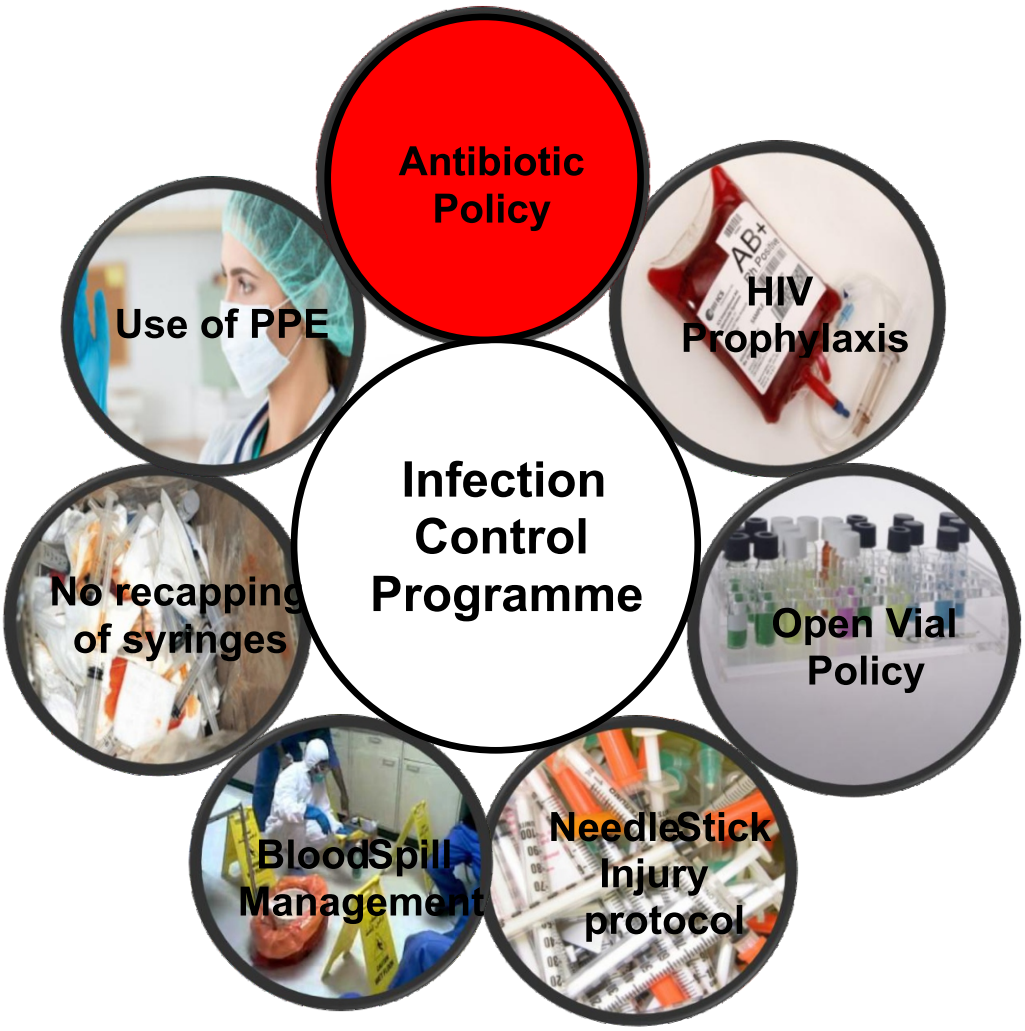
Infection Control Manual
for
Public Health Facilities of Uttar Pradesh



National Health Mission
Uttar Pradesh

Infection Control Programme

&

Antibiotic Policy

NATIONAL HEALTH MISSION
राष्ट्रीय स्वास्थ्य मिशन

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MESSAGE

It is my privilege to write this message for the manual on Hospital Infection Control Manual prepared by QA Division, State Programme Management Unit , National Health Mission Uttar Pradesh. Proper implementation and practice of policies and procedures on infection control by healthcare providers is a highly effective strategy in reducing Health care Associated Infections.

With this manual, the Health Department is enforcing the implementation of prevention practices. The most important conditions include having written policies and procedures that minimize communicable infections. Furthermore, we are strengthening our first line of defense. Infection prevention begins with our staff. Hand hygiene and employee health are the first steps in assembling a successful Infection Prevention Program. We recommend our staff to begin each day with a hand scrub and strictly follow the recommendations stated in the topic, "Hand hygiene".

Surveillance remains the primary tool of prevention; its impact needs to be more explicitly assessed. The primary objective of surveillance is to drive the conduct of interventions that reduce infection rates, outbreaks and control resistance. The active implementation of prevention strategies by Infection Control Programs is essential.

Antibiotic control is mandatory in the hospital as well as in the community and might require culture changes. There are new challenges almost daily in Infection Control, which includes adapting to the moving trends of health care systems. For this reason, Infection Prevention and Control deserve a specific attention in all Public Health Facilities.

In conclusion, we trust that this Infection Control Manual clearly describes protocols and procedures to be implemented at all the health facilities. It is aimed at standardizing the clinical procedures with respect to infection prevention, assisting in training new staff, and having information readily available for the facility staff.

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PREFACE

Health care-associated infection remains a major issue of patient safety. It complicates a significant proportion of patient care deliveries, adds to the burden of resource use, and contributes to unexpected deaths. Parameters for success include those to recognize and explain healthcare-associated infections and implement interventions to decrease infection rates and limit antimicrobial resistance spread.

The infection control policies and procedures, when consistently applied and integrated into all systems and processes result in significantly reduced infection rates thus reducing the morbidity and mortality due to Health care Associated Infections (HAIs). Practicing good infection control measures can significantly reduce patient morbidity and mortality in health facilities and has been proven to be cost effective as well.

Efforts at preventing healthcare associated infections in hospitals remain an ongoing and difficult challenge in the public health care facilities. This Infection Control Manual is intended to assist healthcare providers to adhere to best practices in the control of healthcare-associated infections. The document covers the basic principles of infection control, role of health care workers, Bio medical waste management and elaborates on the steps to be followed for setting up of an effective Infection Control Programme in health care facilities.

It is my sincere hope that all health care facilities will adopt the various recommendations set out in this manual for more efficient and effective infection control in our hospitals, thereby minimizing the healthcare associated infection rates in our health facilities. I am optimistic that over the time this manual will become a reference document and will be followed by all public health care facilities across the State to bring down their infection rates and enhance quality of patient care. I compliment the contributors and State Quality Assurance team, SPMU, National Health Mission, Uttar Pradesh for this effort.

(Prashant Trivedi)

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ACKNOWLEDGEMENT

In keeping with one of the main goals, which is to improve and maintain the quality of health care delivered to the undeserved population, the National Health Mission has introduced a structured programme for the prevention and control of infection since it maximizes patient outcomes, and is part of the Quality Assurance Programme for providing safe, effective and efficient quality health services.

Prevention and Control of Health care Associated Infections is a vital aspect of improving health care as these infections pose great hazards to patients as well as to health care workers and visitors. Although certain important steps have been taken during the past in this direction, no adequate guidelines for public health facilities were available.

This Infection Control Manual would help in establishing and implementing necessary policies and procedures. This manual has been prepared after referring Infection Control Guidelines by National Centre for Disease Control, WHO, Centres for Disease Control and Prevention as well as discussion with other relevant resource persons from King George Medical University, Lucknow and NHSRC, New Delhi.

I wish to express my sincere gratitude to Dr. Archana Verma, General Manager-QA who initiated work on this manual during her tenure and her team member Dr. Preeti Madaan, State Consultant Public Health, Quality Assurance Division, SPMU, National Health Mission, Uttar Pradesh,for her untiring and dedicated efforts in preparing and compiling the manual.

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Programme Officer's Message

Discovery of antibiotics has truly revolutionized the health care delivery system of the world. Antibiotics are the hallmark of modern medicine but the emerging trend of resistance is a serious threat and a challenge not only to the future of antibiotics but also to the patients' clinical outcome.

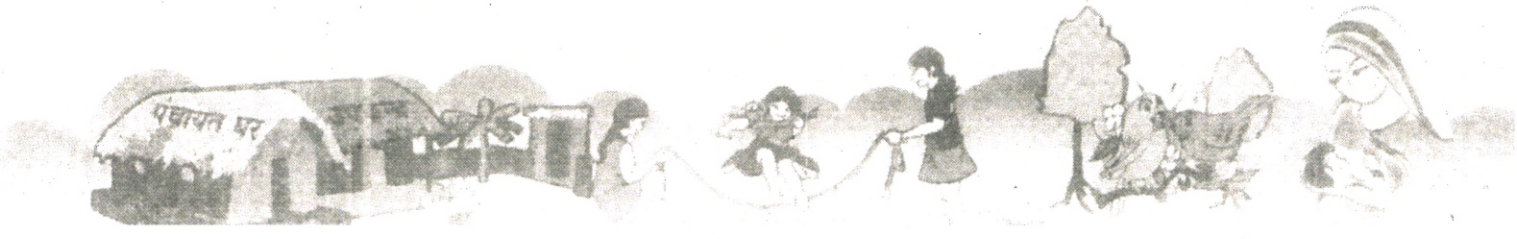
Therefore, implementation of a robust Infection control Programme adjunct with an Antibiotic Policy is the need of the hour in order to combat the fast spreading resistance.

Points to remember for a good antibiotic prescription practice:-

- Judicious use of antibiotics must be ensured.
- Appropriate diagnostic tests including cultures should precede initiation of therapy.
- Analyze factors affecting choice of drugs such as: renal or liver function, drug interaction, allergy etc.
- Empirical therapy, when necessary should be given after ensuring the accuracy of the clinical diagnosis and reviewed on a daily basis. Rapid test kits may be of great help.
- Once culture reports are available, The Physician shall step down to the narrowest spectrum option.
- All intra-venous therapy should usually be given for 48-72 hours, patients' condition to be reviewed and oral options to be considered.
- Change of antibiotic should be done after reading fresh culture.
- All medication offered should be documented properly.

I am confident that this compendium of Infection Control programme and Antibiotic policy will provide necessary professional enlightenment to all the service providers across the State. Let's all join hands to make it successful so that we serve the humanity in a safe, effective and efficient manner.

(Dr. Archana Verma)
GM (Quality Assurance)



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National Health Mission

Quality Assurance Division, SPMU

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

AMENDMENT SHEET

S.N.	Section No. & Page no.	Details of the amendment	Reasons	Signature of the preparatory authority	Signature of the Approval Authority

1. **Purpose:**
    - To maintain standards in Infection control measures.
    - To define policy and procedures regarding Health care associated infections (HAI).

2. **Scope:** Hospital wide

Abbreviations:

- HICC Hospital / Health Facility Infection Control Committee
- ICO Infection Control Officer
- ICN Infection Control Nurse
- HAI Health care Associated Infections

3. **Hospital / Health Facility Infection Control Committee (HICC)**

    a. Chairman:

    b. Secretary (Infection Control Officer): Microbiologist /Pathologist/ Physician

    c. Members:

    .....……..
    ……
    ……
    ……

    d. Infection Control Nurse: Trained in-house

4. **Objectives of Infection Control Program**

- Basic measures for infection control– Standard and additional precaution
- To minimize the risk of HAI to patients, visitors and staff.
- To identify key roles of persons involved in prevention and control of infections.
- Education and training of health care workers
- Protection of health care workers
- Surveillance of HAI such as Catheter associated urinary tract infection, Episiotomy site infection rate, Ventilator / Endo tracheal Tube / Tracheostomy tube associated pneumonia, Surgical site infection and Catheter associated blood stream infection.
- Aseptic techniques
- Use of single use device, reprocessing of instruments and equipment
- Antibiotic usage, management of blood / body fluid exposure, handling of blood / blood products.

- Incident monitoring
- Investigation of outbreaks.
- Monitoring of cleaning and sterilization practices in all high-risk areas (High dependency unit, dialysis, trauma, blood bank, OT, labour room)
- Monitoring kitchen sanitation and food handling.
- Monitoring laundry and linen management.
- Monitoring mortuary practices.
- Monitoring biomedical waste management in the hospital.
- The HICC meets once in two months and early if necessary. The secretary is responsible for organizing and documenting the meetings.
- Secretary and the Infection Control Nurse (ICN) conduct an inspection round once in a month. Register is kept with the ICN

4. Responsibility of key members

Chairperson

- Establish an infection control committee.
- Provide funds and resources for infection control program.
- Receives surveillance reports and other hospital acquired infection related information and assists the Chairperson to initiate appropriate action.

Infection Control Officer (ICO)

- Supervises the functioning of whole program.
- To organize training and education in infection control procedures and practices.
- Surveillance of hospital acquired infections.
- Compilation and dissemination of data on all aspects of HAI.
- Detection and investigation of outbreaks.
- To formulate an antibiotic policy in consultation with clinical departments.
- To supervise functioning of CSSD.
- To make cleaning and disinfection policies and supervise its application in coordination with housekeeping.
- To formulate policies for biomedical waste management (BWM).

Infection Control Nurse (ICN)

- Collaborates with the ICO on surveillance of infection and detection of outbreaks.
- Ensures that relevant specimens are collected and submitted for culture surveillance.

- Training and education of hospital staff on infection control practices
- To increase awareness among patients and visitors about infection control.
- To maintain register for infection control inspection round.

Each health care facility needs to:

- Develop an infection control programme to ensure the well being of both patients and staff;
- Develop annual work plan to assess and promote good health care, appropriate isolation; sterilization; and other practices, staff training, and epidemiological surveillance;
- Provide sufficient resources to support the Infection control programme.

Risk prevention for patients and staff is a concern of everyone in the facility, and must be supported by the senior administration.

Universal Precautions

These are a set of guidelines designed to protect the health care worker from exposure to infections like HIV, Hepatitis B and Hepatitis C which are transmitted by blood and certain body fluids of the patient.

According to the universal precautions, all patients should be assumed to be infectious for blood borne infections such as HIV, Hepatitis B, Hepatitis C and other blood borne pathogens while being provided health care.

Components: Universal precautions consider only certain body fluids as capable of transmitting blood borne diseases (Table1). It advocates the use of barriers to prevent occupational exposure to blood and applicable body fluids.

Table1: Precautions related to body fluids

Universal precautions apply to:	**Universal precautions do not apply to:**
Blood	Faeces
Semen	Nasal secretions
Vaginal secretions	Sputum
Synovial fluid	Sweat
Cerebrospinal fluid	Tears
Pleural fluid	Urine
Peritoneal fluid	Vomitus
Pericardial fluid	Saliva
Amniotic fluid	

Barriers of infection:

Personal protective equipment (PPE): PPE includes gloves, aprons, laboratory coats, gowns, goggles, glasses with side shields, shoe covers and masks. The purpose of PPE is to prevent blood and body fluids from reaching the worker's skin or mucous membranes.

Engineering controls: This includes removing hazards from the workplace. Examples are sharps disposal containers, biological safety cabinets, etc.

Work practice controls: This refers to practical techniques that reduce the likelihood of exposure by changing the way a task is performed. Examples include hand washing, proper handling and disposal of sharps and proper collection and transportation of fluids and tissues.

Thus the universal precautions give priority only to the health care provider. The sole aim of universal precautions is to prevent transmission of infections from the patient to the health care provider.

Table2: Summary of precautions to prevent the spreading and transmission of infections

Purpose	Contact	Droplet	Airborne
Organism based precaution	MRSA, *Clostridium difficile*, lice, scabies	*N.meningitidis*, mumps, Pertussis, norovirus, influenza invasive group A Streptococcus	Pulmonary tuberculosis, measles, chickenpox, disseminated zoster
Syndromic precaution	Draining wound Diarrhea (not yet diagnosed)	Toxic shock	Fever, weight loss, cough, high TB risk
Private room	Preferred	Preferred	Yes
Negative pressure room	No	No	Yes
PPE-Staff	Gown + gloves	Gown + gloves + surgical grade fluid resistant mask	Gown + gloves + N95 mask
Visitor–PPE	Gown + gloves	Gown + gloves + surgical grade fluid resistant mask	Surgical grade mask
Transporting patient	Patient– No Staff–	Patient–Yes Staff– Yes	Patient–Yes Staff–No
Cleaning	Precaution clean	Precaution clean	Precaution clean

Categories of Infection control practices:

i. **Standard precautions:** Applied to all patients at all times (Regardless of diagnosis and infectious status). It aims to prevent transmission of infections from:

- Patient to health care worker
- Health care worker to patient
- Patient to patient (cross-transmission)
- Hospital environment to patient
- Hospital waste to community spread

ii. **Additional (transmission based) precaution:** Specific to the mode of transmission which includes air-borne, droplet and contact

i. Standard precautions

Treating all patients in the health care facility with the same basic level of "standard" precautions involves work practices that are essential to provide a high level of protection to patients, health care workers and visitors which include the following:

- Hand washing and antisepsis (hand hygiene)
- Use of personal protective equipment when handling blood, body substances, excretions and secretions
- Appropriate handling of patient care equipment and soiled linen
- Prevention of needle stick / sharp injuries
- Environmental cleaning and spills-management and
- Appropriate handling of bio medical waste

i. (a) Hand hygiene

Appropriate hand hygiene can minimize micro-organisms acquired on the hands during daily duties and when there is contact with blood, body fluids, secretions, excretions and known and unknown contaminated equipment or surfaces.

Hands can become contaminated with infectious agents through contact with a patient, patient surroundings, the environment, or other healthcare workers. Cross-contamination can occur from one site to another in the same patient, between healthcare worker and patient, between patient or health care worker and the environment, or between health care workers. Practicing hand hygiene before every episode of patient contact (including between caring for different patients and between different care activities for the same patient) and after any activity or Contact that potentially results in hands becoming contaminated (such as removal of gloves) reduces the risk of cross-contamination.

Wash or decontaminate hands:

- After handling any blood, body fluids, secretions, excretions and contaminated items
- Between contact with different patients
- Between tasks and procedures on the same patient to prevent cross contamination between different body sites
- Immediately after removing gloves and
- Using a plain soap, anti microbial agent, such as an alcoholic hand rub or water less antiseptic agent

The health care setting is a good setting for communication about personal hygiene, such as informing visitors and the general public about hygiene rules such as washing hands. The World Health Organization has developed the '5 moments for hand hygiene' in 2009 (Fig.1) to

- Protect patients against acquiring infectious agents from the hands of the health care worker
- Help to protect patients from infectious agents (including their own) entering their bodies during procedures
- Protect health care workers and the health care surroundings from acquiring patients' infectious agents

Few key factors ineffective hand hygiene and maintaining skin integrity include:

- The duration of hand hygiene measures
- The exposure of all surfaces of hands and wrists to the preparation used
- The use of rubbing to create friction
- Ensuring that hands are completely dry

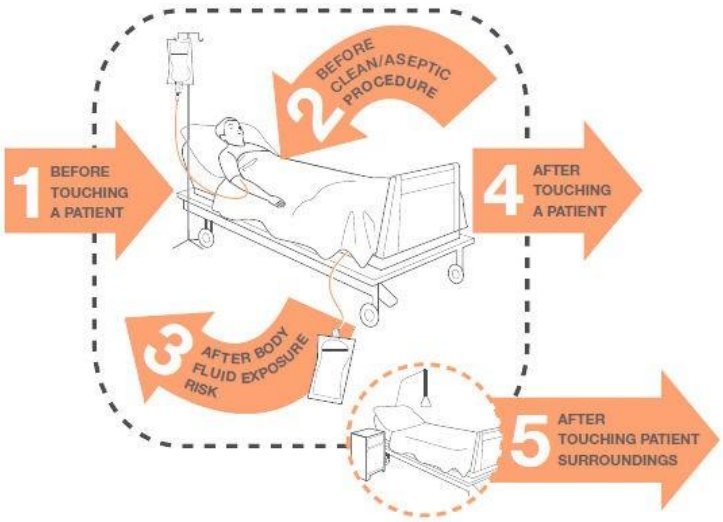


Fig.1: The 5 moments for hand hygiene. Source: WHO (2009). Procedure to use alcohol-based hand rub

Apply the amount of alcohol-based hand rub recommended by the manufacturer on to dry hands. Rub hands together so that the solution comes into contact with all surfaces of the hand, paying particular attention to the tips of the fingers, the thumbs and the areas between the fingers. Continue rubbing until the solution has evaporated and the hands are dry.

Advantages of alcohol-based hand rubs are that they have (Grayson and Russo, 2009):

- Ease accessibility at point of care
- Excellent anti microbial activity against Gram-positive and Gram-negative vegetative bacteria, Mycobacterium tuberculosis and a wide range of fungi
- Generally good anti microbial activity against enveloped viruses.

Disadvantages of alcohol-based hand rubs are:

- Lesser and /or variable anti microbial activity against non-enveloped viruses (such as noro virus)
- No activity against protozoan oocysts and bacterial spores (such as C. difficile).

The range of anti microbial activity in alcohol based hand rubs varies with the alcohol compound (ethanol, isopropanol or n-propanol) used. Different alcohol species have different levels of activity.

Procedure to use soap (including anti microbial soap) and water

Wet hands under tepid running water and apply the recommended amount of liquid soap. Rub hands together for a minimum of 15 seconds so that the solution comes into contact with all surfaces of the hand, paying particular attention to the tips of the fingers, the thumbs and the areas between the fingers. Rinse hands thoroughly under running water, then pat dry with single-use towels.

Plain soaps act by mechanical removal of micro organisms and hav e no anti microbial activity. They are sufficient for general social contact and for cleansing of visibly soiled hands. They are also used for mechanical removal of certain organisms such as C.difficile and norovirus. When difficile and non-enveloped viruses are suspected or known to be present, use of alcohol based hand rubs alone may not be sufficient to reduce transmission of these organisms.

Alcohol based hand rubs are effective at removing vegetative forms of C.difficile,but not effective at removing spores. If gloves are worn during the care of patients in settings where C.difficile or non enveloped viruses are suspected or known to be present, spore contamination of the hands will be minimal and alcohol-based hand rub remains the agent of choice for hand hygiene. However, if gloves have not been worn or the hands are visibly soiled, they must be meticulously washed with soap and water and patted dry, to facilitate the mechanical removal of spores.

As intact skin is a natural defence against infection, cuts and abrasions reduce the effectiveness of hand hygiene practices. Breaks or lesions of the skin are possible sources of entry for Infectious agents and may also be a source of them. Similarly, the presence of finger nail disease may reduce the efficacy of hand hygiene and result in the transmission of pathogens (WHO2009).

To reduce the risk of cross-transmission of infectious agents, cuts and abrasions should be covered with water proof dressings. The type and length of fingernails can have an impact on the effectiveness of hand hygiene as artificial or false nails have been reported to be associated with higher levels of infectious agents, especially Gram-negative bacilli and yeasts, than natural nails. Hence, fingernails should be kept short and clean, and artificial finger nais should not be worn. Hand contamination with infectious agents is increased with ring wearing.

The consensus recommendation is to strongly discourage the wearing of watches, rings or other jewellery during health care; however if jewellery must be worn in clinical areas it should be limited to a plain band (e.g. wedding ring) and this should be moved about on the finger during hand hygiene practices. In high-risk settings such as operating suites / rooms, any jewellery, even a plain band, should not be worn. Each health care facility should develop policies on the wearing of jewellery, artificial finger nails or nail polish by health care workers.

i. (b) Personal protective equipment for health care personnel

Personal protective equipment (PPE) refers to a variety of barriers, used alone or in combination, to protect mucous membranes, airways, skin and clothing from contact with infectious agents. PPE used as part of standard precautions includes aprons, gowns, gloves, surgical masks, protective eye wear and face shields. Selection of PPE is based on the type of patient interaction, known or possible infectious agents, and / or the likely mode(s) of transmission.

<u>Decision-making about personal protective equipment</u>

Selection of protective equipment must be based on assessment of the risk of transmission of infectious agents to the patient or the carer, and the risk of contamination of the clothing or skin of health care workers or other staff by patients' blood, body substances, secretions or excretions.

Factors to be considered are:

- Probability of exposure to blood and body substances
- Type of body substance involved
- Probable type and probable route of transmission of infectious agents

Where to wear PPE

PPE is designed and issued for a particular purpose in a protected environment and should not be worn outside that area. Protective clothing provided for staff in areas where there is high risk of contamination (e.g.operating suite / room) must be removed before leaving the area. Even where there is a lower risk of contamination, clothing that has been in contact with patients should not be worn outside the patient-care area. Inappropriate wearing of PPE (e.g. wearing operating suite / room attire in the public areas of a hospital or wearing such attire outside the facility) may also lead to a public perception of poor practice within the facility.

Using personal protective equipment provides a physical barrier between micro-organisms and the wearer. It offers protection by helping to prevent micro-organisms from contaminating hands, eyes, clothing, hair and shoes and being transmitted to other patients and staff.

Personal protective equipment includes:

- gloves
- protective eye wear (goggles)
- mask
- apron
- gown
- boots / shoe covers and
- cap/ hair cover.

Principles for use of personal protective equipment

It is important that it is used effectively, correctly, and at all times where contact with blood and body fluids of patients may occur. Continuous availability of personal protective equipment and adequate training for its proper use are essential. Staff must also be aware that use of personal protective equipment does not replace the need to follow basic infection control measures such as hand hygiene.

The following principles guide the use of personal protective equipment:

Risk assessment for using gloves

As with all PPE, the need for gloves is based on careful assessment of the task to be carried out, the related risk of transmission of microorganisms to the patient; and the risk of contamination of the health care worker's clothing and skin by the patient's blood and body substances. Risk assessment includes consideration of:

- who is at risk (whether it is the patient or the health care worker)
- whether sterile or non-sterile gloves are required, based on contact with susceptible sites or clinical devices and the aspect of care or treatment to be undertaken
- the potential for exposure to blood or body substances
- whether there will be contact with non-intact skin or mucous membranes during general care and invasive procedures
- whether contaminated instruments will be handled.
- When gloves are worn in combination with other PPE, they are put on last.

ii. Transmission-based precautions

Four categories of transmission-based precautions are available:

- Airborne precautions
- Droplet precautions
- Contact precautions
- Absolute (strict) isolation

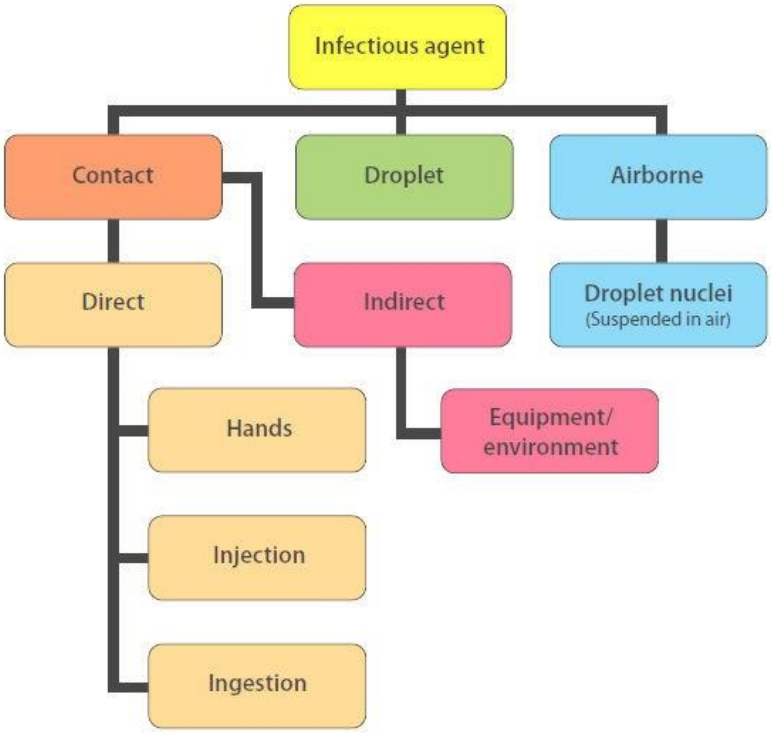


Fig2.Transmission based infection sources.

Absolute (strict) isolation

Absolute isolation is required where there is a risk of infection by a highly virulent or other unique agent of concern where several routes of transmission are implicated such ashaemorrhagic fever, vancomycin resistant *S.aureus*. The precautions that need to be followed are,

- Individual room (isolationward)
- Mask, gloves, gowns, cap, eye protection for all entering the room
- Hygienic hand washing at entry to and exit from the room
- Disinfection of medical instruments
- Incineration of excreta, body fluids, nasopharyngeal secretions
- Disinfection of linen
- Restricted entry of visitors and staff
- Daily disinfection and terminal disinfection at the end of the stay
- Use of disposable (single-use) equipment
- Appropriate transport and laboratory management of patient specimens.

Table3: Chain of transmission and the recommended precautions to breakdown the chain.

Chain of transmission	**Breaking the chain**
Infectious agent	Hand hygiene Cleaning Disinfection/sterilization
Reservoir People Animals Inanimate environment	Environmental cleaning Waste management Disinfection/ sterilization of surfaces/ equipment Maintaining proper food temperatures Maintaining good health
Portal of exit Excretion and secretions Non-intact skin (eg: draining nose) Respiratory tract Gastrointestinal tract Mucous membrane	Hand hygiene, PPE Environmental cleaning Containing excretions and secretions
Mode of transmission Contact Droplet Airborne Contaminated food Vector Parenteral	Hand hygiene PPE Environmental cleaning Respiratory etiquette Spatial separations Airflow control
Portal of entry Non-intact skin Respiratory tract Gastrointestinal tract Mucous membrane Parenteral	Hand hygiene Use of PPE Preventing skin breakdown Safe use/ handling of sharps Aseptic technique Catheter care
Susceptible host Elder persons Immunocompromised Invasive diseases Poor nutrition	Immunization Isolation Recognition of highly risk residents Treatment of underlying disease

Table 4: Measures for prevention of infection (Adapted from: Hospital infection control, 2nd edition. Geneva: WHO, 2002)

Infection	Proven to be effective	Proven to be ineffective
Urinary tract infections	Limit duration of catheter use Aseptic technique at insertion Maintain closed drainage	Systemic antibiotic prophylaxis Bladder irrigation or instillation of normal saline, antiseptic or antibiotic Antiseptic added to drainage bag Antimicrobial-coated catheter Daily antiseptic perineal cleaning
Surgical site infections	Surgical technique Clean operating environment Staff attire Limiting pre operative hospital stay Preoperative shower and local skin Preparation of patient Optimal antibiotic prophylaxis Aseptic practice in operating room Surgical wound surveillance	Pre operative shaving
Pneumonia	***Ventilator-associated*** Aseptic intubation and suctioning Limited duration Non invasive ventilation ***Others*** Sterile water for oxygen and aerosol therapy Isolation policy	Digestive decontamination of all patients Changes of ventilator circuit every 48 or 72 hours
Vascular device infections	***All catheters*** Closed system Limit duration of use Local skin preparation Aseptic technique at insertion Removal if infection suspected ***Central lines*** Surgical asepsis for insertion Limitation of frequency of dressing change Antibiotic-coated catheter for short term use	Anti microbial creams for skin preparation

5. Surveillance

A. Health care Associated Infection

Definition

Infections which arise in hospital are termed 'Health care associated infection' (HAI). Classically they are defined as those infections that were neither present nor incubating at the time the patient was admitted to health care facility. The majority of HAI become evident 48 hours or more following admission. However, it may not become clinically evident until after discharge.

The following infections are **not** considered HAI:

- Infections associated with complications or extensions of infections already present on admission, unless a change in pathogen or symptoms strongly suggests the acquisition of a new infection.
- Infections in infants that have been acquired transplacentally (eg, herpes simplex, toxoplasmosis, rubella, cytomegalovirus, or syphilis) and become evident >48 hours after birth.
- Reactivation of a latent infection (eg, herpes zoster [shingles], herpes simplex, syphilis, or tuberculosis).

The following conditions are not infections:

- Colonization, which means the presence of microorganisms on skin, on mucous membranes, in open wounds, or in excretions or secretions but are not causing adverse clinical signs or symptoms.
- Inflammation that results from tissue response to injury or stimulation by noninfectious agents, such as chemicals.

Tracking of HAI

Crude Infection Rate (CIR): A total of all nosocomial infections over a given period divided by the number of admissions/ discharges in the hospital during that period.

$$CIR = \frac{\text{Number of infections} \times 100}{\text{Number of admissions/ discharges}}$$

Environmental surveillance

As per Centre of Disease Control (CDC) guidelines random, undirected, microbiologic sampling of air, water, and environmental surfaces in health-care facilities is not required. Surveillance is indicated in four situations only:

- To support an investigation of an outbreak of disease or infections when environmental reservoirs or fomites are implicated epidemiologically in disease transmission.
- In research where experimental methods and approaches can provide new information about the spread of health-care–associated diseases.
- To monitor a potentially hazardous environmental condition, confirm the presence of a hazardous chemical or biological agent, and validate the successful abatement of the hazard.
- The fourth indication is for quality assurance to evaluate the effects of a change in infection-control practice or to ensure that equipment or systems perform according to specifications and expected outcomes. For this following activities are carried out by the Microbiology department:

    - Biological indicator testing of autoclaves and ETO : Weekly
    - Air leak rate test (in-house) monitoring for autoclave : Weekly
    - Bowie dick tape test for autoclaves : Monthly
    - Cultures of water and dialysate in hemodialysis unit : Monthly
    - Microbiological analysis of OT air : Weekly
    - Culture of sterile fluids (which are of doubtful quality) : On request
    - In-use testing of Cidex solutions : *
    - Culture of drinking water through multiple tube technique : Once in three months
    - Surface swab culture from all patient care areas : *

C. Staff surveillance

- Samples from hospital staff : *
- Hand hygiene surveillance : Daily (critical area)

Note: all records of the above tests are to be maintained by respective area in-charge and ICO.

6. Staff health program

A. Health evaluation

Pre-employment medical check up is performed at the time of joining services. An annual medical check up will be done for all permanent staff of the hospital. Records are maintained by the HR department in the personnel file. Vaccination for Hepatitis B is provided to all staff members who are not vaccinated.

B. Employee health programme

Employee health education: Periodic classes are conducted for paramedical staff by the ICO & ICN. All employees are instructed to observe standard safety precautions, isolation policies, hand washing protocols and waste management.

All communicable diseases e.g hepatitis, mumps, rubella, measles, chicken pox, diarrhea, productive cough more than three weeks, rashes etc., are to be reported by staff to their immediate supervisor at which time appropriate action to protect the patients in the hospital will be taken.

Staff members found to be colonized with MRSA are restricted from work, advised mupirocin ointment 2% for one week and allowed to return to work after two consecutive cultures drawn one week apart are found to be negative.

All personnel with communicable illnesses shall report to their supervisors. Appropriate evaluation and therapy is done by the clinician:

- Personnel who develop communicable diseases shall be transferred to duties without direct patient contact or released from duty until no longer considered infectious, as decided by the head of the institution.
- If serologic tests are required to demonstrate immunity, employees shall be assisted at no charge in obtaining these tests.
- Passive immunization with immune globulin (gamma globulin) shall be considered for the following:
- Hepatitis, varicella zoster, measles, rubella
- Outbreak of infections within the hospital due to organisms such as salmonella, shigella, meningococci, MRSA may prompt a search for carriers among personnel as part of control of the outbreak.

Pregnant employees shall not be assigned to care for patients with known Hepatitis B unless they have documented adequate anti-HBs antibody. They will not be involved in direct management of patients with rubella, or infants with congenital rubella syndrome or rubella.

They will be informed of risks associated with parvovirus and cytomegalovirus (CMV) infections, herpes simplex and of infection control procedures to prevent transmission when working with high risk patient groups

C. Body fluid exposure: needle stick injury, mucous membrane exposure, intact skin contact.

Immediate action to be taken

- Needle Stick Injuries:
  - Do not panic
  - Do not suck or squeeze the finger
  - Wash for 10 minutes with soap and water.
  - Report to Infection Control Nurse (ICN) or supervisor or senior who in turns informs the Infection Control Officer (ICO).
  - ICN will fill the Needle Stick Injury form.

- **Non intact skin exposure**
  - Wash for 10 minutes with soap and water
  - Report as above

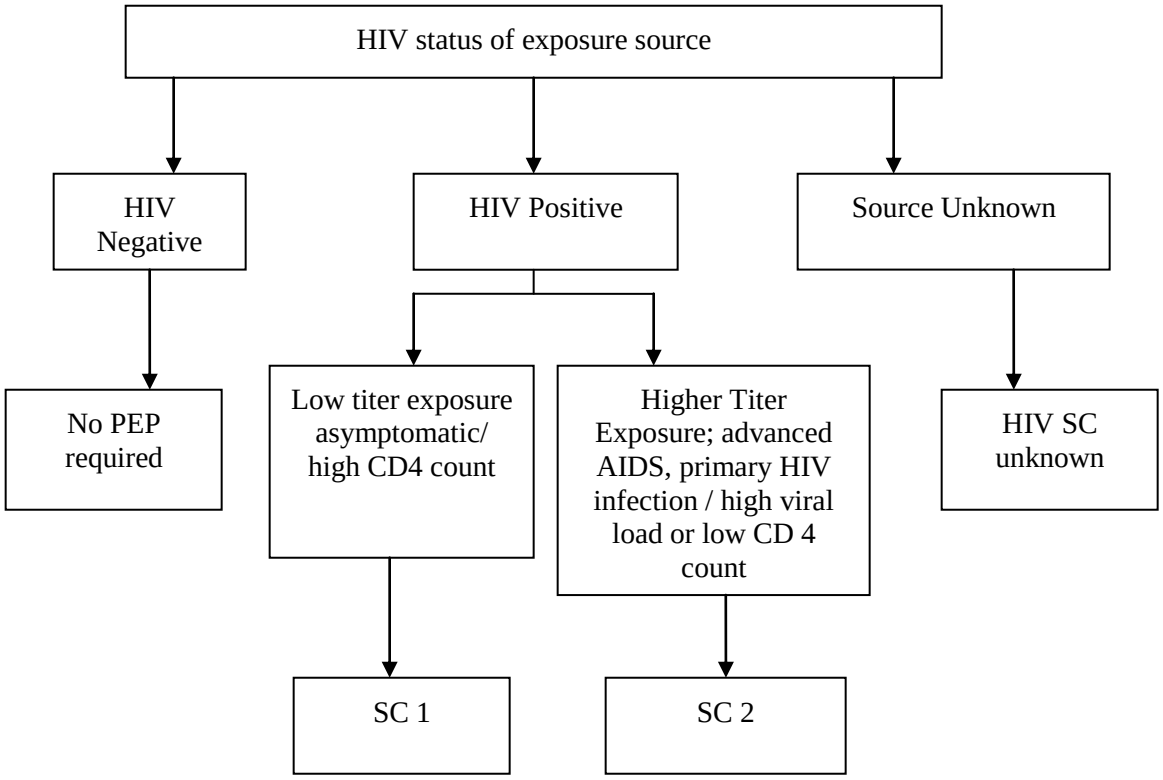
Mucous membrane exposure

- Wash for 10 minutes with soap and water
  - Report as above

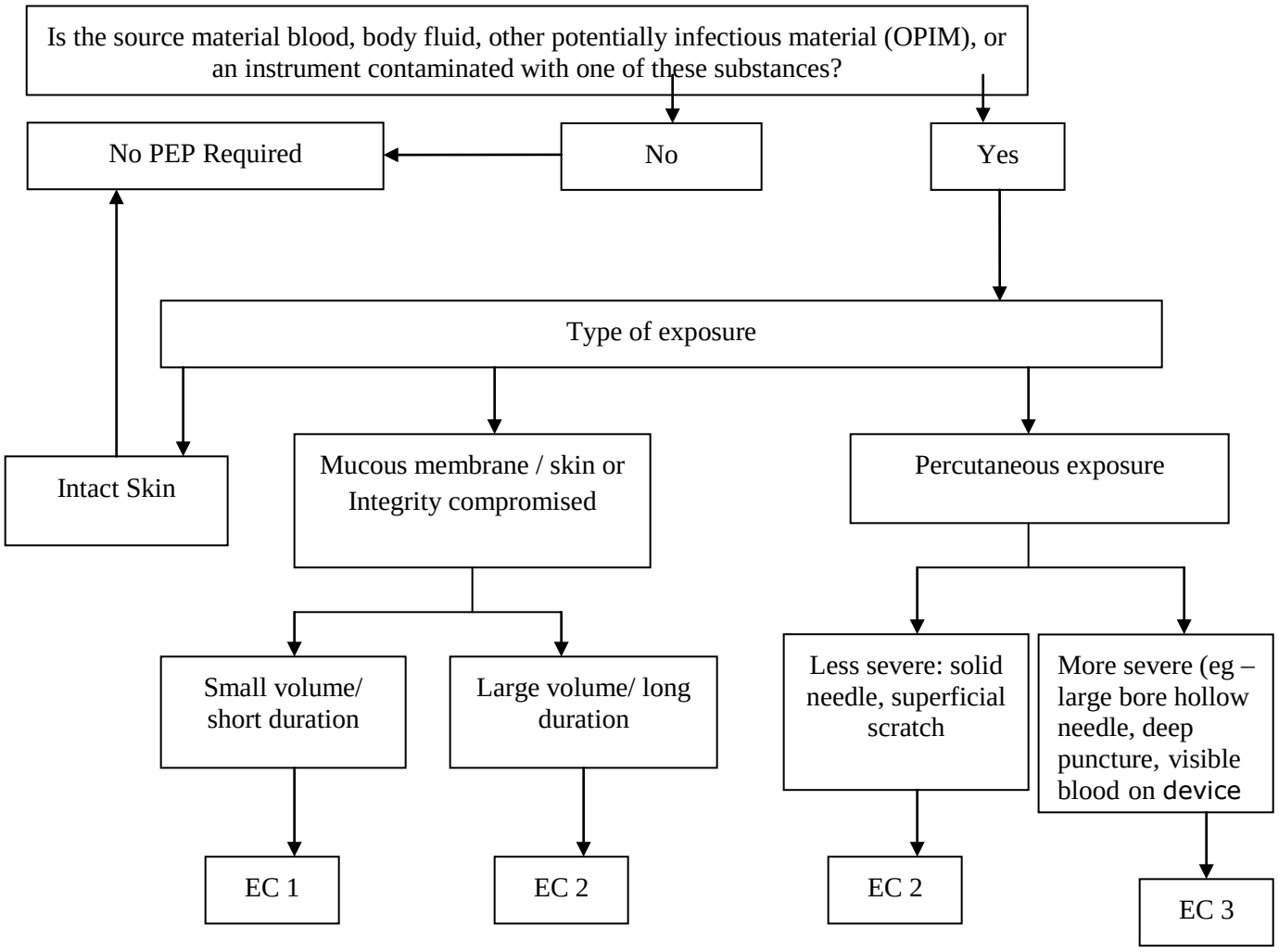
D. Post exposure prophylaxis

A designated doctor assesses the risk of HIV, HBV and HCV transmission following an accidental exposure of blood and body fluids (AEB). This evaluation is to be made rapidly, to start treatment as soon as possible; ideally within 2 hours but certainly within 72 hours. If the risk is insignificant, PEP could be discontinued, if already commenced. Two main factors determine the risk of infection: the nature of exposure and the status of the source patient

STATUS CODE (SC)



EXPOSURE CODE (EC)



PEP recommendations	
SC & EC	PEP
SC1 & EC 1	May not be warranted
SC 2 & EC 1	Consider basic regimen
SC 1 & EC 2	Recommend basic regimen
SC 2 & EC 2	Recommended expanded regimen
SC Unknown & E 2/ E3	If the setting where exposure occurred suggests possible transmission and the EC is 2, consider basic regimen

Annexure I & II: HIV Exposure prophylaxis as per NACO guidelines

Note:

HIV infection is not detected during the primary infection period, for approximately 6 weeks, by routinely used HIV tests. This implies that a negative test result does not exclude HIV infection. HIV

RNA testing by Reverse transcriptase polymerase chain reaction (RT-PCR) during PEP has a very poor positive value & should be strongly discouraged. Testing of other blood born diseases such as syphilis, hepatitis B may also be useful, depending on the nature of risk, symptoms of the source patient, local prevalence & laboratory capacity.

Assessment of the exposed individual

The exposed individual is given a confidential counselling & assessment by an experienced physician. The exposed individual should be assessed for pre existing HIV infection; positive should not receive PEP. They are offered counselling & information on prevention of transmission of infection & referred to antiretroviral therapy (ART) clinic.

Clinical follow up

In addition, in the weeks following an AEB, the exposed person must is monitored for the eventual appearance of signs indicating an HIV seroconversion.

Laboratory testing

Timing	In persons taking PEP
Weeks 2 & 4	Transaminases Complete blood count
Week 6	HIV Ab
Month 3	HIV Ab, anti HCV, HBsAg Transaminases
Month 6	HIV Ab, anti HCV, HBsAg Transaminases

Hepatitis B vaccination

HBV vaccination after an AEB	
HBV vaccination status of exposed person	Action after AEB
Never vaccinated	Give complete hepatitis B vaccine series
Vaccinated, anti-HBs not known	Give hepatitis B vaccine Booster
Vaccinated more than 5 years ago	Give hepatitis B vaccine Booster
□ Hepatitis B vaccine should be given as soon as possible after exposure □ Do not wait for anti- HBs result □ Adequate levels of serum anti-HBs antibody is ≥10 IU/L	

1. Sterilization, disinfection and decontamination practices

A. Classification of patient care equipments:

Critical instruments i.e. which enter sterile tissue or the vascular system or through which a sterile body fluid flows (e.g., blood) should be sterilized. Available options are: autoclaving, ETO and cidex (immerse the equipment al least for 10 hours).

After reception of the sterilized equipment always check the quality of packing material: it should be dry, intact and should have on it a chemical indicator (labeled with the date of sterilization). The equipment should be stored in dust free and dry condition and it can be considered sterile till the package material is dry, intact and it has not accidentally fallen down on the floor.

Semi-critical equipments i.e. which touch either mucous membranes or non-intact skin provide at a minimum, high-level disinfection (cidex, immerse for at least 20 minutes) or preferably use disposable equipment (e.g., gastrointestinal endoscopes, endotracheal tubes, anesthesia breathing circuits, and respiratory therapy equipment).

After disinfection the equipment is to be washed with sterile water or we can use tap water followed by an alcohol rinse. We can use tap water for washing rectal and vaginal probes.

Non-critical equipments i.e. which come in contact with intact skin, perform low-level disinfection when the equipment is visibly soiled or at least once weekly.

Note: Equipment used in care of infected patient needs to go under high level disinfection.

B. Guidelines for use of disinfectants

Name of Disinfectant	Method of Dilution	Contact Time	In Use Span/ Use
Glutaraldehyde CIDEX (2% solution)	Add activator and use undiluted	Disinfection: 30 minutes	14 days. Used for heat sensitive instruments e.g. Endoscopes, laryngoscopes
CIDEX-OPA	Does not require activation		Long acting (28 days). It is not an irritant for the mucous membranes

Sodium Hypochlorite	Diluted in water. Concentration depends on usage. Preparation depends upon strength of the hypochlorite being used. Available in Microbiology department.	20-30 minutes.	If not prepared fresh daily, it can be stored at room temperature for up to 30 days in a capped, opaque plastic bottle. There will be a 50% reduction in chlorine concentration after 30 days. 500 ppm is used for spills. 1000 ppm for equipment disinfection. For spills more than 10 ml use 5000 ppm final dilution.
70% **Alcohol**	Do not dilute	2-5 minutes	24 hours. Used as wipes; for example wiping thermometers
Sterillium (2 propanol - 1 propanol, macetronium ethyl sulfate)	Ready to use	30 seconds	Hand rub
Virex II / 256 (Didecyl, dimethyl ammonium chloride + alkyl dimethyl benzyl ammonium chloride)	(1/256 solution in water)	Disinfection : 10 min	One year/ Used as surface disinfectant
D-125 (alkyl, dimethyl ethyl benzyl ammonium chloride + alkyl dimethyl benzyl ammonium chloride)	1.5% (60 ml in 4 litres of water). This solution is sufficient for 3000 cu feet area	60 minutes	Fumigate, with ventilation open, for 20 minutes, and then close the area for 40 minutes. Mop the wet areas.

Note: After disinfection the equipments should be washed with sterile water.

C. Guidelines for CSSD, TSSU and other sterilizing units.

- All protocols for all sterilization and disinfection (covering all equipments) are documented.
- All records pertaining to sterilization are maintained.
- All materials (including Cheatel forceps, gauze pieces etc.) used in critical procedures are sterilized in separate instrument tray. A surplus stock of sterilized goods, individually packed, is kept in storage drums for usage in case of shortage.
- Chemical indicators are included in each cycle.
- Spore cultures are sent to Microbiology laboratory every week.
- Autoclaves are tested for air-leak rate (where in-house facility is available) for others monthly Bowie-dick tape test is done.
- Recall procedures in case of failure of sterilization is fully documented.

D. Equipment processing

Pre-cleaning of any item / medical device is an essential step prior to disinfection.

Article	Treatment options	Type of equipment, comments
Ambubag	Should be cleaned with detergent and water, dried and disinfected with 1000 ppm hypochlorite. This should be done after using it on one patient. **OR** use disposable units	Semi-critical item; a high level disinfection can be used. After disinfection scrupulously wash with sterile water
Applinator (Tonometer Prisms)	Wiped clean and disinfect with 70% ethyl alcohol, or isopropyl alcohol	Semi-critical equipment
Baby feeding bottles & teats	1. Disposable – single use 2. Re-usable – should be returned to CSSD or washed in detergent, rinsed with water and disinfected in boiling water for 20 minutes	Semi-critical equipment
Baby weighing Scales	A fresh liner should be used for each baby. Wash tray with detergent and water to keep it clean. If there is soiling with body fluid, except sweat, then disinfect with 500 ppm hypochlorite/ virex (if made of metal) and rinse off the agent, after 20 minutes contact time, with water	Non-critical item hence final cleaning step is not necessarily sterile water
Baby bath	As above	As above
Beds and couches	Should be cleaned with detergent and water between patients and as required. If there is soiling with body fluid, except sweat, then disinfect with 500 ppm hypochlorite and rinse off the agent, after 20 minutes contact time, with water	Non-critical item hence final cleaning step is not necessarily sterile water
Mattresses And pillows	As above	As above
Bedpans and urinals	Should be cleaned with hot water. It must be ensured that the item is dry before re-use. If there is soiling of sitting area then disinfection with 500 ppm hypochlorite may be required	Non-critical item
Carpets	Vacuum daily. Steam cleaned after exposure to body fluids	Non-critical item. Preferably do not use in hospital's patient care area
Cheatle forceps	Use in OT: Should be individually packed with each instrument tray and sterilized by autoclaving. Use in wards: Place in Cidex for 20 minutes	Critical/ semi-critical item depending upon use. After disinfection scrupulously wash with sterile water

Commodes	Seat and arms should be cleaned with detergent and water, and dried. If there is soiling with body fluid, except sweat, then disinfect with 500 ppm hypochlorite and rinse off the agent, after 20 minutes contact time, with water	Non-critical item
Cradles	Should be cleaned with detergent and water and dried.	Non-critical item
Crockery and Cutlery	Should be heat disinfected in dishwasher. If washed in sink use hot water and detergent	Non-critical item
Curtains	Should be changed as part of a rolling programme by domestic services.	Should be changed as part of terminal clean
Drip Stands	Should be cleaned with detergent and water and dried. If there is soiling with body fluid, except sweat, then disinfect with 500 ppm hypochlorite and rinse off the agent, after 20 minutes contact time, with water	Non-critical item
Ear Pieces for auroscope	Should be cleaned with detergent and water and dried. If there is soiling with body fluid, except sweat, then disinfect with 500 ppm hypochlorite and rinse off the agent, after 20 minutes contact time, with water	Non-critical item
Earphones	Should be cleaned with detergent and water and dried. If there is soiling with body fluid, except sweat, then disinfect with 500 ppm hypochlorite and rinse off the agent, after 20 minutes contact time, with water	Non-critical item
Eye Protection	Should be cleaned with detergent and water and dried.	For blood splashes spill policy should be followed.
Humidifiers, nebulizers	Should be cleaned and disinfected with 1000 ppm hypochlorite. This should be done after using it on one patient. OR use disposable units	Semi-critical item; a high level disinfection can be used. After disinfection scrupulously wash with sterile water
Incubators	Should be cleaned with detergent and water and switch on to dry. If there is soiling with body fluid, except sweat, then disinfect with 500 ppm hypochlorite and rinse off the agent, after 20 minutes contact time, with water	Non-critical item
Instruments	After single use to be returned to CSSD	Critical items
Laryngoscope	Should be cleaned and disinfected with Cidex	Semi-critical item. After disinfection scrupulously wash with sterile water

Linen	Should be bagged and sent to laundry for hot water washing and disinfection	Non-critical item
Proctoscopes	Rinsed and returned to CSSD.	Semi-critical/ critical
Sphygmo-manometer cuffs	After use in isolation, should be laundered in washing machine.	Non-critical item
Stethoscopes	Should be cleaned with detergent and water and dried. Should be wiped with 70% alcohol.	Non-critical item
Suction bottles	Disinfected with sodium hypochlorite and dried every 48 hours. Must be disinfected in-between each patient. To be stored dry when not in use.	Semi-critical item.
Telephones	To be wiped with 70% alcohol.	Non-critical item
Thermometers	In between patients, should be cleaned and wiped with 70% isopropyl alcohol (swab). After use in isolation (on patients with tuberculosis, chicken pox, measles) it should be disinfected with 1000 ppm hypochlorite	Semi-critical item.
Trolleys (Dressing)	To be cleaned daily with detergent and water. After each use should be wiped with 70% isopropyl alcohol.	Non-critical item
Vomit bowls	Contents must be emptied into sluice then rinsed and washed and disinfected with hot water and detergent.	Non-critical item
Wheel chairs	Clean between patients with detergent and water. If there is soiling with body fluid, except sweat, then disinfect with 500 ppm hypochlorite and rinse off the agent, after 20 minutes contact time, with water	Non-critical item

E. Surface decontamination and cleaning practices

Operation theatre:

Patient preparation:

- Pre-operative bath if possible.
- Pre-operative shaving, if required, should be done immediately before surgery.
- Skin preparation is done with Povidone Iodine 10%.
- If antimicrobial prophylaxis is necessary before surgical procedures time the initial dose is given at the start of operative procedure. A single dose with induction of anesthesia is recommended except in surgeries lasting > 3 hours, wherein a second dose is given. A third generation cephalosporin provides adequate coverage for most clean contaminated operations. Anaerobic cover, if required, is achieved with Metronidazole or Clindamycin.

Surgical team preparation

- Pre-operative surgical scrub with 7.5% povidone iodine.
- Follow other basic rules and Standard precautions.

O.T. environment: Temperature = 20 - 23°C, humidity = 30 - 60, total fresh air through Hepa filter. Minimum three air changes (outdoor) per hour and a total of 15 air changes per hour

Schedule for O.T. cleaning

- Before the first case furniture, equipment, lights are damp dusted with Hospital-OT. Particular attention is to be paid to horizontal surfaces.
- During a surgery spills/ splashes in the vicinity of the sterile field should be first absorbed with a cloth. It should be then covered with freshly prepared 5000 ppm sodium hypochlorite and left for at least 20 minutes before mopping up. All instruments opened for a procedure whether used or not are treated as contaminated.
- Between surgeries furniture, operating lights, suction canisters, other equipments, patient transport vehicle, 3-4 feet area of the floor around the table, wall, door and other areas that have come in contact with the patient's body fluid are wiped with Hospal-OT.
- End of the day disinfect the operating room, scrub utility, corridor, furnishings and equipment.

- **Weekly procedure.** Remove all portable equipment, damp wipe lights and other fixtures with detergent. Clean doors, hinges, facings, glass inserts and rinse with a cloth moistened with detergent.

Wipe down walls with clean cloth, mop with detergent. Scrub floor using detergent and water. Stainless steel surfaces – clean with detergent, rinse & clean with warm water.

Replace portable equipment: Clean wheel castor's by rolling across towel saturated with detergent.

Wash (clean) and dry all furniture and equipment (OT table, suction holders, foot & sitting stools, Mayo stands, IV poles, basin stands, X-ray view boxes, hamper stands, all tables in the room, holes to oxygen tank, kick buckets and holder, and wall cupboards).

After washing floors, allow disinfectant solution to remain on the floor for 5 minutes.

Decontamination and cleaning protocols for patient care areas other than OT

Housekeeping surfaces have been divided into two groups - those with minimal hand contact (floors and ceilings) and those with frequent hand contact or high touch areas (working area, door knobs, bed rails, light switches, edges of the privacy curtains).

Though the strategy of cleaning in terms of frequency, thoroughness and type of cleaner used varies from facility to facility, a general dictum is to give high priority to high touch areas. The patient care areas are disinfected in addition to cleaning.

Following guidelines for cleaning and disinfection practices are to be followed:

Name	**Cleaning/ disinfection**	**Frequency**	**Remarks**
Floor	Cleaning (Tasky-2)	Thrice in each nursing shift and as required	Do not do dry dusting
	Disinfection	Whenever there is a spill of body fluid, except sweat	Part of standard safety precaution
	Pesticide spray	Once a week	All holes and crevices in the floors, walls, ceilings should be sealed
Work surfaces	Cleaning	Twice a day preferably after visiting hours or whenever visibly soiled	
		Whenever there is a spill of body fluid, except sweat	Part of standard safety precaution
	Disinfection	All patient care areas are to be disinfected after visiting hours or twice daily	This is an added safety precaution to prevent hospital associated infections and also spread of multi-drug resistant bacteria
	Disinfection		
Cupboard, shelves, beds, lockers, IV stand, stool and other fixtures	Cleaned	Once a week	
	Disinfected	Whenever there is a spill of body fluid, except sweat	
	Disinfected	In case the patient using these equipment is marked for isolation than the disinfection has to be done daily and as a terminal procedure	This is a part of isolation precautions

Walls	Pesticide spray Disinfection	Once a week Once in a month	
Fans	Cleaning: wet mop with water	Once in a month	
Air Conditioner (Window)	Disinfection Vacuum cleaning	Once a week around window a/c Once in 2 weeks	Before restarting AC after a long period of non-use, call plant technician for cleaning after dismantling
Refrigerator	Defrosted and cleaned with soap solution	Once in a month	
Sinks	Cleaning	Once daily	
Buckets Curtains	Cleaning Changed	Daily in morning Once a month or whenever Soiled	Waste buckets should have a polythene bag inside

- Washing solution is changed regularly (e.g., after every three to four rooms, at no longer than 60-minute intervals.
- Decontaminate mop heads and cleaning cloths (launder and dry daily).
- Do not use disinfectants to clean infant bassinets and incubators while they are occupied. If disinfectants (e.g., phenolics) are used for the terminal cleaning of infant bassinets and incubators, thoroughly rinse the surfaces of these items with water and dry.
- Keep the floor (especially near wash basins) in patient-care-areas dry all the time by 24 hr mopping schedule.

Guidelines for patient linen:

- Bed linen is to be changed daily or whenever soiled with body fluids, except sweat.
- Patient's gown is to be changed every day and whenever soiled with body fluids, except sweat
- All dirty linen whether soiled or not is sent in leak-proof bags (yellow color) to the laundry for disinfection. Soiled linen should be handled with minimum agitation. All soiled linen is bagged at the site of disposal and carted to laundry; it is not be sorted or pre-rinsed in patient-care areas.
- In laundry all the linen undergoes hot water disinfection (72°C with 150 ppm available chlorine) process to render it fit for use.

Clean linen is transported from laundry and stored in a clean and dry storage area.

Standard and isolation precautions

It includes components of Universal safety precautions and also body substance isolation. All blood and body fluids are treated as infectious, except sweat.

Components of standard precautions	**Recommendations**
Hand hygiene	After touching blood, body fluids, contaminated items; after removing gloves; between patient contacts.
Gloves	For touching blood, body fluids, secretions, excretions, contaminated items; for touching mucous membranes and non-intact skin.
Gown	During procedures and patient-care activities when contact of clothing/exposed skin with blood/body fluids, secretions, and excretions is anticipated.
Mask, eye protection (goggles), face shield*	During procedures and patient-care activities likely to generate splashes or sprays of blood, body fluids, secretions, especially suctioning, endotracheal intubation
Soiled patient-care equipment	Handle in a manner that prevents transfer of microorganisms to others and to the environment; wear gloves and gown if required; perform hand hygiene.
Environmental control	Develop procedures for routine care, cleaning, and disinfection of environmental surfaces, especially frequently touched surfaces in patient-care areas. Dispose BMW as per guidelines
Textiles and laundry	Wear PPE, Place in plastic bag and send to laundry
Needles and other sharps	Do not recap used needles, destroy them is needle cutter. Auto destruct syringes are available. Place used sharps in puncture-resistant container. Place used sharps in puncture-resistant container having 500 ppm hypochlorite
Patient resuscitation	Use mouthpiece, resuscitation bag, other ventilation devices to prevent contact with mouth and oral secretions
Patient placement	Prioritize for single-patient room if patient is at increased risk of transmission, is likely to contaminate the environment, does not maintain appropriate hygiene, or is at increased risk of acquiring infection or developing adverse outcome following infection.
Respiratory hygiene / cough etiquette (source containment of infectious respiratory secretions in symptomatic patients, beginning at initial point of encounter e.g., triage and reception areas.	Instruct symptomatic persons to cover mouth/nose when sneezing/coughing; use tissues and dispose in no-touch receptacle; observe hand hygiene after soiling of hands with respiratory secretions; wear surgical mask if tolerated or maintain spatial separation, >3 feet if possible.

Isolation Precautions

Besides standard precautions, specific isolation precautions are observed, based on the mode of transmission (transmission based precautions), to protect health care workers and other patients.

Isolation precaution to be observed	**Mode of transmission**		
	Contact (category I)	**Droplet (category II).** Size >5µm	**Airborne, droplet nuclei (category III).** Size <5µm
Mask	No	Yes	Yes
Gown	Yes	No	Yes*
Gloves	Yes	No	Yes*
Patient Transport	Inform the receiving department of precautions	Mask the patient Inform the receiving department of precautions	Mask the patient Inform the receiving department of precautions
Environment Cleaning	Dedicate or change solutions and equipment after use Change privacy curtain when isolation is discontinued or patient is discharged	Routine	Dedicate or change solutions and equipment after use Change privacy curtain when isolation is discontinued or patient is discharged
Patient Care Equipment (Special Handling)	Yes, dedicated equipments	No	Yes, dedicated equipments
Visitors	Gown, gloves for patient care. Wash hands when entering/leaving room. Mask as directed	Wear a mask. Wash hand when entering or leaving room	Wear a mask, gown and glove.* Wash hand when entering or leaving room
Placement	-----	Place singly in private room or cohort patients. Close door.	Airborne infection isolation room

- Though the agents in this category are transmitted by droplet nuclei in air but since they can survive for long hour in desiccated state the transmission can occur via clothing and other contact material, hence contact precautions are also to be observed.

Isolation policy for special group of organisms.

The Microbiology department shall send an alert to the head of the concerned unit in case of isolation of Methicillin resistant, *Staphylococcus aureus* (MRSA), Vancomycin resistant *Enterococcus* and multidrug resistant bacteria. Patient will be placed under contact precautions.

8. Care of patients with in-dwelling devices

A. Care of patients with intra- vascular devices

At insertion:

- Do hygienic hand wash, wear gloves, select site.
- Use maximum sterile barrier precautions (wear mask, cap, and sterile gloves;
- Use chlorhexidine (more than 0.5% at the site) based antiseptic or 70% Isopropyl alcohol for part preparation and always allow it to dry before starting the procedure. For children below 02 years use povidone-iodine.

II. Peripheral venous catheter

At insertion: Strict aseptic technique and contact precautions to be maintained.

After insertion:

- Clean catheter hub after each manipulation.
- Change the catheter after 72 hours. In children, complete the iv therapy and then remove the catheter unless there is phlebitis or infiltration.
- Use clinical judgement to decide when to remove the catheter but do not remove all catheters when there is fever or when catheter is the unlikely source of bacteremia or fungemia.

III. Other important issues

- Administration sets
    - Replace all administration sets after 72 hours or earlier if there is a catheter related infection.
    - Replace the tubings used to administer amino acids and glucose only after 72 hours.
    - Replace the tubing used to administer blood, blood products and lipids within 24 hours.
    - In case of propofol infusion replace the set within 12 hours.
- Parenteral fluids
    - Complete lipid infusion within 24 hours of hanging the bag.
    - Complete infusion of blood or its products within 4 hours.
- IV injection ports
    - Cap all stop cocks when not in use.
    - Disinfect all ports with 70% alcohol or povidone-iodine after manipulation.
- Preparation and quality of IV admixtures
    - Preparation should ideally be done in a laminar hood using aseptic precautions. Do not use any medication that is visibly turbid, leaky has cracks or particulate matter or has passed its expiry date.
    - Preferably use single use vials. Do not use left over contents of the single use vials.

Multi-dose parenteral medication vials, if used, should be stored as per manufacturer instructions. The access diaphragm should be cleaned with 70% alcohol before inserting a device into the vial. Discard if there has been a compromise with aseptic technique

Evaluation: evaluation should be done daily by palpation through dressing to discern tenderness and by inspection if a transparent dressing is used. At the time of catheter removal examine for the presence of swelling, erythemia, lymphangitis, increased tenderness and palpable venous thrombosis.

Any antimicrobial ointment or blood present on the skin around the catheter is first removed with alcohol. The catheter is withdrawn with sterile forceps, the externalized portion being kept directed upward and away from the skin surface. If infection is suspected, after removal of catheter , the wound is milked in an attempt to express purulence and a 5-7 segment is cut and send for culture.

Strategies to prevent VAP

Apart from standard safety precautions, active surveillance, reducing time duration of invasive ventilation and if possible use of non-invasive ventilation the following strategies help minimize the occurrence of VAP

1. Prevent aspiration of secretions.
2. Reduce colonization of the aerodigestive tract.
3. Use disinfected equipment.

1. **Prevention of aspiration of secretions:**
    a. Maintain a semi-recumbent position (30-45° elevation of head end of bed).
    b. Avoid gastric over-distention.
    c. Use a cuffed endotracheal tube with in-line or subglottic suctioning.
    d. Maintain endotracheal cuff pressure of at least 20 cm of H_2O.
2. **Reduce colonization of the Oro-digestive tract:**
    a. Oro-tracheal intubation is preferred over naso-gastric intubation.
    b. Using sucralfate or H_2 blockers is still an unresolved issue.
    c. Frequent chlorhexidine mouthwashes to be done to decrease oral flora.
3. **Care of respiratory equipment:**
    a. Perform high-level disinfection of re-usable respiratory equipment as per recommendations after use on the patient.
    b. Use sterile water to rinse disinfected equipment.
    c. Use sterile water in nebulizers and humidifier and it should be replaced once in two days.
    d. Remove condensate from the ventilatory circuits and keep them closed during this process.
    e. Change ventilatory circuits and heat-moisture exchange filter (filter should not be changed more frequently than 48 hours) only when visibly soiled or malfunctioning.

D. Tracheostomy / Endotracheal tube care

- Careful attention to post – operative wound care is mandatory.
- The patient should receive aerosol therapy to prevent dessication of the tracheal and bronchial mucosa or the formation of crusts. The skin around the tracheostomy tube should be cleaned with betadine (Povidone – iodine 5%) every day or more frequently , if necessary.
- The tracheostomy tape securing the tube should be changed every 24 hours. This tape must be tied securely at all times.
- The first complete tube change should be performed no earlier 4-5 days to allow time for the tract to be formed. Subsequent changes should be done weekly or as necessary.
- Clean technique should be used to change the tracheostomy tube unless there is a medical indication for sterile technique.
- The obturator should be at the bedside (preferably taped to the head of the bed) to be used if the tracheostomy tube is accidentally dislodged or is removed for any reason.
- Suctioning of endotrachel/ tracheostomy tube : Perform hygienic hand wash, wear mask, cap, gown and sterile gloves. Attach the suction catheter to the suction tubing; do no touch the catheter with bare hands (leave it in its protective covering). When suctioning is completed, clear the catheter, water container and gloves appropriately. Wash hands.
- The tubing and suction canister should be changed every 38 hours. The canister should be labelled with date and time when they are changed. If debris adheres to the side of the tubing or the canister, either or both should be changed. The tubing should be secured between suctioning periods so that it will not fall to the bed, floor etc.

D. Strategies to prevent CAUTI

Most important thing is to use indwelling catheter only when necessary and use it for a minimal duration. Consider condom catheter and in and out catheterization. Other strategies are:

1. **Catheter Insertion :**
    a. Catheter should be inserted by a trained person only.
    b. Follow standard safety precautions.
    c. Use as small a catheter as possible to minimize drainage.
    d. Follow aseptic technique and use sterile equipment. Use sponges, drapes and gloves; an antiseptic solution to clean the meatus and preferably use single – use lubricant jelly packets.
2. **Care of indwelling catheters:**
    a. Maintain a sterile closed drainage system.
    b. For replacement of collection bag follow aseptic technique and disinfect the catheter tubing junction.
    c. For collection of samples use sterile syringe and needle. First disinfect the sample collection port and withdraw the sample with syringe.
    d. Keep the collection bag below the bladder level.

3. **Unresolved issues:**
    a. Use of antimicrobial coated catheters in high risk patients.
    b. Use of antiseptic solutions versus sterile saline for meatal cleaning before catheter insertion.

E. Wound care

Surgical Wounds:

- Surgical wounds after an elective surgery are inspected on the third post-operative day, or earlier if wound infection is suspected.
- All personnel doing dressings should wash their hands before the procedure. Ideally, a two member technique is followed. One to open the wound and second to do the dressing
- If two healthcare workers are not available then after taking off the dressing, wash hand , and then apply a new dressing.
- A clean, dry wound may be left open without any dressing after inspection.
- If there is any evidence of wound infection, or purulent discharge, then dressing are done daily, using providone- iodine to clean the wound and applying dry absorbent dressing.

Guidelines for Kitchen Services:

Food served to patients, visitors and employees is processed in a manner that avoids contamination. The following guidelines are followed.

- All food is prepared and served into covered containers and set into trays in the main kitchen and then sent to wards. This activity is supervised by trained personnel and dietician.
- Hot and cold food is transported in such a manner that appropriate temperatures will be maintained during transportation.
- Food returned to the kitchen is discarded into black bags. Mouths of bags are tied before disposal
- The arrangement of work stations in the kitchen should be such that there is no contamination of cooked food from raw food. There should be no interchange of personnel working on raw food and those on cooked food.
- Personal handling and serving the food are trained to observe standard safety precautions to protect themselves.
- Personnel are also trained to protect food from substances of handling personnel:

    - Clothing should be free from obvious dirt and food spills.
    - Hair nets should be used while on duty
    - Clean gloves may be used.
    - Utensils should be used to handle food.

Surveillance is done biannually for detection of carriage of Salmonella and MRSA Stool samples and nasal swabs are submitted to the microbiology laboratory. Records are maintained by the In- charge of the department.

Laundry and linen management

Routine and linen management:

- Soiled linen is to be handled as little as possible and with minimum agitation to prevent gross microbial contamination of the air and of persons handling the linen.
- All linen is bagged (yellow bag) and put into carts at the location where it was used; it is not sorted or pre- rinsed in patient care areas.
- Linen soiled with blood or body fluids is deposited and transported in bags that prevent leakage.

Washing: Washing is done in automated washer disinfectors. The machine has soaking, bleaching (150 ppm available chlorine), hot rinse (72°C) and cold rinse cycles.

Storage of clean linen: the linen is stored in the linen storage room in laundry.

Transportation of clean linen: Clean linen is transported from laundry in trolleys to the site of usage. Storage in patient care areas is done in clean and dry storage spaces.

Mortuary Practices:

The mortuary has two air-conditioned caskets for storing the body. It is kept locked. During transfer of the body standard safety precautions and transmission based precautions are observed. After removal of the body from the mortuary disinfect the casket with Virex.

Special Care units:

a) Obstetrics and labour room

Policies regarding admission of pregnant women with infection:

- Pregnant women suffering from infections:
  - **Not in labour**: admit in medical wards/ isolation ward just as one wound admit a non-pregnant women with similar illness.
  - **In labour**: Admit to isolation side of labour room
- Pregnant women with at least 22 weeks of gestation and in labour with following conditions should be admitted to the isolation side:
  - Hepatitis (A,E unknown)
  - Diarrhoea (severe, watery, with blood and mucous)
  - Known infections with a blood borne pathogen (HBV, HCV, & HIV)
  - Suspected or confirmed communication disease requiring isolation.

Housekeeping should be meticulous:

- Clean the floor at least four times a day or when soiled. One of these should be with detergent and copious amount or water. Lysol may be used to mop the floor for the remaining times.
- Any spill of body fluid should be immediately decontaminated as per spill policy.rea, equipment and furniture around the bed of the patient should be disinfected with hospital – OT as a part of terminal clean (after the patient is transferred out)
- Use fresh linen for each patient.

13. **Investigation of an outbreak**

Occurrence of an infection over and above its endemic prevalence is termed and outbreak.

Investigation is done to discover the route of transmission to discover the route of transmission and possible sources of infection. If the cases occur in steadily increasing numbers and are separated by an interval approximating the incubation period, the spread of the disease is probably due to person to person spread. On the other hand if a large number of cases occur following a shared exposure eg. an operation, it is termed a common source outbreak.

a. Epidemiological methods

Formulation of a hypothesis regarding source and spread is made before undertaking microbiological investigations in order that the most appropriate specimens are collected.

Steps to be taken to investigation an outbreak

Step 1

- Recognition of the outbreak.
- Preliminary investigation must be begun by developing a case definition, identifying the site, pathogen and affected population.
- Determination of the magnitude of the problem and if immediate control measures are required. If so general control measures such as isolation or cohorting of infected cases; strict hand washing and asepsis should be immediately applied.
- Verification of the diagnosis.
- Confirmation that an outbreak exists by comparing the present rate of occurrence with the endemic rate should be made.

Step 2

The appropriate departments and personnel and the hospital administration should be notified and involved.

Step 3

- Additional cases must be searched for by examining the clinical and microbiological records.
- Line listings for every case, patient details, place and time of occurrence and infection details should be developed.

- An epidemic curve based on place and time of occurrence should be developed, the date analyzed, the common features of the cases e.g age, sex, exposure to various risk factors, underlying diseases etc. should be identified.
- A hypothesis based on literature search and the features common to the cases; should be formulated to arrive at a hypothesis about suspected causes of the outbreak.
- Microbiological investigations depending upon the suspected epidemiology of the causative organism should be carried out. This will include (a) microbial culture of cases, carriers and environments (b) epidemiological typing of the isolates to identify clonal relatedness.
- The hypothesis should be tested by reviewing additional cases in a case control study, cohort study and microbiological study.

Step 4

- Specific control measures should be implemented as soon as the cause of outbreak of identified.
- Monitoring for further cases and effectiveness of control measures should be done.
- A report should be prepared for presentation to the HICC, departments involved in the outbreak and administration

b**. Immediate control measures**

An intensive review of infection control measures should be made this includes:

- Strict hand washing.
- Intensification of environmental cleaning and decontamination.
- Adherence to aseptic protocols.
- Strengthening of disinfection and sterilization.

c**. Microbiological Study**

Microbiological study is planned depending upon the known epidemiology of the infection problem. The study is carried out to identify possible sources and routes of transmission. The investigation may include cultures from other body sites of the patient, other patients, staff and environment. Careful selection of specimens to be cultured is essential to obtain meaningful data.

d**. Specific control measures**

These measures may include:

- Identification and elimination of the contaminated product.
- Identification and treatment of carriers.
- Rectification of lapse in technique or procedure.

e**. Evaluation of efficacy of control measures**

The efficacy of control measures should be evaluated by a continued followed-up of cases after the outbreak clinically as well as microbiologically. Control measures are effective if cases cease to occur or return to the endemic level.

- The outbreak should be documented.

14. Visitor policy

Following practices are ideal for the benefits of the patients:

- The ward sisters and the doctors concerned shall have the responsibility of informing the patients' relatives of the measures to be taken and the importance of restriction of visitors. This should be done at admission of the patient.
- The patient and the relatives are given education about the cause, spread and prevention of the infection. The need for isolation and restriction of visitors should be discussed with them.
- Hand washing after all contact with the patient will have to be stressed.
- No more than two adult visitors should be allowed 'at a time' during the hospital visiting hours and the length of stay should be governed by the needs of the patient.
- Children below 12 years are not allowed into the isolation areas.
- Before entering the room, visitors must enquire at the nurses' station for instructions and for gown and mask if indicated. Visitor's footwear, bags etc., should be left outside the room. Only articles that can be discarded, disinfected or sterilized should be taken into the room.
- Visitors are not allowed to sit on the patient's bed.
- Visitors should wash their hands with soap and water before entering and when leaving the room.
- Active immunization of attendants and other follow up steps, where applicable must be conducted by the physician in-charge.

15. **Surveillance activities**

A. Microbiological assessment of air in OT.

In case HVAC system is not installed in the OT, then weekly fumigation is followed by microbiological assessment of Bio-load in air. In case HVAC system is installed air testing can be done if there is increase in infection rate.

Method: Air-settle plate technique: open blood agar plates are kept in the OT for sixty minutes. The plates are closed and send to Microbiology department.

Criteria for interpretation (Bacterial load in m^2/ minute = x bcp/ m^3 / 3):

Conventional OT: Bio-load (bcp/ m^3) should not increase 35 (11/ m^2/ min) in an empty theatre and 180 (60/ m^2/ min) during an operation

Ultra-clean air OT: Bio-load (bcp/ m^3) should not increase 01 (0/ m^2/ min) in centre of an empty theatre and not more than 10 (03/ m^2/ min), during an operation. At periphery it should not exceed 20 (07/ m^2/ min).

Calculation for a 100 mm plate.

Area of plate = 22/7 X r^2 or 22/7 X $5cm^2$ or 22/7 X $5m^2/ 10^4$. = 0.0078 m^2.

So if there should not be more than 11 colonies in one minute in 1 m^2; then in an area of 0.0078 m^2, in 60 minutes, the count should not exceed: 11X 0.0078 X 60 = 5 colonies.

B. Surface cultures

Environment disinfection surveillance is done in the following phased manner:

- First check the quality of the disinfectant used to clean the surfaces. Swab cultures are collected after a proper disinfection protocol (as per manufacturer's instructions) from various places in the hospital. If results are satisfactory then the disinfectant can be used in the hospital for surface disinfection.
- Train all staff, responsible for cleaning, on use of the disinfectant.
- Second is to establish the right frequency of cleaning. To determine the correct frequency collect random samples from all high touch areas under surveillance. This should include bed rails, door knobs, nursing station, medicine trolley etc. Significant growth can be due to low frequency of cleaning or faulty technique.
- If the technique was right then frequency needs to be adjusted.
- Irrespective of disinfection frequency the cleaning has to be done after spillage and soiling.

Once the technique is settled then random sampling of different sites in all areas of the hospital is carried out to check adherence to the cleaning and disinfection policy.

Method: A moist (moistened with tryptic soy broth) sterile cotton swab is used to collect the surface culture (per cm^2 of area). Various articles like iv canula dressing, oxygen mask, bed rails, medicine table, Iv stand, cardiac table, ambu bag, suction tubing, doctor table, nursing station, humidifier and nubulizer are sampled after decontamination and disinfection.

These swabs are placed in 1 ml of tryptic soy broth, then vortexed and finally 0.01 ml of the broth is cultured on TSY agar and incubated till 48 hours. The result is reported quantitatively as cfu/ cm^2 after the isolated colonies are multiplied by a factor of 100.

C. Sterile fluids

Parenteral solutions for e.g. saline, sterile water, filtered water, IV fluids etc are cultured on request.

Method: The fluid to be tested is collected using aseptic technique (10 ml). One ml of the fluid is added to 10 tubes containing 01ml of brain heart infusion broth. A set of five tubes is incubated at 35°C for 48 hours and another at 25°C for five days to observe for growth.

If growth is present it is immediately brought to the notice of faculty/sister-in-charge of the area concerned and the entire lot of the suspected material is called back and labeled as 'not for use' until further tests.

D. RO water & Dialysate fluid

Total viable heterotrophic plate count (HPC) is calculated:

Method: 0.1 ml of fluid is transferred aseptically to tryptic soy agar by spread plate technique and incubated at 35°C for forty-eight hours. Water used to prepare the dialysate and reprocess hemodialyzers should not contain more than 200 CFU/ ml. Dialysate and the end of dialysis fluid should not have more than 2000 CFU/ ml.

E. Potable water

Routine testing is not indicated. HPC and a total coliform count are done. HPC has been mentioned above, while total coliform count is done via Multiple Tube Technique.

Method: HPC level should be less than 100 and 10, at 22°C and 37°C respectively, CFU/ ml and coliform, faecal streptococci should be zero in 100 ml.

F. Disinfectant testing

- **"In-use test" for disinfectants –**

  The working solution of the disinfectants being used in the hospital is tested randomly for checking proper usage:

  Testing: Diluted the disinfectant in use (1:10) in Nutrient broth. To obviate the effect of disinfectant during testing we neutralize its effect by using double strength broths. 0.02 ml of this dilution is cultured on to Nutrient agar plates in 10 sections in duplicate. One plate is incubated at 37°C (for three days) and another at room temperature (seven days). Presence of growth in 5 or more sections of these drops is considered unsatisfactory. The reports are immediately brought to the notice of the faculty/sister-in charge of the area.

G. Monitoring of sterilizers

- Biological indicators (BI) are used on a weekly basis to monitor functioning of autoclaves and ETO machines in CSSD. *B.stearothermophilus* and *B. atropheus* spores are used as BI for autoclaves and ETO respectively.
- Chemical indicators: autoclave tape is used on all loads. Class V chemical indicator, having ability to show adherence to both exposure duration and correct temperature during sterilization is used once in a week.
- Air leak rate test: For autoclaves where the hospital can do an in-house air leak rate test the same is conducted weekly.
- Bowie-dick tape test: For autoclaves the air leak rate test facility is not available in-house, Bowie-dick tape test is done monthly.

H. Epidemiologically determined sampling

Finger-print/ nasal swabs of the persons working in the wards will be taken whenever indicated. Samples for fungal culture are also collected when required.

I. Quarterly detection of carriage of enteropathogens in staff working in kitchen.

For this stool samples will be collected and processed as per standard protocol.

A. Spill policy

1. Do not mop or broom the floor before decontamination.
2. Prepare hypochlorite solution containing 500 ppm available chlorine, except in case of spill of large amounts of blood (e.g.>10 ml) where a concentration of 5000 ppm is made.

Hypochlorite solution comes in various strengths. Use the following guide to prepare a working solution:

Available hypochlorite solution	Amount of hypochlorite to be added for making **1% hypochlorite solution**	Amount of water
10% (100,000 ppm)	100 ml	900 ml
5% (50,000 ppm)	200 ml	800 ml
4% (40,000 ppm)	250 ml	750 ml
3% (30,000 ppm)	330 ml	670 ml
Available hypochlorite solution	Amount of hypochlorite to be added for making 1000ml solution containing 1000 ppm of available chlorine	Amount of water
10% (100,000 ppm)	10 ml	990 ml
5% (50,000 ppm)	20 ml	980 ml
4% (40,000 ppm)	25 ml	975 ml
3% (30,000 ppm)	33 ml	967 ml
Available hypochlorite solution	Amount of hypochlorite to be added for making 1000ml solution containing 5000 ppm of available chlorine	Amount of water
10% (100,000 ppm)	50 ml	950 ml
5% (50,000 ppm)	100 ml	900 ml
4% (40,000 ppm)	125 ml	875 ml
3% (30,000 ppm)	167 ml	833 ml

3. Gauge the size of the spill and take an appropriate size of mop. Place the mop over the spill and wet it with hypochlorite solution.
4. Let the mop remain there for at least twenty minutes.
5. The area is decontaminated and you can proceed with the routine cleaning of the floor. Discard the mop, used for decontamination in yellow bag.
6. In case sharps are present in the spill pick them with tongs or dust collector and place them in blue waste container.
7. If chlorine solution is not prepared fresh daily, it can be stored at room temperature for up to 30 days in a capped, opaque plastic bottle with a 50% reduction in chlorine concentration after 30 days of storage (e.g., 1000 ppm chlorine at day 0 decreases to 500 ppm chlorine by day 30).

National Health Mission
Quality Assurance Division, SPMU

ANTIBIOTIC POLICY

AMENDMENT SHEET

S.N.	Section No. & Page no.	Details of the amendment	Reasons	Signature of the preparatory authority	Signature of the Approval Authority

Quality Assurance Division, National Health Mission, Uttar Pradesh, has come out with this manual to ensure that the use of antibiotics in the patients is regulated for prevention of development of resistant strains, decrease in the incidence of nosocomial infection and to bring down the cost of therapy.

INTRODUCTION

Nosocomial or healthcare associated infections are a major public health problem in health care organizations throughout the world. At least 5% of patients entering hospitals will develop a nosocomial infection. Nosocomial infections represent a leading cause of death. Nosocomial infections, such as bacteremia, surgical wound infection, pneumonia and urinary tract infection, are also associated with major morbidity in hospitalized patients. These nosocomial infections add significantly to the expected length of stay for patients.

The Study on the Efficacy of Nosocomial Infection Control project, conducted by The Centers for Disease Control, found that up to one third of nosocomial infections can be prevented by an effective infection control program.

INFECTION CONTROL POLICY:

The facility has a well designed, comprehensive and coordinated infection control program aimed at reducing/ eliminating risks to patients, visitors and providers of care. The important factors of the hospital infection program at the facility are:

1. The purpose of the facility Infection control programme is to prevent and reduce risk of nosocomial infections.
2. The facility has a multi-disciplinary infection control committee
3. The facility has an infection control team
4. The facility has designated and qualified Infection Control Officer performing various activities ranging from training of all staff in safe practices, monitoring and provision of resources for the same
5. All the activities of the program are documented
6. The Hospital Infection Control Manuals are under constant revision by way of inviting suggestions and comments from the users as well as incorporating best practices. Midterm alterations are done on the amendment sheets and the whole policy and procedures are reviewed at least once a year.

Inappropriate use of antibiotics is considered to be the main reason behind drug resistant nosocomial infections and poor results. The facility has to therefore develop its antibiotic policy and also the **"Guide for Use of Antibiotics"** for uniform organization wide guidelines for using antibiotics.

ANTIBIOTIC POLICY:

The facility has to develop its antibiotic policy with the following points:

1. The hospital antibiotic policy is established, documented and implemented.

2. There is a system of monitoring drug susceptibility (based on culture sensitivity) and accordingly the antibiotic policy has been developed and is also modified after review of such drug susceptibility periodically. This is done at least once a year, but may also be reviewed once in three months for tracking any significant change in the drug susceptibility of major pathogens.
3. National and international guidelines are used while framing the policy.
4. The "Guide for Use of Antibiotics" is provided to all the medical staff across the hospital for its applicability in patient care.

GUIDE FOR USE OF ANTIBIOTICS

Please read these notes before using the Guide

1. Scope of the Guide
2. The guide covers the most common bacterial and fungal infections encountered in hospital practice at the facility. Certain infections are however omitted – principally because their treatment is best left to a specialist unit. Examples are sexually transmitted diseases; tuberculosis; eye infections (other than simple conjunctivitis); and some other uncommon infections and communicable diseases.
3. Dosages
4. Doses are not formally included in the Guide. Occasionally, particularly high doses are indicated in the treatment of certain infections; when this is the case, the dose (for adults with normal renal function) is indicated in parentheses or in the accompanying notes.
5. Important note: Recommendations given in this guide apply mainly to adult patients except where otherwise stated, though some of these are also suitable for children. Consideration must be given to whether the likely infecting organisms may be different in children when compared to adults. Therefore, use this guide with caution when treating paediatric patients.
6. Further advice
7. Additional advice on the use of antibiotics can be obtained from the clinical microbiologist.

GENERAL PRINCIPLES OF ANTIMICROBIAL THERAPY

1. Diagnosis:

i. Clinical: A working clinical diagnosis is essential for the rational choice of an antibiotic, even if the diagnosis is later changed.

ii. Bacteriological: Appropriate specimens for bacteriology must be taken before treatment is started. It may be extremely difficult to isolate the causative organism once treatment has been given.

Moreover, antibiotics may alter the normal flora (e.g. of the oropharynx) resulting in colonization with potentially pathogenic bacteria. This may further confuse the bacteriological diagnosis.

2. Choice of antibiotic(s): This will depend on several factors:

i. **The known or probable sensitivity of the likely pathogen(s):** Some bacteria are invariably sensitive to certain antibiotics (e.g. group A beta-hemolytic streptococci and penicillin); but these tend to be exceptions and in most cases sensitivity testing will be necessary. Before the results are available, it may be necessary to use a broad spectrum agent or combination of agents; treatment can then be adjusted when the infecting organisms and their sensitivities are known. Note that the likely infecting organisms may vary between adult and paediatric patients. When prescribing for children, always consider whether the recommendations in this guide, which are intended principally for adult patients unless specifically stated otherwise, are also suitable for a child.

ii. **The site of infection:** The chosen drug must reach the site of the infection to be effective. Certain sites (e.g. the CSF) are less accessible to antibiotics and treatment must be chosen accordingly.

iii. **Toxicity:** No antibiotic is completely free from toxin effects and it follows that these drugs should not be prescribed lightly. All else being equal, it is sensible to choose the least toxic drug from whatever range of effective agents is available. Bear in mind that new agents (even if they are only developments of relatively safe predecessors) may cause unexpected toxic effects; use new drugs with caution. Furthermore certain agents promote the emergence and spread of resistant bacteria which may cause problems in treatment of the same patient or other patients in the hospital. The agents recommended in this Guide have been chosen to try to minimize this risk as far as possible.

iv. **Cost:** Many antibiotics are expensive and the volume of antibiotic prescribing in such that purchases of these drugs accounts for a considerable (and increasing) sum of money each year. Costs may be contained as far as possible by only using an antibiotic when clearly indicated.

3. Dose: Factors influencing the dose include:

i. **The sensitivity of the organism:** Moderately sensitive organisms may require higher doses for treatment than fully sensitive ones.

ii. **The site of infection:** Some infections (e.g. meningitis, endocarditis) need higher doses than usual than usual because of the relative inaccessibility of the infected areas.

iii. **Impairment of excretion:** If the main route of excretion (especially renal or hepatic) is impaired, dosage modification may be necessary.

iv. **Toxicity:** Some drugs, for example the amino glycosides, have a low therapeutic ratio. Dosage must be controlled by assay of drug levels in serum or other body fluids.

4. Route of administration:

i. Oral administration may be inappropriate in seriously ill patients due to reduced absorption, a reduced level of consciousness, or vomiting. However, the oral route is to be preferred in all cases where there is no indication to use parenteral therapy. Oral administration is generally cheaper, more convenient, and less unpleasant for the patient.

ii. Intramuscular administration may be unsatisfactory if injections are painful or if large volumes are injected. Absorption is unreliable in shocked patients and IM injections may be hazardous in the presence of clotting disorders. If parental administration is required, the intravenous route is much preferred in most circumstances.

iii. Intravenous administration gives the most consistent level of antibiotic in serum. Some drugs are best given by bolus injection (e.g. amino glycosides) whereas others must be given by short infusion e.g. vancomycin). However, there are disadvantages to intravenous therapy. Not only are there additional hazards in giving IV as opposed to oral drugs, but the IV form is usually more expensive. There is also the additional work for the medical or nursing staff in giving IV drugs.

iv. In general therefore, a patient commenced on IV treatment should be changed to oral therapy when the clinical circumstances permit. Exactly when this may be will vary from patient to patient, but in many cases the change from IV to oral administration should be considered after 48 hours IV treatment. Bear in mind that it may not be possible to change from the IV drug to an exact equivalent orally. The most common example of this is when changing from IV cefuroxime to an oral drug. Although oral cefuroxime (in the form of cefuroxime axetil) is marketed, this formulation is associated with a high incidence of diarrhoea and/ or Clostridium difficile infection. For this reason, another agent such as cephlexin or co-amoxiclav will be required, the choice depending on the infecting organism(s) which were the target for the cefuroxime.

v. Other routes of administration, such as intramuscular or by suppository, may also be considered.

vi. The topical use of antibiotics on the skin should be avoided if at all possible. In particular drugs normally systemically (especially fusidic acid and gentamicin) should not be used topically since the emergence of resistant strains of Staph. Aureus is a potential result.

Before prescribing consider following:

i. Which organism is likely to cause the syndrome?

ii. What is the clinical diagnosis and what are the steps should be taken to improve the diagnostic precision?

iii. 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?

iv. Check for factors which will affect drug choice & dose, e.g. renal function, interactions, allergy, pregnancy and lactation.
v. Check that the appropriate dose is prescribed. If uncertain, contact Physician or check in the formulary.
vi. What is the duration of treatment?
vii. Is treatment working?

5. Clinical Diagnosis:

The antibiotic treatment chosen must be based on some assumption regarding 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, anthrax, 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 micro-organism and doctor may be wrong if he has to guess which antimicrobial agent to use. In such instances one should seek a bacteriological diagnosis.

6. Empiric Therapy:

Empiric Therapy may be started, if the causative agent is not known and there is urgency to initiate the therapy and delay would be life threatening or risky. In such cases, Antimicrobial Therapy based on a clinically defined infection and in consonance with hospital Anti-bio-gram is justified. However, following points should be taken into consideration:

i. Must collect the necessary specimens before commencing therapy.
ii. Cover all possible microbial causes.
iii. Try to attain synergy.
iv. Consider possible interaction with other drugs.
v. Accuracy of diagnosis should be reviewed regularly and treatment altered / stopped when microbiological results become available.
vi. Use drugs which are available in Hospital formulary, where possible.

7. The need for antimicrobial therapy should be reviewed on daily basis. For most infections 5-7 days of antimicrobial therapy is sufficient.

8. In critical cases, the therapy to be started with Injectable antibiotics for 48–72 hours, subsequently the consideration for oral alternatives to be explored. This should be done in the light of new microbiological or other information (e.g. fever, effervescence, for at-least 24 hrs, marked clinical

improvement; low CRP) should at this stage often permit as oral antibiotic(s),or switch to an IV narrow spectrum alternative, or cessation of antibiotics (no infection present).

9. 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.

10. Some guiding principles for de-escalation/escalation:

i. If ESBL+ve : drug choice is monotherapy with carbepenems .Group I carbepenem. Piperacillin – Tazobactum & Cefoperazone – Sulbactum can be used if in vitro sensitive and for mild infections.
ii. Vancomycin should be used only for confirmed MRSA infections and not MSSA.
iii. In case of Pan drug resistant Pseudomonas / Acinetobacter sp combination therapy using Colistin along with β lactams should be discussed with microbiologist / physician.

11. **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. Combinations may be indicated in certain situations, namely:

i. To treat mixed infections where a single agent is not effective against the pathogen.
ii. To achieve synergy between two drugs e.g. in treating infective endocarditis.
iii. During the investigation of an obscure illness
iv. To prevent the development of resistance (as in the treatment of tuberculosis)
v. To achieve a broader spectrum of activity than would be possible with a single agent.
vi. To permit a reduced dose of a toxic agent (e.g. combination of amphotericin B with flucytosine).

The choice of drug should be that they act synergistically. The following combinations are synergistic.

i. Aminoglycoside and β–lactam antibiotic.
ii. β–lactam antibiotic and β–lactamase inhibitor.
iii. β–lactam antibiotic and cell wall inhibitor (Vancomycin)
iv. Sulphamethoxazole and Trimethoprim.

12. Is Treatment working?

Where treatment is apparently failing, advice from an 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 sequester 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.

Section A

URINARY TRACT INFECTIONS

A.1. Contracted outside hospital

A.1.1 Cystitis

Because of the variable sensitivity patterns of the above organisms, it is preferable wherever possible to wait for results of sensitivity testing before prescribing an antibiotic. If therapy is indicated before then the following agents are recommended:

Choice	Antibiotics
First Choice	Fluoroginolon, Nitrofurantoin, Amikacin
Alternative Choice	Augmentin

Length of treatment: this will depend on clinical circumstances:

Clinical presentation	Length of treatment
Uncomplicated UTI is an adult	3 days
Bacteriuria of pregnancy	7 days

A.1.2. Acute Pyelonephritis

1. Send blood cultures as well as urine before starting treatment as sometimes the infecting organism cannot be isolated from urine.
2. Treatment will always be empirical and must be reviewed when the pathogens and its sensitivities are known.
3. Nitrofurantoin is not suitable for the treatment of this condition as it does not produce adequate serum and tissue levels.

Likely pathogens: Same as for cystitis

Recommended antibiotics:

Choice	Antibiotics
First Choice	Third Generation Cephalosporin, Piperacillin-Tazobactum Plus Amikacin
Alternative Choice	Meropenum/ Imipenum

Length of treatment: 14 days, changing from parenteral to oral treatment when appropriate (see General Principles of Antimicrobial Therapy, section 4)

A.2. Hospital – acquired UTI or Pyelonephritis

Likely pathogens: Same as for cystitis plus Pseudomonas aeruginosa. Other Gram-negative bacilli, Staph. aureus, Coagulase-negative staphylococci, Yeasts

Recommended antibiotic: The organisms responsible are often antibiotic-resistant and treatment must be guided by the urine culture and sensitivity results. If desired, initial treatment with one of the agents from section A.1.1 or section A.1.2 may be given. If the patient is seriously ill, treat as 'Septicaemia or severe infection of unknown cause' (see section D.1 below).

A.3 Catheterized patients

Colonization of the urine is almost invariable with long term (more than 7 days) catheterization. Antibiotics are unlikely to eradicate the organisms, which are likely to persist, and the use of broad-spectrum antibiotics in catheterized patients is likely to result in the emergence of resistant organisms. Long term catheterized patients should therefore only be treated when there are symptoms and signs of urinary infection (pyrexia, suprapubic pain, loin pain, leucocytosis , etc.), or if bacteraemia or sepsis secondary to UTI is suspected.

A.4. Acute epididymo-orchitis

Likely pathogens: Gram-negative bacilli, e.g, E.coli, Klebsiella, Pseudomonas (in younger men Chlamydia trachomatis and Neisseria gonorrhoeae are common)

Recommended antibiotic:

AGE	ANTIBIOTIC
Men under 35 years	doxycycline plus levofloxacin
Men over 35 years	levofloxacin

Section B

RESPIRATORY TRACT INFECTIONSS

B.1. Vincent's angina (acute ulcerative gingivitis)

Send a swab of pus for microscopy and culture. The diagnosis can be performed on the typical appearance of bacteria in a stained film.

Likely pathogens: Mouth anaerobes

Recommended antibiotic:

Choice	Antibiotics
First Choice	Metronidazole
Alternative Choice	Penicillin V

Length of treatment: 7 days

B.2. Sore throat, tonsillitis, pharyngitis

- Up to two-thirds of all sore throats are caused by viruses, for which antibiotic treatment is not useful. A throat swab must be taken to confirm the diagnosis of grp-A streptococcal infection.
- Glandular fever may also be a possibility and amoxicillin is therefore contraindicated due to the risk of a skin rash. Amoxicillin may be used if EBV infection has been excluded.
- Recent studies have shown an oral cephalosporin to be more effective (both clinically and in eradicating the organism from the throat) than oral penicillin V.
- Sore throats should be treated with antibiotics if the following criteria are fulfilled:
    a. severe sore throat with purulent tonsillar exudates and/or
    b. presence of otitis media or quinsy and/or
    c. cervical lymphadenopathy

Likely pathogen: Step.pyogenes (group A beta-haemolytic streptococci)

Recommended antibiotic:

Choice	Antibiotics
First Choice	Cephalexin, Co-Amoxiclav
Alternative Choice	Erythromycin, Clindamycin (Either may be used in patients hypersensitive to the penicillin and cephalosporin)

Length of treatment: 10 days. A repeat course is occasionally necessary.

B.3. Ear infections

B.3.1. Otitis externa

- Amino glycosides should be used with caution in patients with a tympanic perforation due to the risk of ototoxicity
- Prolonged courses of antibacterial treatment may predispose to fungal infection
- Many cases of otitis externa do not require antibiotics but respond instead to avoidance of scratching and possibly topical steroids. Aural toilet is a very important part of management of this condition; patients may need referral to an ENT surgeon for assessment.

Likely pathogens: various, including Staph. aureus, Coliforms, Pseudomonas aeruginosa, Fungi (mixed infections are common)

Recommended antibiotic: Depends on culture and sensitivity. For most bacteria, ear drops containing topical amino glycosides such as Amikacin or framycetin (but see note 1 above), polymixin, or chloramphenicol are suitable.

Length of treatment: 7 days

B.3.2 Otitis media

- Amoxicillin is preferable to penicillin V due to its activity against H. influenzae (common in young children).
- Controversy exists about the antibiotic treatment of otitis media. Some studies indicate that antibiotic treatment is not useful. The recommendations above apply to patients in whom the decision to treat with antibiotic has been taken; they are not a general recommendation to treat with an antibacterial.

Likely pathogens: Strep. Pyogenes, Strep.pneumoniae, Haemophilius influenza

Recommended antibiotics:

Choice	Antibiotics
First Choice	Amoxicillin
Alternative Choice	Co-amoxiclav, Cotrimoxazole, Azythromycin

Length of treatment: 10-14 days

For severe infections, or those not responding to the above agents, parenteral cefuroxime is recommended for hospitalized patients.

B.4. Sinusitis

Likely pathogens: Same as for Otitis media (sect ion B.3.2) plus anaerobes

Recommended antibiotics:

Choice	Antibiotics
First Choice	Co-amoxiclav
Alternative Choice	Doxycycline

B.5. Acute exacerbations of chronic bronchitis

- The early oral cephalosporin (such as cephalexin) have poor activity against H. influenzae should not be used in this condition. Later agents such as oral cefuroxime axetil – associated with a very high incidence of diarrhoea), cefixime, cefpodoxime, and ceftibuten have much better activity.
- Some strains of H. influenzae (about 15%) found in this condition are resistant to amoxicillin but most are sensitive to co-amoxiclav or cefuroxime.
- Tetracyclines are contraindicated in the presence of renal dysfunction.
- Ciprofloxacin is not recommended for the empirical treatment of this condition due to its poor activity against Strep. Pneumoniae. However, it may be used in confirmed H. influenzae or M. catarrhalis infection.
- The newer quinolones such as Moxifloxacin and levofloxacin have better activity against Strep. Pneumoniae and can be given once daily. Moxifloxacin may be useful in the management of patients infected with penicillin-resistant Strep. Pneumoniae. They may also be useful in units where Clostridium difficile infection is a problem, since the quinolones are less likely than the cephalosporin to increase the risk of this infection.
- Clarithromycin is the oral macrolide of choice. For intravenous use, Clarithromycin is preferred as it is less likely to cause thrombophlebitis. In general, these agents are not indicated as single agents for the treatment of acute exacerbations of COPD due to their poor activity against H. influenzae.

Likely pathogens: Strep. Pneumonia, H. influenzae, Moraxella catarrhalis

Recommended antibiotic:

Choice	Antibiotics
First Choice	Amoxicillin
Alternative Choice	Co-amoxiclav, Doxycycline, Levofloxacin/ Moxifloxacin, Cefuroxime (parenteral) is recommended for severe infections or those not responding to the above agents

Length of treatment: 7-10 days, depending on clinical response.

B.6. Community-acquired pneumonia

- Initial 'best guess' treatment may need to be modified when culture and sensitivity results are available.
- The incidence of penicillin-resistant Strep. Pneumoniae is increasing worldwide. If Penicillin-resistant pnemococcal infection is thought possible, contact a microbiologist for advice on treatment.
- Erythromycin or cefuroxime are suitable choices in penicillin-hypersensitive patients (remembers that a small proportion of penicillin-allergic patients may also react to cefuroxime).
- Amoxicillin plus metronidazole should be used in aspiration pneumonia; if more broad-spectrum cover against Gram-negative bacilli is required (e.g. in patients hospitalized for 5 days or more) use cefuroxime plus metronidazole.
- The newer quinolones such as Levofloxacin/ Moxifloxacin have better activity against Strep. pneumoniae. They may prove useful in the management of patients infected with penicillin-resistant Strep. Pneumoniae.

Likely pathogens:

Common: Strep. Pneumoniae, H. Influenzae (often together with Strep. Pneumoniae), Mycoplasma pneumoniae

Less Common: Staph. Aureus, Klebsiella pneumoniae, Chlamydia psittaci, Coxiella burnetii (Q fever), Legionella pneumophila, Anaerobes (aspiration pneumonia)

Recommended antibiotic: if the infecting organism is not known (which applies to the majority of cases on admission) the following combinations are recommended:

Choice	Antibiotics
First Choice	Amoxicillin/ Augmentin
Alternative Choice	Cefuroxime (in severe infections), Quinolons In both cases, add a macrolide (erythromycin or Clarithromycin-see above) if an 'atypical' infection is suspected
Treatment may need to be altered when sputum culture results are available	

Length of treatment: 10 days

B.7. Pneumonia (acquired in hospital)

- Gram-negative bacilli, especially Klebsiella and Pseudomonas, often colonize the upper respiratory tract in patients receiving broad-spectrum antibiotics. This finding is not in itself an indication to change the antibiotics (or to prescribe one if the patient is not receiving antibiotic

treatment), especially if the patient is improving and does not have an unresponsive pneumonia. The patient's clinical condition must be assessed in conjunction with the sputum findings.

- Other causes of pneumonia in immuno-suppressed patients include Pneumocystis, Candida and Aspergillus consult a microbiological about diagnosis and treatment.
- Neonatal pneumonia is sometimes due to group B streptococci and, rarely, to Chlamydia trachomatis.

Likely pathogens: coliforms e.g. E. coli, Klebsiella, Proteus; Pseudomonas aeruginosa; H. Influenzae; Legionella pneumphilia; Staph. aureus (including MRSA); Strep. Pneumoniae; Anaerobes (following aspiration); Yeasts

Recommended antibiotics: Various antibiotics or combinations of antibiotics have been suggested, each with advantages and disadvantages. It may help to look at any previous bacteriology results of sputum or tracheal aspirate culture. In general, the following treatment is recommended:

Choice	Antibiotics
First Choice	Piperacillin-Tazobactam/Cefoperazone-Sulbactam
Alternative Choice	Other antibiotics may be indicated – contact a microbiologist for advice
The choice of antibiotic should be made on an individual basis taking into account the patient's history, any previous bacteriology results, and what antibiotics he/she has received recently. If in any doubt, contact a microbiologist.	

Length of treatment: 10 days minimum but longer courses may be required depending on clinical response

Section C
SKIN AND SOFT TISSUE INFECTIONS

C.1. Bacterial infection

C.1.1. Erysipelas and cellulitis

Likely pathogens: Strep. Pyogenes (other β –haemolytic streptococci may also cause cellulitis)

Recommended antibiotic:

Choice	Antibiotics
First Choice	Cloxacillin, Augmentin
Alternative Choice	Azithromycin, Clindamycin

Length of treatment: depend on clinical response, which may be slower than might be expected. At least 7-10 days will be required, sometimes longer. For severe cellulites, IV therapy may be required for 48 hours or more (Clindamycin is normally given orally).

C.1.2. Boils

Antibiotics are not usually necessary, unless the lesion is situated on the face or accompanied by spreading infection.

Likely pathogen: Staph. aureus

Recommended antibiotic:

Choice	Antibiotics
First Choice	Cloxacillin, Augmentin
Alternative Choice	Azithromycin

Length of treatment: 5 days longer courses may be necessary if the lesion is accompanied by spreading cellulitis.

C.1.3. Bites (animal or human)

Likely pathogens: Staph. Aureus, Strep.pyogenes, Anaerobes, Pasteurella multocida (animal bites), Capnocytophaga species

Recommended antibiotic:

Choice	Antibiotics
First Choice	Co-amoxiclav
Alternative Choice	Clindamycin

Length of treatment: 5 days.

C.1.4. Soft tissue infections in intravenous drug users

If empirical treatment is given, remember the possibility of septicaemia and endocarditis in these patients, often with unusual organisms. Blood cultures should be taken before treatment.

Likely pathogens: very varied, but includes: Staph. Aureus, Strep. Pyogenes, Anaerobes. Gram-negative bacilli (may be unusual environmental organisms)

Treatment should be guided by culture and sensitivity results. If "blind" treatment is necessary, the *recommended antibiotics* are:

Choice	Antibiotics
First Choice	Clindamycin, Doxycycline
Alternative Choice	Cefuroxime plus metronidazole

Length of treatment: depends on clinical response, but at least 7 days treatment will be required.

C.1.5. Infections associated with leg ulcers and pressure sores

- While topical antiseptics (e.g. chlorhexidine, povidone-iodine) may be useful in these lesions, topical antibiotics have little role to play. In particular, topical gentamycin or fusidic acid should not be used on these lesions.
- Do not use topical mupirocin on these lesions unless advised by a microbiologist, due to the possibility of the emergence of resistance to this very useful agent.
- These lesions are often colonized with a variety of organisms, including staphylococci, streptococci, coliforms and anaerobes. The presence of these bacteria in such a lesion does not necessarily imply infection or that systemic treatment is necessary. True infection (as opposed to colonization) in immuno-competent patients is rarely associated with Gram-negative bacilli, even though these organisms are commonly isolated from such lesions. Should signs of infection be present (e.g. pyrexia, spreading cellulites) the likely pathogens are shown below:

Likely pathogens: Staph. Aureus, Strep.pygenes. (and other ß-haemolytic streptococci), Anaerobes

Suspect anaerobic infection in particularly deep lesions, and/or necrotic tissue, and/or profuse, foul-smelling pus, contact a microbiologist about the lesions of this nature which are failing to respond to antibiotics.

Recommended antibiotic:

Choice	Antibiotics
First Choice	Cloxacillin (plus metronidazole if anaerobes are Clinically suspected
Alternative Choice	Clindamycin, Co-amoxiclav

The alternative agents Clindamycin or co-amoxiclav may be particularly useful if anaerobic infection is suspected.

Length of treatment: in most cases 7 days should be sufficient, but this is partly dependent on other factors such as the severity of infection and the blood supply to the site of infection.

C.1.6 Surgical wound infections

Likely pathogens: Staph.aureus, B-haemolytic streptococci, Coliforms, Anaerobes

Recommended antibiotic: depends on culture and sensitivity: Reasonable best-guess therapy would be:

Choice	Antibiotics
First Choice	Cloxacillin, Augmentin
Alternative Choice	Clindamycin or Cefuroxime plus metronidazole (particularly if Gram-negative and/or anaerobic infections are suspected

Length of treatment: 7 days

C.1.7. Necrotizing fasciitis

Likely pathogens:

- Simultaneous infection with Gram-negative such as E. coli and anaerobic bacteria such as Bacteroides spp. and/or anaerobic cocci; other intestinal organisms such as enterococci may also be present
- Strep. pyogenes as a single organism

Recommended antibiotic:

Note: surgical debridement is essential in the management of this condition. It will not respond to antibiotics alone. Always send debrided tissue (not swabs) to the laboratory for culture. Due to the wide variety of infecting organisms and differing clinical backgrounds, always consult a microbiologist for advice on antibiotic treatment.
First choice: Due to the wide variety of infecting organisms and differing organisms and differing clinical backgrounds in patients with necrotizing fascitis, always consult a microbiologist for advice on antibiotic treatment

Length of treatment: minimum 10 days (longer courses may be required). Treatment can be rationalized after the results of culture of debrided tissue are known.

C.2 Superficial fungal infections

C.2.1 Dermatophytosis (ringworm)

Likely pathogens: Dermatophyte fungi

Recommended antifungal: A topical antifungal agent, e.g. clotrimazole or terbinafine

The treatment of choice for dermatophytosis is a topical antifungal wherever possible. Oral antifungal agents for the treatment of these conditions should only be prescribed on the advice of a dermatologist.

C.2.2 Oral Candidiasis

A topical antifungal is the most commonly used treatment for oral candidiasis. However, consider using fluconazole in patients who fail to respond to topical therapy or in Immuno-suppressed patients. Systematically active agents such as fluconazole should always be used patients with HIV infection.

Fluconazole usage may lead to resistance, particularly if it is used widely.

Likely pathogens: Candida albicans, Other Candida species

Recommended antifungal:

Choice	Anti-fungal Agents
First Choice	Topical nystatin, A topical imidazole (the oral gel preparation of miconazole is particularly useful

Alternative Choice	Fluconazole (systemic, given orally)

C.2.3. Vaginal candidiasis

In this condition, topical imidazoles such as clotrimazole or miconazole are superior to topical polyenes such as nystatin or amphotericin.

Likely pathogens: Candida albicans, Other Candida species

Recommended antifungal:

Choice	Anti-fungal Agents
First Choice	Topical imidazole (e.g. clotrimazole or miconazole
Alternative Choice	Itraconazole or fluconazole (systemic, given orally)

Length of treatment: depends on the drug and preparation chosen; see the BNF

Section D

SEPTICAEMIA AND SEVERE INFECTIONS

D.1. Septicemia or severe infection of unknown cause

In seriously ill patients, consult a microbiologist for advice on treatment.

It is important to realize that a broad spectrum combination may still have gaps (MRSA, for example) or may provide less than optimal therapy against some organisms (e.g. Pseudomonas). No agent or combination of agents can hope to cover all eventualities. This recommendation is necessarily a compromise; the patient should be examined thoroughly for a source of infection and therapy tailored to counter likely pathogens (see other sections on individual infections). If in doubt, consult a microbiologist.

Blood cultures are essential before starting treatment; therapy must be reviewed when results are available or if the patient fails to respond within 24 – 48 hours.

It is unusual for a septicemia to be of totally unknown origin. The patient's history will often allow a good guess as to likely infecting organisms to be made. This is frequently not the case in neutropenic patients.

Coagulase-negative staphylococci (sometimes reported as Staph. epidermidis) are of low pathogenicity and are most commonly encountered as a cause of septicemia when associated with an intravenous cannula. In this case, consider removing the cannula as infection may be difficult to eradicate in its presence.

These recommendations do not apply to sepsis in neutropenic patients. Units which deal regularly with these patients should have their own antibiotic policies for sepsis in neutropenia and these should be followed. Separate guidelines to staff who do not routinely manage neutropenic patients but who see such patients in the course of their usual work can be found in.

Likely pathogens: very varied. Mixed Gram-positive and Gram-negative infections may occur.

Recommended antibiotics:

Choice	Antibiotics
First Choice	Piperacillin-Tazobactam/Cefoperazone-Sulbactam
Alternative Choice	Imipenem/ Meropenem (plus Vancomycin/ teicoplanin if MRSA is suspected)

Length of treatment: for confirmed sepsis, a minimum of 7 days, but this may vary according to clinical circumstances

E.5. Prophylaxis of meningitis

Chemoprophylaxis of meningitis should be offered to certain contacts of the patient in both meningococcal and Haemophilus infection. Unfortunately the persons at risk and the regimen used vary slightly between these two conditions.

Note that contacts of cases of other serious infections due to meningococci and H. influenzae type b (e.g. septicaemia, epiglottitis, cellulites, arthritis, etc.) should also be given prophylaxis.

Important: prophylaxis is not required for most hospital staff who have come into contact with the case, in case of doubt, please contact a microbiologist for advice.

Prevention of secondary case of meningococcal meningitis: Rifampicin for 2 days or single dose ceftriaxone or ciprofloxacin

Prevention of secondary case of H. influenzae type b disease: Rifampicin OD for 4 days

E.5.1 Prophylaxis of meningococcal meningitis

Patients given Rifampicin MUST be warned about potential unwanted effects, particularly with regard to staining of contact lenses and possible failure of oral contraception.

For patients who cannot be given Rifampicin, ciprofloxacin (500mg single dose in adults) is a potential alternative to Rifampicin but is not licensed for this indication. It should only be used on the advice of a microbiologist.

A single dose of Ceftriaxone (250mg IM in adults; 125mg IM in children under 12) is an alternative for patients who cannot be given Rifampicin or ciprofloxacin, e.g. in pregnant women.

The **drug of choice** is Rifampicin, given in the following doses

Category	Age	Dose of Rifampicin
Adults	All age groups	600mg BD for 2days
Children	>12years	600mg BD for 2days
	6-12years	300mg BD for 2days
	1-5years	150mg BD for 2days
	3-11months	40mg BD for 2days
	0-2months	20mg BD for 2days

E.5.2. Prophylaxis of Haemophilus Influenzae Type B meningitis

Patients given Rifampicin MUST be warned about potential unwanted effects, particularly with regard to staining of contact lenses and possible failure of oral contraception.

Consult a microbiologist for advice on alternative agents if a person cannot be given Rifampicin.

Important: note that dosage schedules for meningococcal and Haemophilus infection is different.

The drug of choice is Rifampicin, given in the following doses:

Category	Age	Dose of Rifampicin
Adults	All age groups	600mg BD for 4days
Children	>12years	600mg once daily for 4days
	6-12years	300mg once daily for 4days
	1-5years	150mg once daily for 4days
	3-11months	40mg once daily for 4days
	0-2months	20mg once daily for 4days

Alternative – Ciprofloxacin – 500 mg Single Dose

Section F

MISCELLANEOUS INFECTIONS

F.1. Enteric infections

- Penicillins, cephalosporins and aminoglycosides are less effective clinically against salmonellae even if sensitive in the laboratory, and should not be used for treatment.

- Antibiotic therapy is not always necessary, and may be disadvantageous since the period of excretion of the organism may be prolonged. Fluid and electrolyte replacement and symptomatic treatment remains the mainstays of therapy. Antibiotics may be indicated in severe gastroenteritis, systemic disease, prolonged symptoms and (rarely) where the person is symptom-free but continues to excrete the organism. However, certain categories of patient-e.g. those on proton pump inhibitors and H2 blockers those who have had previous gastric surgery, and Immuno-compromised patients- are more likely to develop severe salmonellosis and antibiotic therapy should be considered early.
- Clostridium difficile infection should be suspected in any patient who develops diarrhea during or following a course of antibiotics.
- In travel-related infection, consult an infectious diseases physician.
- The management of infection with Helicobacter pylori is a specialist area not considered in this guide.

Likely pathogens: Campylobacter; Salmonella; Shigella; E.coli (particularly E.coli O157, the cause of haemolytic-uraemic syndrome); Clostridium difficile; Viruses, e.g., rotavirus, norovirus, small round structured viruses; Other organisms may also be encountered, such as protozoa and Cryptosporidium (especially in immunocompromised patients)

Recommended antibiotics:

Campylobacter infection: Erythromycin (ciprofloxacin is an alternative treatment)

Salmonella infection: Ciprofloxacin

(Ciprofloxacin is recommended as best-guest therapy for patients presenting with severe gastroenteritis in which early antibiotic therapy is required)

C. difficile infection: Oral metronidazole (for treatment failures, consult a microbiologist for advice on alternative therapy to metronidazole)

Length of treatment: 5 days (7-10 days for C.difficile)

F.2. Systemic fungal infections

- The incidence of these infections continues to increase with the increasing numbers of severely immuno-compromised patients. It is strongly recommended that a microbiologist is contacted if a patient is suspected of suffering from a systemic fungal infection. The following notes may be of initial help.
- Only the following agents should be considered for the treatment of systemic fungal infection: amphotericin B (standard and lipid preparations), 5-fluorocytosine (flucytosine), fluconazole, and itraconazole, voriconazole, and caspofugin.

- Amphotericin B is effective in a wide range of fungal infections, including candidiasis, cryptococosis, and aspergillosis, plus a range of other fungi. Due to its potential toxicity, other agents such as fluconazole or voriconazole are often preferred.
- Flucytosine is only effective in infections due to yeasts (e.g. candidiasis and cryptococcosis) and resistance develops rapidly if the drug is used alone. It should be used in combination with amphotericin B and only on microbiological advice. The measurement of serum levels is required for this drug.
- Fluconazole has proved effective in the treatment of cryptococcal meningitis and its efficacy in systemic Candida albicans infection is similar to that of amphotericin B. For the treatment of systemic infection with other Candida species, please contact a microbiologist for advice as fluconazole-resistant strains may occur.
- Various different preparations of amphotericin B are available, including three lipid preparations. These are: liposomal amphotericin B (Ambisome/ Fungisome); amphotericin B lipid complex (Abelcet); amphotericin B colloidal dispersion (Amphocil). These agents particulary Ambisome and Amphocil, have a much lower incidence of immediate side effects such as fever, rigors, and skin rashes. However, they are much more expensive than conventional amphotericin, particularly Ambisome. Ambisome should be reserved for certain specialized units or where conventional amphotericin has been found to be unsuitable.
- Itraconazole has proved to be effective in prophylaxis against Aspergillus infection. Units which treat patients vulnerable to this condition will have their own policies for its use. Other units should contact a microbiologist for advice.
- Caspofungin is licensed for the treatment of aspergillosis refractory to amphotericin B, and in systemic candidiasis. It would normally only be used in specialized units which frequently deal with systemic fungal infections, or on the advice of a microbiologist.
- Voriconzole is derived from fluconazole but has much greater activity against fungi which are normally fluconazole-resistant. It is also much better absorbed than itraconazole when given orally, and unlike itraconazole penetrates into the CSF. It is indicated for aspergillosis, for candidiasis due to fluconazole-resistant strains, and for some other fungal infections. As with caspofungin, it would normally only be used in specialized units which frequently deal with systemic fungal infections:

Systemic candidiasis: Fluconazole is the treatment of choice for systemic infection with Candida albicans and for some other Candida species where the organism is known to be susceptible.

Amphotericin B (with the addition of flucytosine in certain rare circumstances) may be required is some cases, particularly if the organism is fluconazole-resistant. Voriconazole or caspofungin are alternatives in the treatment of infection due to fluconazole-resistant strains.

Cryptococcosis: Amphotericin B plus fluconazole or flucytosine,

Aspergillosis: Amphotericin B; voriconzole or caspofungin are possible alternatives for patients who cannot tolerate amphotericin or who have failed to respond to treatment with amphotericin B.

Section G

ANTIBIOTIC PROPHYLAXIS

Several uses of prophylactic antibiotics are discussed elsewhere in this Guide. They are:

Section	Type of Prophylaxis
A.4.	Prophylaxis during surgery of the urinary tract
E.4.	Prophylaxis of meningitis

The only other common use of prophylactic antibiotics is in the prevention of surgical wound infections and this is discussed below.

Important: many surgical units will have individual policies for prophylactic antibiotics which are specific to certain types of surgical procedure. Prescribers should check for the existence of such policies in the units where they work and adhere to the local policy if one exists.

Antibiotic Schedule for Sensitivity testing		
For Urine Specimen (Gram negative)		
	Entrobacteriaceae members	**Non- Fermentars**
Ist Line Primary drugs	Ampicillin	Ampicillin
	Cephalothin	Carbenicillin
	Gentamicin	Gentamicin
	Tobramycin	Tobramycin
	Norfloxacin	Norfloxacin
	Nitrofurantoin	Ofloxacin
	Co-trimoxazole	
IInd Line Primary drugs (Use Selectively)	Cefuroxime	Amikacin
	Amoxycillin + Clavulanic acid	Aztreonam
	Amikacin	Cefepime
	Cefotaxime	Cefpirome
	Ceftriaxone	Ciprofloxacin

	Ciprofloxacin	Levofloxacin
	Levofloxacin	Piperacillin + Tazobactam
	Cefepime	Cefoperazone + Sulbactam
	Cefpirome	Imipenem
	Carbenicillin	Meropenem
	Imipenem	
	Meropenem	
Supplemtal Drugs (Report Selectively)	Chloramphenicol	Chloramphenicol
	Aztreonam	Polymyxin-B
	Ceftazidime	Colistin
	Tetracycline	Doxycycline
	Doxycycline	
	Polymyxin-B	
	Colistin	
	Cefoperazone + Sulbactam	
	Piperacillin + Tazobactam	
	Netilmicin	

Antibiotic Schedule for Sensitivity testing

For Urine Specimen (Gram Positive)

	Staphylococcus species	Entrococcus species
Ist Line Primary drugs	Penicillin	Ampicillin
	Ampicillin	Penicillin
	Norfloxacin	Norfloxacin
	Nitrofurantoin	Levofloxacin
	Co-trimoxazole	Ciprofloxacin
	Oxacillin / Cefoxitin	Nitrofurantoin
	Clindamycin	Tetracycline
IInd Line Primary drugs (Use Selectively)	Doxycycline	Doxycycline
	Tetracycline	Vancomycin
	Vancomycin	Linezolid

	Linezolid	Teicoplanin
	Teicoplanin	
	Ciprofloxacin	
	Levofloxacin	
	Amoxycillin + Clavulanic acid	
Supplemtal Drugs (Report Selectively)	Ofloxacin	Ofloxacin
	Moxifloxacin	Moxifloxacin
	Chloramphenicol	Gentamicin (HLG)
	Gentamicin	Chloramphenicol

Antibiotic Schedule for Sensitivity testing

For samples other than Urine (Gram Positive)

	Staphylococcus species	**Entrococcus species**
Ist Line Primary drugs	Penicillin	Penicillin
	Ampicillin	Ampicillin
	Oxacillin / Cefoxitin	Co-trimoxazole
	Erythromycin	
	Co-trimoxazole	
IInd Line Primary drugs (Use Selectively)	Doxycycline	Linezolid
	Tetracycline	Vancomycin
	Vancomycin	Teicoplanin
	Linezolid	Clindamycin
	Teicoplanin	Tetracycline
	Clindamycin	
	Amoxycillin + Clavulanic acid	
Supplemtal Drugs (Report Selectively)	Chloramphenicol	Ciprofloxacin
	Ciprofloxacin	Levofloxacin
	Levofloxacin	Chloramphenicol
	Ofloxacin	Gentamicin (HLG)
	Moxifloxacin	
	Gentamicin	

	Amikacin	

Antibiotic Schedule for Sensitivity testing

For samples other than Urine (Gram Negative)

	Entrobacteriaceae members	Non- Fermentars
Ist Line Primary drugs	Ampicillin /Amoxycillin	Ampicillin
	Cephalothin / Cephalexin	Gentamicin
	Gentamicin	Tobramycin
	Tobramycin	Piperacillin
	Co-trimoxazole	Ceftazidime
		Doxycycline
		Tetracycline
IInd Line Primary drugs (Use Selectively)	Amoxycillin + Clavulanic acid	Cefoperazone + Sulbactam
	Cefoperazone + Sulbactam	Piperacillin + Tazobactam
	Piperacillin + Tazobactam	Aztreonam
	Cefuroxime	Ceftriaxone / Cefotaxime
	Amikacin	Cefepime
	Cefotaxime	Cefpirome
	Ceftriaxone	Amikacin
	Ciprofloxacin	Imipenem
	Levofloxacin	Meropenem
	Imipenem	Ciprofloxacin
	Meropenem	Levofloxacin
Supplemental Drugs (Report Selectively)	Netilmicin	Netilmicin
	Doxycycline	Polymyxin-B
	Tetracycline	Colistin
	Chloramphenicol	Ofloxacin
	Aztreonam	
	Ceftazidime	
	Polymyxin-B	
	Colistin	

PRESCRIPTION AUDIT :

Prescription audit is a quality improvement process that seeks to improve patient care. The most important part of healthcare system is to deliver the right medicine to the right people. Prescription auditing is one of the important tool to avoid misuse of drugs and improves rational use of drugs. The Performance of the health care providers related to the appropriate use of drugs can be accessed by analyzing the different prescribing indicators.

The parameters which have to be analyzed in the process of prescription auditing are: Patient demographics, Clinical diagnosis, Prescribing standards, Doctor's name and signature. A total of 25 national and international articles collected to see the prescribing patterns of drugs by the physician. The studies shown that majority of practitioners are not following the guidelines while writing the prescriptions and usage of drugs. There is a need to standardize the prescribing patterns in India so that all essential information is included and will be helpful for the better patient care.

The objective of prescription audit is to articulate measures for improving the prescription practices and to generate information on the core prescribing indicators. Prescription Audit form is annexed.

PRESCRIPTION AUDIT (In-patient)

Name of the patient :

Age / Sex : IP number :

Date of admission : Admission diagnosis :

Active case record : □ Discharged case record: □

Name of the treating doctor:

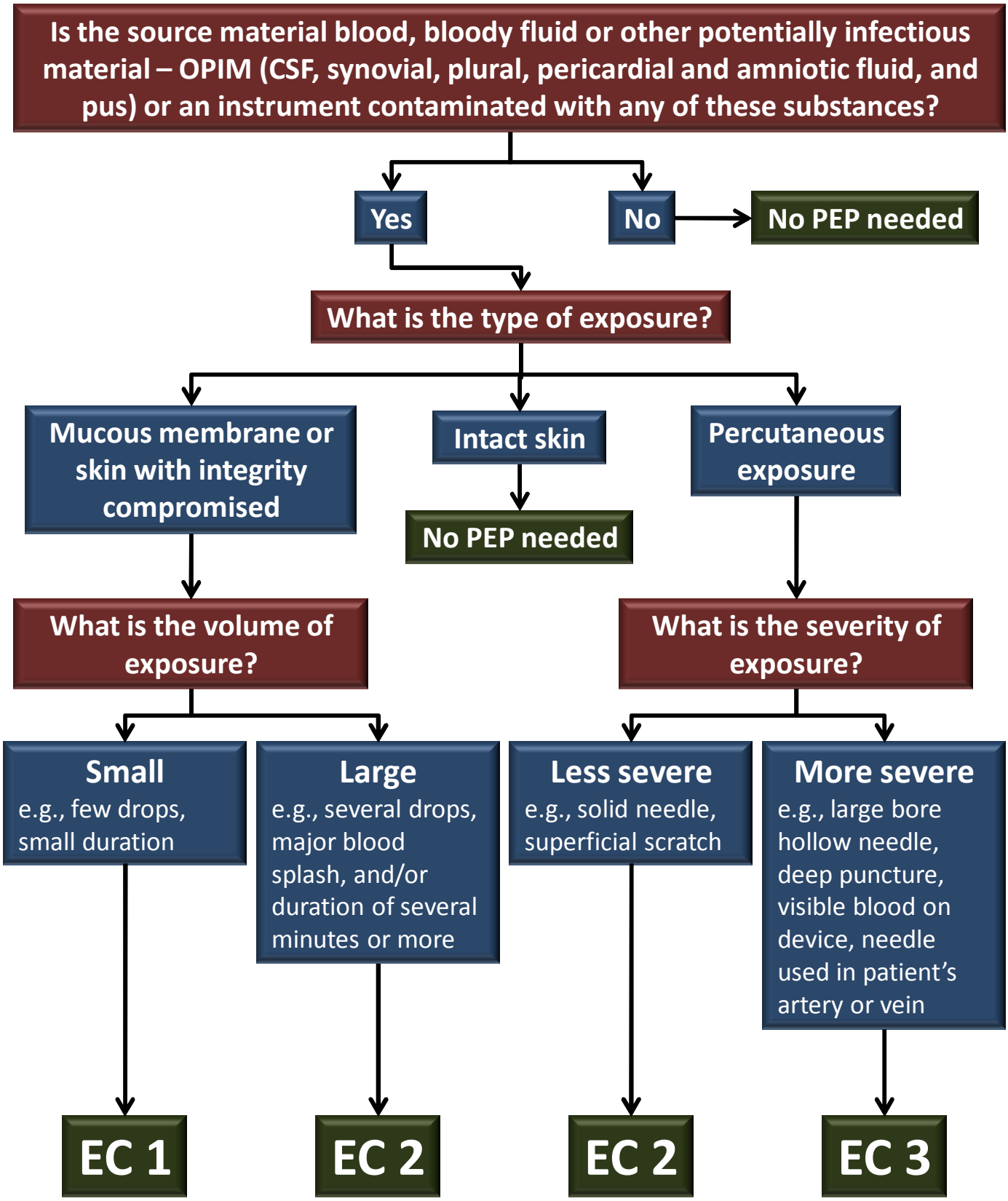
Name of the auditing doctor:

S.N.	Details of the prescription	Yes	No	NA
1.	Documentation of drug allergy			
2.	Prescription of drugs as per STG / rational to clinical condition / diagnosis			
3.	Prescription written in a uniform location of the patient's medical record			
4.	Prescription of drugs under generic name			
5.	Strength of the drug documented			
6.	Frequency of the drug prescribed			
7.	Route of administration documented			
8.	Use of error prone abbreviations and symbols			
9.	Therapeutic duplication in the prescription			
10.	Does the prescription contain drug-drug interaction medications?			
11.	Does the prescription contain food-drug interaction medications? If so are there any measures taken to avoid the same?			
12.	Prescription of 3rd and 4th generation antibiotics			
13.	Prescription written in a comprehensible manner			
14.	Prescription signed by Doctor			
15.	Name of the doctor mentioned on prescription			
16.	Date mentioned on the prescription			
17.	Time mentioned on the prescription			

Date: Signature of the auditor

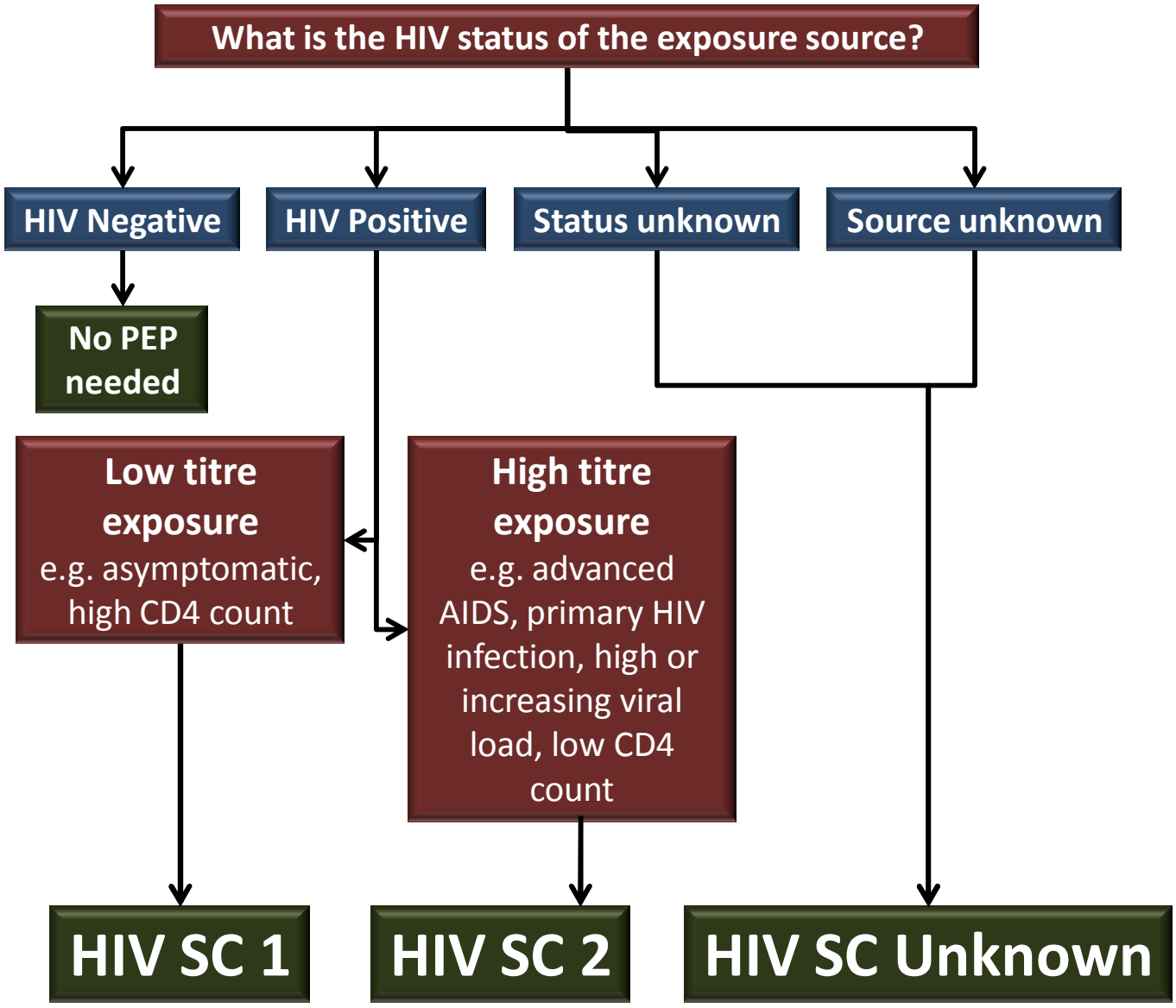
Post Exposure Prophylaxis – NACO Guidelines

Figure 1: Determination of Exposure Code (EC)



Post Exposure Prophylaxis – NACO Guidelines

Figure 2: Determination of HIV Status Code (EC)



Post Exposure Prophylaxis – NACO Guidelines

Determining PEP recommendation

EC	HIV SC	PEP Recommendation
1	1	**PEP may not be warranted.** Exposure type does not pose a known risk for HIV transmission. Whether the risk for drug toxicity outweighs the benefit of PEP should be decided by the exposed HCW and treating clinician.
1	2	**Consider basic regimen.** Exposure type poses a negligible risk for HIV transmission. A high HIV titre in the source may justify consideration of PEP. Decision should be taken by the exposed HCW and treating clinician.
2	1	**Recommended basic regimen.** Most HIV exposures are in this category. No increased risk for HIV transmission has been observed but use of PEP is appropriate.
2	2	**Recommended expanded regimen.** There is an increased risk of HIV transmission.
2/3	Unknown	**Consider basic regimen.** If the source (in case of an unknown source), and the setting where the exposure occurred suggests a possible risk for HIV exposure, PEP basic regimen can be considered.

Post Exposure Prophylaxis – NACO Guidelines

PEP must be initiated as soon as possible, preferably within 2 hours but not later than 72 hours.
PEP drugs should be taken for 28 days.

Basic Regimen	• Zidovudine (AZT) – 600 mg in divided doses (300 mg twice a day or 200 mg thrice a day AND • Lamivudine (3TC) – 150 mg twice a day
Expanded Regimen	• Basic regimen AND • Indinavir (800 mg thrice a day) or Nelfinavir (750 mg thrice a day)

HIV test and PEP regimen

Baseline HIV test of the HCW should be done at the time of exposure and repeated at 6 weeks following exposure.
If second test is also negative, HIV test to be repeated 12 weeks following exposure.

Post Exposure Prophylaxis (PEP) – NACO Guidelines

"Post exposure prophylaxis" (PEP) refers to the comprehensive management given to minimize the risk of infection following potential exposure to blood-borne pathogens (HIV, HBV, HCV).

This includes:

1. First aid
2. Counseling
3. Risk assessment
4. Relevant laboratory investigations based on informed consent of the source and exposed person
5. Depending on the risk assessment, the provision of short term (4 weeks) of antiretroviral drugs
6. Follow up and support

"Exposure" which may place an HCP at risk of blood-borne infection is defined as:

1. Per cutaneous injury (e.g. needle-stick or cut with a sharp instrument),
2. Contact with the mucous membranes of the eye or mouth,
3. Contact with non-intact skin (particularly when the exposed skin is chapped, abraded, or afflicted with dermatitis), or
4. Contact with intact skin when the duration of contact is prolonged (e.g. several minutes or more) with blood or other potentially infectious body fluids.

Table 46: Potentially infectious body fluids

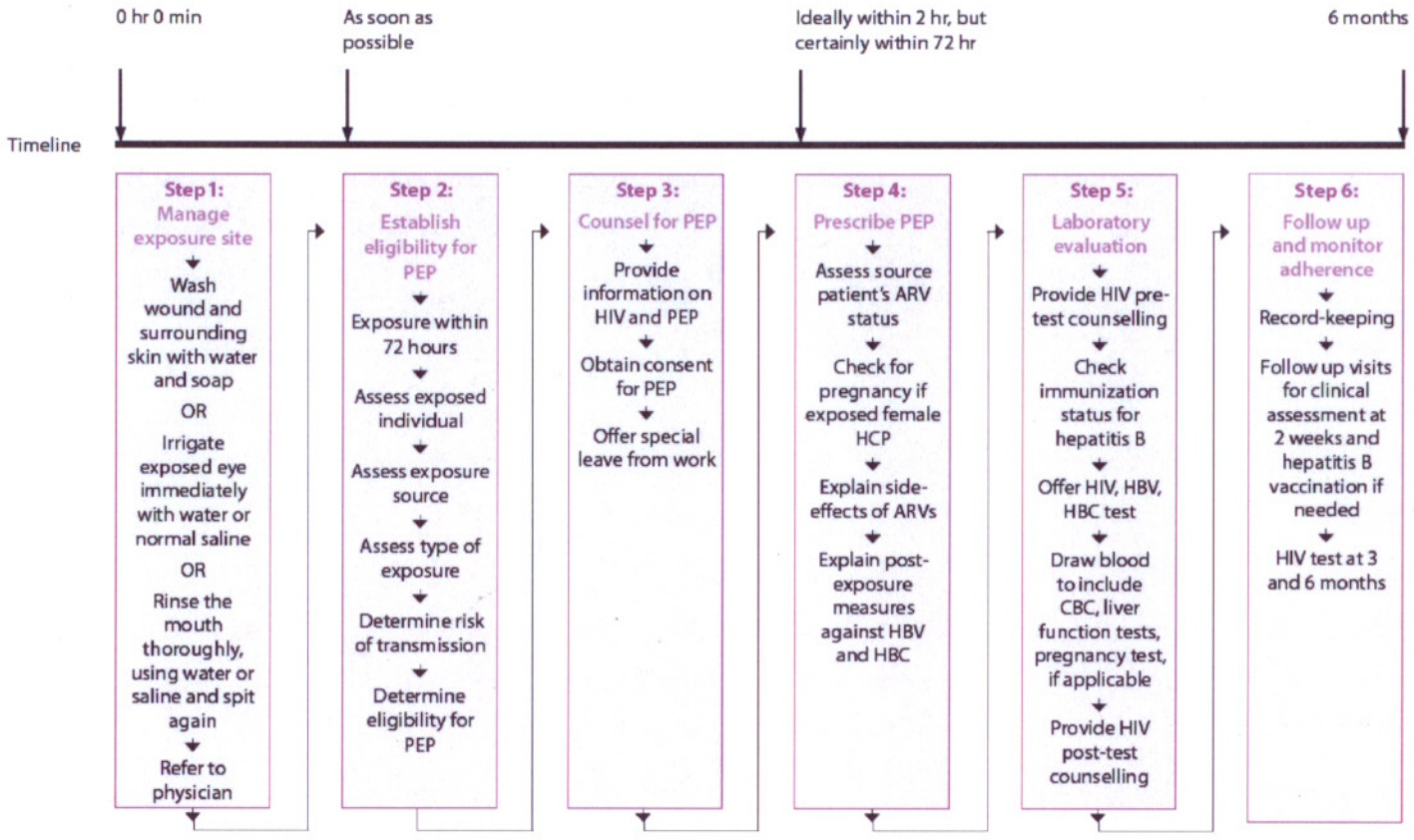
Exposure to body fluids considered *'at risk'*	Exposure to body fluids considered *'not at risk'*	
Blood Semen Vaginal secretions Cerebrospinal fluid Synovial, pleural, peritoneal, pericardial fluid Amniotic fluid Other body fluids contaminated with visible blood	Tears sweat Urine and faeces saliva	*unless these secretions contain visible blood*

Table 47: HIV transmission risk of different routes

Exposure route	HIV
Blood transfusion	90–95%
Perinatal	20–40%
Sexual intercourse	0.1 to 10%
Vaginal	0.05–0.1%
Anal	0.065–0.5%
Oral	0.005–0.01%
Injecting drugs use	0.67%
Needle stick exposure	0.3%
Mucous membrane splash to eye, oro-nasal	0.09%

Note: Needle-stick exposure for HBV is 9–30% and for HCV is 1–10%

Steps for managing occupational exposure



See annex 10: Occupational exposure management- sample flow chart

Step 1: Management of Exposure Site–First Aid

For skin—If the skin is broken after a needle-stick or sharp instrument:
Immediately wash the wound and surrounding skin with water and soap, and rinse. Do not scrub. Do not use antiseptics or skin washes (bleach, chlorine, alcohol, betadine).

After a splash of blood or body fluids:
To unbroken skin:

- Wash the area immediately
- Do not use antiseptics

For the eye:

- Irrigate exposed eye immediately with water or normal saline.
- Sit in a chair, tilt head back and ask a colleague to gently pour water or normal saline over the eye.
- If wearing contact lens, leave them in place while irrigating, as they form a barrier over the eye and will help protect it.
- Once the eye is cleaned, remove the contact lens and clean them in the normal manner. This will make them safe to wear again.
- Do not use soap or disinfectant on the eye.

For mouth:

- Spit fluid out immediately.
- Rinse the mouth thoroughly, using water or saline and spit again. Repeat this process several times.
- Do not use soap or disinfectant in the mouth.
- Consult the designated physician of the institution for management of the exposure immediately.

Table 49: Summary of do's and don't

Do	Do Not
Remove gloves, if appropriate	**Do not** panic
Wash the exposed site thoroughly with running water	**Do not** put the pricked finger in mouth
Irrigate with water or saline if eyes or mouth have been exposed	**Do not** squeeze the wound to bleed it
Wash the skin with soap and water	**Do not** use bleach, chlorine, alcohol, betadine, iodine or other antiseptics/detergents on the wound
** Do - Consult the designated physician immediately as per institutional guidelines for management of the occupational exposure **	

Step 2: Establish eligibility for PEP

The HIV sero-conversion rate of 0.3% after an AEB (for percutaneous exposure) is an average rate. The real risk of transmission depends on the amount of HIV transmitted (= amount of contaminated fluid and the viral load).

A designated person/trained doctor must assess the risk of HIV and HBV transmission following an AEB. This evaluation must **be made rapidly**, so as to start any treatment as soon as possible after the accident (Ideally within 2 hours but certainly within 72 hours). This assessment must be made thoroughly (because not every AEB requires prophylactic treatment).
The first dose of PEP should be administered within the first 72 hours of exposure and the risk evaluated as soon as possible. If the risk is insignificant, PEP could be discontinued, if already commenced. Two main factors determine the risk of infection:

- The nature of exposure and
- The status of the source patient.

2.1 Assessing the nature of exposure and risk of transmission:

Three categories of exposure can be described based on the amount of blood/fluid involved and the entry port. These categories are intended to help in assessing the severity of the exposure but may not cover all possibilities.

Table 50: Categories of exposure

Category	Definition and example
Mild exposure :	mucous membrane/non-intact skin with small volumes E.g.: a superficial wound (erosion of the epidermis) with a plain or low calibre needle, or contact with the eyes or mucous membranes, subcutaneous injections following small-bore needles
Moderate exposure:	mucous membrane/non intact skin with large volumes **OR** percutaneous superficial exposure with solid needle E.g.: a cut or needle stick injury penetrating gloves
Severe exposure :	percutaneous with large volume e.g.: • an accident with a high calibre needle (≥18 G) visibly contaminated with blood; • a deep wound (haemorrhagic wound and/or very painful); • transmission of a significant volume of blood; • an accident with material that has previously been used intravenously or intra-arterially.

The wearing of gloves during any of these accidents constitutes a protective factor.

Note: In case of an AEB with material such as discarded sharps/needles, contaminated for over 48 hours, the risk of infection becomes negligible for HIV, but still remains significant for HBV. HBV survives longer than HIV outside the body.

2.2 Assessing the HIV status of the source of exposure:

- PEP needs to be started as soon as possible after the exposure and within 72 hours. In animal studies, initiating PEP within 12, 24 or 36 hours of exposure was more effective than initiating PEP 48 hours or 72hours following exposure.

- PEP is not effective when given more than 72 hours after exposure. A baseline rapid HIV testing should be done before starting PEP.

- Initiation of PEP where indicated should not be delayed while waiting for the results of HIV testing of the source of exposure.
- Informed consent should be obtained before testing of the source as per national HIV testing guidelines.

Table 51: Categories of situations depending on results of the source	
Source HIV Status	**Definition of risk in source**
HIV negative	Source is not HIV infected but consider HBV and HCV
Low risk	HIV positive and clinically asymptomatic
High risk	HIV positive and clinically symptomatic (see WHO clinical staging)
Unknown	Status of the patient is unknown, and neither the patient nor his/her blood is available for testing (e.g. injury during medical waste management the source patient might be unknown). The risk assessment will be based only upon the exposure **(HIV prevalence in the locality can be considered)**

2.3 Assessment of the exposed individual:

- The exposed individual should have confidential counseling and assessment by an experience physician.
- The exposed individual should be assessed for **pre-existing HIV infection** intended for people who are HIV negative at the time of their potential exposure to HIV.
- Exposed individuals who are known or discovered to be HIV positive should not receive PEP. They should be offered counseling and information on prevention of transmission and referred to clinical and laboratory assessment to determine eligibility for antiretroviral therapy (ART).
- Besides the medical assessment, **counseling** exposed HCP is essential to allay fear and start PEP (if required) at the earliest.

Step 3: Counseling for PEP

- Exposed persons (clients) should receive appropriate information about what PEP is about and the risk and benefits of PEP in order to provide informed consent.
- It should be clear that PEP is not mandatory.
- Informed Consent.
- Psychological support: Many people will feel anxious after exposure. Every exposed person needs to be informed about the risks and the measures that can be taken. This will help to relieve part of the anxiety, but some may require further specialized psychological support.
- Documentation on record is essential. Special leave from work should be considered for a period of time eg. 2 weeks (initially) then, as required based on assessment of the exposed person's mental state, side effects and requirements.

Step 4: Prescribe PEP

4.1 Deciding on PEP regimen

There are two types of regimens:

- Basic regimen: 2-drug combination
- Expanded regimen: 3-drug combination

The decision to initiate the type of regimen depends on the type of exposure and HIV sero status of the source person.

Table 53: HIV Post-exposure Prophylaxis evaluation

Exposure	Status of source		
	HIV+ and asymptomatic	**HIV+ and Clinically symptomatic**	**HIV status unknown**
mild	Consider 2-drug PEP	Start 2- drug PEP	Usually no PEP or consider 2-drug PEP
moderate	Start 2-drug PEP	Start 3-drug PEP	Usually no PEP or consider 2-drug PEP
severe	Start 3-drug PEP	Start 3-drug PEP	Usually no PEP or consider 2-drug PEP

- HIV testing of the source patient should not delay the decision about whether or not to start PEP.
- Start 2-drugs first if required, then send for consultation or refer.
- In the case of a high risk exposure from a source patient who has been exposed to or is taking antiretroviral medications, consult an expert to choose the PEP regimen, as the risk of drug resistance is high.
- Refer/consult expert physician. Start 2 drug regimens first.

PEP must be initiated as soon as possible, preferably within 2 hours

4.3 Initiate HIV chemoprophylaxis

- Because post-exposure prophylaxis (PEP) has its greatest effect if begun within 2 hours of exposure, it is essential to act immediately. There is little benefit if >72 hours later. The prophylaxis needs to be continued for 4 weeks.
- Report exposure immediately to appropriate authority.
- Never delay start of therapy due to debate over regimen. Begin with basic 2-drug regimen, and once expert advice is obtained, change as required.
- The 3rd drug can be added after consultation with an expert.

Table 54: Dosages of the drugs for PEP		
Medication	**2-drug regimen**	**3-drug regimen**
Zidovudine (AZT)	300 mg twice a day	300 mg twice a day
Stavudine (d4T)	30 mg twice a day	30 mg twice a day
Lamivudine (3TC)	150 mg twice a day	150 mg twice a day
Protease Inhibitors		1st choice : Lopinavir/ritonavir (LPV/r) 400/100 mg twice a day or 800/200 mg once daily with meals 2nd choice : Nelfinavir (NLF) 1250 mg twice a day or 750 mg three times a day with empty stomach 3rd choice : Indinavir (IND) 800 mg every 8 hours and drink 8–10 glasses (≥ 1.5 litres) of water daily
Note: If protease inhibitor is not available and the 3rd drug is indicated, one can consider using Efavirenz (EFV 600 mg once daily). Monitoring should be instituted for side effects of this drug eg CNS toxicity such as nightmares, insomnia etc. * Fixed Dose Combination (FDC) are preferred, if available. Ritonavir requires refrigeration.		

Table 55: PEP regimens to be prescribed by health centers		
	Preferred	**Alternative**
2-drug regimen (basic PEP regimen)	**1st choice:** Zidovudine (AZT) + Lamivudine (3TC)	**2nd choice:** Stavudine (d4T) + Lamivudine (3TC)
3-drug regimen (expanded PEP regimen) - consult expert opinion for starting 3rd drug eg LPV/r, NLF or IND		
Not recommended	ddI + d4T combination NNRTI such as Nevirapine should not be used in PEP	
More information on alternative schedules is available in the latest update USPHS guidelines issued 30 September 2005. (http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5409a1.htm) or www.who.int		

4.4 Selection of the PEP regimen when the source patient is known to be on ART: The physician should consider the comparative risk represented by the exposure and information about the exposure source, including history of and response to antiretroviral therapy based on clinical response, CD4 cell counts, viral load measurements (if available), and current disease stage (WHO clinical staging and history). When the source person's virus is known or suspected to be resistant to one or more of the drugs considered for the PEP regimen, the selection of drugs to which the source person's virus is unlikely to be resistant is recommended. Refer for bexpert opinion.

4.5 If this information is not immediately available, **initiation of PEP, if indicated, should not be delayed. Give the 2 drug (basic) regimen.** Changes in the PEP regimen can be made after PEP has been started, as appropriate. Re-evaluation of the exposed person should be considered within 72 hours post-exposure, especially as additional information about the exposure or source person becomes available.

4.6 Antiretroviral drugs during pregnancy

If the exposed person is pregnant, the evaluation of risk of infection and need for PEP should be approached as with any other person who has had an HIV exposure. However, the decision to use any antiretroviral drug during pregnancy should involve discussion between the woman and her health-care provider (s) regarding the potential benefits and risks to her and her fetus. Data regarding the potential effects of antiretroviral drugs on the developing fetus or neonate are limited. There is a clear contraindication for Efavirenz (first 3 months of pregnancy) and Indinavir (pre natal). In conclusion, for a female HCP considering PEP, a **pregnancy test** is recommended if there is any chance that she may be pregnant. Pregnant HCP are recommended to begin the basic 2-drug regimen, and if a third drug is needed, Nelfinavir is the drug of choice.

4.7 Side-effects and adherence to PEP

Studies of HCP taking PEP have reported more side effects than PLHAs taking ART, most commonly nausea and fatigue. Possible side-effects occur mainly at the beginning of the treatment and include nausea, diarrhea, muscular pain and headache. The person taking the treatment should be informed that these may occur and **should be dissuaded from stopping the treatment** as most side-effects are mild and transient, though possibly uncomfortable. Anemia and/or leucopenia and/or thrombocytopenia may occur during the month of treatment. A complete blood count and liver function tests (transaminases) may be performed at the beginning of treatment (as baseline) and after 4 weeks. In practice and from HCP studies, many HCP did not complete the full course of PEP because of side effects. Side effects can be reduced by prescribing regimens that do not include a protease inhibitor (PI), by giving medications to reduce nausea and gastritis and by educating clients about how to reduce side effects eg. taking PEP medications with food. It is important that side effects should be explained before initiating PEP so that the symptoms are not confused with symptoms of sero conversion to HIV. Adherence information is essential with psychological support. More than 95% adherence is important in order to maximize the efficacy of the medication in PEP.

4.8 Amount of medication to dispense for PEP:

- All clients starting on PEP must take 4 weeks (28 days) of medication.
- In all cases, the **first dose of PEP** should be offered as soon as possible, once the decision to give PEP is made.
- HIV testing or results of the source HIV test can come later.
- As usage of PEP drugs is not frequent and the shelf life is 1 to 1.5 years, it is proposed that **starter packs for 7 days** can be put in the emergency department with instructions to go to a designated clinic/officer within 1–3 days for a complete risk assessment, HIV counseling and testing and dispensing of the rest of the medications and management.

- At least 3 such kits are provided in the casualty department.

Step 5: Laboratory Evaluation

The reason for HIV testing soon after an occupational exposure is to establish a "baseline" against which to compare future test results.

- If the HCP is HIV-negative at the baseline test, it is in principle possible to prove that subsequent infection identified by follow-up testing is related to the occupational exposure (Depending on the timing of infection and consideration of other risks or exposures).
- When offered HIV testing, the exposed person should receive standard pre-test counseling according to the national HIV testing and counseling guidelines, and should give informed consent for testing.
- Confidentiality of the test result must be ensured. There are different reasons for possibly delaying HIV testing: the HCP may be unable to give informed consent immediately after the exposure due to anxiety, the exposure occurs outside working hours or in settings where HIV testing is not readily available.
- The HIV test may be done up to several days after the exposure, based on informed consent and with pre- and post-test counseling and ensuring confidentiality.

Do not delay PEP if HIV testing is not available.

Step 6: Follow-up of an Exposed Person

Whether or not PEP prophylaxis has been started, follow up is indicated to monitor for possible infections and provide psychological support.

6.1 Clinical follow-up

- In addition, in the weeks following an AEB, the exposed person must be monitored for the eventual appearance of signs indicating an HIV seroconversion: acute fever, generalized lymphadenopathy, cutaneous eruption, pharyngitis, non-specific flu symptoms and ulcers of the mouth or genital area.
- These symptoms appear in 50%-70% of individuals with an HIV primary (acute) infection and almost always within 3 to 6 weeks after exposure. When a primary (acute) infection is suspected, referral to an ART centre or for expert opinion should be arranged rapidly.
- An exposed person should be advised to use precautions (e.g., avoid blood or tissue donations, breastfeeding, unprotected sexual relations or pregnancy) to prevent secondary transmission, especially during the first 6–12 weeks following exposure. Condom use is essential.

- Adherence and side effect counseling should be provided and reinforced at every follow-up visit. Psychological support and mental health counseling is often required.

6.2 Laboratory follow-up

- Follow-up HIV testing: exposed persons should have post-PEP HIV tests. Testing at the completion of PEP may give an initial indication of sero-conversion outcome if the available antibody test is very sensitive.
- However, testing at 4–6 weeks may not be enough as *use of PEP may prolong the time to seroconversion;* and there is not enough time to diagnose all persons who seroconvert.
- Therefore, testing at 3 months and again at 6 months is recommended.
- Very few cases of seroconversion after 6 months have been reported. Hence, no further testing is recommended if the HIV test at 6 months is negative.

Table 59: Recommended follow-up laboratory tests

Timing	In persons taking PEP (standard regimen)	In persons not taking PEP
Weeks 2 and 4	Transaminases* Complete blood count §	Clinical monitoring for hepatitis
Week 6	HIV-Ab	HIV-Ab
Month 3	HIV-Ab, anti-HCV, HBsAg Transaminases*	HIV-Ab, anti-HCV, HBsAg
Month 6	HIV-Ab, anti-HCV, HBsAg Transaminases*	HIV-Ab, anti-HCV, HBsAg

* *Transaminases should be checked at week 2 and 4 to detect hepatitis in case the exposed person contracted HBV from the AEB.*
§ *For persons started on AZT-containing PEP regimens*

Table 59: Drug stock at the healthcare facility		
Level of health care facility	**Designated person/team in charge of PEP**	**Minimum drug stock of PEP exposure-response kits***
Tertiary hospitals and medical colleges	**Team:** Infection control officer, Physician, Casualty officer Where ART centers are within the same institution, the ART nodal officer should be the reference person for PEP	3 kits of 7 days supply ie. FDC (AZT/3TC) 2 tabs/day x 7 days x 3 kits = 42 tabs If ART centre available, to link for supply and referrals
Secondary –district, taluk	**Team:** infection control officer, casualty officer The district/taluk physician (internal medicine) should be the reference person for PEP	3 kits of 5 days supply Ie. FDC (AZT/3TC) 2 tabs/day x 5 days x 3 kits = 30 tabs If ART centre available, to link for supply and referrals
Primary – CHC	The medical officer of the CHC is the reference person for PEP	2 kits of 3 days supply. Ie FDC (AZT/3TC) 2 tabs/day x 3 days x 2 kits = 12 tabs
Primary Health centers (PHC)	The PHC medical officer is in-charge of referring for PEP to CHC or district level	Link to CHC or district level for PEP
* PEP kit comprises of the 2 drug regimen: AZT (300mg) + 3TC (150mg) as a fixed dose combination		

Co- Trimaxazole Prophylactic Therapy- NACO Guidelines

For HIV Exposed Children:

Cotrimoxazole Prophylaxis (CPT) is now considered standard of care for HIV. Co-Trimoxazole prophylaxis protects the infant from PCP, toxoplasmosis and other bacterial diseases. It is the standard component of HIV care to reduce the morbidity and mortality of children less than five years of age. Children with a history of severe adverse reaction (grade 4 reaction) to CTX or other sulfa drugs and children with G6PD (glucose-6-phosphate dehydrogenase deficiency) should not be prescribed CTX. The alternative drug is dapsone 2 mg/kg once daily, if available. Some children cannot tolerate both, in this case, there are no other alternatives.

2.1 Who should receive cotrimoxazole prophylaxis

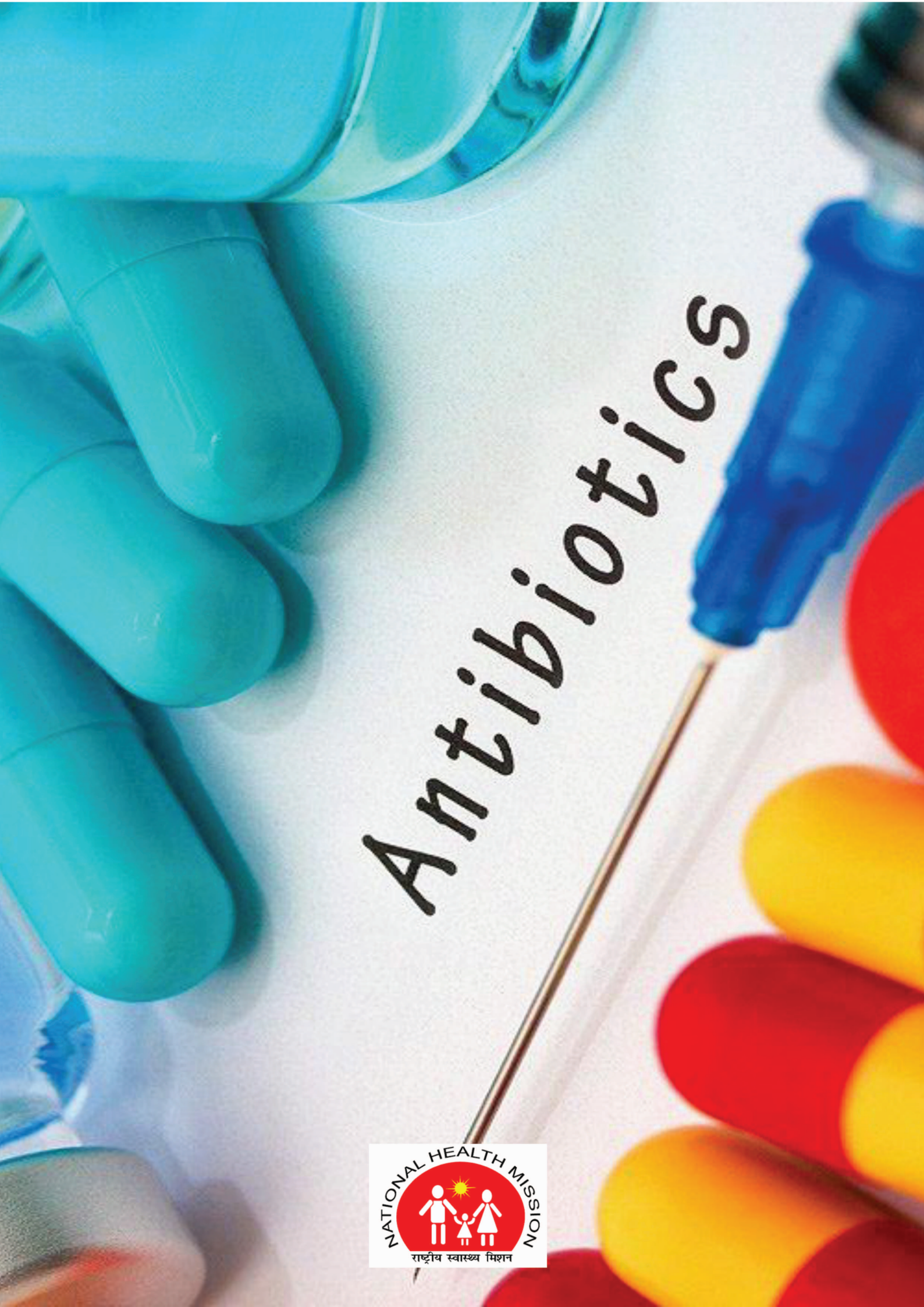
Table 2: Indications for CTX prophylaxis	
Group	**Give cotrimoxazole**
All HIV-exposed infants	• from 4–6 weeks of age (or at first encounter with health services) until HIV infection can be excluded.
All HIV-infected infants < 1 year of age	• irrespective of symptoms or CD4 counts
All HIV-infected children between 1 and 5 years of age	• WHO stage 2,3 and 4 or CD4 < 25 %
All symptomatic HIV-infected children > 5 years of age	• WHO Stage 2, 3 and 4 if CD4 counts not available *or* • WHO Stage 3 and 4 irrespective of CD4 *or* • CD4 < 350 cells/mm3 irrespective of WHO staging
As secondary prophylaxis	• After initial treatment for PCP – < 5 years old: do not stop – > 5 years old: may consider stopping as per Table 3 below.

2.2 How long cotrimoxazole should be given

Table 3: How long cotrimoxazole should be given : discontinuing CTX	
Group	**Discontinue CTX when-**
HIV-exposed children	Give CTX until HIV infection has been ruled out and the mother is no longer breast-feeding.
Infants and children living with HIV < 5 years	Maintain on CTX prophylaxis until age 5 years irrespective of clinical and immune response
HIV-infected children on ART and > 5 years old	CTX can be stopped only when clinical or immunological indicators confirm restoration of the immune system for more than 6 months i.e. in a child > 5 years of age with a CD4 count of > 350 cell/mm3 on two occasions not less than 3 months apart (as per adult guidelines).

All HIV-exposed infants should get CTX prophylaxis from age of 4–6 weeks.

Dose and schedule: 5mg/kg body weight of trimethoprime per day single dose till the HIV status of child is confirmed.


Antibiotics
NATIONAL HEALTH MISSION
राष्ट्रीय स्वास्थ्य मिशन