunosuppressive drugs). Surgical procedures and radiation therapy impair defenses of the skin and other involved organ systems. Indwelling devices such as urinary catheters, endotracheal tubes, central venous and arterial catheters and synthetic implants facilitate development of HAIs by allowing potential pathogens to bypass local defenses that would ordinarily impede their invasion and by providing surfaces for development of biofilms that may facilitate adherence of microorganisms and protect from antimicrobial activity. Some infections associated with invasive procedures result from transmission within the healthcare facility; others arise from the patient's endogenous flora.

Modes of transmission

Several classes of pathogens can cause infection, including bacteria, viruses, fungi, parasites, and prions. The modes of transmission vary by type of organism and some infectious agents may be transmitted by more than one route: some are transmitted primarily by direct or indirect contact,

(e.g., Herpes simplex virus [I-ISV], respiratory syncytial virus, Staphylococcus aureus), others by the droplet, (e.g., influenza virus, Ba pertussis) or airborne routes (e.g., M. tuberculosis), Other infectious agents, such as bloodborne viruses (e.g., hepatitis B and C Viruses [HBV3 HCVI and HIV are transmitted rarely in healthcare settings, via percutaneous or mucous membrane exposure. Importantly, not all infectious agents are transmitted from person to person. These are distinguished in Appendix A. The three principal routes of transmission are summarized below.

I.B.3.a. Contact transmission

The most common mode of transmission, contact transmission is divided into two subgroups: direct contact and indirect contact 15

I.B.3.a.i. Direct contact transmission

Direct transmission occurs when microorganisms are transferred from one infected person to another person without a contaminated intermediate object or person. Opportunities for direct contact transmission between patients and healthcare personnel have been summarized in the Guideline for Infection Control in Healthcare Personnel, 1998 [17] and include:

- blood or other blood-containing body fluids from a patient directly enters a caregiver's body through contact with a mucous membrane [66] or breaks (i.e., cuts, abrasions) in the skin [67]
- mites from a scabies-infested patient are transferred to the skin of a caregiver while he/she is having direct ungloved contact with the patient's skin [68]

69 - a healthcare provider develops herpetic whitlow on a finger after contact with I-ISV when providing oral care to a patient without using gloves or I-ISV is transmitted to a patient from a herpetic whitlow on an ungloved hand of a healthcare worker (HCW) 70, 71

1.B.3.a.ii Indirect contact transmission

Indirect transmission involves the transfer of an infectious agent through a contaminated intermediate object or persona In the absence of a point-source outbreak, it is difficult to determine how indirect transmission occurs. However, extensive evidence cited in the Guideline for Hand Hygiene in Health-Care Settings suggests that the contaminated hands of healthcare personnel are important contributors to indirect contact transmission 16 .Examples of opportunities for indirect contact transmission include:

- Hands of healthcare personnel may transmit pathogens after touching an infected or colonized body site on one patient or a contaminated inanimate object, if hand hygiene is not performed before touching another patient.72, 73.
- Patient-care devices (e.g., electronic thermometers, glucose monitoring devices) may transmit pathogens if devices contaminated with blood or body fluids are shared between patients without cleaning and disinfecting between patients74 7577
- Shared toys may become a vehicle for transmitting respiratory viruses (e.g., respiratory syncytial virus 24, 78, 79 or pathogenic bacteria (e.g., Pseudomonas aeruginosa [80]) among pediatric patients.
- Instruments that are inadequately cleaned between patients before disinfection or sterilization (e.g., endoscopes or surgical instruments) 81-85 or that have manufacturing defects that interfere with the effectiveness of reprocessing 86,87may transmit bacterial and viral pathogens.Clothing, uniforms, laboratory coats, or isolation gowns used as personal protective equipment (PPE), may become contaminated with potential pathogens after care of a patient colonized or infected with an infectious agent, (e.g., MRSA [88] VRE [89], and C. difficile [90] Although contaminated clothing has not been 16 implicated directly in transmission, the potential exists for soiled garments to transfer infectious agents to successive patients.

I.B3.b. Droplet Transmission

Droplet transmission is, technically a form of contact transmission, and some infectious agents transmitted by the droplet route also may be transmitted by the direct and indirect contact routes. However, in contrast to contact transmission, respiratory droplets carrying infectious pathogens transmit infection when they travel directly from the respiratory tract of the infectious individual to susceptible mucosal surfaces of the recipient,

generally over short distances, necessitating facial protection. Respiratory droplets are generated when an infected person coughs, sneezes, or talks [91 ' 92] or during procedures such as suctioning, endotracheal intubation, 93-96 cough induction by chest physiotherapy [97] and cardiopulmonary resuscitation 98, 99 Evidence for droplet transmission comes from epidemiological studies of disease outbreaks [100]103 , experimental studies [104] and from information on aerosol dynamics 915 105.

Studies have shown that the nasal mucosa, conjunctivae and less frequently the mouth, are susceptible portals of entry for respiratory viruses

[106] The maximum distance for droplet transmission is currently unresolved, although pathogens transmitted by the droplet route have not been transmitted through the air over long distances, in contrast to the airborne pathogens discussed below Historically, the area of defined risk has been a distance of <3 feet around the patient and is based on epidemiologic and simulated studies of

selected infections 103, 104 Using this distance for donning masks has been effective in

preventing transmission of infectious agents via the droplet route. However, experimental studies with smallpox [107' 108] and investigations during the global SARS outbreaks of 2003 [101] suggest that droplets from patients with these two infections could reach persons located 6 feet or more from their source. It is likely that the distance droplets travel depends on the velocity and mechanism by which respiratory droplets are propelled from the source, the density of respiratory secretions, environmental factors such as temperature and humidity, and the ability of the pathogen to maintain infectivity over that distance [105] Thus, a distance of <3feet around the patient is best viewed as an example of what is meant by "a short distance from a patient" and should not be used as the sole criterion for deciding when a mask should be donned to protect from droplet exposure. Based on these considerations, it may be prudent to don a mask when within 6 to 10 feet of the patient or upon entry into the patient's room, especially when exposure to emerging or highly virulent pathogens is likely. More studies are needed to improve understanding of droplet transmission under various circumstances. Droplet size is another variable under discussion.

Droplets traditionally have been defined as being >5 um in size. Droplet nuclei, particles arising from desiccation of suspended droplets, have been associated with airborne transmission and defined as <5 gm in size 105 a reflection of the pathogenesis of pulmonary tuberculosis which is not generalizable to other organisms. Observations of particle dynamics have demonstrated that a range of droplet sizes, including those with diameters of 30gm or greater, can remain suspended 17

in the air [109] The behavior of droplets and droplet nuclei affect recommendations for preventing transmission.

Whereas fine airborne particles containing pathogens that are able to remain infective may transmit infections over long distances, requiring AIIR to prevent its dissemination within a facility; organisms transmitted by the droplet route do not remain infective over long distances, and therefore do not require special air handling and ventilation. Examples of infectious agents that are transmitted via the droplet route include Bordetella pertussis 110 influenza virus 23 adenovirus 111 rhinovirus [104] Mycoplasma pneumoniae 112 SARSassociated coronavirus (SARS-CoV) 21, 96, 113 group A streptococcus 114 and Neisseria meningitidis [95' 103' 115] Although respiratory syncytial virus may be transmitted by the droplet route, direct contact with infected respiratory secretions is the most important determinant of transmission and consistent adherence to Standard plus Contact Precautions prevents transmission in healthcare settings 24,116, 117 Rarely, pathogens that are not transmitted routinely by the droplet route are dispersed into the air over short distances For example) although S. aureus is transmitted most frequently by the contact route, viral upper respiratory tract infection has been associated with increased dispersal of S. aureus from the nose into the air for a distance of 4 feet under both outbreak and experimental conditions and is known as the "cloud baby" and "cloud adult" phenomenon118-120 .

I.B.3.c Airborne transmission

Airborne transmission occurs by dissemination of either airborne droplet nuclei or small particles in the respirable size range containing infectious agents that remain infective over time and distance (e.g., spores of Aspergillus spp, and Mycobacterium tuberculosis). Microorganisms carried in this manner may be dispersed over long distances by air currents and may be inhaled by susceptible

individuals who have not had face-to-face contact with (or been in the same room with) the infectious individual 121-124

Preventing the spread of pathogens that are transmitted by the airborne route requires the use of special air handling and ventilation systems (e.g., AIIRs) to contain and then safely remove the infectious agent [11 ' 12] Infectious agents to which this applies include Mycobacterium tuberculosis 124- 127 rubeola virus measles) 122 and varicella-zoster virus (chickenpox) 123 In addition, published data suggest the possibility that variola virus (smallpox) may be transmitted over long distances through the air under unusual circumstances and AIIRs are recommended for this agent as well; however, droplet and contact routes are the more frequent routes of transmission for smallpox 108, 128, 129 In addition to AIIRs, respiratory protection with NIOSH certified N95 or higher level respirator is recommended for healthcare personnel entering the AIIR to prevent acquisition of airborne infectious agents such as M. tuberculosis 12。 For certain other respiratory infectious agents, such as influenza 130, 131 and rhinovirus 104 and even some gastrointestinal viruses (e.g., norovirus 132 and rotavirus [133]) there is some evidence that the pathogen may be transmitted via small-particle aerosols, under natural and experimental conditions. Such transmission has occurred over distances longer than 3 feet but within a defined 18 airspace (e.g., patient room), suggesting that it is unlikely that these agents remain viable on air currents that travel long distances. AIIRs are not required routinely to prevent transmission of these agents. Additional issues concerning examples of small particle aerosol transmission of agents that are most frequently transmitted by the droplet route are discussed below.

I.B.3.d. Emerging issues concerning airborne transmission of infectious agents.

I.B.3.d.i. Transmission from patients

The emergence of SARS in 2002, the importation of monkeypox into the United States in 2003, and the emergence of avian influenza present challenges to the assignment of isolation categories because of conflicting information and uncertainty about possible routes of transmission. Although SARS-CoV is transmitted primarily by contact and/or droplet routes, airborne transmission over a limited distance (e.g. within a room), has been suggested, though not proven [134-141] This is true of other infectious agents such as •influenza virus 130 and noroviruses 132, 142, 143 Influenza viruses are transmitted primarily by close contact with respiratory droplets 23, 102 and acquisition by healthcare personnel has been prevented by Droplet Precautions, even when positive pressure rooms were used in one center [144] However, inhalational transmission could not be excluded in an outbreak

of influenza in the passengers and crew of a single aircraft [130] Observations of a protective effect of UV lights in preventing influenza among patients with tuberculosis during the influenza pandemic of 1957-'58 have been used to suggest airborne transmission

145, 146 In contrast to the strict interpretation of an airborne route for transmission (i.e., long distances beyond the patient room environment), short distance transmission by small particle aerosols generated under specific circumstances (e.g., during endotracheal intubation) to persons in the immediate area near the patient has been demonstrated. Also, aerosolized particles <100 um can remain suspended in air when room air current velocities exceed the terminal settling velocities of the particles 109 SARS-CoV transmission has been associated with endotracheal intubation, noninvasive positive pressure ventilation, and cardiopulmonary resuscitation 93, 94, 96, 98, 141 Although the most frequent routes of transmission of noroviruses are contact and food and waterborne routes, several reports suggest that noroviruses may be transmitted through aerosolization of infectious particles from vomitus or fecal material [142, 143, 147, 148] It is hypothesized that the aerosolized particles are inhaled and subsequently swallowed.

Roy and Milton proposed a new classification for aerosol transmission when evaluating routes of SARS transmission: 1) obligate: under natural conditions, disease occurs following transmission of the agent only through inhalation of small particle aerosols (e.g., tuberculosis); 2) preferential: natural infection results from transmission through multiple routes, but small particle aerosols are the predominant route (e.g. measles, varicella); and 3) opportunistic: agents that naturally cause disease through other routes, but under special circumstances 19 may be transmitted via fine particle aerosols [149] This conceptual framework can explain rare occurrences of airborne transmission of agents that are transmitted most frequently by other routes (e.g., smallpox, SARS, influenza, noroviruses) Concerns about unknown or possible routes of transmission of agents associated with severe disease and no known treatment often result in more extreme prevention strategies than may be necessary; therefore, recommended precautions could change as the epidemiology of an emerging infection is defined and controversial issues are resolved.

I.B.3.d,ii. Transmission from the environment

Some airborne infectious agents are derived from the environment and do not usually involve person-toperson transmission. For example, anthrax spores present in a finely milled powdered preparation can be aerosolized from contaminated environmental surfaces and inhaled into the respiratory tract [150, 151] Spores of environmental fungi (e.g., Aspergillus spp.) are ubiquitous in the environment and may cause disease in immunocompromised patients who inhale aerosolized (e.g., via construction dust) spores [152, 153] As a rule, neither of these organisms is subsequently transmitted from infected patients. However, there is one well-documented report of person-toperson transmission of Aspergillus sp. in the ICU setting that was most likely due to the aerosolization of spores during wound debridement 154 A Protective Environment refers to isolation practices designed to decrease the risk of exposure to environmental fungal agents in allogeneic HSCT patients 11 , 14, 15, 155-158

Environmental sources of respiratory pathogens (e.g. Legionella) transmitted to humans through a common aerosol source is distinct from direct patient-topatient transmission

OUTBREAK POLICY

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Outbreak Investigation Plan

Definition

The occurrence of two or more similar cases relating to place and time is identified as a cluster or an outbreak and needs investigation to discover the route of transmission of infection and possible sources of infection in order to apply measures to prevent further spread.

Epidemiological methods

Investigation of an outbreak requires

Formulation of a hypothesis regarding source and spread

1) Common source
2) Person to person spread

- Microbiological investigations: A laboratory report of an micro-organism which needs to alert the clinician and hospital authorities
- A rare organism or an organism with multi-drug resistant strain /multiple infections of similar nature

Steps to be taken to investigate an outbreak

Step I

Recognition of an outbreak

1. Increase in the number of cases of a particular infection

2. Increase in the number of a particular organism

3. Clustering of cases

Preliminary investigation: As soon as an outbreak is suspected based on preliminary evaluation Confirm the existence of outbreak and diagnosis using microbiological investigations

1) Case definition
2) Site identification
3) Pathogen identification
4) Patients at risk

Determination of magnitude of problem & immediate control measures if needed

1. Isolation
2. Cohering
3. Barrier nursing

Verification of diagnosis

Case review for definition

Step 2

- Notification to ICC : In case of notifiable disease information is sent through appropriate authorities.
- Certain specified diseases which required to be notified to public health authorities under international health regulation as follows to WHO

1) Cholera
2) Plague
3) Yellow fever

In India the following diseases are also notifiable and may vary from state to state

1) Polio
2) Influenza
3) Malaria
4) Rabies
5) HIV/AIDS
6) Tuberculosis
7) Leprosy
8) Leptospirosis
9) Viral hepatitis
10) Dengue Fever
11) NIPAH
12) H1N1

Various diseases notifiable under the factories act are lead poisoning, anthrax, asbestoses and silicosis. The organization first shall ensure that this is sent through specific format through medical record department in a specific time limit as required by statutory authorities. Surveillance activities of the team will ensure tracking and analyzing of infection risk) rates and trends. Prevalent rate of infection is studied at regular intervals and produced in an annual report. Organization shall take suitable steps based on the analysis. Surveillance activities include monitoring the effectiveness of housekeeping services as following aspects in hospital.

Step 3

Case analysis

1. Demographics
2. Clinical signs & symptoms
3. Risk factors
4. Predisposing factors
5. Microbiological investigations

❖ Cultures from body sites depending upon the epidemiology of infection e Cultures from other patients

❖ Environmental cultures

Arrival at some conclusion and control measures

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Step 4

Immediate control measures: initiated as soon as possible of the suspected outbreak

1. Strict hand washing
2. Intensification of environmental cleaning and hygiene
3. Adherence to aseptic protocols
4. Strengthening of disinfection & sterilization

Specific control measures

1. Identification and elimination of the contaminated product
2. Modification of nursing procedures
3. Identification of treatment of carriers
4. Rectification of lapse in technique or procedure

Step 5

Monitoring for the effectiveness of control measures

- Continued follow up of cases after the outbreak, clinically and microbiologically

Documentation of outbreak

Step 6

Report preparation with sequence of events

Responsibility

1. Microbiology section
   For investigation of the outbreak
2. Infection control Nurse
   For collection of relevant data
3. ICC
   For formulating the policies to prevent its recurrence

HOSPITAL INFECTION CONTROL TRAINING

Education And Training Of Health Care Staff

Health administrators should be oriented towards the importance of the infection control programme. Health care workers should be equipped with requisite knowledge, skills and attitudes for good infection control practices.

The infection control team should:

- Assess training needs of the staff and provide required training through awareness programmes, in-service education and on-the-job training;

- Organize regular training programmes for the staff for essential infection control practices that are appropriate to their job description;
- Provide periodic re-training or orientation of staff; and review the impact of training.
- Training provided on all policies approved by the Institution to concerned departments.

Reference Annexure I:

- PolicyN0. 012 - Standard Infection Control Precautions
- PolicyN0. 001 – Hand washing, Hand care & Antisepsis
- Chapter 18.0 - Bio-Medical waste management Nursing Dept
- Policy No. 009 - Food Handling Diet Dept. & Cafeteria staff
- Policy No.008 Cleaning, Disinfection & Sterilization CSSD & Nursing staff
- Policy No.010 Domestic Cleaning, House keeping & Laundry Dept.
- Policy No. 005 Environmental Culturing
- Policy No. 006 Environmental health & Safety Maintenance
- PolicyN0.014 Infection Control & Prevention Requirements for Employees, General staff

PATIENT VISITORS POLICY

Patient Visitors

Policy

- Visitors with respiratory, skin, or acute gastrointestinal infections should not visit.
- Visitors, especially children, who have been exposed and may be incubating communicable diseases (e.g., chicken pox, measles, or german measles) should not visit and should not be brought to patient care unit areas such as waiting rooms, solariums or playrooms
- Children under 12 years of age are not allowed to visit patients who can infect or transmit infection to the child
- Visitors should be instructed to use hand washing and other precautions as appropriate to their degree of contact with patient's blood or other body substances

a. Responsibilities of nursing staff:

- Explain necessary precautions and assist visitors with the use of appropriate barriers (e.g., hand washing, mask, and gloves),
- Screen visitors for active or incubating infections as noted aboveo This is especially important on pediatric and neonatal units and for patients who are immunosuppressed.

Spillage Management

Blood spillage

- 1% sodium hypochlorite soln
- Pour so ..hy on spillage
- Cover it with piece of paper
- Keep it for 5-10 mts
- Mop it with separate mop and mop should be dipped in 1% s.h soln for 30 mts.

Mercury spillage

- Use PPE
- Make a proper in conical shape
- Take the mercury and kept in a air tight container and seal the container
- Send it to the biomed
- Raise an incident repor

Hand Hygiene

5 moments of hand hygiene
Hand washing steps

PPE

1. **Gown**
   - Fully cover torso from neck to knees, arms to end of wrists.
   - Wrap around the back
   - Faster in band of neck and waist
2. **Mark**
3. **Goggles or face shield**
4. **Gloves**

Remaining of PPE

- 1st-gloves-hand hygiene
- Goggles or face shield
- Gown
- Perform hygiene
- Remove mask: Do not touch front of mask

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