LOK NAYAK HOSPITAL
NEW DELHI

MANUAL OF
INFECTION PREVENTION AND CONTROL

2016

Version 2.0

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Images are for representation only.
Valuable inputs, comments, suggestions can be sent to hicclnh@gmail.com

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Amendment Sheet

S.No	Date of Amendment	Amendment made	Reason of Amendment made	Sign of ICO
1.	17/08/2016	To frame antibiotic policy for the hospital has been added in the "purpose"	As a step towards optimizing antimicrobial therapy	
2.	17/08/2016	"Objectives" of the Infection control program has been revised	To improve the scope of the program as per scope of services provided by the hospital	
3.	17/08/2016	Terms of reference of HICC has been added	To define the scope of activities carried out by HICC	
4.	17/08/2016	List of committee members revised	For an effective implementation and monitoring of Hospital infection control practices	
5.	17/08/2016	Incharges of all high risk areas included as committee members	To strengthen the implementation of infection control processes in high risk areas	
6.	17/08/2016	Nursing sister incharges have been included as committee members	For an effective implementation and monitoring of Hospital infection control practices	
7.	17/08/2016	List of notifiable/reportable diseases has been added	For better regulatory compliance	
8.	17/08/2016	List of alert organisms and alert conditions has been added	To implement effective infection control practices for such organisms and conditions	
9.	17/08/2016	Surveillance activities for high risk areas have been updated.	To facilitate effective implementation and monitoring.	
10.	17/08/2016	Policy of monitoring of efficacy of disinfectants added.	To monitor efficacy of disinfection by glutaraldehyde	
11.	17/08/2016	Elaborated the surveillance activities.	Further detailing of surveillance activities has been done to facilitate effective implementation and monitoring.	
12.	17/08/2016	CSSD process has been re-defined. Recall policy for CSSD has been added	To make the process more clear	
13.	17/08/2016	Infection control procedures	To make the process	

		and practices has been elaborated	more clear	
14.	17/08/2016	Respiratory hygiene and cough etiquettes has been added	To implement effective infection control practices against respiratory diseases and control from spreading	
15.	17/08/2016	Hand hygiene policy elaborated with the inclusion of surveillance of hand hygiene compliance	To make the process more clear and to facilitate effective implementation and monitoring.	
16.	17/08/2016	Safe injection practices and safe drug administration has been added	To aware HCW about the safe injection practices.	
17.	17/08/2016	Management of sharps disposal, injuries and PEP has been elaborated	To make the process more clear	
18.	17/08/2016	Isolation policy and list of diseases which need isolation has been included	To facilitate effective infection control practices to contain transmission of infection within hospital	
19.	17/08/2016	Steam sterilization process has been defined and various levels of monitoring of such processes.	To meet sterilization standards as per national and international guidelines/ requirements has been added.	
20.	17/08/2016	ETO process and monitoring	For improved employee safety and to meet sterilization standards as per national and international guidelines/ requirements have been added.	
21.	17/08/2016	Method of instrument cleaning and endoscopes reprocessing has been added	To make the sterilization process more effective	
22.	17/08/2016	Added new list of disinfectants and their role in several departments	To implement and promote rational and appropriate use of disinfectants	
23.	17/08/2016	Chapter on care of systems and indwelling devices has been added	To promote infection prevention practices and to reduce device associated hospital acquired infection	
24.	17/08/2016	Added chapter on special care units	To implement good infection control practices in high risk areas	
25.	17/08/2016	Visitors policy in emergency services	To minimize risk of HCAI among patients, staff and	

			visitors	
26.	17/08/2016	Chapter on Food safety has been added	To make the process more clear	
27.	17/08/2016	Elaboration of methods for laundry and linen management	To ensure linen handling at all levels in safe manner	
28.	17/08/2016	Multidose vial policy has been added	To promote safe injection practices	
29.	17/08/2016	Antimicrobial Stewardship Programme is included	For rational use of antibiotics	
30.	17/08/2016	BMW policy has been included	As per revised management rules March 2016	
31.	17/08/2016	Case definitions used for diagnosis of HACIs	To make HCW aware about the definitions	
32.	17/08/2016	List of appendices added: HIC indicators, Housekeeping checklist, Daily round checklist, List of disinfectants, Dialysis checklist, NSI form		

ACRONYMS

ABUTI – Asymptomatic bacteremic urinary tract infection
AE – Assistant engineer
AEB – Accidental reporting to blood
AIDS – Acquired immune deficiency syndrome
AMT - Antibiotic Management Team
ANS – Assistant Nursing Superintendent
ART – Anti retroviral therapy
ASP – Antimicrobial stewardship program
AUR - Antibiotic usage and resistance monitoring
BL-BLI – Beta lactam-beta lactamase inhibitor
BMW – Bio-medical waste management
CA-UTI – Catheter associated urinary tract infections
CBWTF – Common bio-medical waste treatment facility
CCDC – Consultant for communicable disease control
CCU – Critical care unit
CDC – Centre for disease control and prevention
CLABSI – Central line associated blood stream infection
CRBSI – Catheter related blood stream infection
CSSD - Central sterile services department
DAI – Device associated infection
DDD - Defined Daily Dose
DG – Diesel generator
DGHS – Directorate general of health services
DNS – Deputy nursing superintendent
DPCC – Delhi pollution control committee
DTC - Drug and Therapeutics Committee
EC – Exposure code
EPA – Environment protection act
ESBL – Extended spectrum beta lactamase
ETO – Ethylene oxide
ETP – Effluent treatment plant
GOI – Government of India
HA-BSI - Hospital acquired blood stream infection
HBV – Hepatitis B virus
HCAI – Healthcare associated infection
HCV – Hepatitis C virus
HCW – Health care worker
HD – Haemdialysis
HDU – High dependency unit
HEPA – High efficiency particulate
HIC – Hospital infection control
HICC - Hospital infection control committee
HICPAC - Healthcare Infection Control Practices Advisory Committee
HIV – Human immunodeficiency virus
HLD – High level disinfectant
HMEF – Heat and moisture exchanging filter
ICD – International classification of disease
ICN – Infection control nurse
ICO – Infection control officer
ICT – Infection control team
ID – Infectious disease
IM – Intramuscular
IPD – In-patient department
IV - Intravenous
JE – Junior engineer
LCBSI – Laboratory confirmed blood stream infection
MBL – Metallo-betalactamase
MDR – Multidrug resistant
MDRO - Multidrug resistant organism
MRSA – Methicillin resistant Staphylococcus aureus
MSSA – Methicillin sensitive Staphylococcus aureus
MTP – Medical termination of pregnancy
NACO – National AIDS control organisation
NHSN – National healthcare surveillance network
NICU – Neonatal intensive care unit
NS – Nursing superintendent
OPA - Orthophthaldehyde
OPAT - Out Patient Parenteral Antibiotic Therapy
OPD – Out-patient department
OR – Operating room
OT – Operation theatre
PEP – Post exposure prophylaxis
PICU – Paediatric intensive care unit
PO – Per oral
PPE – Personal protective equipment
PWD – Public work department
RCU – Respiratory care unit
RO – Reverse osmosis
SC – Source code
SSI – Surgical site infection
SUTI – Symptomatic urinary tract infection
VAP – Ventilator associated pneumonia
VRE – Vancomycin resistant enterococcus
VRSA – Vancomycin resistant *Staphylococcus aureus*
WHO – World health organisation

1. INTRODUCTION

1.1 Infections which arise in healthcare are termed Healthcare associated infection (HAI). HAIs are 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.

1.2 Lok Nayak Hospital recognizes the control of hospital associated infections (HAI) as an essential part of patient care. The Hospital is committed to fulfilling its responsibility by ensuring that proper safeguards are instituted to identify and prevent HAI. All aspects of hospital functions are included in this activity.

1.3 Infection Control includes the prevention and management of HAIs through the application of research based knowledge to practices that include: standard precautions, decontamination, waste management, surveillance and audit.

1.4 The overall aim of this document is to provide evidence based information in the prevention and control of infection at Lok Nayak Hospital. To fulfill this aim hospital infection control committee has been formed that looks after the infection control needs of Lok Nayak Hospital. It is relevant to all staff including doctors,nurses, other clinical professionals and managers working at Lok Nayak Hospital to help to fulfill their legal and professional obligations with regard to both communicable diseases and infection control.

1.5 This document will be reviewed and updated by the HICC of Lok Nayak Hospital yearly.

2. ORGANIZATION OF INFECTION PREVENTION AND CONTROL PROGRAM

Lok Nayak Hospital recognizes the prevention and control of hospital associated infections (HAI) as an important issue and is committed to fulfilling its responsibility by ensuring that proper safeguards are instituted to identify and prevent HAI. All aspects of hospital function are included in this activity.

2.1 Purpose

- To establish standards in prevention, control measures and minimize HAIs in patients, staff and visitors.
- To define policies and procedures for implementing and monitoring of HAIs at Lok Nayak Hospital.
- To establish antibiotic stewardship program with at least yearly updation of evidence based antibiotic policy with monitoring of its adherence by the prescribing authorities and monitoring antibiotic utilisation in various areas of Lok Nayak Hospital.

2.2 Components of the Lok Nayak Hospital Infection Prevention and Control Program

1. Establishing and regular updating of hospital infection control manual
2. Minimizing HAIs through continuous monitoring of healthcare associated infections
3. Surveillance
    - **a.** Laboratory based surveillance of HAIs
    - **b.** Ward based surveillance of HAIs
    - **c.** Surveillance and regular feedback of device associated infections
    - **d.** Surveillance and regular feedback of surgical site infections
4. Improvement of hand hygiene compliance
5. Investigation and control of outbreaks
6. Monitoring of emergence of antimicrobial resistance
7. To recommend antibiotic policy for Lok Nayak Hospital based on local antibiograms and evidence based published national/international guidelines.
8. Identify areas if irrational use of antibiotics and curb irrational use of antibiotics in hospital areas
9. Identification of high risk areas and establish steps to mitigate risk of HAIs to patients, staff and visitors
10. Establish sterilization and disinfection protocols and establish mechanisms to monitor the same.
11. Monitoring of staff health to prevent, staff to patient and patient to staff spread of infection.
12. Monitoring and promotion of bio-medical waste management as per government regulations
13. Training of staff in prevention and control of HAI.

2.3 Objectives and Terms of Reference

2.3.1 Objectives of the program

i. To minimize healthcare associated infections among patients, staff and visitors
ii. To establish antimicrobial stewardship program and promote rational use of antimicrobials
iii. To provide education and training to healthcare workers, patients and visitors regarding policies and procedures to minimise healthcare associated infections

2.3.2 Terms of reference of HICC

i. To develop a documented healthcare associated infections prevention and control program and review it atleast annually.
ii. To identify and reduce risks of healthcare associated infections among patient, staff and visitors and implement risk mitigation strategies for the same
iii. To meet and monitor all statutory requirement related to healthcare associated infections asked by various government authorities from time to time
iv. To perform surveillance activities to capture and monitor infection prevention and control data
v. To take action to prevent and control healthcare associated infections in patient, visitors and healthcare workers
vi. To ensure adequate and appropriate resources for prevention and control of healthcare associated infections
vii. To identify and take appropriate action to control outbreaks of infection in the hospital
viii. To document policies and procedures and sterilization activities and ensure its implementation and monitoring
ix. To ensure appropriate and safe handling of Biomedical waste management in hospital premises
x. To plan, support and implement regular training of healthcare regarding infection control and prevention
xi. Prepare the programon the proper use of antibiotics, develop antibiotic policies and recommend remedial measures when antibiotic resistant strains are detected.
xii. Ensure that the data generated through surveillance activities is reviewed at least monthly by the HICC and generate action points based on data, hospital and community needs.

2.4 Constitution of Hospital Infection Control Committee (HICC)

2.4.1 HICC Members

Atleast following members shall be part of the program*:

S. No	Designation /Departments	Name	Commttee Organisation
1	Medical Director	DR. J. C. PASSEY	Chairperson
2	Prof. & HOD Microbiology (MAMC)	DR. C.P. BAVEJA	Vice Chairperson
3	Asst. Prof Microbiology	DR. VIKAS MANCHANDA	Infection Control Oficer
4	Addl. M.S NABH	DR.S.D SHARMA	Member

5	Prof & HOD Neonatology	DR. S.RAMJI	Member
6	Prof & HOD Surgery	DR. S.K.TUDDU	Member
7	Prof & HOD Gynae/Obs	DR. SUDHA PRASAD	Member
8	Prof & HOD Anesthesia	DR. U.C VERMA	Member
9	Prof & HOD Orthopedics	DR. A.K DHAL	Member
10	Prof & HOD ENT	DR. J.C PASSEY	Member
11	C.C.M.O Causality	DR.RITU SAXENA	Member
12	M.O.I/C CSSD & OT Complex	DR. PAWANINDERA LAL	Member
13	I /C ICU	DR. ANIL MISHRA	Member
14	I /C CCU	DR. M.K. DAGA	Member
15	I /C RCU	DR. D.P BADHURIA	Member
16	I /C PICU	DR. U.JHAMB	Member
17	I /C Nursery Referral	DR. N.B.MATHUR	Member
18	I /C Dialysis Unit	DR. RAJIV KHOLI	Member
19	Incharge Nursing Services (D.N.S)	MRS. SANDAL VATS	Member
20	D.N.S Emergency Block	MRS. BIMLESH KAIN	Member
21	D.N.S Gynae Block	MRS. VEENA SINGH	Member
22	D.N.S Ortho / OT Block	MRS. RAMPYARI MEHRA	Member
23	D.N.S Surgery /OPD Block	MRS. HIRAMANI LUGUN	Member
24	D.N.S Paeds Block	MRS. PUSPA MINZ	Member
25	D.N.S Medicine Block	MRS. CECILIA KUJUR	Member
26	A.N.S (HICC)	MRS. R.E.LEPCHA	Member
27	Sister Incharge ICU	MRS. RUPA SINGH	Member
28	Sister Incharge RCU/CCU	MRS.KUNJU MOL	Member
29	Sister Incharge NICU /Ward 16	MRS.TRIPTA GIRDHAR	Member
30	Sister Incharge PICU	MRS MARRY BABU	Member
31	Sister Incharge Nursery	MRS. KHOLE KHANNE	Member
32	Sister Incharge Dialysis	MRS. POONAM	Member
33	Infection Control Nurses	ALL ICNS	Members
34	S.R Microbiology L.N.H	-	Infection Control SR
35	Occupational Epidemiologist	DR. SUNIL KUMAR	Secretary
	Co –Opted Members		
1	Addl. M.S Procurement	DR ASHOK KUMAR MITTAL	Member
2	Addl. M.S Out Sourced Services	DR. SATISH KR.SHARMA	Member
3	Addl. M.S Sanitation & Bmw	DR. S.S GAMBHIR	Member
4	Prof & HOD Pediatric Medicine	DR. SANGEETA YADAV	Member
5	Prof & HOD Medicine	DR. N.GUPTA	Member
6	Hod Blood Bank /B.T.O	DR. SUNITA MEENA	Member
7	M.O I/C PWD	DR. DHEERAJ KUMAR	Member
8	M.O I/C Laundry /Linen Stores / Gen Store	DR. VINITA JAISWAL	Member
9	D M S OPD	DR. VIKAS RAMPAL	Member
10	M.O I/C Stationary Store/Kitchen	DR.SANGEETA BHASIN	Member
11	M.O I/C (MRD) Nodal Officer Vector Borne Disease	DR. SUDHA RANI	Member

Hospital attempts to maintain 18 infection control nurses in Lok Nayak Hospital.

2.4.2 Meetings of HICC

i. The infection control committee meets at least monthly or more frequently as necessary. Documentation of meetings and recommendations are kept by the secretary.

ii. Minimum Quorum required: Chairperson, Infection Control Team [ICO and ICNs (atleast 50%)] and 50% of other members.
iii. The ICN (Infection Control Nurse) conduct rounds and report the findings to the ICO on daily basis. Registers are maintained by ICNs.

2.4.3 Hospital Infection control team (ICT)

The infection control team (at the minimum) consists of:

1. Microbiologist (Infection control officer)
    1. Dr Vikas Manchanda, 9968604387
    2. Dr Rohit Chawla, 9968604393, (Link, Infection control officer)
2. Infection Control Nurses (18 ICNs)
    1. Mr. Rajesh Kumar Saini 9868552836 (ICN coordinator)
    2. Minimol Joy 9873689561

2.4.3.1 Responsibilities of the Infection Control Team

i. Advise staff on all aspects of infection control and maintain a safe environment for patients and staff.
ii. Advise management of at risk patients.
iii. Carry out targeted surveillance of healthcare associated infections and act upon data obtained e.g. investigates clusters of infection above expected levels.
iv. Recommend antibiotic policy for different areas of the hospital.
v. Provide a manual of policies and procedures for aseptic, isolation and antiseptic techniques.
vi. Investigate outbreaks of infection and take corrective measures.
vii. Provide relevant information on infection problems to management.
viii. Assist in induction training of all new employees as to the importance of infection control and the relevant policies and procedures.
ix. Have written procedures for maintenance of cleanliness.
x. Surveillance of infection, data analyses, and implementation of corrective steps. This is based on reviews of lab reports, reports from nursing in charge etc.
xi. Surveillance of Biomedical Waste managementactivities
xii. Supervision of isolation procedures.
xiii. Monitors employee health programme.
xiv. Addresses all requirements of infection control and employee health as specified by Central laws, State laws and NABH.

2.4.4 Infection Control Nurse (ICN)

The duties of the ICN are primarily associated with ensuring the practice of infection control measures by healthcare workers. Thus the ICN is the link between the HICC and the wards/ICUs etc. in identifying problems and implementing solutions.

2.4.4.1 Duties of infection Control Nurse includes:

i. The ICN conducts Infection controlrounds daily and maintains the registers.
ii. The ICN is involved in education of practices minimising healtcare associated infections and hand hygiene among Healthcare workers.

iii. Maintains registers and data of Sharps/Needle stick injuries and Post–exposure prophylaxis.
iv. Initiates and ensure proper immunization for Hepatitis B Virus Immunoglobulin and HBsAg vaccine, in consultation with microbiologist (Member HICC) in case of suspected exposure to any hospital worker.
v. Ensures that all positive culture cases are been tracked and for each positive culture from inpatient unit a hospital infection information sheet or surgical site infection Sheet is filled and keep record for each positive culture case. All probable cases of healthcare associated infections and anomalous/irrational use of antibiotics must be discussed in HICC meetings.
vi. Track the indicators of infection control and present the data to the HICC meetings on regular basis.
vii. Conducts special tasks given to him/her as per components and objectives of the hospital infection prevention and control.

2.4.4.2 Selection of ICNs

ICNs can be selected through following process:-

i. Any staff nurse can volunteer to enrol for ICN provisionally.
ii. Nominated nursing staff can be enrolled for ICN provisionally.
iii. All staff nurses have to undergo written exam provided by surveillance and infection control division. Only staff nurses scoring more than 90% of marks shall be enrolled as ICN. Till the time provisional ICNs qualify the exam, they can work under supervision of qualified ICN. Provisional ICN shall not work independently or take independent rounds.

2.4.5 Infection Control Officer (ICO)

The microbiologist serves as Infection Control Officer. In the absence of a microbiologist, a trained physician or surgeon may serve as ICO.

2.4.5.1 Duties of Infection Control Officer:

i. The ICO supervises the surveillance of healthcare associated infections as well as preventive and control programs.
ii. Co-ordinate with the chairperson and HICC in planning infection control programme and measures.
iii. Keeps a track of any developing outbreaks.
iv. Participate, guides in research activities related to infection control practices and publish them.
v. Developing guidelines for appropriate collection, transport & handling of specimens.
vi. Ensuring laboratory practices meet appropriate standards.
vii. Ensuring safe laboratory practices to prevent infection in staff.
viii. Performing antimicrobial susceptibly testing following internationally recognized method & providing summary reports of prevalence of resistance.
ix. Monitoring sterilization, disinfection & the environment where necessary.

2.5 Review and Revision of Infection Control Manual

Written policies and procedures shall be reviewed at least in a year. Signature of chairperson HICC, Secretary HICC, NS and Infection Control Nurses shall be affixed on controlled copies. There shall be atleast five controlled copies that shall be distributed to the following: MS, ICO, ICN, NS and Hospital Library. All department shall have atleast one printed copy of the manual. Digital version should be available through hospital website to all.

3. SURVEILLANCE AND REPORTING OF HOSPITAL ACQUIRED INFECTIONS

3.1 Statutory Notifications

Infectious diseases, which are listed in section 3.1.2 whether confirmed or suspected, must be notified by the attending doctor to the Consultant for **Communicable Disease Control** (CCDC) who is MO/Ic MRD.

3.1.1 Prompt notification and reporting of disease is essential.

The objectives of notification are:

a. Regulatory obligation by Govt. of NCT of Delhi
b. To collect accurate and complete epidemiological information on the disease.
c. To ensure prompt and appropriate control measures to prevent the spread of infection.

i. Any doctor who considers that a patient is suffering from a notifiable/ reportable disease/ has a statutory duty to notify the Nodal officers (Medicine, Paediatrics and Dermatology).
ii. Nodal Officers should provide weekly data to ICN.
iii. ICN should monitor Infection control practices in wards for these diseases and should provide feedback to ICO, CCDC and nodal officer.

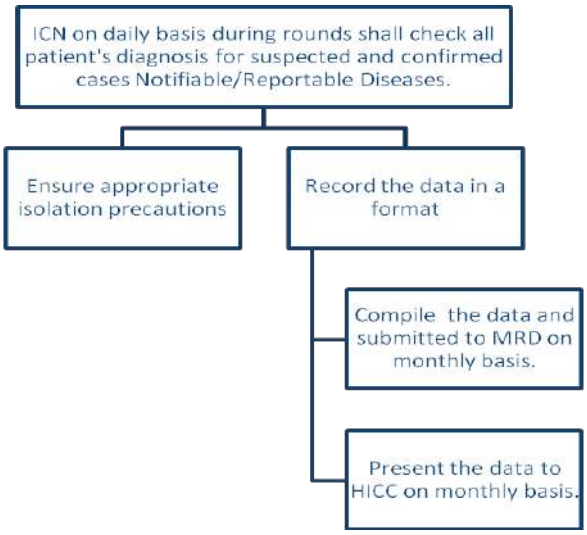
3.1.2 Notifiable/Reportable Diseases (ICD code)

i. Measles (B05)
ii. Cholera – (A00)
iii. Smallpox (B03)
iv. Plague (A20)
v. Diphtheria (A36)
vi. Dengue hemorrhagic fever/ Dengue (A90)
vii. Acute flaccid paralysis (G82.0)
viii. Swine flu
ix. Malaria (B54)
x. HIV/ AIDS (B24)

In case of an epidemic:

i. Acute gastroenteritis (A09)
ii. Viral hepatitis (B19)
iii. Meningococcemia (A39.2)
iv. Any other as notified by the relevant authorities

3.1.3 Procees of tracking of notifiable diseases



3.2 Healthcare associated Infection Surveillance

Surveillance of health care associated infections means recording and counting of infections arising in the hospital. It is done so that we know the extent of any problems that exist.

3.2.1 Aims

The main objectives of surveillance of hospital acquired infections are:

3.2.2 Objective of Surveillance

i. Establish endemic baseline rate.
ii. Reducing infection rates in the hospital.
iii. Identifying and containing the outbreaks.
iv. Evaluating and monitoring infection control measures.
v. Monitoring antimicrobial susceptibility patterns

Surveillance is part of the routine infection control programme. It helps to identify risks of infection and reinforces the need for good practices. Preventing outbreaks depends on prompt recognition of one or more infections with alert organisms and instituting special control measures to reduce the risk of spread of the organism. Collection of accurate data allows comparison with other units and measurement of response to changes in practice. All patients which are diagnosed with HAI are followed up till separation (discharge, death, LAMA, Abscond) for monitoring of ALOS, outcome of HAI .All bed side X-Rays of IPD are monitored on daily basis to detect hospital acquired pneumonia. Efforts will be made to contact all patient undergoing surgery at THE HOSPITAL. Telephonic follow up till the 90 days of surgery (if implant placed up to one year) are done to detect possible SSI.

3.2.3 Surveillance Policy describes following key points

1. Passive methods of surveillance
   a. Methods
   b. Action plan
   c. Response statement
2. Active methods of surveillance

3.2.3.1 Passive Surveillance

Passive surveillance shall be done laboratory based-ward surveillance in conjunction with "Alert organism/Alert condition" surveillance. The system is managed by the Infection Control Team and details are reported back to the Infection Control Committee.

3.2.3.1.1 Laboratory-Based Ward Liaison Surveillance (Alert Organisms).

All positive microbiology reports from in patient will be screened and may result in a case review, a search for other carriers or infected patients and ward visits by the Infection Control Nurse. Approximately 70% of infections and alert organisms can be detected in this way. A patient may be placed in source isolation if considered to be a source of infection to other patients.

3.2.3.1.2 Ward Based Surveillance(Alert Conditions)

Alert conditions are medical syndromes such as Acinetobacter bacteraemia or Pseudomonas pneumonia which immediately suspected healthcare associated infection. It is the responsibility of the ward staff to notify the infection control team if they suspect an infection which may be a risk to others. Appropriate specimens must be taken and sent promptly, properly labelled, to the laboratory. Source isolation precautions must be instituted immediately that infection is suspected.

3.2.3.2 Action Plan

When organism/s is/are detected by the laboratory based surveillance or ward based surveillance, microbiologist and the treating clinician will discuss the possibility of healthcare associated infections and action will be recorded in Hospital acquired infection assessment form. Every effort will be made to evaluate critically each and every positive culture report from the in-patient units including critical care areas. The record will be maintained by ICN and the data will be presented atleast once a month at HICC meeting to review the case critically for possible HAI infections and the feedback will be provided to the concerned unit head.

3.2.3.3 Response

Appropriate measures will be taken in case of suspected outbreak or sudden increase in rates of suspected healthcare associated infections. Control measures to prevent spread of infection and decrease the incidence of healthcare associated infections may be suggested in feedback report to the concern units. The report will be prepared atleast biannually and will be submitted to the unit heads. In case urgent intervention is required the response may be communicated more frequently.

Clinicians must tell the Infection Control Team about any Alert Condition/s.

List of ALERT ORGANISMS (suggestive list but NOT limited to)

BACTERIA

1. Methicillin-resistant *Staphylococcus aureus*
2. Other resistant *Staphylococcus aureus*
3. Penicillin-resistant *Streptococcus pneumoniae*
4. *Haemophilus influenzae*
5. *Legionella* spp.
6. Glycopeptide-resistant enterococci
7. *Neisseria meningitidis*.
8. Pan-resistant Gram negative bacilli
9. *Mycobacterium tuberculosis*

10. Any unusual bacteria

VIRUSES

1. Hepatitis B
2. Hepatitis C
3. HIV
4. Rotavirus
5. Small round structured virus (Norovirus)
6. Respiratory syncytial virus
7. Varicella zoster
8. Influenza virus
9. Parvovirus
10. Measles
11. Novel H1N1
12. Dengue

Examples of **ALERT CONDITIONS**

1. Post-surgical sepsis
2. Exanthemata (acute rash illness)
3. Chicken pox or shingles
4. Mumps, measles, rubella, parvovirus
5. Whooping cough
6. Poliomyelitis
7. Diphtheria
8. Meningococcal Meningitis
9. Hepatitis B and Hepatitis C Viral Infection)
10. Pyrexia of unknown origin
11. Typhoid and paratyphoid fevers
12. Viral haemorrhagic fever
13. Swine flu

3.2.4 Targeted surveillance

Detailed targeted surveillance in specific areas is performed. An example would be surgical site infection (SSI) surveillance. Results are feedback to HICC.

3.2.5 Active Surveillance of HAI

ICN collects positive culture reports from the microbiology. The ICN in consultation with ICO may proceed for investigation of HAI.

3.2.5.1 Active surveillance of High Risk Areas and other areas of significance.

High risk areas of the hospital are identified includes:

- Intensive care units (NICU, PICU, CCU/RCU, MSICU)
- Operation theatres (OT I, OT II, OT III, Urology OT, Burns and Plastic OT, Gynae OT, PPOT, Septic OT
- HDU
- Dialysis unit
- Kitchen
- CSSD
- Blood bank

- Drinking water facilities

I. OPERATION THEATRES

As per guidelines for Environmental Infection Control in health care facilities recommended by the Centers for Disease Control (CDC) and the Healthcare Infection Control Practices Advisory Committee (HICPAC), 2003, Microbial Sampling of Air and inanimate surfaces (i.e. Environmental Sampling including surface swabs) is not recommended.

The air quality testing shall be done only under following conditions:-

1. To support an investigation of an outbreak of disease or infections.
2. For the purpose of research.
3. After any major construction periods to qualitatively detect breaks in environmental infection-control measures.
4. Surprise air checks can be undertaken to monitor general OT discipline at least once in a month.
5. Fogging of OTs will be done on the basis of these reports and/or clinical out of procedures carried out in the operating areas (For details see chapter 7).
6. Records are kept with nursing incharge OT and the results must be produced in HICC meetings biannually or more frequently. In case of unacceptable results decision on corrective measures are taken by HICC.

Monitoring of disinfectants (Glutaraldehyde 2%): The efficacy of the Glutaraldehyde shall be tested by surprise check at least once in a month and records are to be kept with ICN. The data shall be presented in HICC meeting atleast once in 3 months.

II. INTENSIVE CARE UNITS

Surveillance samples to be taken when there is suspected outbreak or same isolate irrespective of their antibiotic sensitivity are isolated from 3 or more patients in defined time frame.

Surveillance clinical samples are sent per patient on basis of clinical data or microbiological reports. Any positive sample will be analyzed critically to detect healthcare associated infections. The data will be maintained by ICN and presented in subsequent HICC meeting.

Colonization swabs (nasal and rectal) will be collected from time to time to monitor anti-microbial resistance and multi drug resistant organism.

III. TRANSFUSION SERVICES UNIT

The blood samples from bags must be sent for culture periodically. Blood component FFP and platelets shall be screened for contamination, as and when required.The record will be maintained by blood bank officer and chairman/Secretary HICC must be updated about the data atleast once in a month and presented in HICC meetings.

IV. FOOD HANDLERS

Screening of food handlers is done biannually. Samples include nasal swabs (for MRSA Carriage), urine and stool samples (for typhoid carriage; ova/cyst examination in stool).

Records to be maintained by the dietician and ICN.

V. DRINKING WATER

Bacteriological surveillance is to be done at least once in 2 months in the microbiology laboratory for live bacterial contamination and once in six months in an accredited laboratory for detailed anaysis. Responsibility of sending the samples and records maintenance is of Dietary department. Copy of the ame must be send to infection control unit.

VI. CSSD

Cleaning protocols of CSSD:

Environmental surveillance is done monthly basis to check the Air quality of the sterile zone.

- Floor is mopped daily with soap and water.
- Fogging of sterile storage room may be done based on air surveillance reports or as per needs.
- Trolleys, shelves and tables are wiped with disinfectant every day.

Structure:-

The different Standard Operating Procedures in the CSSD are followed. CSSD has been divided into 3 zones. There should not be cris-crossing of processes within CSSD. The three zones are:

1. Protective zone
2. Clean zone
3. Sterile zone

1. **Protective Zone includes:-**
   i. Receiving Window (double door window to contain contamination).
   ii. Cleaning Area
   iii. Decontamination Area
2. **Clean Zone includes:-**
   i. Drying Area
   ii. Assembling and Packaging Area
   iii. Autoclaving Area/ ETO /Glas plasma Area
3. **Sterile Zone includes:-**
   i. Assembling and Packaging Area
   ii. Sterile storage room
   iii. Issuing window.

For further details please refere to chapter on Sterilisation and disinfection.

3. Protective Zone

i. **Receiving Area**: Items are brought to CSSD from respective wards, ICU's , O.T.'s & casualty by nursing orderly. The CSSD assistant receives them & checks the status of items.

ii. **Cleaning Area**: In this area all instruments are primarily cleaned and rinsed with plain water to remove visible particles.

iii. **Decontamination Area**: In this area soiled instruments including heat sensitive items like oxytubings, nebulisation chamber, airway etc. and other supplies are decontaminated with the help of glutraldehyde 2%, enzyme solution(s) 1% etc .

4. Clean zone

i. **Drying Area**: In this area all cleaned items are dried with the help of drying cabinet at a temperature of 45^0 C for 45 minutes.

ii. **Assembling & Packaging Area**:
Here all the instruments are assembled and packed for sterilization after cleaning & drying. Labels and autoclave indicator tapes are pasted on all the packs. Indicators used for various sterilisation methods are ensured to be in place.

iii. **Packing Area**: In this section Various types of dressings like gauge pieces; cotton pads and bandages etc. are also prepared in this area.

iv. **Autoclaving Area**: In this area sterilization process is carried out by autoclaves. Before that autoclave indicators are pasted on the packs. Then technician places the packs in the autoclave machine and starts the machine as per cycle of appropriate temperature and pressure recommended by the manufacturer for 30 minutes.

5. Sterile zone

i. **Sterile storage Area**: In this area sterile items are placed in racks after completion of autoclave before that adequacy of sterilization is confirmed by indicators.

ii. **Issuing Window**: All the sterile instruments and other supplies are distributed to concerned departments at a separate window after entry of allthe items in the appropriate issuing register.

3.2.6 Special Studies

Special studies will be conducted as needed. These may include:
The investigation of clusters of infections above expected levels.

a) The investigation of single cases of unusual or epidemiologically significant HA infections.
b) Prevalence and incidence studies, collection of routine or special data as needed and sampling of personnel or the environment as needed.

3.2.7 Surveillance of Hand Hygiene Compliance

i. Direct observations can be made by any of the infection control team members. This can usually be accomplished well through regular observations, especially at odd hours.

ii. Data for all categories of staff should be gathered including faculty, residents, nursing, ward boys and other health care workers involved in direct patient care.

iii. This should be followed by awareness drives and educational activities.

iv. Provision of accessible alcoholic rubs should preferably be made at each bedside.

v. Data generated should be presented in HICC meeting regularly.

4. INFECTION CONTROL PROCEDURES AND PRACTICES

Since it is impossible to identify some infectious patients (especially those infected with HIV, Hepatitis B or C) a system of standard precautions MUST be adopted in all health care work.

According to HICPAC and the CDC *Standard Precautions are a group of infection prevention practices that apply to all patients and residents, regardless of suspected or confirmed infection status, in any setting in which healthcare* is delivered and include:

1. Hand hygiene
2. Use of personal protective equipment (e.g., gloves, gowns, facemasks), depending on the anticipated exposure
3. Respiratory hygiene and cough etiquette
4. Management of spillage
5. Safe injection practices

4.1. Hand Hygiene

4.1.1 Purpose

Hand washing is **THE SINGLE** most important measure in reducing the spread of infection. Hands are the principle route of cross infection. The level of hand hygiene will be determined by the activity or area of practice.

4.1.2 Scope

All procedures that require hand hygiene should be done through appropriate hand hygiene.

4.1.3 Responsibilities

All hospital staff including Nurses, Doctors, O.T. Technicians, Lab Technicians, Nursing orderlies, food handlers and housekeeping staff.

4.1.4 When to wash hands

This is determined by actions – those completed and those about to be performed – social hand wash, aseptic /hygiene hand wash and surgical hand wash.

4.1.5 Routine washing (Social Hand Wash)

1. Before preparing, eating, drinking or handling food.
2. Before and after smoking.
3. After visiting the toilet.
4. Before starting work (remove jewellery, e.g. rings) and after leaving an occupational area.All jewellery and ornaments like bangles, watches, and rings must be removed before performing hand hygiene.
5. Before and after physical contact with each client in clinical situations, eg bathing, assisting to move, toileting.
6. After handling contaminated items such as dressings, bedpans, urinals, urine drainage bags and nappies.
7. Before putting on gloves and after removing them.
8. Before and after removing any protective clothing.
9. After blowing your nose, covering a sneeze.

10. Whenever hands become visibly soiled.
11. When hands are visibly soiled,
12. Before starting work,
13. Handling food and following patient contact.

4.1.6 The "My 5 Moments for Hand Hygiene" approach

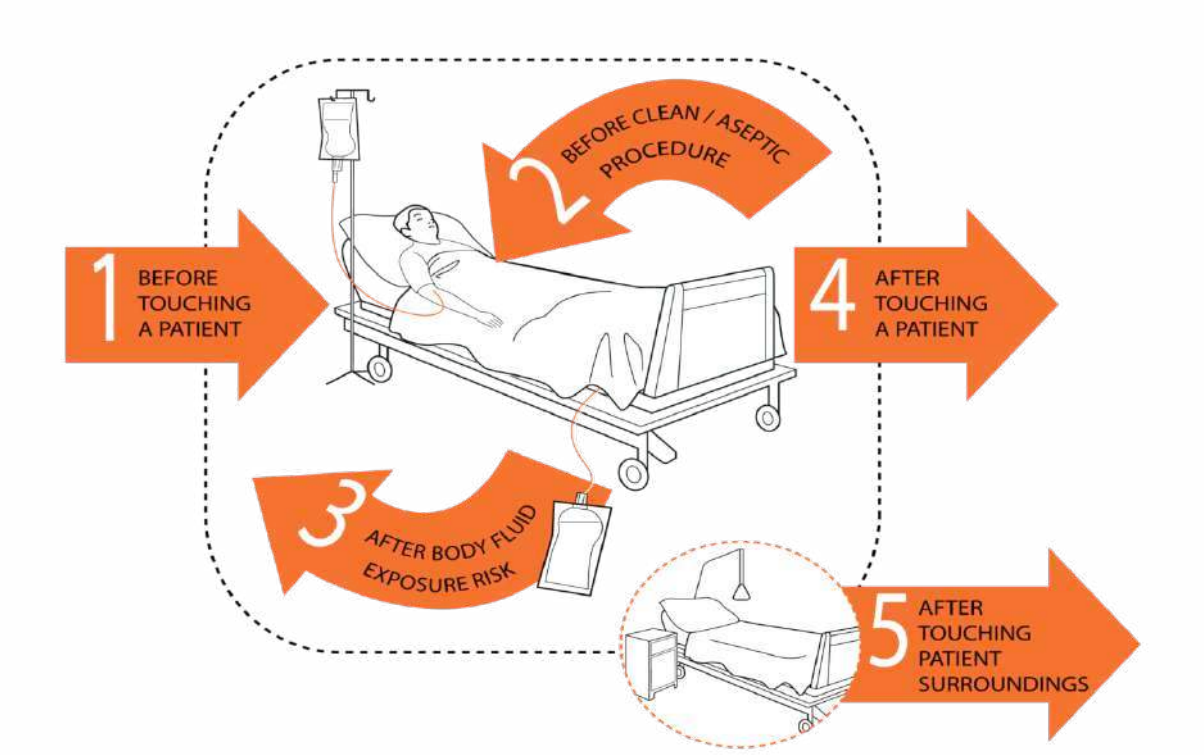


Fig 4.1: A World Alliance for Safer Healthcare. World Health Organization

1. Before touching a patient
2. Before clean/ aseptic procedure
3. After body fluid exposure risk
4. After touching a patient
5. After touching patient surroundings

4.1.7 Sequence of events

1. Wet hands under running water.
2. Dispense one dose of soap into cupped hand.
3. Hand wash for 40-60 seconds vigorously and thoroughly by following six step techniques, without adding more water. (See Figure 4.2)
4. Rinse hands thoroughly under running water.
5. Dry hands with single use brown paper.

4.1.8 Hand disinfection - Aseptic/hygiene hand wash

Hand disinfection with alcohol based hand rub (e.g., 70% alcohol, sterilium) preferably with chlorhexidine and alcohol are practice at least in following condition:

1. Whenever touching any patient esp. in inpatient units and critical care areas.
2. After handling any potentially infectious object
3. Before putting on gloves and after removing them.
4. Prior to invasive procedures
5. Visibly clean hands
6. In high dependency areas and after attending patients in isolation or with known transmissible condition.

Broken skin, cuts and abrasions in any area of exposed skin, particularly the hands and forearms, are covered with a waterproof dressing. Wear gloves if hands are extensively affected. Wrist watches/bracelets are removed.
Alcohol is an effective decontamination agent but should only be used on visibly clean hands. It is also a valuable agent for use, but should only be used 2-3 times consecutively before a hand wash as build up can occur.

- Dispense the required amount of solution onto the hands.
- Ensure solution covers all hand surfaces.
- Rub vigorously, using hand washing technique, until dry.

It is recommended that everyone involved in providing healthcare in the community must be trained in hand decontamination, the use of protective clothing and safe disposal of sharps, and this includes patients and healthcare personnel.

4.1.9 Hand Care

1. Keep nails clean and short.
2. Remove rings with stones or ridges.
3. Do not wear artificial or gel nails or nail polish.
4. When washing hands, wrist watches are removed.
5. Sleeves are rolled up to the elbow.
6. Nailbrushes should not be used for routine hand washing as they damage the skin and encourage shedding of cells.
7. Nailbrushes, where used, must be single use disposable or single use autoclaveable.

Gloves are worn before:

- Before inserting a central intravascular catheter.
- Before inserting indwelling urinary catheters, peripheral vascular catheters, or other invasive devices that do not require a surgical procedure.
- For cleaning up any spillage of body fluids.

The physical action of washing and rinsing hands under such circumstances is recommended because alcohols, chlorhexidine, iodophors, and other antiseptic agents have poor activity against spores.

4.1.10 Hand-hygiene Technique

When decontaminating hands with an alcohol-based hand rub

1. Apply product to palm of one hand and rub hands together,
2. Cover all surfaces of hands and fingers by six step technique, **until hands are dry**.

3. Follow the manufacturer's recommendations regarding the volume of product to use.

When washing hands with soap and water

1. Wet hands first with water
2. Apply an amount of product recommended by the manufacturer to hands
3. **Rub hands together vigorously for atleast 40-60 seconds**
4. Cover all surfaces of the hands and fingers by following six step technique
5. Rinse hands with water and,
6. Dry thoroughly with a **disposable towel/Paper**
7. **Use sterile paper towel to turn off the faucet or elbow taps if available**.

Fig 4.2. Steps of hand washing

4.1.11 Surgical hand preparation

The introduction of sterile gloves does not render surgical hand preparation unnecessary. Sterile gloves contribute to preventing surgical site contamination and reduce the risk of bloodborne pathogen transmission from patients to the surgical team. However, 18% (range: 5–82%) of gloves have tiny punctures after surgery, and more than 80% of cases go unnoticed by the surgeon. After two hours of surgery, 35% of all gloves demonstrate

puncture, thus allowing water (hence also body fluids) to penetrate the gloves without using pressure. Double gloving decreases the risk of puncture during surgery, but punctures are still observed in 4% of cases after the procedure.

Objectives of surgical hand preparation:

Surgical hand preparation should reduce the release of skin bacteria from the hands of the surgical team for the duration of the procedure in case of an unnoticed puncture of the surgical glove releasing bacteria to the open wound. In contrast to the hygienic handwash or handrub, surgical hand preparation must eliminate the transient and reduce the resident flora. It should also inhibit growth of bacteria under the gloved hand.

Steps before starting surgical hand preparation:

i. Keep nails short and pay attention to them when washing your hands – most microbes on hands come from beneath the fingernails.
ii. Do not wear artificial nails or nail polish.
iii. Remove all jewellery (rings, watches, bracelets) before entering the operating theatre.Jewellery is a hazard in theatres; wrist watches and jewellery of any kind (including dress rings and bangles) must not be worn. Wedding rings harbour bacteria so should be removed when scrubbing wherever possible. Earrings are dangerous in that they may fall into a wound and therefore must not be worn at any time. All staff should adhere to “bare below the elbows” prior to any form of clinical contact with patients.
iv. Wash hands and arms with a non-medicated soap before entering the operating theatre area or if hands are visibly soiled.
    1. Clean subungual areas with a nail file. Nail brushes should not be used as they may damage the skin and encourage shedding of cells. If used, nailbrushes must be sterile, once only (single use). Reusable autoclavable nail brushes are on the market.
    2. Hands and forearms must be free of open lesions and breaks in skin integrity.
    3. Wear complete operating room attire including mask, cap, and goggles if required.
    4. Keep clothing away from sink and splashes
    5. Keep arms level well away from body and hands up above elbows for duration of scrub.
    6. Turn on water and wet hands and forearms
    7. Apply antiseptic hand wash solutions
    8. Lather hands and forearms for at least **one minute** from fingertips to three inches above elbows starting with hands to forearm, forearm to elbow.
    9. Wash hands thoroughly, using the following six steps to facilitate eradication of all bacteria and 10 seconds/step.

    Steps to washing

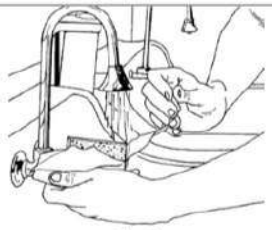
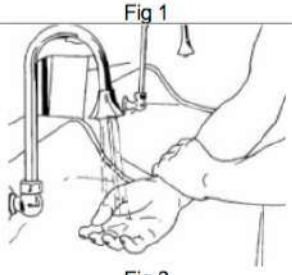
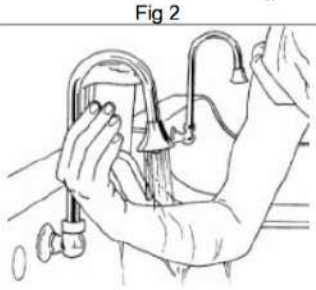
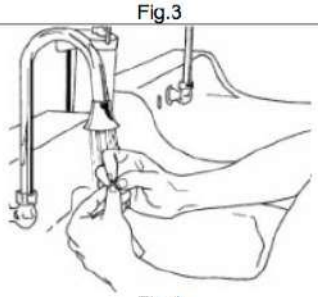
    - Palm to palm
    - Palm over dorsum
    - Palm to palm, fingers interlaced
    - Back to fingers to opposing palms

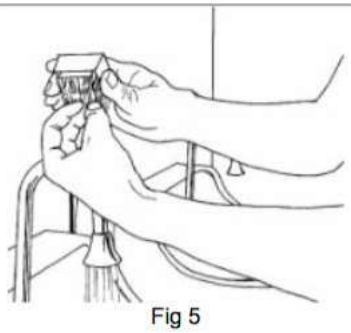
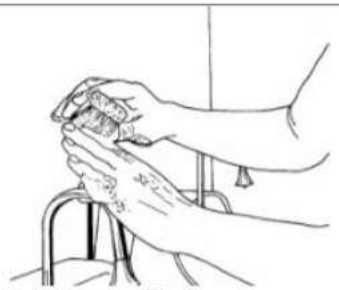
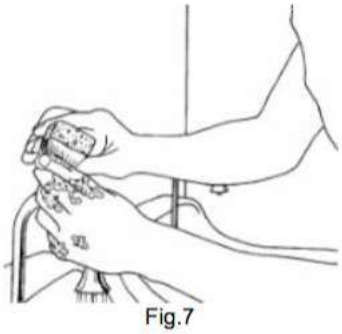
- Rotate thumbs in palm
- Rotate fingers in palm
- Rinse

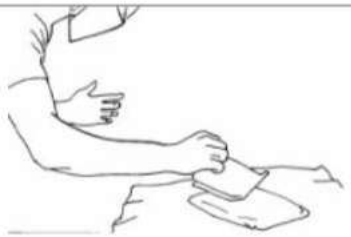
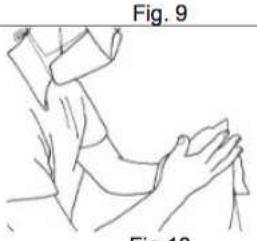
Protocol for surgical scrub with a soap

i. Start timing. Scrub each side of each finger, between the fingers, and the back and front of the hand for 2 minutes.
ii. Proceed to scrub the arms, keeping the hand higher than the arm at all times. This helps to avoid recontamination of the hands by water from the elbows and prevents bacteria-laden soap and water from contaminating the hands.
iii. Wash each side of the arm from wrist to the elbow for 1 minute.
iv. Repeat the process on the other hand and arm, keeping hands above elbows at all times. If the hand touches anything at any time, the scrub must be lengthened by 1 minute for the area that has been contaminated.
v. Rinse hands and arms by passing them through the water in one direction only, from fingertips to elbow. Do not move the arm back and forth through the water.
vi. Apply antiseptic hand wash solution a second time.
vii. Lather hands and forearms for at least two minutes in the same manner.
viii. Recommended scrub time is between 2-6 minutes, longer times are not necessary.
ix. Rinse hands and forearms under running water.
x. Keep hands higher than the elbow at all times.
xi. Thoroughly dry hands and forearms with a sterile paper towel keeping hands raised.
xii. Proceed to OT keeping hands above the elbow and out from scrub clothes. Allow hands and forearms to dry thoroughly before donning sterile gloves.
xiii. Between short cases only, hands may be disinfected by using 2 or more applications of an alcohol
xiv. Proceed to the operating theatre holding hands above elbows.
xv. At all times during the scrub procedure, care should be taken not to splash water onto surgical attire.
xvi. Once in the operating theatre, hands and arms should be dried using a sterile towel and aseptic technique before donning gown and gloves.

Please note that scrubbing areas other than the nails using the nail brush has shown to cause abrasions to the skin and should be avoided.

Regulate the flow and temperature of the water. Open package containing nailbrush (see Figure 1) lie the brush on the back of the scrub sink still in the opened package.	 Fig 1
Wet hands and arms (see Figure 2) for an initial prescrub wash. Use several drops of scrub solution, work up a heavy lather, then wash the hands and arms to the elbows.	 Fig 2
Rinse hands and arms thoroughly, allowing the water to run from the hands to the elbows (see Figure 3). Do not retrace or shake the hands and arms; let the water drip from the elbow	 Fig.3
Remove the sterile brush and pick from opened package. Clean under nails with pick and discard. (Figure 4)	 Fig.4

Moisten brush and work up a lather. Lather fingertips with sponge-side of brush; then, using bristle side of brush, scrub the spaces under the fingernails of the right or left hand (see Figure 5). Repeat for other hand. When scrubbing the hands must remain above the level of the elbows and away from theatre attire to avoid contamination from splashing.	 Fig 5
Lather fingers. Wash on all four sides of the fingers using the **sponge side only**. (Figure 6)	 Fig.6
The scrub procedure must follow the Trust policy for hand decontamination ie. 1. Palm to palm 2. Right palm over left dorsum and left palm over right dorsum 3. Palm to palm fingers interlaced 4. Back of fingers to opposing palms with fingers interlocked 5. Rotational rubbing of right thumb clasped in left palm and vice versa 6. Rotational rubbing backwards and forwards with clasped fingers of right hand in left palm and vice versa. Continue to wash the arms but encompassing only two thirds of the forearms to avoid compromising the cleanliness of the hands. Hands and arms must be rinsed thoroughly from fingertip to elbow without retracing, allowing the water to drip from the elbow before approaching the gown pack. (Figure 7-8)	 Fig.7  Fig. 8

Pick up one hand towel from the top of the gown pack and step back from the table (see Figure 9). Grasp the towel and open it fully. Do not allow the towel to touch any unsterile object or unsterile parts of your body. Hold your hands and arms above your elbow, and keep your arms away from your body. (Figure 9)	 Fig. 9
Holding one end of the towel with one hand dry the fingers of the opposite hand using a blotting rotational motion. Move to the dry area of the towel and continue in this manner down the forearm to the elbow. **DO NOT** retrace any areas. Discard this towel in an appropriate receptacle. Repeat with the other towel from the pack for the other hand/arm. (Figures 10-12)	 Fig 10  Fig 11  Fig 12

4.1.12 Surgical hand preparation with alcohol-based handrubs

The hands of the surgical team should be clean upon entering the operating theatre by washing with a non-medicated soap. While this handwash may eliminate any risk of contamination with bacterial spores, experimental and epidemiological data failed to demonstrate an additional effect of washing hands before applying handrub in the overall reduction of the resident skin flora.The activity of the handrub formulation may even be impaired if hands are not completely dried before applying the handrub or by the washing phase itself. A simple handwash with soap and water before entering the operating theatre area is highly recommended to eliminate any risk of colonization with bacterial spores.

4.1.13 Technique for the application of surgical hand preparation using alcohol-based handrub

The handrubbing technique for surgical hand preparation must be performed on perfectly clean, dry hands.
On arrival in the operating theatre and after having donned theatre clothing (cap/hat/bonnet and mask), hands must be washed with soap and water.
After the operation when removing gloves, hands must be rubbed with an alcohol-based formulation or washed with soap and water if any residual talc or biological fluids are present (e.g. the glove is punctured).

Surgical procedures may be carried out one after the other without the need for handwashing, provided that the handrubbing technique for surgical hand preparation is followed (Images 1 to 17).

1 Put approximately 5ml (3 doses) of alcohol-based handrub in the palm of your left hand, using the elbow of your other arm to operate the dispenser

2 Dip the fingertips of your right hand in the handrub to decontaminate under the nails (5 seconds)

3 Images 3–7: Smear the handrub on the right forearm up to the elbow. Ensure that the whole skin area is covered by using circular movements around the forearm until the handrub has fully evaporated (10-15 seconds)

4 See legend for Image 3

5 See legend for Image 3

6 See legend for Image 3

7 See legend for Image 3

8 Put approximately 5ml (3 doses) of alcohol-based handrub in the palm of your right hand, using the elbow of your other arm to operate the dispenser

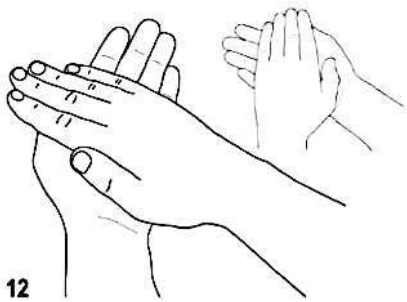
9 Dip the fingertips of your left hand in the handrub to decontaminate under the nails (5 seconds)

10

Smear the handrub on the left forearm up to the elbow. Ensure that the whole skin area is covered by using circular movements around the forearm until the handrub has fully evaporated (10-15 seconds)

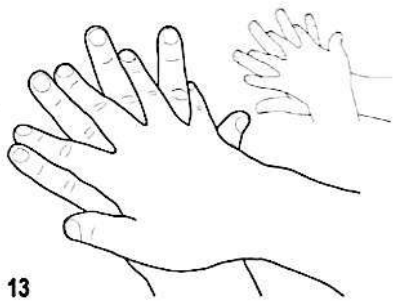
11

Put approximately 5ml (3 doses) of alcohol-based handrub in the palm of your left hand, using the elbow of your other arm to operate the distributor. Rub both hands at the same time up to the wrists, and ensure that all the steps re-presented in Images 12-17 are followed (20-30 seconds)



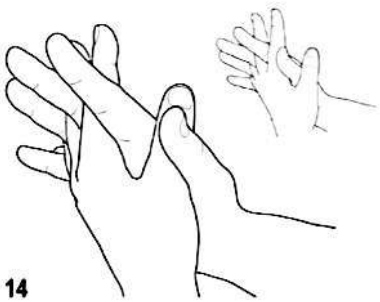
12

Cover the whole surface of the hands up to the wrist with alcohol-based han-drub, rubbing palm against palm with a rotating movement



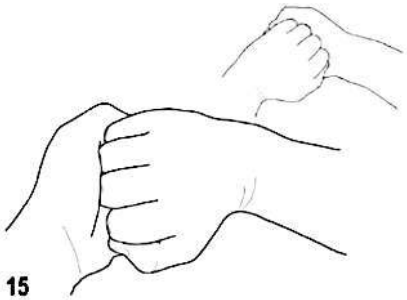
13

Rub the back of the left hand, including the wrist, moving the right palm back and forth, and vice-versa



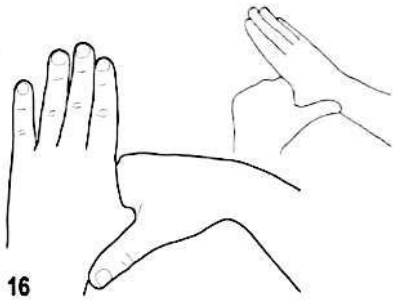
14

Rub palm against palm back and forth with fingers interlinked



15

Rub the back of the fingers by holding them in the palm of the other hand with a sideways back and forth movement



16

Rub the thumb of the left hand by rota-ting it in the clasped palm of the right hand and vice versa

17

When the hands are dry, sterile surgical clothing and gloves can be donned

Repeat the above-illustrated sequence (average duration, 60 sec) according to the number of times corresponding to the total duration recommended by the manufacturer for surgical hand preparation with an alcohol-based handrub.

4.1.14 Re-use/reprocessing of gloves

- As medical gloves are single-use items, glove decontamination and reprocessing are not recommended and should be avoided, even if it is common practice in many health-care settings with low resources and where glove supply is limited.
- At present no standardized, validated and affordable procedure for safe glove reprocessing exists.
- Every possible effort should be made to prevent glove reuse
- in health-care settings, such as educational activities to reduce inappropriate glove use, purchasing good quality disposable gloves and replenishing stocks in a timely manner.

4.1.14 Hand washing facilities at all clinical areas including consultation chambers, each floor & critical care

All clinical areas including consultation chambers, each floor & critical care areas should have:

i. Hand washing facilities appropriate to the area.
ii. Clear unobstructed access to the hand washing sink
iii. Hand washing sinks for that purpose only and clear of inappropriate items.
iv. Liquid soap and alcohol hand rubs available at every sink.
v. Hand washing posters are placed by each sink.

4.1.15 Hand Hygiene Audit

i. To ensure that the hand washing protocols are followed in the THE HOSPITAL Hospital.
ii. A monthly report is generated and analyzed and corrective actions taken by training.
iii. The audits are done in the prescribed format.

4.1.16 Patient Hand Hygiene

Hand hygiene for patients must be encouraged as it is equally as important in the prevention and control of infection. Staff must ensure that patients are afforded an opportunity to hand wash prior to meals, after having used a bedpan/urinal or toilet or when hands are otherwise soiled.

4.1.17 Quality Assurance

i. Completion of mandatory training on Hand Hygiene by all Healthcare Doctors, paramedical, housekeeping and Nurses.
ii. Monitor and record adherence to hand hygiene.
iii. Provide feedback to healthcare workers about their performance.

4.2 Personal Protective Equipment (PPE)

In determining the type of personal protective equipment to use for a given procedure, HCWs should consider the following factors:

- Probability of exposure to blood and body substances;
- Amount likely to be encountered;

- Type of body substance involved; and
- Probable route of transmission of infectious agents

Full protective wear, including double gloves, protective eye/face-shields, protective footwear and impermeable gowns or aprons, is recommended for operating room or mortuary procedures.

4.2.1 Risk assessment

The risk assessment should take account of various factors that include:

- Nature of the task to be undertaken.
- Risk of contamination to either patient or user.
- Barrier efficacy of gloves, both surgical and examination gloves can fail.
- Sterile or non-sterile gloves required.
- Patient/user sensitization.

4.2.2 Gloves

The use of disposable gloves is part of the Standard Precautions concept, which offers consistent guidelines for infection control programmes. As part of personal protective equipment, gloves prevent contact with blood, body fluids, and mucous membranes. They also protect the patient from contamination by the micro-organisms from the wearer's hands; **glovesare single use items** and are changed after each procedure to further minimize the risk of infection.

Gloves are worn when dealing with:

Any blood or other body fluids, such as synovial fluid, peritoneal fluid, amniotic fluid, pleural fluid.

- Any wound or broken skin.
- Handling chemicals or disinfectants, which could cause skin irritation

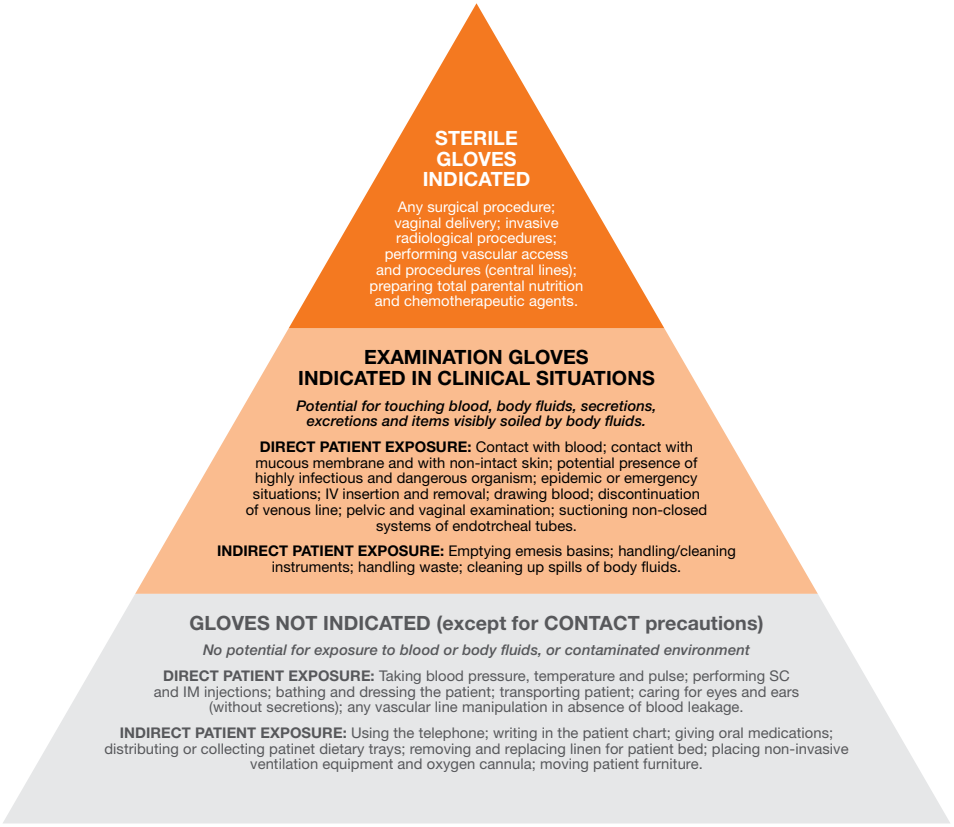
As a general rule, if the risk is to the patient then '**Sterile'** gloves are required. If the risk is to the user then '**Non-sterile'** gloves will probably be sufficient. When handling chemical disinfectants you may need to wear industrial or domestic gloves.

Important points to remember regarding gloves and going procedures:

- Gloves should be used during all patient-care activities that may involve exposure to blood and all other body fluid (including contact with mucous membrane and non-intact skin), during contact precautions and outbreak situations.
- Gloves do not provide complete protection against hand contamination.
- Prolonged use of gloves for contact precautions in the absence of considering the need to perform hand hygiene can result in the transmission of germs.
- it is important that health-care workers are able to differentiate between specific clinical situations when gloves should be worn and changed and those where their use is not required (see The Glove Pyramid). Moreover, the health-care worker should be accurately informed on the moment (see Table below) for donning and removing gloves.

4.2.2.1 The Glove Pyramid

To aid decision making on when to wear (and not wear) gloves
Gloves must be worn according to STANDARD and CONTACT PRECAUTIONS. The pyramid details some clinical examples in which gloves are not indicated, and others in which examination or sterile gloves are indicated. Hand hygiene should be performed when appropriate regardless of indications for glove use.



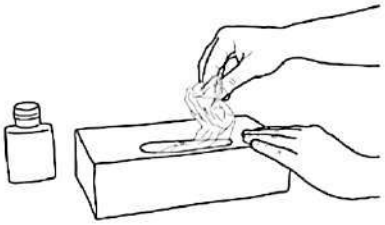
4.2.2.2 Summary of the indications for gloving and for glove removal

	Indication
Gloves on	1. Before a sterile procedure 2. When anticipating contact with blood or another body uid, regardless of the existence of sterile conditions and including contact with non-intact skin and mucous membrane 3. Contact with a patient (and his/her immediate surroundings) during contact precautions.
Gloves off	1. As soon as gloves are damaged (or non-integrity suspected) 2. When contact with blood, another body uid, non-intact skin and mucous membrane has occurred and has ended 3. When contact with a single patient and his/her surroundings, or a contaminated body site on a patient has ended 4. When there is an indication for hand hygiene.

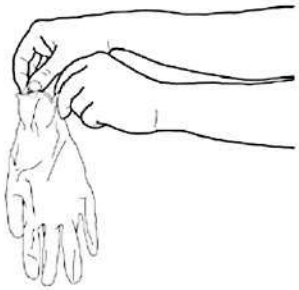
4.2.2.3 Technique for donning and removing non-sterile examination gloves

When the hand hygiene indication occurs before a contact requiring glove use, perform hand hygiene by rubbing with an alcohol-based handrub or by washing with soap and water.

I. HOW TO DON GLOVES:

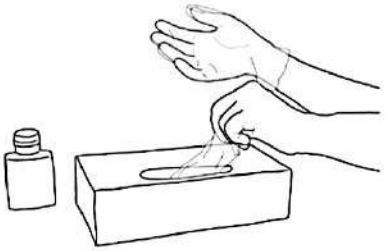


1. Take out a glove from its original box

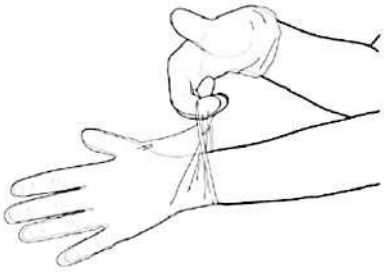


2. Touch only a restricted surface of the glove corresponding to the wrist (at the top edge of the cuff)

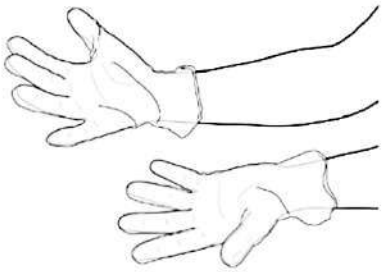
3. Don the first glove



4. Take the second glove with the bare hand and touch only a restricted surface of glove corresponding to the wrist

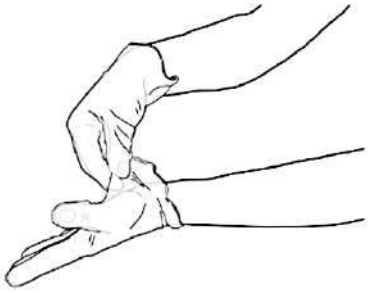


5. To avoid touching the skin of the forearm with the gloved hand, turn the external surface of the glove to be donned on the folded fingers of the gloved hand, thus permitting to glove the second hand

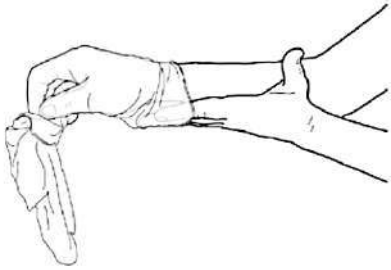


6. Once gloved, hands should not touch anything else that is not defined by indications and conditions for glove use

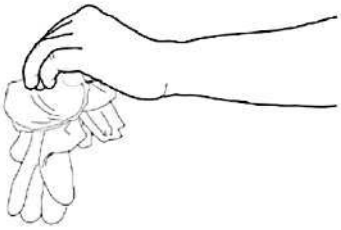
II. HOW TO REMOVE GLOVES:



1. Pinch one glove at the wrist level to remove it, without touching the skin of the forearm, and peel away from the hand, thus allowing the glove to turn inside out



2. Hold the removed glove in the gloved hand and slide the fingers of the ungloved hand inside between the glove and the wrist. Remove the second glove by rolling it down the hand and fold into the first glove



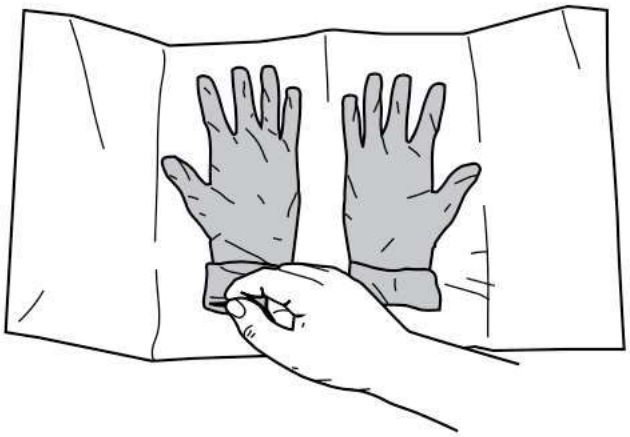
3. Discard the removed gloves

4. Then, perform hand hygiene by rubbing with an alcohol-based handrub or by washing with soap and water

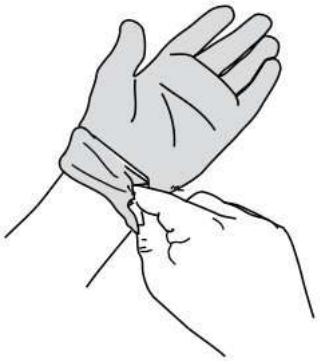
Put on the sterile gloves

- **Opening the package:**
  Sterile gloves may be wrapped inside your sterile tray or packaged on their own.
- Packaged inside the sterile tray on top of supplies:
    - Wash your hands.
    - Open your sterile dressing tray.
    - Take the sterile gloves out of the tray by pinching the middle of the paper the gloves are wrapped in.
    - Put the paper on a clean dry surface. Do not put the paper on your sterile supply wrapper.
- Packaged in a paper wrapper separate from the sterile tray:
    - Wash your hands.
    - Open the outer wrap of the sterile glove pack.
    - Take out the inner wrap.
    - Put the wrapped sterile gloves on a clean, dry surface like a table or counter top. Do not put the wrapped gloves on the sterile supply wrapper.
- **Putting on the gloves:**

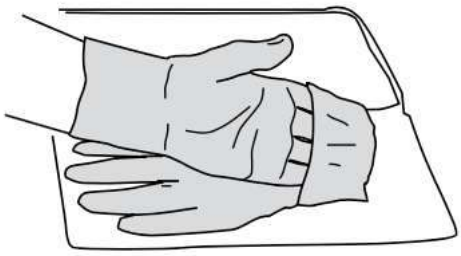
Open the wrapper, so you can see both gloves. With the hand you usually write with, grasp the opposite glove at the folded edge of the cuff. Pick the glove up by the folded edge.



Slip your hand into the glove. Keep your hand at and your thumb tucked in. Pull the glove on. Be careful not to touch the outside of the glove. Touch only the part of the glove that will be next to your skin. Leave the cuff on the glove folded.

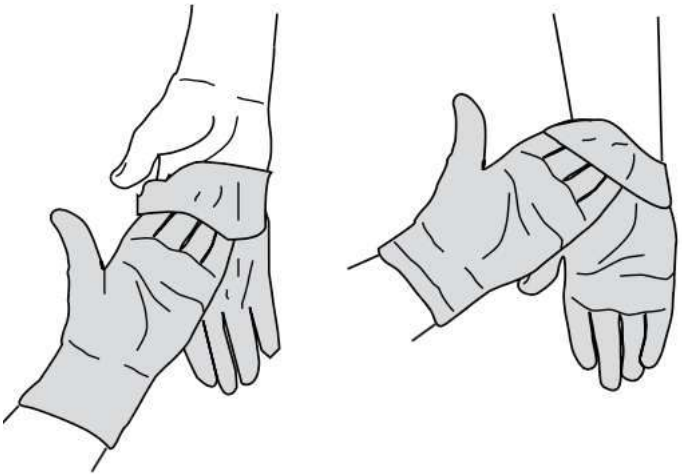


With your gloved hand, slip your ngers into the folded cuff of the other glove. Pick up the second glove.



Slip the glove over your fingers. Keep the hand that you are putting the glove on at. Keep the gloved thumb up and back to keep from touching your bare palm or wrist.

Pull the glove over your hand. Adjust each glove to get a snug fit. Reach under the cuffed part to pull up or adjust.
Once you have your gloves on, keep your hands in front of you and above your waist. Do not touch anything outside the sterile field.



4.2.3 Gowns and aprons

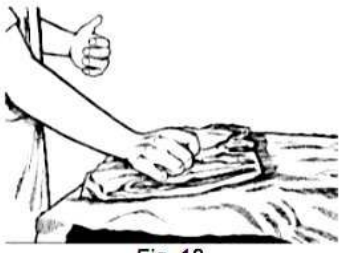
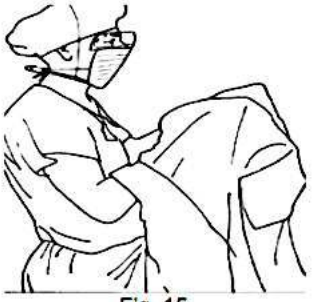
The purpose of wearing gowns and aprons is to protect susceptible patients from infection and protect the wearer from contamination as well as maintaining the uniform or clothes worn under the apron in a clean and dry state. Gowing must be done before all invasive procedures like lumber puncture, insertion of central lines etc.

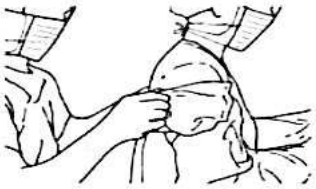
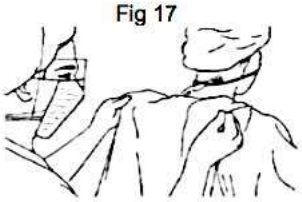
Gowns and aprons should not be worn outside the area they are intended to be used. Remove your gowns/aprons when moving out of area they are intended to be used.
Surgical gowns are folded with the inside facing the scrub person. This method of folding facilitates picking up and donning the gown without touching the outside surface. If the scrub person touches the outside of the gown whilst donning it, the gown must be considered to be contaminated. If this occurs discard the gown.

The scrub person's hands and arms are contaminated if they are allowed to fall below waist level or to touch the body therefore hands and arms should be kept above the waist and away from the body at an angle of about 20 to 30 degrees above the elbows.

After donning the surgical gown, the only parts of the gown that are considered sterile are the sleeves (except for the axillary area) and the front from waist level to a few inches below the neck opening. If the gown is touched or brushed by an un-sterile object the gown is then considered contaminated. The contaminated gown must be removed using the proper technique and then a new sterile gown should be donned.

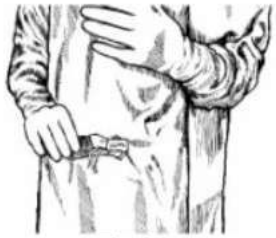
4.2.3.1 Gowning Procedure

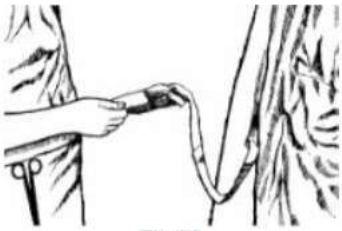
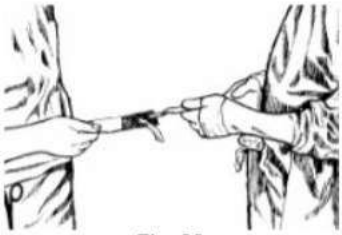
With one hand, pick up the entire folded gown from the wrapper by grasping the gown through all layers, being careful to touch only the inside top layer which is exposed (Figure 13). Step back from the trolley / shelf.	 Fig. 13
Hold the gown in the manner shown in Figure 14 near the gown's neck and allow it to unfold being careful that it does not touch either the body or other un-sterile objects. Grasp the inside shoulder seams and open the gown with the armholes facing.	 Fig. 14
Slide arms part way into the sleeves of the gown keeping hands at shoulder level away from the body (Figure15).	 Fig. 15
Slide arms further into the gown sleeves and when the fingertips are level with the proximal edge of the cuff, grasp the inside seam at the cuff hem using thumb and index finger. Be careful that no part of the hand protrudes from the sleeve cuff (Figure 16).	 Fig.16

The circulating person should assist at this point to position the gown over the shoulders by grasping the inside surface of the gown at the shoulder seams. They can then adjust the gown over the scrub person's shoulders. The circulating person's hands are only in contact with the inside surface of the gown. The circulating person then prepares to secure the gown, the neck and back may be secured with a Velcro tab or ties. The circulating person then ties the gown at waist level at the back. This technique prevents the contaminated surfaces at the back of the gown from coming into contact with the front of the gown. (Figures 17-19)	 Fig 17  Fig 18  Fig 19

4.2.3.2 Final Tie of gown

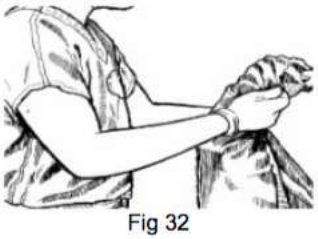
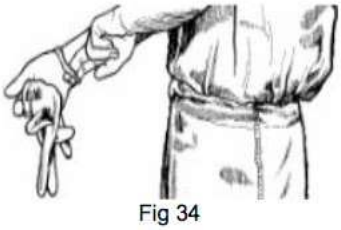
Once the sterile gloves are on the scrub practitioner is ready to secure their gown with assistance from the circulating person as follows:

The scrub person will take hold of the belt tab which is securing the belt ties. Keeping hold of the left side tie with the left hand pull the tab with the right hand ties still secured and hand the tab to the circulating person.	 Fig. 27

The circulating person will take hold of the tab being very careful not to touch the tie and will move to the side or behind the scrub person. The scrub person will then turn if necessary to enable them to reach and retrieve the tie. (Figure 28).	 Fig 28
When the scrub person is properly positioned they will then take hold of the **belt tie only** being careful not to touch the tab and pull on the tie leaving the circulating person with only the tab in their hand The circulating person must hold on tightly to the tab so that when the scrub person pulls on the tie the tab doesn't come with it and contaminate them. (Figure 29).	 Fig. 29
Finally the scrub practitioner will secure the ties on left side. (Figure 30)	 Fig 30

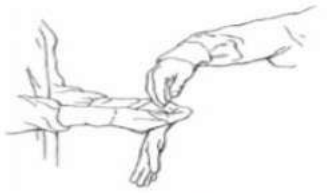
4.2.3.3 Removing the Gown and Gloves

On completion of a surgical case the outer part of the gown and gloves are considered to be contaminated by bacteria from the procedure and the scrub person must remove them very carefully to avoid contamination to their forearms and hands. The gloves should be removed after the gown. The procedure is as follows:

After the circulating person unties the neck and back ties, the scrub person performs the following procedure by themselves. Grasp the gown at the shoulders and pull the gown forward and down over the arms and gloved hands. (Fig 31)	 Fig. 31
Holding arms away from the body fold the gown so that the outside is folded in and discard it into the appropriate bag. (Figure 32)	 Fig 32
Grasp the outer surface of one glove with the other gloved hand "rubber to rubber" and peel off the glove. Discard the glove into the designated receptacle. (Figure 33)	 Fig 33
Place the fingers inside the cuff of the glove of the other hand "skin to skin" peel off as before and discard. (Figure 34)	 Fig 34

4.2.3.4 Procedure for changing gloves during the case

i. When gloves require changing intra-operatively due to a puncture or inadvertent contamination, the glove must be removed in a way that avoids further contamination.
   This can be achieved by pulling the gloves downwards by the fingers and palms (whilst also grasping the cuff of the gown), until the glove comes over the end of the hands / fingers. The glove may then be discarded into the appropriate receptacle.
ii. Hands must remain inside the sleeves of the gown and the closed glove technique is used to don a new glove as described in the gloving procedure.
iii. On occasions it may be preferable to don a second pair of gloves taking care not to contaminate them during the gloving procedure.
iv. Alternatively a new glove may be donned with the assistance of another member of the surgical team as described below:

Grasp the right glove firmly at waist level. Keeping your thumbs extended and covered by the glove cuff; stretch the cuff so that the practitioner can introduce their hand without touching your gloves. The scrub person protects own gloved fingers by holding them beneath the cuff of the glove, and their thumbs by holding them away from the partly-gloved hand.	 Fig. 35

On leaving the theatre remove mask only handling the ties and discard into a clinical waste receptacle. Decontaminate hand using soap and water or alcohol gel.

4.2.4 Face Protection: Masks

Protective eye or face wear are considered where risk of blood or other bodily fluids splashing into eyes is a possibility, including the preparation of some cytotoxic chemotherapy and during the physical decontamination or cleaning of instruments.

4.2.4.1 Masks

There is no clear guidance available for the efficacy of masks in the prevention of airborne infections. However, they may offer protection against potential splashing of the mouth and face during certain procedures such as minor operations, physical decontamination or cleaning instruments with a brush.

The type of mask best suited to a particular situation depends on the body substances likely to be encountered and the nature of the activity.

There are two main types of masks used in health care:

- ***Surgical masks*** — fluid-repellent paper filter masks worn during surgical and dental procedures
- ***Particulate filter personal respiratory protection devices (P2 respiratory protection devices)*** — close fitting masks capable of filtering 0.3-µmparticles and worn when attending patients withactive pulmonary tuberculosis

Mask must:

- Be fitted and worn according to the manufacturer's instructions;
- Not be touched by hand while being worn;
- Cover both mouth and nose while worn;
- Be removed as soon as practicable after they become moist or visibly soiled;
- Be removed by touching the strings and loops only; and not be worn loosely around the neck, but be removed and discarded as soon as practicable after use.

A surgical mask is worn primarily to protect the patient from bacteria exhaled by operating room personnel. All members of the scrub team should wear a mask, but the wearing of masks by other personnel should be at the discretion of the Consultant in charge. Every individual in the operating theatre should wear a mask when prosthesis / implant surgery is

taking place. The mask must fit snugly to the face to prevent passage of air around the sides and fogging of glasses if worn. A fresh mask should be donned immediately before beginning the scrub procedure and it is not considered sterile. If the mask becomes damp, droplets from the nose and mouth can easily pass though it and the mask no longer serves as a barrier to germs, therefore the mask should be changed after each procedure and more often if it becomes damp.

A mask should never be allowed to dangle around the neck, placed in a pocket or on a clean surface and should only be handled by the ties after it is removed. Careful handling of a used mask by the ties prevents the spread of micro organisms throughout the surgical suite. As soon as the mask is removed it should be placed in a designated receptacle and the hands should be washed.

4.2.5 Eye wear

Protection of the mucous membranes of the eyes, mouth and nose from procedures that involve splashing or spraying of blood, body fluids or bone chips is essential. Protective eye wear covering front and side of the eyes, or full face visors must be worn by the surgical scrub team and those performing invasive procedures. These should either be disposable or cleaned according to manufacturer's instructions after use. Ordinary prescription spectacles do not provide sufficient protection. Visors cannot be used with magnifying loupes and should, therefore be fitted with side shields. Dust mist masks (FFP3) must be available in theatre for procedures where there is a risk of exposure to TB.

4.2.6 Shoe cover

Shoe cover must be worn before entering to the ICU, Operating Theatre, Dialysis, CSSD and HDU.

Dedicated personalised closed toe non-slip footwear must be available for all regular theatre staff in the theatre complex. Boots should be worn if there is ahigh risk of heavy blood/body fluid loss. Observers to theatre procedure within the operating theatre must be provided with spare theatre shoes.

4.2.6.1 Protective foot wear:

Protective foot wear should be used when handling biomedical waste as unnoticed cuts and wounds are quite common in the legs. Footwear is also essential to protect legs from 'sharps' injury.

4.2.7 Head cap

Head cap covers the hairs of the health care provider in order to prevent the contamination of the sterile high risk areas.

4.2.8 Respiratory Hygiene and Cough Etiquette

4.2.8.1 The strategy is targeted at the patients and accompanying family members and friends with undiagnosed transmissible respiratory infections, and applies to any persons

with sins of illness including cough, congestion, rhinorrhea, or increased production of respiratory secretions when entering a health care facilities.

4.2.8.1 The elements of respiratory hygiene/ cough etiquette include

3.1 Education of healthcare facility staff, patients and visitors

3.2 Source control measures (Covering the mouth/nose with tissue or a cloth when coughing or sneezing)

3.3 Hand hygiene after contact with respiratory secretions

3.4 Spatial separation, ideally >3 feet, of persons with respiratory infections in common waiting areas when possible

3.5 Masks should be provided to the coughing patients to contain dispersion of respiratory secretions into the air from infected patients

3.6 Healthcare personnel are advised to observe Droplet precautions (i.e. wear a mask) and hand hygiene when examining and caring for patients with signs and symptoms of a respiratory infections.

3.7 Healthcare personnel who have a respiratory infection are advised to avoid direct patient contact, especially with high risk patients. If this is not possible then a mask should be worn before providing patient care.

4.3 Management of Spillage

It is vital that any spillage must be attended to as soon as possible. Assessment of hazards and associated risks to health must be undertaken to ensure the health and safety of employees, patients and other visitors to the primary health care premises.

4.3.1 Responsibilities

1. Department Heads are responsible for the development and implementation of a policy that deals with spillages, and should exposure occur, they are also required to ensure that any risks to staff, patients and visitors are minimized.
2. All staff has the responsibility for ensuring that they adhere to any policies and procedures to minimize the hazards resulting from any spillage.
3. All staff involved in the clinical care of patients or the safe handling of waste are aware of how to deal safely with any spillage should it occur.

"ALL SPILLS LARGE (>30ml) OR SMALL(<30ml) MUST BE REPORTED TO HOSPITAL INFECTION CONTROL NURSE (ICN) IMMEDIATELY"

4.3.2 Body Fluid Spillage

Body fluid spills are divided in to two categories, those which are visibly contaminated with blood and those which are not.

4.3.2.1 Blood Spillage or other body fluid visibly contaminated with blood.

1. Spillages of blood are dealt with as soon as possible.
2. Splashes of blood (or any body fluid) on the skin are washed off immediately with soap and water.

3. If there is broken glass do not touch even with gloved hands- use a paper or plastic scoop and dispose in the sharps box.

4.3.2.2 Management blood spillage.

i. Make the people aware about spill
ii. Cordon off the area.
iii. Identify the spill kit.
iv. Wear PPE.
v. Put soaking paper (brown paper, newspaper and tissue paper) over the spill.
vi. Make fresh bleaching solution by using 0.75gm of bleaching powder in 100ml water) which equivalent to 0.5 to 1% strength.
vii. Pour this prepared solution over the recovered spill.
viii. Leave for contact time ideally 20 minutes but if the area where the spill is occurred is a very busy area then minimum 2-5 minutes.
ix. After contact time put another paper covering the soaked paper and then remove the soaked paper and put it in the RED bag.
x. Discard this red bag in main red bin the unit.
xi. Clean the area with soap and water.
xii. Remove the PPE & discard it in the red bag.
xiii. Do the hand washing.
xiv. Report the spill in incident reporting form.

4.3.2.3 Large Blood Spill managment

In case of large spill Inform HIC dept. or ICN immediately.
Immediate action has to be taken with the help of large spill kit available at the concern department. Procedure to manage large spill is as follows:

i. Cordon off the area and make the people aware about the spill.
ii. Put on the PPE.
iii. If there is any sharp material present along with the spill, then first remove it with the help of plastic scoop or with x-ray film.
iv. Put large size gauze pad over the spill to soak large amount of spill and discard the pads in red bag.
v. Put soaking paper over the rest amount of spill.
vi. Make fresh bleaching solution by using 7.5gm bleaching powder in 1 Ltr. of water
vii. Put this bleaching solution over the spill and wait for contact time (20 min)
viii. Take another paper and with the help of this paper, remove the paper which is already put on the spill.
ix. Discard all the papers in red bag.
x. Wash the area with soap and water.
xi. Remove the PPE and discard in red bag.
xii. Do hand washing.
xiii. Fill the incident reporting form and send it to the HIC department.
xiv. **It is the responsibility of person who had done the spill to manage it. For anonymous spills nursing staff posted in the area shall be responsible to get it**

managed. Ultimate responsibility of implementation of the policy lies with Nursing Incharge of the area where spill has occurred.

Role of ICN in the large spill management.

1. To ensure proper spill management
2. Ensure incident reporting form is filled with proper details.
3. Root cause analysis of incident and ensure that preventive action is taken.

4.3.2.4 Urine Spills visibly contaminated with blood

Chlorine releasing agents are **NOT** to be used for urine spillages even if it contains visible blood. If a chlorine releasing agent is used with urine the resulting fumes are considered a hazard. The recommended practice is:

i. Wearing non-sterile, non-powdered latex gloves and plastic apron.
ii. Soak up with paper.
iii. Use detergent and water on area after soaking up the spill.
iv. A chlorine-releasing agent may now be used on the area if necessary.
v. Discard gloves, waste materials and apron in a Reg bag .
vi. Wash hands thoroughly

4.3.2.5 Spillages of Body Fluids not visibly contaminated with Blood

These spillages will include faeces, vomit, urine and sputum.

i. Always wear protective clothing, i.e. plastic disposable apron, disposable powder-free, non-sterile latex or similar.
ii. Use paper towels to soak up the spill.
iii. If there is broken glass do not use hands even if gloved - use a paper or plastic scoop and dispose in the sharps box.
iv. Discard paper towels and any other waste from the spillage into clinical waste bags.
v. Clean the contaminated area with water and detergent.
vi. Discard gloves and apron into a red bag
vii. Wash hands.

4.3.3 Mercury Spillages

As per the Delhi Govt. policy of mercury free hospital, every attempt has been made to make hospital mercury free. Mercury containing equipments are replaced and no mercury containing equipments are purchased by the Hospital.

5. STERILISATION, DISINFECTION AND DECONTAMINATION

5.1 STERILISATION

Sterilization is defined as a process where all microbes are removed from a defined object, inclusive of bacterial endospores**.**

5.1.1 Methods:

i. Heat Sterilization:

- **Moist Heat:** Exposure to saturated steam at 121ºC for 15-20 min OR 134ºC for 4 min in any autoclave.
- **Dry Heat:** Exposure to dry heat at 160ºC for 120 min.

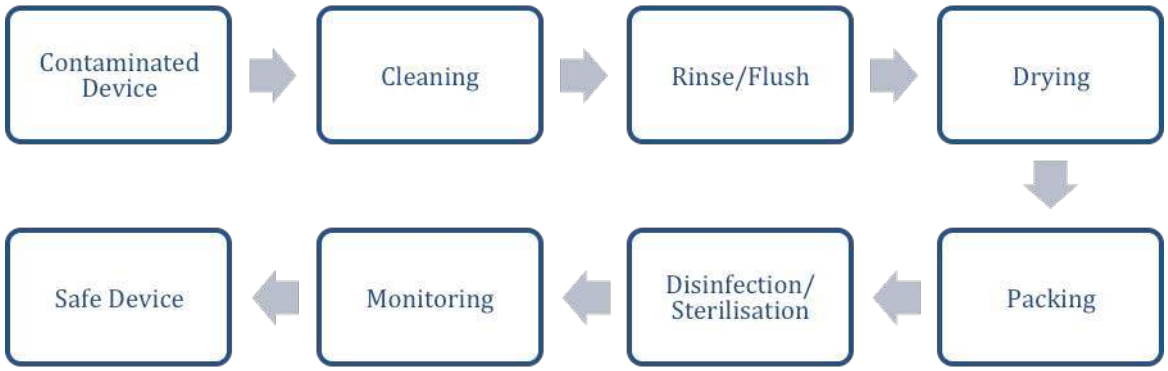
ii. Chemical Sterilization: (for heat sensitive items)

- Ethylene oxide

iii. Low temperature Sterilization

- Plasma sterilizer using Per acetic acid or hydrogen peroxide.

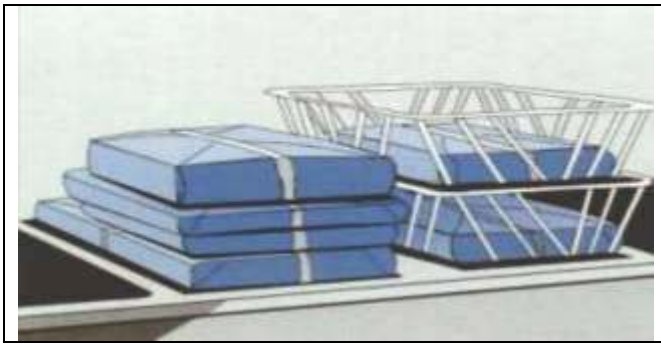
Recommended Practice:



5.1.2 Packing & Loading

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

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

	**Textile pack should not exceed 5kg or exceed 30cm wide by 30cm high by 50cm long.**

	**Package the object loosely**

Proper loading of material inside sterilizer is very critical for efficient sterilization. Relative humidity in the processing area should be at least 35%.

1. When loading sterilizer there should be space between item to facilitate circulation and penetration of sterilant.
2. There should be no contact between items and chamber wall.
3. In mixed load linen should be kept on top racks and metal on bottom
4. Peel pouches should be kept on the edge facing same direction
5. Textile should be kept on the edge
6. Instrument sets should be placed flat

Vertical position favors the output of air and the pathway of water vapor

Horizontal position makes it difficult for the air to move out and the water vapor to go through

5.1.3 Monitoring

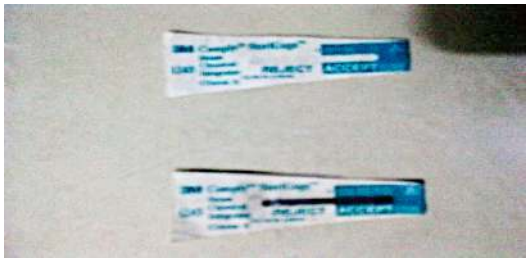
- Mechanical, chemical and biological monitors can be used to evaluate the effectiveness of the sterilization process.
- Each load is monitored with mechanical (time, temperature, pressure) and chemical (internal and external) indicators.
- Biological indicators (spores) should be used weekly to monitor the effectiveness of sterilization.Vials are removed from sterilizers and put in designated incubator in CSSD. Monthly report are sent to ICN.
- Chemical indicators as strips should be used with every batch.
- An expiry date is given for sterile articles based on the packing material used.

5.1.4 Quality Indicators (Before use & after use)

Monitoring protocol of Autoclave :

1. ***Temperature, Pressure and time*** of each cycle is recorded is followed according to manufacturer's recommendations. Records should be maintained for each cyle.
2. Various ***quality indicators*** are used to check the efficacy of sterilization:
   a) **Exposure control**: Autoclave indicators tapeis pasted on all packs to be kept in autoclave.
   b) **Load Control**: Biological indicators (spores of *Bacillus stearothermophilus*) are used once a week (Monday) in all autoclave machines in first load and with every load which contain any implant. This indicator gives us rapid results, i.e. positive result in one hour and negative result in 3 hours. If result is positive means sterilization is not adequate that whole load is recalled & re-autoclaved.

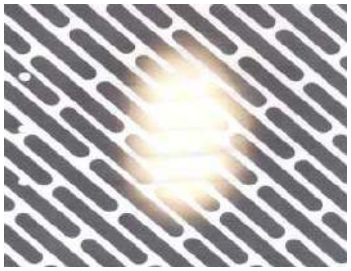
   c) **Pack control**: Class 5 chemical integrator - It is used in every pack.



   d) **Equipment control**: Bowie-dick test pack – It is used once daily in each machine.

Bowie-DickTest-negative

Bowie-DickTest-Positive



3. **Air cultures** are taken once in a month from sterile zone.
4. **Wet pack** is not accepted as sterile. These are repacked and resterilized (even if the indicators show the appropriate changes.
5. There are **different trolleys** for carrying sterile and unsterile instruments White & Red respectively.
6. No person is allowed to enter in sterile room without **Personal Protective Equipments (PPE)** (i.e. Cap, mask, gown, & slippers etc.)
7. All sterile items must be used within 72 hours after 72 hours items should send to CSSD for re autoclaving

5.1.5 Recall policy:

Actions to be taken if any monitoring indicators fail:

1. Recall the item immediately with the help of load number
2. CSSD supervisor are informed immediately.
3. CSSD personnel should try and discover the cause of the failure and arrange for corrective action.
4. The item are reprocessed and then supplied after confirmation of sterility.

5.1.6 Record keeping:

1. Entry of all the items made in CSSD receipt register including date, time, type of instruments in the pack, name of department, procedure used for, case infected not, name and signature of person receiving the items.
2. Inventory of sterile packs is checked so that they are not distributed directly to the user department.
3. Record of all the indicators tests and culture report is kept.
4. Result of load control ,equipment control and glutaraldehyde solution monitoring results are submit to the HIC department on monthly basis.
5. Recall event should be documented and record should be maintained in a register.

5.1.7 ETO monitoring

1. Use to sterilize items that are moisture or heat sensitive.
2. Essential parameters of ETO sterilization includes:
3. Temperature – Should be 40-55°C
4. Exposure time – 16 hours

AN1087 Dosimeters are placed with every run. They change color from yellow to blue when exposed to Ethylene oxide. They integrate the effects of time, temperature and the concentration of Ethylene oxide in contact with the crystals in the capillary tube.
For a load to be considered sterile, the color change from yellow to blue must extend past the triangular mark on the label. No laboratory testing is required. The information is available immediately at the end of a sterilization cycle.

Biological Indicators – Done weekly

Each **AN1080** Biological and Chemical Sterilizer Control pouch is a complete sterility control. Steritest eliminates the possibility of a false positive by including both a spore strip and an ampoule of sterile culture broth sealed in a transparent, gas permeable, waterproof, plastic pouch.

Place the unopened Steritest with the items to be sterilized. At the end of the cycle, remove the Steritest and look at the Dosimeter. A color change from yellow to blue that extends to the triangular mark on the Dosimeter label indicates that a dose of Ethylene oxide sufficient for sterilization has been delivered. Without opening the Steritest pouch, manipulate the ampoule of culture broth inside of its break shield so that the neck of the ampoule is broken.

Gently shake the broth down to cover the spore disk. Incubate the Steritest at 37.5ºC for 72 hours. A change in the color of the broth from blue to orange indicates growth of bacteria and therefore an unsterile load.

5.2 Disinfection

Disinfection is a process where most microbes are removed from defined object or surface, expect bacterial spores**.**

High level disinfection is that which kills all microganism and high number of bacterial spores.

5.2.1 Classification of Disinfectants

(a) High Level Disinfectants:

- They destroy all microorganisms including vegetative bacteria, most bacterial spores, fungi, viruses including enteroviruses and mycobacterium tuberculosis except some bacterial spores.Ex.: 2% Glutaraldehyde, Ethylene Oxide, 1%Sodium Hypochlorite (10,000ppm of chlorine)
- Used for semi critical instruments and equipments (those that are in contact with intact mucous membrane without penetration)
- For gastrointestinal endoscopes, endotracheal tubes, anesthesia breathing circuits, respiratory therapy equipments.

(b) Intermediate Level Disinfectants:

They destroy vegetative bacteria, Mycobacterium tuberculosis, most viruses e.g. entero viruses and fungi but not bacterial spores. E.g., Isopropyl alcohol (70%), ethyl alcohol, sodium hypochlorite (0.1%), Chlorhexidine, hydrogen peroxide, phenolic solutions.

(c) Low Level Disinfectents:

They destroy most vegetative bacteria, fungi and enveloped virus e.g. HIV but will not kill bacterial spores, Mycobacteria and non enveloped viruses like enterovirus. E.g., Quaternary ammonium compounds like benzylkonium chloride, some soaps.

5.2.2 Guidelines for Selection of Disinfectants:

There is no ideal disinfectant. Each application requires careful view of following:

1. Type and number of organisms.
2. Type and amount of organic matter
3. Contact time
4. Type of surface (Rough / Corrugated)
5. Type of water (hard / soft)
6. Manufacturers data on efficacy
7. Safety and environmental aspects (chlorine is not free from toxicity)
8. Cost, shelf life and convenience of use

9. Residual activity

5.2.3 Two Approaches for Selection of Disinfectants:

1. Accept the manufacturers data
2. Validate yourself

5.2.4 Guidelines for Use of Disinfectants

Name of Disinfectant	Method of Dilution	Contact Time	In Use Span/ Use
Aldehyde Solutions: a. Glutaraldehyde (2%)	Add activator powder / liquid to the liquid in 5 liter jar and use undiluted	Disinfection: 20-30 mins Sterilization: 10 hours	14 days used for heat sensitive instruments e.g. Endoscopes
b. OPA (orthophthalyl aldehyde)	Same as above	Same as above	Long acting (28 days)
c. Glutaraldehyde + Formaldehyde + Benzyl chloride	Water 1 part : 49 parts (20 ml + 980 ml)	Disinfection : 15 min Sterilization : 5 hours , 30 min	24 hours Used as surface disinfectant or 2% solution in operation theaters and 0.5% in wards, dressing room. Can be used in a low pressure sprayer.
(Glutaraldehyde + formaldehyde)	water 1 part : 9 parts (10 ml + 990 ml)	Disinfection : 15 min Sterilization : 5 hour, 30 min	14 days (used for instrument sterilization)
6% Hydrogen Peroxide (Available as 30% stabilized solution)	20 ml H_2O_2 + 80 ml normal saline = 6% H_2O_2 (use freshly prepared)	6-8 minutes	Use immediately after preparation for surgical dressings.
1% Sodium Hypochlorite Ex. : Polar Bleach 5% Polar Bleach 10%	**5%:** 80 ml water + 20 ml bleach to make it 1% solution. **10%:** 90 ml water + 10 ml bleach	20-30 minutes	8 hours Used for blood spills and laboratory decontamination
Calcium hypochlorite Ex. : Bleaching powder (70% available chlorine)	1.4 gms / liter of water for visibly contaminated articles	20-30 min.	24 hours Disinfection of toilets, bathrooms and may be used if liquid bleach not

			available
Formaldehyde (40%) Ex. : Formalin	Ready to use	30 minutes Then open the area after 6 hours	No longer recommended for fumigation.
70% Alcohol	Do not dilute	2-5 minutes	24 hours used for surface disinfection
Chlorhexidine (2%)w/v 4% Chlorhexidine w/v	Ready to use	2-3 minutes	2%:Upto 6-8 hours for disinfection of hands 4%: Used before a procedure.
Povidine Iodine 10%	Ready to use	Allowed to dry	For skin preparation before surgery
1% Triclosan	Ready to use	Antiseptic soap or bathing liquid	For MRSA (Methicillin resistant Staphylococcus aureus)
(2 propanol - 1 propanol, macetronium ethyl sulfate)	Ready to use	30 seconds	Hand rub
(Stabilized H_2O_2 11% w/v with 0.01% w/v diluted silver nitrate solution)	10 % w/v solution 20% w/v solution	60 minutes 60 minutes	Surface disinfection For fogging*

***(Fogging is not routinely recommended, however, specific patient care unit may decide after due discussions with infection control officer].**

5.2.5 General Guidelines For Disinfection

i. Critical instruments /equipments - (that are those penetrating skin or mucous membrane or enter sterile tissue or vascular system) should undergo sterilisation before and after use. e.g. surgical instruments and implants
ii. Semi-critical instruments /equipments - (that are those in contact with intact mucous membrane without penetration or skin that is not intact) should undergo high level . e.g laryngoscopes, Aneasthesia equipment.
iii. Non-critical instruments /equipments - (that are those in contact with intact skin and no contact with mucous membrane) requires only intermediate or low level disinfection before and after use.e.g. ECG electrodes

Classification	Item Use	Goal	Appropriate Process
Critical item	Items entering sterile tissue, the body cavity, the vascular system and non-intact mucous membranes	Objects will be sterile (free of all microorganisms including bacterial spores)	Sterilization (or use of single use sterile products) (steam sterilization)

	Eg surgical instruments		
Semi-Critical items	Items that make contact, directly or indirectly, with intact mucous membranes or non-intact skin. Eg endoscopes, anaesthetic equipments, Respirotary therapy Equipment Endocavitory probes Tonometer Diaphragm	Objects will be free of all microorganisms, with the exception of high numbers of bacterial spores	High level disinfection · Thermal disinfection · Chemical disinfection (glutaraldehyde, OPA) It is always preferable to sterilize semi-critical items whenever they are compatible with available sterilization processes.
Non-Critical items	Objects that come into contact with intact skin but not mucous membranes Eg crutches, BP cuffs, Tabletops Bed pans,bed rail,bedside table, ECG leads etc	Objects will be clean	Low level disinfection Cleaning (manual or mechanical)

5.2.6 Instrument cleaning process

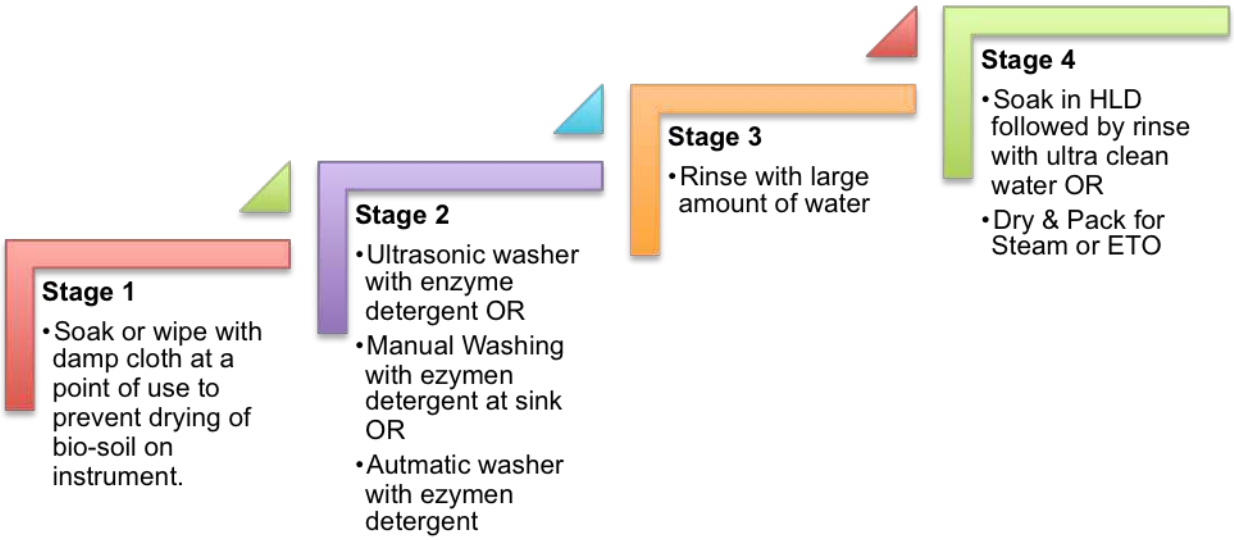
STEP 1 - *Decontamination*

- Decontaminate instruments and other items by placing them in a plastic container of 0.5% Hypochloride solution/Bleaching Solution. Let them soak for 10 minutes. A container of this solution should be kept in every operating theatre and procedure room, so that used items can be place directly into the bucket.
- Users should put instruments and other items into the solution as soon as they are finished using each item. Open or unlock jointed instruments, such as haemostats and scissors. Disassemble those instruments with sliding or multiple parts.
- After 10 minutes, remove the items from the Hypochlorite solution/Bleaching Solution and either rinse with water or clean immediately. Do not leave items in the solution for more than 10 minutes, since excessive soaking in the solution can damage instruments and other items. Always wear gloves when removing instruments and other items from a chlorine solution. Dried out instruments then can be taken for further processing.

STEP 1 has to be performed at User area. All other steps to be performed at CSSD.

STEP 2- *Primary Cleaning*

- Cleaning is the removal of foreign material (e.g., soil, and organic material) from objects and is normally accomplished using water with detergents or enzymatic products.
- Thorough cleaning is required before high- level disinfection and sterilization because inorganic and organic materials that remain on the surfaces of instruments interfere with the effectiveness of these processes.
- If soiled materials dry or bake onto the instruments, the removal process becomes more difficult and the disinfection or sterilization process less effective or ineffective.
- Surgical instruments should be pre-soaked or rinsed to prevent drying of blood and to soften or remove blood from the instruments



5.2.7 Steps of Cleaning

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

Step 1

Decontamination

Soak or wipe with damp cloth at a point of use to prevent drying of bio-soil on instrument.

Step 2

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

Step 3

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

Step 4

Allo**w** items to air-dry (or dry them with a clean towel).

Note: Instruments that will be further processed with chemical solutions must dry completely to avoid diluting the chemicals; items that will be high-level disinfected by boiling do not need to be dried first.

5.2.8 Endoscopes - cleaning and disinfection

1. *Mechanical cleaning:* This is the most important step. Flush the air/water channel for 10-15 seconds to eject any blood or mucus. Aspirate detergent through the biopsy/suction channel to remove gross debris. Use a cleaning brush suitable for the instrument and channel size to brush through the suction channel.
2. *Disinfection:* The endoscope and all internal channels are soaked in 2% Glutaraldehyde for 20 minutes.
3. *Rinsing:* Following disinfection, rinse the instrument internally and externally to remove all traces of disinfectant.
4. *Drying:* Dry the endoscope externally. Flush air through each channel.
5. Store: store the endoscope in a way that prevents recontamination and promotes drying (e.g., hung vertically).
6. *Monitoring : Monitoring* of disinfection procedure of endoscope is done on regular basics (through round sheet) and disinfectant is checked on regular basic.

5.3 Decontamination

This encompasses cleaning, disinfecting and sterilizing of equipment/device:

5.3.1 Decontamination Procedure for Equipment

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

Article	Standard Procedure	Comments
Airways and endotracheal tubes.	Clean with soap and water and Steam sterilization (CSSD) or use disposable.	For heat sensitive tubes use manufactuer's instructions.
Ambu –masks	Single use – disposable or High Level Disinfection.	
Ambubag	Should be cleaned with detergent and water, dried and sterilized.	
Applinator (Tonometer Prisms)	Immersion in 0.05% hypochlorite (500 parts per million available chlorine) for 10 minutes.	A fresh solution should be prepared at the start of each clinic.
Arterial catheters	Sterile, single use only, must be discarded after use.	

Baby equipment feeding bottles & teats	1. Disposable – single use. 2. Re-usable – should be returned to CSSD or washed in hot detergent and water, rinsed and immersed in Milton fluid, freshly made up from tablets according to manufacturer's instructions.	Should be soaked for a minimum of 1 hour.
Baby weighing scales	A fresh liner should be used for each baby. Clean tray as necessary with detergent and water.	If contaminated should be wiped with hypochlorite 1000ppm after washing.
Baby bath	Should be cleaned after each use with detergent and water	
Beds and couches Frame	Should be cleaned with detergent and water between patients and as required	If contaminated with body fluids, see spillage policy. If used in isolation room after cleaning, should be wiped with a disinfectant
Bowls (Surgical)	Return to CSSD	
Bowls (Washing)	Wash with detergent and water and decontaminate with 1% Hypochlorite solution/ bleaching solution, rinse and dry after each use. Store inverted and separated.	
Mattresses and pillows	Should be cleaned with detergent and water between patients and as required	If contaminated with body fluids, the blood spills policy should be implemented. Should not be used if cover is damaged. Contaminated pillows must be discarded. Torn mattress covers must be replaced before mattress is re-used.
Bedpans and urinals	Should be cleaned and disinfected with 0.5% sodium hypochlorite or hot water. It must be ensured that the item is dry before re-use.	

Buckets	Clean with detergent and water and use 0.5 % Bleaching solution for decontamination, rinse and store dry.	
Breast pumps	Should be washed with detergent and water, immersed in sodium hypochlorite, freshly made up from tablets according to manufacturer's instructions.	
Brushes Nail Toilet	1. Disposable – single use. 2. Re-usable-to be returned to CSSD after each use. Should be rinsed well in flush water and stored dry.	Should not be left on sink after use.
Carpets	Vacuum daily	Should be shampooed or steam cleaned in isolation rooms as part of terminal cleans.
Commodes	Seat and arms should be cleaned with detergent and water, and dried.	If soiled or used in isolation, should be wiped with sodium hypochlorite 2% and dried, after cleaning
Couches (examination)	Cover with rubber mat followed by draw sheet between patients. Send to laundry after each day session, and the mattresses are cleaned with soap and water.	
Cradles	Should be cleaned with detergent and water and dried.	
Crockery and cutlery	Should be heat disinfected in dishwasher. If washed in sink with water and detergent	
Curtains	Should be changed as part of a rolling program by domestic services.	Should be changed as part of terminal clean
Denture pots	1. To be cleaned by patients themselves with detergent and water	

	2. Disposable with lid-single use.	
Drainage bottles	1. Disposable – single use 2. Reusable- rinse and return to CSSD	Wash with detergent and water, put jars in the disinfectant solution. Leave for contact time, rinse and store dry, or send to CSSD. Weekly autoclaving or HLD is highly recommended.
Drip Stands	Should be cleaned with detergent and water and dried.	After use in isolation, should be wiped with sodium hypochlorite 2% and dried after cleaning.
Ear Pieces for auroscope	Should be cleaned with detergent and water and dried.	To be returned to CSSD after use in isolation
Earphones	Should be cleaned with detergent and water and dried.	Foam should be replaced after use in isolation.
ECG leads and machines	Wash with detergent and water, then 70% alcohol wipe.	
Leads and monitors	Should be dismantled to smallest components and cleaned with detergent and water and dried.	
Eye protection	Should be cleaned with detergent and water and dried.	For blood splashes blood spillage policy should be followed.
Floors	A damp mop with detergent and water should be used.	For blood splashes blood spillage policy should be followed.
Flower vases	Should be cleaned with detergent and water and dried. Should be stored inverted.	
Furniture	Should be damp dusted with detergent and water.	
Humidifiers	Should be cleaned and sterilized at low temperature.	Drain atleast once each day, clean with detergent and water Refill with sterile water and label the humidifiers or follow Manufacturer's

		instructions. Humidifiers which are not in use should be cleaned and kept dry.
Incubators	Should be cleaned with detergent and water and switch on to dry.	Terminal sterilization with ethylene oxide gas may be required after some infections.
Intravenous monitoring pumps (and feed pumps)	Should be cleaned with detergent and water and dried.	After use in isolation wipe with sodium hypochlorite 2% and dry, after cleaning
Instruments	After single use to be returned to CSSD	
Linen	Should be soaked in hot water, returned to laundry	
Laryngoscope	Decontaminate with 0.5% bleaching solution if blood stained. Clean with detergent and water and HLD is done with glutraldehyde 2%.Bulb of the laryngoscope should be removed and cleaning with spirit swab. For autoclaving return to CSSD.	
Mops	Disposable use for one day. Re-usable to be laundered in washing machine.	Mops must not be stored wet or cleaned in disinfectant solutions.
Peak flow	Disposable – single patient use.	
Nebulizers	Cleaning and low temperature sterilization.	Send for cleaning and reprocessing to CSSD.
Nebulizer Tubing	Send for cleaning and reprocessing to CSSD.	
Pressure relieving devices	Should be clean with detergent and water and dried.	
Proctoscopes	Disposable - single use, re-usables to be rinsed and returned to CSSD.	
Raised toilet seats	Should be cleaned after each use with detergent.	
Razors	Safety – single use disposable Electric – patients own. Razors should not be	

	shared. Detachable head and clean with 70% isopropyl alcohol swab.	
Shaving brush	Should not be used unless supplied by the patients for their own use.	
Skin disinfection	Showers are preferred to bath or bed baths.	
Soap dispensers	Should be cleaned weekly with detergent and water and dried.	
Sphygmo-manometer cuffs	After use in isolation, should be laundered in washing machine.	
Spillages	Should be cleaned with detergent	
Sputum pots	Disposable with close fitting lid. Should be discarded into clinical waste for incineration.	
Stethoscopes	Should be cleaned with detergent and water and dried. Should be wiped with 70% alcohol.	
Suction bottles	Disposal liners. Must be sealed when 75% full and placed in yellow plastic bag. Re-usable (jar and tubings), should be cleaned with 1% sodium hypochlorite and dried. Must be changed daily and in between each patient. To be stored dry when not in use.	Atleast weekly autoclaving of suction jars should be done, wherever applicable. Minimum 1-2% sodium hypocholorite solution should be kept in jar in volume which is 1/10 volume of the jar. After use, add equal quantity of hypocholorite for disinfection at source before discarding the content.
Telephones	To be wiped with 70% alcohol.	
Thermometers	To be covered with disposable sleeve before use and stored dry in individual holder. In	

	between patients, should be cleaned and wiped with 70% isopropyl alcohol (swab). If disposable sleeve not used in between patients, should be washed in general purpose detergent and tepid water then wiped with 70% alcohol (swab). To be stored in individual holder inverted.	
Toilet seats	To be cleaned at least twice daily with detergent	
Toys	Toys should be cleaned with detergent and water and dried.	For isolated patients, toys that cannot be decontaminated to be avoided. Heavily contaminated toys may have to be destroyed.
Trolleys (Dressing)	To be cleaned daily with detergent and water. After each use should be wiped with 70% isopropyl alcohol.	
Urine measuring jugs	To be heat disinfected after each use in bed pan washer.	
Ventilators	Daily cleaning and disinfection of tubing must be done. After 72hrs of use autoclaving should be done for autoclavable tubings. Humidifier water must be changed atleast every 8hrs. Daily autoclaving of humidifiers is recommended where autoclavable.	Heat and moisture exchangers (HMEs) must be changed atleast every 72hours or as per manufacturer's instructions.
Vomit bowls	Contents must be emptied into sluice then rinsed and washed and disinfected with hot water and detergent.	
Walls	Should be cleaned with detergent and water as part	

	of planned preventive maintenance program.	
Wash bowls	Patients must have own dedicated bowl. After each patient's use, should be cleaned with detergent.	
Wheel chairs	Patient's own – should be cleaned with detergent and water as necessary. Hospital – clean between patients with detergent and water	

6. HOUSE KEEPING

6.1 House Keeping In Wards

6.1.1 Patient Care Environment Cleaning

A patient admitted to the hospital can develop infection due to bacteria that survive in the environment. Therefore, it is important to clean the environment thoroughly on a regular basis. This will reduce the bacterial load and make the environment unsuitable for growth of micro-organisms.

i. The floor is to be cleaned at least twice times in 24 hours. Detergent and copious amounts of water are used during cleaning.
ii. The walls are to be washed with a brush, using detergent and water once a week
iii. High dusting is to be done with a wet mop
iv. Fans and lights are cleaned with soap and water once a month.
v. All work surfaces are to be disinfected by wiping with appropriate disinfectant and then cleaned with detergent and water twice a day.
vi. Cupboards, shelves, beds, lockers, IV stands, stools and other fixtures are to be cleaned with detergent and water once a week.
vii. Curtains are to be changed once a month or whenever soiled. These curtains are to be sent for regular laundering. In certain areas, eg. Transplant units and ICUs, more frequent changes are required.
viii. Patient's cot is to be cleaned every week with detergent and water. 1% hypochlorite to be used when soiled with blood or body fluids. In the isolation ward, cleaning is done daily.
ix. Store rooms are to be mopped once a day and high dusted once a week.
x. The floor of bathrooms is to be cleaned with a broom and detergent once a day and then disinfected.
xi. Toilets are cleaned with a brush using a detergent twice a day (in the morning and evening). Disinfection and stain removal solution may be used.
xii. Wash basins are to be cleaned every morning
xiii. Regular AC maintenance is required.

6.1.2 Patient linen

i. Bed linen is to be changed daily and whenever soiled with blood or body fluids.
ii. Patient's gown is to be changed every day and whenever soiled with blood or body fluids.
iii. Dry dirty linen is to be sent to the laundry for regular wash.
iv. Linen soiled with blood or body fluids, and all linen used by patients diagnosed to have HIV, HBV, HCV and MRSA, are send in red bag to the laundry.

6.1.3 Miscellaneous items

i. Kidney basins, basins, bed pans, urinals, etc to be cleaned with detergent and water and disinfected with 0.5% hypochlorite solution.

6.2 House Keeping In The Operation Theatre

i. Theatre complex are absolutely clean at all items. Dust should not accumulate at any region in the theatre.
ii. Soap solution is recommended for cleaning floors and other surfaces. Operating rooms are cleaned daily and the entire theatre complex is cleaned thoroughly once a week.

6.2.1 Environment: STEPS to be followed for maintenance of the housekeeping in O.T.

6.2.1.1 Before the start of the 1st case

Wipe all equipment, furniture, room lights, suction points, OT table, surgical light reflectors, other light fittings, slabs etc with soap or disinfectant solution(2% Bacillocid). This are completed at least one hour before the start of surgery.

6.2.1.2 Between two surgeries

i. Spill - Clean spills with a 0.5% bleaching solution.
ii. Wipe OT table, surgical light reflectors, slabs etc. are disinfected with peroxide based disinfectant (1%) or with available disinfectant solution.
iii. Instrument tables (trolley Mayo stands & other flat surfaces. Wipe all flat surfaces that have come in immediate contact with a patient or body fluids with a disinfectant cleaning solution.
iv. Waste- Collect and remove all waste from the operating room in closed leak proof containers.
v. Sharps containers. Close and remove containers from the operating room when they are three quarters full.

6.2.1.3 After the last case

i. The same procedure as mentioned above is followed and in addition the following are carried out.
ii. Wipe over heads light, cabinets, waste receptables, equipments, furniture with ecoshield.
iii. Wash floor and wet mop with liquid soap and then remove water and wet mop with Bacilloflor solution.
iv. Clean the storage shelves scrub & clean sluice room.

6.2.2 Linen & gloves

Gather all soiled linen and towels in the receptacles provided. Take them to the service corridor (behind the theatre) and place them in trolleys to be taken for sorting. The dirty linen is then sent to the laundry. Use gloves while handling dirty linen.

6.2.3 Instruments

Used instruments are cleaned immediately by the scrub nurse and the Nursing Orderly. Reusable sharps are decontaminated in Lysol / hypochlorite and then washed in the room adjacent to the respective OR by scrubbing with a brush, liquid soap and vim. They are then sent for sterilization in the CSSD. After septic cases the instruments are sent in the instrument tray for autoclaving. Once disinfected, they are taken back to the same instrument cleaning area for a manual wash described earlier. They are then packed and re-autoclaved before use.

6.2.4 Weekly cleaning procedure

1. Remove all portable equipment.
2. Damp wipe lights and other fixtures with detergent.

3. Clean doors, hinges, facings, glass inserts and rinse with a cloth moistened with detergent.
4. Wipe down walls with clean cloth mop with detergent.
5. Scrub floor using detergent and water or Bacilloflor.
6. Stainless steel surfaces – clean with detergent, rinse & clean with warm water.
7. Replace portable equipment: Clean wheel castors by rolling across towelling saturated with detergent.
8. 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)
9. After washing floors, allow disinfectant solution to remain on the floor for 5 minutes to ensure destruction of bacteria (Bacilloflor)

6.2.5 Maintenance and Repairs

1. Machinery and equipment are checked, cleaned and repaired routinely
2. Urgent repairs are carried out at the end of the days list
3. Air conditioners and suction points are checked, cleaned and repaired on a weekly basis.
4. Preventive maintenance on all theatre equipment to be carried out weekly and major work to be done at least once every year.

6.3 Moping Schedule for Various Departments

6.3.1 ICU, Dialysis, HDU: Floors should be mopped in atleast each shift with detergent and water.

6.3.2 **OPD, LABS and Wards:** Floor should be moped atleast thrice daily with soap and water. Continous mopping may be required at places with heavy foot fall.

6.3.3 **CSSD:** Floor should be moped atleast twice daily with soap and water.

6.3.4 **OT:** Floors should be moped with soap and water after all surgeries are done. Triple bucket mopping between every case should also be done.

6.3.5 **Toilets:** In all areas must be clean regularly based on the foot falls, should be pest free and free of any offensive odour. Urinal cakes must be available one the times. Liquid soap, preferably with foot dispensers must be available all the times. Floors should be kept dry all the times. Posters encouraging hand hygiene and personal hygiene should be available at all the hand washing station across the hospital. House keeping check list should be availble in the toilets duly signed by house keeping staff and supervisor.

Note: Phenyl must not be used for mopping of floors.

6.4 Bio-Medical Waste collection schedule

1. Segregated BMW is collected atleast twice daily from each departments except laboratories.
2. In laboratories BMW is collected atleast three times in a day.

7. BIOMEDICAL WASTE MANAGEMENT

Biomedical Waste management policy at the hospital has been implemented in accordance with the-Biomedical Waste Management Rules 2016.

7.1 Environmental Protection Act, 1986

The Government of India (GOI) enacted the Environmental Protection Act, 1986, (EPA) under Article 253 of the Constitution. The purpose of this Act is to serve as an "umbrella" legislation designed to provide a framework for central government coordination for the activities of various established central and state authorities. As this is an "umbrella" and all-encompassing legislation, this is relevant to the health sector activities as well. There are rules/notifications that have been brought out under this Act, which are directly relevant to the health sector.

7.2 Bio-Medical Waste Management Rules, 2016

Under the Environmental Protection Act, the Bio-Medical Waste Management Rules were notified on 28th March 2016 by MOEF & CC. These Rules are directly relevant to the health sector. The salient features of these Rules are as follows:

a. **Bio-medical waste** means waste that is generated during the diagnosis, treatment or immunization of human beings or animals or in research activities pertaining thereto or in the production or testing of biological or in health camps , includingthe categories mentioned in schedule I appended to these rules
b. **Applicaton** : These rules are applicable to all the persons who generate, collect, receive, store, transport, treat, dispose or handle bio medical waste in any form including hospitals, nursing homes, clinics, dispensaries, veterinary institutions, animal houses, pathological laboratories, blood banks, Ayush hospitals, clinical establishments, research or educational institutes, health camps, medical or surgical camps, vaccination camps, blood donation camps, first aid rooms of schools, forensic laboratories and research labs.
c. These BMW Rules 2016 shall NOT apply to
    a) Radioactive waste
    b) Hazardous Chemicals
    c) Solid Wastes
    d) Lead acid batteries
    e) Hazardous waste
    f) E waste
    g) Hazardous microorganisms, genetically engineered microorganisms.
d. ***Authorisation*** *: refers to permission granted by prescribed authority(DPCC) to generate, collect, receive , store, transport, treat, process, dispose or handle biomedical waste in accordance with these rules and the guidelines issued by the central government or Central Pollution Control Board as the case may be*
e. ***Occupier*** *: refers to a person having administrative control over the institution and the premises*
f. **I**t is the duty of every occupier of an institution generating bio-medical waste which includes a hospital, nursing home, clinic, dispensary, veterinary institution, animal house,

pathological laboratory, blood bank by whatever name called to take all steps to ensure that such waste is handled without any adverse effect to human health and the environment.

g. **Legal Aspects** : MO/IC Bio Medical waste Management shall be responsible for timely followup of legal compliance.

Consent to Establish (CTE) :
– once, only, initially for 1 year, from DPCC
Consent to Operate (CTO) :
– After CTE , every 5 years, from DPCC
Authorization :
- Every 3 years, Apply in FORM II , from DPCC
Noise Monitoring Certificate :
- for DG Sets, from DPCC approved labs
Flue Gas Analysis :
- for DG Sets, Boilers chimneys etc., from DPCC approved labs
Effluent Analysis :
- from DPCC approved labs

7.3 Objectives

1. To prevent infection by maintaining good hygiene and sanitation.
2. To protect the patient, patient attendants and all health care personnel from avoidable exposure to infection.
3. To prevent injuries and other health hazards from biomedical waste
4. To prevent environmental pollution.
5. To manage waste in a clean, healthy, economical and safe manner.
6. To minimize waste

7.4 Steps in Waste Management

1. Segregation
2. Pretreatment
3. Collection
4. On-siteTransportation
5. Storage.
6. Off-site transport
7. Final disposal

7.4.1 Segregation, & Pretreatment

i. Segregation is done at source. ***It is responsibility of generator of waste to discard the waste in appropriate bins. E.g. If cannulation is done by doctor/nurse that doctor/nurse shall be responsible for removal of the waste from patient side to the appropriate bins.***

ii. Bio-Medical waste should not be mixed with other wastes.

iii. A colour code as per schedule I of BMW Rules (detailed below) is followed.

iv. Appropriately colour coded waste bags are placed in colour coded bins in all patient care areas near the points of generation.

v. Bags and containers are marked with biohazard symbol as per schedule IV of BMWM rules 2016. ***The labels should be affixed to the bags at the time for inserting new bags in the bins (before starting the usage of the bags).***

vi. Liquid chemical waste shall be segregated at source and shall be pretreated or neutralised prior to mixing with other effluent generated from the hospital.

vii. Dead Fetus below the viability period (as per MTP Act 1971 and amendments) can be considered as anatomical waste. Such may be handed over to CBWTF in yellow bag with a copy of official MTP Certificate from the Obstretician or Medical Superintendant of hospital.

viii. Microbiology waste & other clinical laboratory waste, blood samples & blood bags shall be pretreated through non-chlorinated disinfection or sterilisation (autoclaving) on-site, as per the WHO or NACO guidelines. ***All the read bags and yellow bags generated from laboratories should be autoclaved in waste sterilizer (autoclave) before handing over to the outsourced agency.***

ix. Syringes shall be mutilated and needles shall be cut and then stored in tamper proof, leakproof and puncture resistant sharp containers.

7.4.2 Collection

i. Bags are packed when ¾ full .

ii. Waste bags are tightly closed or sealed at neck when removed from the containers for safe and easy handling by waste handlers.

iii. Labelling of all the bags with predesigned labels specified in schedule IV with information including hospital name, patient care unit name, date and weight is done before usage of bags.

iv. Bar code & Global Positioning system shall be added by the hospital as per the directions of competent authorities as soon as available. ***When available, barcode printing shall be done in the hospital stores at the time of indenting of BMW bags by patient care units. These can be affixed along with BMW labels described above.***

v. Waste from various patient care areas is collected daily or more frequently as required.

vi. The staff is provided with personal protective equipment (PPE).

7.4.3 Storage

i. A Biomedical waste storage location is designated inside the health care establishment, away from patient care area & kitchen.

ii. This temporary storage site shall be secured & locked, well ventilated, have a biohazard sign visible from a distance and have access to transportation vehicle from CBWTF.

iii. The storage room shall have a pucca floor with its level above the ground level.

iv. The waste bags should not be stored on the floor. There should be either trolleys or shelves for this purpose.

v. Red and Yellow bags should be stored separately.

vi. There shall be provision of washing in the storage area and the waste trolleys to be washed after each emptying.

vii. Drainage of Storage area to be connected with ETP / STP
viii. Untreated human anatomical waste, animal waste, soiled waste, Biotechnology waste shall not be stored for more than 48 hours.

7.4.4 Transportation

7.4.4.1 On-site transportation

i. The bags are transported by the housekeeping department at defined timings via defined routes. (Avoid heavy footfall areas)
ii. The bags are transported to the central waste receiving terminal in colour coded covered trolleys with biohazard signage.
iii. The trolleys should be leakproof, without any sharp edges, easily washable with provision for drainage of washing water and wheels & handles for easy transportation by waste handler.
iv. Avoid the transport of too many bags at one time and contact of the bag with the body of personnel. ***The trolley should not be overfilled and trolley cover should snugly fit to cover the bags in trolley appropriately.***
v. ***The personnel involved in handling and transporting the biomedical waste bag should wear appropriate PPE which includes atleast three ply surgical mask, red rubber gloves, plastic gown with sleeves and shoes. When handling liquid waste goggles/faceshield also should be worn.***
vi. ***All patient care units shall record the weight of all categories of waste handed over to the waste collectors and should bear the name, signature, date and time of waste handover.***

7.4.4.2 Off-site Transportation

i. The operator of common bio-medical waste treatment facility shall transport the biomedical from the premises of an occupier to the authorised off- site CBWTF.
ii. Only authorized vehicle shall be used to transport BMW from the premises of occupier to off-site CBWTF
iii. The vehicle shall have the label & information as specified in part 'A' & part 'B' of schedule IV
iv. The vehicle shall comply with the conditions stipulated by DPCC as well as requirements contained in Motor Vehicle Act, 1988, if any or the rules made thereunder for transportation of such infectious waste.
v. Waste shall be weighed and handed over under supervision of a designated hoslpital staff.
vi. A record of vehicle registration no.,date & time and quantum of waste handed over shall be maintained

7.4.5 Final Treatment & Disposal

i. No final treatment or disposal of biomedical waste is done within the hospital premises.
ii. This is undertaken by an outsourcing agency (CBWTF) authorised by DPCC in accordance with schedule I of BMWM rules 2016

iii. In case of non collection of BMWM for final treatment & disposal by the operator within the intended time, Prescribed authority (DPCC & DGHS) shall be informed immediately.

iv. Treatment and disposal of liquid waste shall be done in accordance with water T/t & disposal of liquid waste as per Water act, 1974

v. For liquid chemical waste, occupier should ensure a separate collection system leading to Effluent Treatment Plant. The combined liquid discharge shall conform tothe discharge norms given in schedule III.

vi. If liquid chemical waste can not be connected to ETP, then it should be handed over to CBWTF operator

vii. Residual or discarded chemical wastes, used or discarded disinfectants, chemical sludge to be sent to Hazardous Waste treatment, storage & disposal facility shall be sent through CNWTF only.

7.4.6 Disposal of Contaminated Needles and Syringes (Refer Injection safety chapter 22)

Contaminated needles are burnt in needle destroyer and the trays are emptied in sharps container when use of needle destroyer is possible. Contaminated needle are disposed of by placing them uncapped into a puncture resistant container. Containers are closed and are handed over to the medical wa\ste disposal contractors.

7.5 SCHEDULE I (categories of waste)

SCHEDULE I

Biomedical wastes categories and their segregation, collection, treatment, processing and disposal options

Category Type of Waste Type of Bag or Container to be used Treatment and Disposal options (1) (2) (3) (4)

Category	Type of Waste	Type of Bag or Container to be used	Treatment and Disposal options
1	2	3	4
YELLOW	**(a) Human Anatomical Waste:** Human tissues, organs, body parts and fetus below the viability period (as per the Medical Termination of Pregnancy Act 1971, amended from time to time).	Yellow coloured non-chlorinated plastic bags	Incineration or Plasma Pyrolysis or deep burial*
	(b) Animal Anatomical Waste : Experimental animal carcasses, body parts, organs, tissues, including the waste generated from animals used in experiments		

	or testing in veterinary hospitals or colleges or animal houses.		
	(c) Soiled Waste: Items contaminated with blood, body fluids like dressings, plaster casts, cotton swabs and waste to be sent for energy recovery.		Incineration or Plasma Pyrolysis or deep burial* In absence of above facilities, autoclaving or micro-waving/ bags containing residual or discarded blood and blood components. hydroclaving followed by shredding or mutilation or combination of sterilization and shredding. Treated waste to be sent for energy recovery.
	(d) Expired or Discarded Medicines: Pharmaceutical waste like antibiotics, cytotoxic drugs including all items contaminated with cytotoxic drugs along with glass or plastic ampoules, vials etc.	Yellow coloured non-chlorinated plastic bags or containers	Expired `cytotoxic drugs and items contaminated with cytotoxic drugs to be returned back to the manufacturer or supplier for incineration at temperature >1200°C or to common bio-medical waste treatment facility or hazardous waste treatment, storage and disposal facility for incineration at >1200°C Or Encapsulation or Plasma Pyrolysis at >1200°C. All other discarded medicines shall be either sent back to manufacturer or disposed by incineration.
	(e) Chemical Waste: Chemicals used in production of biological and used or discarded disinfectants.	Yellow coloured containers or non-chlorinated plastic bags	Disposed of by incineration or Plasma Pyrolysis or Encapsulation in hazardous waste treatment, storage and disposal facility.
	(f) Chemical Liquid Waste : Liquid waste generated due to use of chemicals in production of biological and used or discarded disinfectants, Silver X-ray film developing liquid, discarded Formalin, infected secretions, aspirated body fluids**,** liquid from laboratories and floor washings, cleaning, house-keeping and disinfecting activities etc.	Separate collection system leading to effluent treatment system	After resource recovery, the chemical liquid waste shall be pre-treated before mixing with other wastewater. The combined discharge shall conform to the discharge norms given in Schedule-III.

	(g) Discarded linen, mattresses, beddings contaminated with blood or body fluid.	Non-chlorinated yellow plastic bags or suitable packing material	Non- chlorinated chemical disinfection followed by incineration or Plasma Pyrolysis or for energy recovery. In absence of above facilities, shredding or mutilation or combination of sterilization and shredding. Treated waste to be sent for energy recovery or incineration or Plasma Pyrolysis.
	(h)Microbiology, Biotechnology and other clinical laboratory waste: Blood bags, Laboratory cultures, stocks or specimens of microorganisms, live or attenuated vaccines, human and animal cell cultures used in research, industrial laboratories, production of biological, residual toxins, dishes and devices used for cultures.	Autoclave safe plastic bags or containers	Pre-treat to sterilize with nonchlorinated chemicals on-site as per National AIDS Control Organisation or World Health Organisation guidelines thereafter for Incineration.
RED	**Contaminated Waste (Recyclable)** (a) Wastes generated from disposable items such as tubing, bottles, intravenous tubes and sets, catheters, urine bags, syringes (without needles and *fixed needlesyringes*) and vaccutainers with their needles cut) and gloves.	Red coloured non-chlorinated plastic bags or containers	Autoclaving or micro-waving/ hydroclaving followed by shredding or mutilation or combination of sterilization and shredding. Treated waste to be sent to registered or authorized recyclers or for energy recovery or plastics to diesel or fuel oil or for road making, whichever is possible. Plastic waste should not be sent to landfill sites.
WHITE (TRANSLUCENT)	**Waste sharps including Metals:** Needles, syringes with fixed needles, needles from needle tip cutter or burner, scalpels, blades, or any other contaminated sharp object that may cause puncture and cuts. This includes both used, discarded and contaminated metal sharps	Puncture proof, Leak proof, tamper proof containers	Autoclaving or Dry Heat Sterilization followed by shredding or mutilation or encapsulation in metal container or cement concrete; combination of shredding cum autoclaving; and sent for final disposal to iron foundries (having consent to operate from the State Pollution Control Boards or Pollution Control Committees) or sanitary landfill or designated concrete waste sharp pit.
BLUE	**(a) Glassware:**	Cardboard boxes with	Disinfection (by soaking the

	Broken or discarded and contaminated glass including medicine vials and ampoules except those contaminated with cytotoxic wastes.	blue colored marking	washed glass waste after cleaning with detergent and Sodium Hypochlorite treatment) or through autoclaving or microwaving or hydroclaving and then sent for recycling.
	(b) Metallic Body Implants	Cardboard boxes with blue colored marking	

Notes:

(1) Chemical treatment using at least 1% hypochlorite solution or any other equivalent chemical reagent. It must be ensured that chemical solution has adequate strength to disinfect all the time during the chemical treatment.

(2) Mutilation/shredding must be such that so as to prevent unauthorized reuse.

(3)There will be no chemical pretreatment before incineration. Chlorinated plastics/bags shall not be incinerated.

(4) Disposal of bio-medical waste by deep burial shall be prohibited in Towns and Cities. Disposal by deep burial is permitted only in rural areas where there is no access to common bio-medical waste treatment facility, with prior approval from the prescribed authority. The deep burial facility shall be located as per provisions and guidelines issued by Central Pollution Control Board from time to time.

(5) Liquid waste generated from laboratory, washing, cleaning, house keeping and disinfecting activities shall be treated along with other effluent generated from premises of the occupier or the facility operator so as to meet the discharge standards stipulated under these rules.

(6) Incineration ash (ash from incineration of any bio-medical waste) shall be disposed through secured landfill, if toxic or hazardous constituents are present beyond the prescribed limits as given in the Hazardous Waste (Management, Handling and Transboundary Movement) Rules, 2008.

All upcoming Common Bio-medical Waste Treatment Facilities having incineration facility or captive incinerator shall comply with standards for dioxins and furnas.

7.6 SCHEDULE IV (Label)

Based on SCHEDULE IV

[See rule 8(3) and (5)]

Part A

LABEL FOR BIO-MEDICAL
WASTE CONTAINERS or BAGS

CYTOTOXIC HAZARD SYMBOL

HANDLE WITH CARE HANDLE WITH CARE

Part B

LABEL FOR TRANSPORTING BIO-MEDICAL WASTE BAGS OR CONTAINERS

Date of generation: Day ..... Month .....Year .....

Waste category Number .....

Waste quantity…… Kg

Sender's Name and Address : Receiver's Name and Address:

Phone Number ..... Phone Number .....

Fax Number..... Fax Number .....

Contact Person ..... Contact Person .....

In case of emergency please contact :

Name and Address :

Phone No.

Note :Label shall be non-washable and prominently visible.

7.7 Equipments & Materials

i. Colour coded non-chlorinated plastic bags: Yellow and Red with biohazard symbol
ii. Colour coded non-chlorinated plastic bins: Yellow and Red with lids, with biohazard symbol
iii. Colour coded waste trolleys: Yellow and Red with lids and wheels ***(With bearings – noiseless)***, with biohazard symbol,
iv. Syringe and Needle mutilators.
v. Sharp Containers: Leak proof, Tamper proof, Puncture resistant, white translucent with biohazard symbol.
vi. Sharp Containers: Puncture proof Cardboard boxes with blue coloured markings, with biohazard symbol
vii. Autoclave for pretreatment of lab waste.
viii. PPE (caps, masks, heavy duty gloves, plastic aprons full sleeves, shoes/rubber boots, protective goggles).
ix. Disinfectants (Sodium hypochlorite others as per NACO/ WHO guidelines)
x. Labels as per schedule IV, washproof, self adhesive.

7.8 Biomedical Waste Management Cell

7.8.1 Terms of Reference:

Biomedical Waste Management cell is responsible for handling all the procedural issues including legal aspects, correspondence, compilation and timely submission of monthly / quarterly / annual reports, timely submission of applications to prescribed authorities, replies to RTIs / PQs / Showcause notices (if any), compilation and analysis of data, internal correspondence, planning for regular inhouse trainings and its records, planning regular BMWM Committe meetings and to eep arecord of the minutes, analysis and distribution of logistics etc.

7.8.2 Budget

There should be a separate budget head for BMW Management.
(the budget shall include consumables like BMW bags and bins, BMW trolleys, PPEs, Sharp containers, Needle destroyers, Hand rubs, Disinfectents etc.). Budgetary provisions for trainings including training materials, tools, IEC, resource persons must be allocated.

7.6.3 Composition :

a. Nodal Officer BMWM (In-charge)
b. BMWM Nurse (Liasion Nurse)
c. Clerk
d. Peon / Multitasking Worker

7.9 Biomedical Waste Management Committee

Waste Management committee is responsible for making Hospital specific action plan for hospital waste management and its implementation,supervision and monitoring.

7.9.1 Terms of Reference

i. To seek a commitment from Management to comply with all relevant Legislation (Delhi State Pollution Control Board and Biomedical Waste Management Handling Rules)

ii. To conduct a waste audit and prepare a comprehensive report of current waste generation, segregation, handling, storage and disposal practices and costs
iii. To *monitor* use of appropriate Personal Protective equipment and offer staff vaccinations
iv. To develop spill management strategies for all waste categories and provide regular training to the health care workers. Monthly mock drills should be conducted in different patient care units and recrds of the mock drills should be mainatained by Nodal Officer BMWM.
v. To implement an ongoing waste management training program which caters for all staff.
vi. To promote waste management principles throughout hospital (signs, posters, notice boards, bulletins, etc.)
vii. To monitor & improve waste segregation.
viii. To liaise with the corporation authorities and private waste contractors with regard to the transport and disposal of waste external to the hospital.
ix. To conduct a Waste Management Audit annually and review the Waste Management Plan
x. To conduct on-going audits of waste.
xi. The findings of drills and audits alonwith training details should be presented periodically during HICC meetings.

7.9.2 Composition of the Committee

i. Medical superintendant / Medical Director – Chairperson
ii. Nodal Officer BMWM – Member secretary
iii. Infection Control Officer (ICO)
iv. Clinical In-charges major clinical departments (Medicine, Surgery/Ortho., Obs & Gyn etc.)
v. Officer In-charge Housekeeping Services
vi. Officer In-charge Stores (Consumables, Nonconsumables, Drugs)
vii. Purchase Officer
viii. Officer In-charge PWD
ix. EE/AE/JE PWD(Electrical)
x. EE/AE/JE PWD(Civil)
xi. Nursing Director/NS/DNS/ANS (senior most)
xii. Nurse Incharge BMWM (Liason Nurse)
xiii. Safety/ sanitory Officer

The Committee is represented at the Hospital Risk Management and Safety Committee and/or Hospital infection Control Committee, where progress reports are made at each meeting. Minutes of the meeting are maintained.

7.9.3 Meetings

1. The Group or committee will meet atleast quarterly or more frequently, if necessary.
2. This committee shall liaison & coordinate with HICC.

3. Minutes of meeting (at least 6 monthly) shall be submitted to DPCC along with Annual report

7.10 Record keeping

7.10.1 Daily Record: Date, Time, Weight, Number of bags

a. At the point of generation
b. At the time of collecton
c. At the time of handing over for transport to CBWTF

7.10.2 Monthly Report

1. To be compiled by Liasion Nurse in proforma provided by DPCC & DGHS

7.10.3 Quarterly Report

1. To be compiled by BMW Cell in proforma provided by DGHS

7.10.4 Annual report

1. Every occupier/operator shall submit an annual report to the prescribed authority (DPCC)
2. To be submitted in the prescribed format (FORM IV)
3. To be submitted by 30th June of next year
4. Details of trainings of staff, accidents, minutes of BMWM Committee meetings to be sent alongwith the annual report.

7.11 Trainings and IEC

All categories of staff & HCW handling BMW should be carried out at least:

1. At the time of induction and at lest once in 6 months thereafter.
2. Record of the trainings to be maintained and submitted with Annual Report to DPCC.
3. IEC material / posters to be displayed at strategic points (nursing stations, treatment rooms, OTs, LRs,Labs, Injection rooms, OPDs, ICUs,HDUs etc.)

7.12 Safety Considerations

7.12.1 Accident Reporting

1. All the staff including housekeeping staff should be sensitized for prompt reporting of all the Accidents and incidents including near misses, spillages, damaged containers, torn bmw bags, inappropriate segregation, needle stick / sharps injury etc.
2. All the accidents should be reported in FORM I of BMWM rules.
3. A record of all the accidents / incidents shall be maintained by BMWM Nurse.
4. Accident record shall be submitted to DPCC alongwith the annual report.

7.12.2 Health Checkups & immunisation

1. At the time of joining & At least once a year thereafter including ocupational safety.
2. Immunisation (Hepatitis B, Tetanus) of all the categories of staff.
3. Record to be maintained & submitted to DPCC with Annual report and regular updates must be provided to HIC Department.
4. Availability of Post Exposure Prophylaxis round the clock.

7.13.3 Waste Audits and Waste Tracking

1. Waste Audit to be conducted by BMWM Committee once in 3 months

2. Waste Tracking
    i. Tracking of the BMWM vehicle from the occupier facility till the CBWTF in an unidentified vehicle
    ii. Should be done by members of BMWM committee.
    iii. Should be done once in 3-6 months.
    iv. Records of Waste Tracking should be maintained and irregularity if found , should be immediately reported to DPCC and HIC department.

7.13 DISPOSAL OF CYTOTOXIC WASTES

The proper identification and disposal of potentially infectious hazardous waste is essential to prevent infection and injury to patients, clinical and custodial staff and persons in the community
Hazardous effect on health care workers during preparation and administration of cytotoxic drugs

Acute Health Effects

- Irritation to the skin, eyes & mucous membrane
- Light headedness
- Nausea

Chronic Health Effects

- Miscarriage in Pregnant Staff
- Birth defects
- Low birth weight

Handling and administration of cytotoxic drugs.

Handling and administration of cytotoxic drug should be done by trained staffs identified in designated departments where chemotherapy is administered.

Use of PPE
Proper PPE (Cap gloves, apron goggles, mask) should be worn while preparation and administration of cytotoxic drugs.
Disposal of non infected cytotoxic drugs
All the non infected cytotoxic wastes should be discarded separately in yellow bin with cytotoxic label.
Disposal of infected Cytotoxic Wastes
All the infected cytotoxic wastes (syringes and IV tubings and cannula) stained with blood should be discarded separately in yellow bin with cytotoxic label.
Sharps disposal
Sharps, needles contaminated with cytotoxic drugs should be discarded in separate sharp box with cytotoxic label.

WARD SISTER'S BMW RECORD SHEET

WARD NO._____DEPARTMENT OF_____

DATE & TIME					WEIGHT OF BAGS						NAME & SIGN OF NURSING STAFF	
	RED		YELLOW		SHARP CONTAINER				BLACK			
					White translucent		Blue					
	No.	Wt.	No.	Wt	No.	Wt.	No.	Wt.	No.	Wt.		

IT IS MANDATORY TO DEPOSIT THIS DOCUMENT TO THE DEPARTMENT OF SANITATION, HK & BMWM AT THE END OF EVERY MONTH

SIGN OF NURSING STAFF

Form - IV

(See rule 13)

ANNUAL REPORT

[To be submitted to the prescribed authority on or before 30th June every year for the period from January to December of the preceding year, by the occupier of health care facility (HCF) or common bio-medical waste treatment facility (CBWTF)]

Sl. No.	Particulars		
1.	Particulars of the Occupier :	:	
	(i) Name of the authorised person (occupier or operator of facility)	:	
	(ii) Name of HCF or CBMWTF	:	
	(iii) Address for Correspondence	:	
	(iv) Address of Facility		
	(v)Tel. No, Fax. No	:	
	(vi) E-mail ID	:	
	(vii) URL of Website		
	(viii) GPS coordinates of HCF or CBMWTF		
	(ix) Ownership of HCF or CBMWTF		(State Government or Private or Semi Govt. or any other)
	(x). Status of Authorisation under the Bio-Medical Waste (Management and Handling) Rules	:	Authorisation No.: …… ……..valid up to ……..
	(xi). Status of Consents under Water Act and Air Act	:	Valid up to:
2.	Type of Health Care Facility :		
	(i) Bedded Hospital	:	No. of Beds:…..
	(ii) Non-bedded hospital (Clinic or Blood Bank or Clinical Laboratory or Research Institute or Veterinary Hospital or any other)	:	
	(iii) License number and its date of expiry		
3.	Details of CBMWTF :		
	(i) Number healthcare facilities covered by CBMWTF	:	
	(ii) No of beds covered by CBMWTF	:	

	(iii) Installed treatment and disposal capacity of CBMWTF:	:	_____ Kg per day
	(iv) Quantity of biomedical waste treated or disposed by CBMWTF	:	_____ Kg/day
4.	Quantity of waste generated or disposed in Kg per annum (on monthly average basis)	:	Yellow Category :
			Red Category :
			White:
			Blue Category :
			General Solid waste:
5.	Details of the Storage, treatment, transportation, processing and Disposal Facility		
	(i) Details of the on-site storage Facility	:	Size : Capacity : Provision of on-site storage : (cold storage or any other provision)
	(ii) Quantity of recyclable wastes sold to authorized recyclers after treatment in kg per annum.	:	Red Category (like plastic, glass etc.)
	(iv) No of vehicles used for collection and transportation of biomedical waste	:	
	(v) Details of incineration ash and ETP sludge generated and disposed during the treatment of wastes in Kg per annum		Quantity generated Where disposed
	(vi) Name of the Common Bio- Medical Waste Treatment Facility Operator through which wastes are disposed of	:	
	(vii) List of member HCF not handed over bio-medical waste.		
6.	Do you have bio-medical waste management committee? If yes, attach minutes of the meetings held during the reporting period		
7.	Details trainings conducted on BMW (i) Number of trainings conducted on BMW Management.		
	(ii) number of personnel trained		
	(iii) number of personnel trained at the time of induction		
	(iv) number of personnel not undergone any training so far		
	(v) whether standard manual for training is available?		
	(vi) any other information)		

8.	Details of the accident occurred during the year		
	(i) Number of Accidents occurred		
	(ii) Number of the persons affected		
	(iii) Remedial Action taken (Please attach details if any)		
	(iv) Any Fatality occurred, details.		
9.	Are you meeting the standards of air Pollution from the incinerator? How many times in last year could not met the standards?		
	Details of Continuous online emission monitoring systems installed		
10.	Liquid waste generated and treatment methods in place. How many times you have not met the standards in a year?		
11.	Is the disinfection method or sterilization meeting the log 4 standards? How many times you have not met the standards in a year?		
12.	Any other relevant information	:	(Air Pollution Control Devices attached with the Incinerator)

Certified that the above report is for the period from
……
……
……

Name and Signature of the Head of the Institution

Date:
Place

FORM – I
ACCIDENT REPORTING
1. Date and time of accident :
2. Type of Accident :
3. Sequence of events leading to accident :
4. Has the Authority been informed immediately :
5. The type of waste involved in accident :
6. Assessment of the effects of the accidents on human health and the environment:
7. Emergency measures taken :
8. Steps taken to alleviate the effects of accidents :
9. Steps taken to prevent the recurrence of such an accident :
10. Does you facility has an Emergency Control policy? If yes give details:
Date : …… Signature …….
Place: …… Designation ……..

8. SHARPS MANAGEMENT, SHARP INJURIES AND POST EXPOSURE PROPHYLAXIS

Safe handling and disposal of sharps is a vital component of the Standard Precautions approach to reduce the risk of transmission of blood borne virus.

8.1 Good practice involves

i. Correct assembly of the sharps container with proper size opening.
ii. Labelling of the container upon assembly as "SHARP CONTAINER "with Biohazard symbol and department name.
iii. Sharps container should not be more than two thirds full.
iv. Sharps containers are properly sealed before sending it for final segregation.
v. Being aware of the first aid treatment following a needle-stick injury.
vi. Being aware of the follow up treatment after a used needle-stick injury.

8.2 Disposal of Sharps

i. An adequate number of sharps containers, are located and conveniently placed in clinical areas.
ii. Ensure that the sharps containers have been assembled correctly.
iii. Make sure the department's name is identified on the sharps bin.
iv. It is the responsibility of the person using the sharp to dispose of it safely.
v. Sharps (needles, scalpel blades, razor blades and glass ampoules etc) are placed directly into a container.
vi. Whenever possible, take a sharps bin to the point of use.
vii. Needle must not to be recapped, bent or broken.
viii. If it is necessary to disassemble a needle and syringe, such as before transferring blood from a syringe to a pathological specimen bottle, the needles are placed in the sharps container before transferring the blood.
ix. Sharps containers are sealed closed when two-thirds to three-quarters full.
x. Sharps containers when carried are held away from the body.
xi. Use needle safety devices where there are clear indications that they will provide a safer system of working.
xii. Needle collection tray in needle destroyer must be emptied in the morning by the coming nursing staff or more frequently if required. It should never be overfilled
xiii. Stray sharps should not be present.

8.3 Sharp injuries

This part is designed as guidance for all Health Care Workers in handling needle-stick injuries and exposure to blood and body fluids. An exposure that might place HCW at risk for HBV, HCV, or HIV infection is defined as:

- **Sharp Injury**-a percutaneous injury (e.g , a needle stick injury (NSI) or cut with a sharp object

- **Blood and body fluid exposure (BBF)-**Contact of mucous membrane or non-intact skin (e.g, exposed skin that is chapped, abraded or affected with dermatitis) – Contact with blood, tissue, or other body fluids that are potentially infectious
- **Contamination, from an Infected Known or Highly Suspected Person to another recipient the risks are:**
    - Hepatitis B virus 1:3
    - Hepatitis C virus 1:30
    - Human Immunodeficiency Virus 1:300

It has been estimated that the risk of acquiring HIV through mucous membrane exposure splashed with contaminated body fluids is much less (probably 1 per 1000 injuries) 0.1%.

8.3.1 Main Risks From Needle-Stick Injury And Blood Contamination

The main concern is the transmission of bloodborne viruses, i.e.

- HEPATITIS B (HBV)
- HEPATITIS C (HCV)
- HUMAN IMMUNODEFICIENCY VIRUS (HIV)

8.4 Body fluids likely to be infectious

There is more experience of occupational exposure in the health care situation and in these circumstances the **highest risk** of transmission is from exposure to **liquid blood**. The risk is lower for other body fluids or body tissues from an infected patient.

Those, which represent a lower risk are:

- Cerebrospinal Fluid.
- Peritoneal Fluid, Pleural Fluid, Pericardial Fluid, Synovial Fluid, Amniotic Fluid
- Semen.
- Vaginal Secretions.
- Breast Milk.
- Any other body fluid containing visible blood, eg saliva.
- Bleeding gums in association with bites.
- Unfixed tissues and organs, ie those which have not been preserved in formalin.

8.5 Risks from Injuries

The risk of transmission is higher (particularly for HIV) when there is:

1. A deep injury, i.e. when the injury is deeper than a superficial scratch drawing blood.
2. Visible blood on the device that caused the injury (including teeth).
3. Injury with a needle that had come from the source patient's artery or vein.
4. Terminal HIV related illness in the source patient.

8.5.1 When does NSI Occur?

- Recapping needles (Most important)
- Performing activities involving needles and sharps in a hurry
- Handling and passing needles or sharp after use

- Failing to dispose of used needles properly in puncture-resistant sharps containers
- Poor healthcare waste management practices
- Ignoring Universal Work Precautions

Infections transmitted by NSI / BBF

Blastomycosis	Hepatitis B	Malaria	*S. aureus*
Brucellosis	Hepatitis C	Mycobacteriosis	*S.pyogenes*
Cryptococcosis	Herpes	Mycoplasmosis	Syphilis
Diphtheria	HIV	Scrub typhus	Toxoplasmosis
Ebola fever	Leptospriosis	Tuberculosis	Gonorrhoea
Rocky mountain fever			

8.6 Management of the exposed site

8.6.1 First Aid

For skin – if the skin is broken after a needle stick or sharp instrument:

- Immediately wash the wound & surrounding skin with water & soap and rinse.
- Do not scrub.
- Do not use antiseptics or skin scrub (bleach, chlorine, alcohol, betadine)

After a splash of blood or body fluid:

- Wash the affected area immediately
- Do not use antiseptics.

For the eye:

- Irrigate the 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 lenses, leave them in place while irrigating, as they form a barrier over the eye and will help to protect it. Once the eyes cleaned, remove the contact lense and clean them in normal manner. This will make them 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 split 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.

8.6.2 Summary of do's & dont's

DO	DON'T
Remove gloves, if appropriate	• Do not panic
Wash the exposed site thoroughly with running water	• Do not put pricked finger in mouth

Irrigate with water or saline if eyes or mouth have been exposed	• Do not squeeze wound to bleed it
Wash the skin with soap and water	• Do not use bleach, chlorine, alcohol, betadine, iodine or any antiseptic or detergent
Note: Do consult the designated physician immediately as per institutional guidelines for management of the occupational exposure. Report all needle stick injuries to unit head / casualty medical officer. Fill the requisite proforma and send blood sample to microbiology laboratory for testing of HIV / HBsAg / HCV after pre-test counseling and consent of both patient and health care worker.	

8.6.3 Establish eligibility for PEP

The HIV sero-conversion rate after an AEB (accidental exposure to blood) for percutaneous exposure is0.3%. The risk of infection transmission is proportional to the amount of HIV transmitted (=amount of the contaminated fluid and the viral load).

1. Healthcare worker must inform ICN of the injury in designated form. After routine duty hours CMO on duty should be informed in designated form. The designate person shall assess the risk of HIV and HCV 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).
2. 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.

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

Two main factors determine the risk of infection: the nature of exposure and the status of the source patient. Availability of PEP needs to be ensured at emergency Department for round-the-clock availability of PEP. The utilization data should be prepared on monthly basis as per NACO/DSACS guidelines.

8.7. Post-HIV exposure management / prophylaxis (PEP)

- Post exposure prophylaxis is available for HIV in the form of antiretroviral (ARV) drugs which are prescribed on the basis of NACO guidelines.
- HBV vaccine is available in routine hours and anti HBV immunoglobulin will be made available to the exposed worker as soon as possible after consulting with Microbiologist.
- For HBV PEP following criteria will act as guideline:

1. Determine the status of the exposure and the HIV status of the exposure source before starting post-exposure prophylaxis (PEP).
2. Prompt reporting in accident/incident reporting forms
3. Post-exposure treatment is begun as soon as possible preferably within two hours

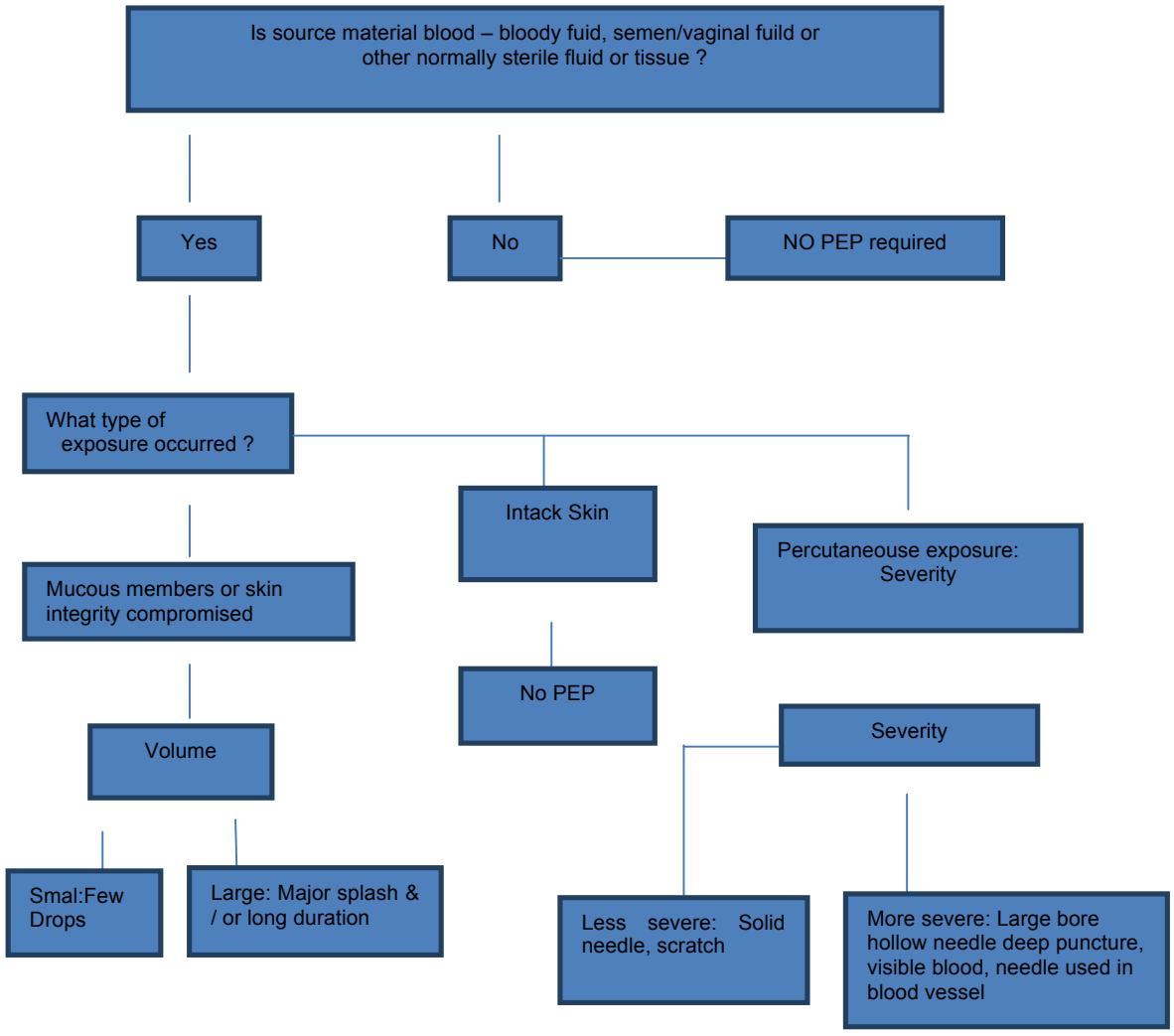
4. Not recommended after seventy -two hours
5. PEP is not needed for all types of exposures

8.7.1. Post exposure Prophylaxis

The decision to start PEP is made on the basis of degree of exposure to HIV and the HIV status of the source from whom the exposure/infection has occurred. PEP is started, as early as possible, after an exposure. Incase PEP is **initiated** after 72 hours of exposure is of limited use and hence is not recommended. In case of anticipated delay of serology reports one dose of PEP may be given.

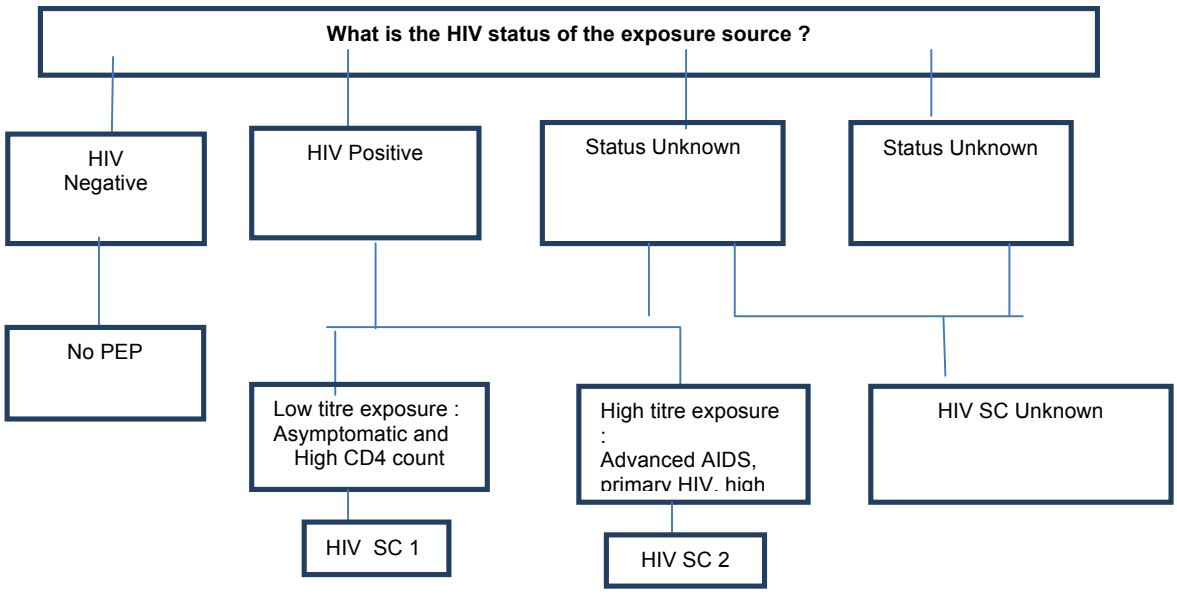
8.7.1.1 Determination of the Exposure Code (EC)

- Exposure code can be defined as per the flow chart given below



8.7.1.2 Status Code (SC)

Determined as per flow chart below.



8.7.1.3. Determine Post-Exposure Prophylaxis(PEP) Recommendation

EC	HIV SC	PEP
1	1	Consider basic
1	2	Recommend basic regimen
2	1	Recommend expanded regimen
3	1 or 2	Recommend expanded regimen
1,2,3	Unknown	If exposure setting suggests risks of HIV Exposure, consider basic regimen

8.7.1.4 Basic regimen (Three Drug Regimen):

1. Tenofovir 300 mg + Lamovudine 300 mg+ Efavirenz 600 mg once daily for 28 days. **Expanded regimen: (Three drug regimen)**
2. Basic regimen (+ Indinavir – 800 mg/thrice a day, or any other protease Inhibitor.

8.7.1.5 Testing and Counseling

The health care provider are tested for HIV as per the following schedule t**o** monitor seroconversion:

1. Base-line HIV test - at time of exposure
2. Repeat HIV test - at **six weeks** following exposure
    - 2nd repeat HIV test - **at twelve weeks** following exposure
    - 3rd repeat HIV test - **at 6 months** following exposure

3. On all four occasions, HCW must be provided with a pre-test and post-test counseling. HIV testing are carried out on three ERS (Elisa/ Rapid/ Simple) test kits or antigen preparations as per NACO guidelines.
4. The HCW are advised to refrain from donating blood, semen or organs/tissues and abstain from sexual intercourse.
5. In case sexual intercourse is undertaken a latex condom be used consistently. In addition, women HCW should not breast -feed their infants.

8.7.1.6 Duration of PEP

1. PEP is started, as early as possible, after an exposure. It has been seen that PEP started after 72 hours of exposure is of no use and hence is not recommended.
2. The optimal course of PEP is not unknown, but 4 weeks of drug therapy appears to provide protection against HIV.
3. If the HIV test is found to be positive at anytime within 12 weeks, the HCW are referred to a physician for treatment.
4. **In case, exposed worker refuses PEP or refuses to get the laboratory testing done for monitoring of PEP, the same is documented on PEP refusal form.**

8.8 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.

8.8.1 Categories of exposure

Categories of exposure	
Category	**Definition & example**
Mild exposure	Mucous membrane/non-intact skin with small volumes Eg: a superficial wound with a plain or low caliber 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 Eg: a cut or needle stick injury penetrating gloves
Severe exposure	Percutaneous with large volume. Eg: An accident with a high caliber needle (>18G)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.	

8.8.2 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 72 hours 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.

Do not delay initiation of PEP where indicated while waiting for the results of HIV testing of the source of exposure. Informed consent should be taken before testing of the source as per national HIV testing guidelines.

8.8.3 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 & HCV
Low risk	HIV positive & clinically asymptomatic
High risk	HIV positive & clinically symptomatic
Unknown	Status of the patient is unknown & neither the patient nor his/her blood is available for testing. The risk assessment will be based only upon the exposure

HIV infection is not detected during the primary infection period by routine use HIV tests. During the window period which lasts for approximately 6 weeks, the antibody level is still too low for detection, but infected persons can still have a high viral load. This implies that a positive HIV test result can help in taking the decision to start the PEP, but a negative test result does not exclude HIV infection. In districts or some population groups with a high HIV prevalence, a higher proportion of HIV infected individuals are found in the window period. In these situations, a negative result has even less value for decision making on PEP.

8.9 Assessment of the exposed individual

1. The exposed individual should have confidential counseling & assessment by an experienced 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.
2. They should be offered counseling & information on prevention of transmission of & referred to clinical & laboratory assessment to determine eligibility for antiretroviral therapy (ART). Besides the medical assessment, counseling exposed HCP is essential to allay fear & start PEP (if required) at the earliest.

8.10 Counseling for PEP

Exposed persons should receive appropriate information about what PEP is about & the risk & benefits of PEP in order to provide informed consent. It should be clear that PEP is not mandatory.

Key information to provide informed consent to the client after occupational exposure

The risk of acquiring HIV infection from the specific exposure	• Ask client for understanding of HIV transmission risk after exposure • The risk of getting HIV infection from a person known to be HIV positive is estimated to be • Sharps injury :3 in 1000 exposures (0.3%) • Mucous membrane splash: 1 in 1000 exposures(0.1%) • The risk in increased with large exposure eg: needle stick from hollow bore needles with visible blood, from artery/vein & from source patients with high viral load
What is known about PEP efficacy	• Ask clients understanding of PEP • PEP is provided to prevent potential transmission of the HIV virus • PEP is not 100%effective & should be given within 72 hours • Balance risk & benefits of PEP:PEP may prevent HIV transmission, versus possible risk of side effects
• Information about clients risk of HIV infection based upon a risk assessment • The importance of being tested & receiving appropriate post test counseling • That PEP medicines will be discontinuedif their initial HIV test is positive	• Clients possibility of prior HIV infection should be assessed. • Counsel for HIV testing &follow-up psychosocial support- where possible rapid testing should be used based on national testing guidelines • Inform if the baseline test is positive, then the PEP will be discontinued • Arrange referral to ART centre for assessment if found HIV positive
• Importance of adhering to medication once started • Duration of the course of medicine (4weeks)	• Discuss dosing of the PEP medicine eg:pill should be taken twice a day for 28 days • Depending on the nature & risk of exposure, 2drugs or 3 drugs may be used • Side effects may be important with use of 3 drugs. • Expert opinion/consultation by phone or referral may be needed with a HIV specialist if 3rd drug is used. • Arrange for special leave from work (2 weeks initially).
Common side effects that may be experienced	• Discuss possible side effects of the PEP medicines eg: nausea, fatigue,headache • Side effects often improve over time. It is often

	minor & do not need specialized supervision. • Symptomatic relief can also be given by using other drugs.
That they can stop at any time but will not get the benefit of PEP – if the source is HIV positive	• Animal studies suggest that taking less than 4 weeks of PEP does not work. • If client decides to stop at any time, he needs to contact the physician before stopping the medication. • Arrange for follow up visit & decide further course of action.
Prevention during the PEP period	• After any AEB, the exposed person should not have unprotected intercourse until it is confirmed,3 months after the exposure, that he is not HIV infected. • It is also advised to avoid pregnancy. • Use of condoms is essential.
If client is pregnant – she can still take PEP during pregnancy	• The PEP drugs used are safe for pregnancy. • If the client gets HIV during the pregnancy due to the exposure, the baby will have some risk of becoming HIV infected.
Safety of PEP if the client is breast feeding	• The PEP drugs used are safe during breast feeding. • May consider stopping breast feeding if PEP is indicated.
Educate client on the possible signs & symptoms of early HIV sero conversion	• Signs & symptoms of early HIV seroconversion: fever, rash, oral ulcer, pharangitis, malaise, fatigue, joint pains, weight loss, mayalgia, headache(similar to flu like symptoms)
Risk of acquiring Hepatitis B & C from a specific exposure & availability of prophylaxis for this	• Risk of Hepatitis B is 9-30% from a needle stick exposure – client can be given vaccinations. • Risk of Hepatitis C is 1-10% after a needle stick exposure – there is no vaccination for this.

HIV RNA testing by Reverse transcriptase polymerase chain reaction (RT-PCR) during PEP has a very poor positive predictive value & should be strongly discouraged.

Pregnancy testing should also be available, but its unavailability should not prevent the provision of PEP.

Other laboratory testing such as haemoglobin estimation should be available, especially when AZT is used in areas where anaemia is common.

Testing of other blood borne diseases such as syphilis, malaria & kala azar may also be useful, depending on the nature of risk, symptoms of the source patient, local prevelance & laboratory capacity.

8.11 Follow up of an Exposed Person

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

8.11.1 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 eruptions, pharangitis, non-specific flu symptoms & ulcers of the mouth & genital area. These symptoms appear in 50-70% of individuals with an primary infection & almost always within 3-6 weeks after exposure. When a primary 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 (eg- avoid blood/ tissue donations, breastfeeding, unprotected sexual relations or pregnancy. Condom use is essential.

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

8.11.2 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 seroconversion 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 of seroconversion; & there is not enough time to diagnose all persons who seroconvert. Therefore testing at 3 months & 6 months is recommended. Very few cases of seroconversion after 6 months has been reported. Hence, no further testing is recommended if the HIV test at 6 months is negative.

Recommended follow up laboratory tests		
Timing	**In persons taking PEP**	**In persons not taking PEP**
Weeks 2 & 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

8.12. Hepatitis B Virus

All health staff should be vaccinated against hepatitis B. the vaccination for Hepatitis B virus consists of 3 doses: initial, 1 month & 6 months. Sero conversion after completing the full course is 99%.

If the exposed person is unvaccinated or unclear vaccination status give complete hepatitis B vaccine series.

Guidelines for Post exposure prophylaxis[*] of persons with nonoccupational exposures[1] to blood or body fluids that contain blood by exposure type and vaccination status

Exposure	*Treatment*	
	Unvaccinated person[2]	**Previously vaccinated person[3]**
HBsAg[**]Positive source		
Percutaneous (e.g., bite or needle stick) or mucosal exposure to HBsAg positive blood or body fluids	Administer hepatitis B vaccine series and hepatitis B immune globulin (HBIG).	Administer hepatitis B vaccine booster dose.
Sex or needle sharing contact of an HBsAg positive person	Administer hepatitis B vaccine series and HBIG	Administer hepatitis B vaccine booster dose
Victim of sexual assault/abuse by a perpetrator who is HBsAg positive	Administer hepatitis B vaccine series and HBIG	Administer hepatitis B vaccine booster dose
Source with unknown HBsAg status		
Victim of sexual assault/abuse by a perpetrator with unknown HBsAg status	Administer hepatitis B vaccine series.	No treatment
Percutaneous (e.g., bite or needle stick) or mucosal exposure to potentially infectious blood or body fluids form a source with unknown HBsAg status.	Administer hepatitis B vaccine series.	No treatment
Sex or needle sharing contact of person with unknown HBsAg status.	Administer hepatitis B vaccine series.	No treatment

(*) Whenindicated immunoprophylaxis should be initiated as soon as possible,preferably within 24 hours Studies are limited on the maximum interval after exposure during which postexposure prophylaxis is effective , but the interval is unlikely to exceed 7 days for Percutaneous exposures or 14 days for sexual exposures . The hepatitis B vaccine series should be completed.

(**) Hepatitis B surface antigen.

(1). These guidelines apply to nonoccupational exposures .Guidelines for management of occupational exposure have been published separately (1) and also can be used for management of nonoccupational exposure, if feasible.

(2).A person who is in the process of being vaccinated but who has not completed the vaccine series should complete the series and receive treatment as indicated.

(3) A person who has written documentation of a complete hepatitis B vaccine series and who did not receive post vaccination. testing.

8.12.1 Determination of HBIG (Immunglobulin)

For percutaneous(needlestick), ocular, or mucous-membrane exposure to blood known to contain HBsAg and for human bites from HBsAg carriers that penetrate the skin , a single dose of HBIG (0/.06 ml/kg or 5.0 ml for adults) should be given as soon as possible after exposure and within 24 hours if possible. HB vaccine 1 ml (20 ug) should be given IM at a separate site as soon as possible, but within 7 days of exposure , with the second and third doses given after one month and 6 month, respectively , If HBIG is unavailable , immunoglobulin may be given in an equivalent dosage (0/06 ml/kg or 5.0 ml for adults). If an individual has received at least two doses of HB vaccine before an accidental exposure , no treatment is necessary if serologic tests show adequate levels (> 10MIU/DL) of anti-HBs. For persons who choose not to receive HB vaccine, the previously recommended two doses HBIG regimen may be used

8.12.2 HBV prophylaxis for reported exposure incidents

HBV status of person Exposed	Significant exposure			Non-significant exposure	
	HBsAg positive source	Unknown source	HBsAg negative source	Continued risk	No further risk
≥1 dose HB vaccine pre-exposure	Accelerated course of HB vaccine* HBIG x 1	Accelerated course of HB vaccine*	Initiate course of HB vaccine	Initiate course of HB vaccine	No HBV prophylaxis Reassure
≥ 2 doses HB vaccine pre-exposure (anti-HBs not known)	One dose of HB vaccine followed by second dose one month later	One dose of HB vaccine	Finish course of HB vaccine	Finish course of HB vaccine	No HBV prophylaxis Reassure
Known responder to HB vaccine (anti-HBs > 10 miU/ml)	Consider booster dose of HB vaccine	Consider booster dose of HB vaccine	Consider booster dose of HB vaccine	Consider booster dose of HB vaccine	No HBV prophylaxis Reassure
Known non-responder to HB vaccine (anti-HBs <10 miU/ml 2-4 months post-immunisation)	HBIG x 1 Consider booster dose of HB vaccine!	HBIG x 1 Consider booster dose of HB vaccine	No HBIG Consider booster dose of HB vaccine	No HBIG Consider booster dose of HB vaccine	No prophylaxis Reassure

8.13 Hepatitis C Virus

There is presently no prophylaxis available against hepatitis C. Post exposure management for HCV is based on early identification of chronic HCV disease & referral to a specialist for management. In the absence of PEP for HCV, recommendations for post exposure management are intended to achieve early identification of chronic disease and, if present, referral for evaluation of treatment options. However, a theoretical argument is that intervention with antivirals when HCV RNA first becomes detectable might prevent the development of chronic infection. Data from studies conducted outside the United States suggest that a short course of interferon started early in the course of acute hepatitis C is associated with a higher rate of resolved infection than that achieved when therapy is begun after chronic hepatitis C has been well established. These studies used various treatment regimens and included persons with acute disease whose peak ALT levels were 500–1,000 IU/L at the time therapy was initiated (2.6–4 months after exposure).

No studies have evaluated the treatment of acute infection in persons with no evidence of liver disease (i.e., HCV RNA-positive <6 months duration with normal ALT levels); among patients with chronic HCV infection, the efficacy of antivirals has been demonstrated only among patients who also had evidence of chronic liver disease (i.e.,abnormal ALT levels). In addition, treatment started early in the course of chronic HCV infection (i.e., 6 months after onset of infection) might be as effective as treatment started during acute infection. Because 15%–25% of patients with acute HCV infection spontaneously resolve their infection, treatment of these patients during the acute phase could expose them unnecessarily to the discomfort and side effects of antiviral therapy.

Data upon which to base a recommendation for therapy of acute infection are insufficient because

c. No data exist regarding the effect of treating patients with acute infection who have no evidence of disease,

d. Treatment started early in the course of chronic infection might be just as effective and would eliminate the need to treat persons who will spontaneously resolve their infection, and

e. The appropriate regimen is unknown

8.14 Pregnancy and PEP:

Based on limited information, anti-retroviral therapy taken during 2nd and 3rd trimester of pregnancy has not caused serious side effects in mothers or infants. There is very little information on the safety in the 1st trimester. If the HCW is pregnant at the time of exposure to HIV, the designated authority/physician must be consulted about the use of the drugs for PEP.

Side-effects of these drugs: Most of the drugs used for PEP have usually been tolerated well except for nausea, vomiting, tiredness, or headache.

Follow-Up of HCW with Sharps Injury Or BBF For HBV & HCV Seroconversion.

- SGOT and SGPT test - at **six weeks** following exposure and **at twelve weeks** following exposure
- In case above mentioned parameters are found deranged then HCW should be screened for seroconversion. If found positive, HCW should be referred to Hepatologist.

References:

- NACO PEP Guidelines
- CDC Guidelines for the Management of Occupational Exposures to HBV, HCV, and HIV and Recommendations for Post exposure Prophylaxis
- MMWR. DEC 8, 2006/55(RR16)

9. STAFF HEALTH PROGRAMME

9.1 Health evaluation at placement

1. A medical checkup is performed at placement according to protocol laid down by Govt of NCT of Delhi. After induction to the hospital services immunisation and health appraisal is conducted by preventive health clinic medical officer in conjunction with HICC nominated member. Data is maintained by Preventive Health Clinic Medical Officer and monthly presented in HICC meeting.
2. The data is collected in prescribed form.
3. Vaccination for Hepatitis B is provided to all staff members who are not vaccinated or those vaccinated but do not have protective anti-HBs levels. These schedules are initiated by the staff member within one month of start of employment. All staff are encourgaed to get their Anti-HBs titers done to ensure their safety after vaccination. ***All students (medical, nursing, technical courses) students must be vaccinated within first year of there joining the course.***
4. Vaccination for Salmonellosis is mandatory for kitchen staff and must be vaccinated within three months of their employment.
5. Vaccination Varicella, Meningococcal Disease etc. will be carried out in staff exposed during the outbreak or as and when required as decided by HICC time to time.

9.2 Employee Health Programme

1. **Employee health education:** Periodic education programs are conducted for paramedical staff by the ICN. All employees MUST attend the program within month of their induction to the hospital and then at least twice a year. The attendance record is kept by ICN. All employee are instructed to adhere to universal precautions, nursing barrier/ isolation policies, hand washing protocols and waste management.
2. All infections including contagious and other diagnosed communicable diseases e.g. hepatitis, mumps, rubella, measles, chicken pox, diarrhea, productive cough more than three weeks, rashes etc., MUST to be reported by staff to their immediate supervisor and thereby to ICN at which time appropriate action to protect the patients/ staff in the hospital will be taken. Work restrictions may be imposed in situations which call for such action.
3. All staff is informed that they should report exposure to potentially infectious body fluid to their immediate supervisor who in turn informs the ICN or secretary HICC in absence of ICN. Action is taken after assessment of risk at each situation (refer PEP guidelines). It is MANDATROY to report all such kind of exposures on prescribed form. Work restrictions may be imposed in situations which call for such action.
4. Personnel shall adhere to policies and practices to minimize the potential spread of diseases and /or infection. Personnel shall adhere to existing employee health requirements**.**

10. ISOLATION POLICY AND TRANSMISSION BASED PRECAUTIONS

10.1 Isolation Policy

10.1.1 Aim

1. To prevent the transmission of pathogenic microorganisms within the hospital.
2. To recognize the importance of all body fluids, secretions and excretions in the transmission of healthcare associated pathogens
3. To practice adequate precautions for infections transmitted by airborne Droplet & contact

10.1.2 Measures for Reduction of Transmission

10.1.2.1 Hand Washing

- Frequent hand washing is the most important measure.

10.1.2.2 Patient care Handwash

- Wash hands after touching blood, body fluids, secretions, excretions and contaminated items, whether gloves are worn or not.
- Wash hands immediately after gloves are removed.
- Wash hands between tasks and procedures on the same patient to prevent cross contamination of different body sites.
- Use a plain soap for routine hand washing.
- Use antiseptic soap or an alcohol based disinfectant followed by thorough hand washing for accidental skin contamination. Antimicrobial hand washing products are used for hand washing before personnel care for newborns and when otherwise indicated during their care, between patients in high-risk units, and before personnel take care of severely immunocompromised patients.

10.1.2.3 Surgical Hand Wash

- Procedural hand hygiene includes a full surgical scrub using running water and 4% chlorhexidene scrub solution from the fingertips to the elbow. The scrub is performed for a minimum of 2 to 3 minutes.

10.1.2.4 Gloves

- Clean, unsterile gloves may be worn as a protective barrier during procedures. Sterile gloves are worn when sterile procedures are undertaken

10.1.2.5 Personal Protective Equipment (PPE)

- Gowns: A clean, no sterile, gown is worn to prevent contamination of clothing and skin of personnel from exposure to blood and body fluids. When gowns are worn to attend to a patient requiring barrier nursing, they are removed before leaving the patients environment and hand washing is done.
- Masks and goggles: This equipment is worn to provide barrier protection. Mask should cover both the nose and the mouth.

10.2 Patient Isolation

Patients are isolated when suffering from highly transmissible diseases e.g. chicken pox. These patients are provided with isolation through designated isolation areas (e.g. isolation room in swine flu ward – when no patient of swine flu is admitted or in a single room at private wards).

10.2.1 Barrier Nursing

Barrier nursing: The aim is to erect a barrier to the passage of infectious pathogenic organisms between the contagious patient and other patients and staff in the hospital, and hence to the outside world. Preferably, all contagious patients are isolated in separate rooms, but when such patients must be nursed in a ward with others, screens are placed around the bed or beds they occupy.

Cohort nursing may be practiced as re-infection with the same organism is unlikely. The nurses, attending consultants as also any visitors must wear gowns, masks, and sometimes rubber gloves and they observe strict rules that minimize the risk of passing on infectious agents. Surgical standards of cleanliness in hand washing are observed after they have been attending the patient.

- Bedding is carefully moved in order to minimize the transmission of airborne particles, such as dust or droplets that could carry contagious material.
- Barrier nursing must be continued until subsequent cultures give a negative report Infected with epidemiologically important microorganisms such as MRSA, Pan- resistant gram-negative bacteria are kept in their patient care unit with alert of zero tolerance barrier nursing.

10.2.2 Cleaning of Equipment and articles

Contaminated disposable articles are bagged appropriately in leak proof bags and disposed. Critical reusable medical equipment is disinfected or sterilized after use. Non-critical equipment is cleaned, disinfected after use.

10.2.3 Laundry

Soiled linen are handled as little as possible and with minimum agitation to prevent gross microbial contamination of the air and of persons handling the linen. All soiled linen are bagged in red bag with proper labels and put into small carts at the location where it was used than transferred into the big carts; it should not be sorted or pre-rinsed in patient-care areas and transported to the laundry from the pre-defined corridors. Clean washed linen must be transported in separate trolleys.

10.2.4 Eating Utensils

Routine cleaning with detergent and hot water is sufficient.

10.2.5 Terminal Cleaning

Terminal cleaning of patient unit should be done with appropriate disinfectant solution.

1. Bed should be cleaned properly including Bed frames, side rails and mattress initially with soap and water followed by disinfectant solution.

2. Other equipments like I/V stands, bed lockers etc should be cleaned with soap and water followed by disinfectant solution.
3. All metal items should me clean with bacillocid (0.5%) and non-metal items can be clean with superoxide water.
4. If any electrical items like infusion pumps etc. used should be clean with spirit twice.
5. All the used items like oxygen mask, O2 tubing's, suction jars and tubing's should be send to CSSD for HLD.
6. If ventilator is used for the patient then whole ventilator tubing's should be send to CSSD for autoclaving after primary cleaning. Ventilator surface also should be disinfected.
7. Ventilator switching from one patient to another is strongly discouraged.
8. All wall tiles and floor should clean with soap and water.
9. swine flu ward – when no patient of swine flu are admitted or in a single room at private wards).

10.2.6 Isolation policy for certain groups of organism

1. MRSA: When MRSA is isolated in the lab the microbiologist will inform the sister-in charge/duty doctor/head of unit. Patient is isolated and barrier nursed. Hand washing is strictly adhered to by all concerned. Linen is changed on a daily basis. Dirty linen is carefully packed in red bag with proper label and sent to laundry.
2. Multi-resistant bacteria e.g. Imipenem resistant Acinetobacter, multi-resistant *Pseudomonas aeruginosa*: The aim is to curtail the spread of such bacteria. Hence patient is to be placed on strict barrier nursing precautions irrespective of whether the organism is a coloniser or the cause of infection.
3. Pulmonary tuberculosis: Masks are used during the care of all patients with sputum positive pulmonary tuberculosis. *Note: Isolation precautions are to be followed until all previous culture sites are negative.*
4. HIV/HBsAg/ HCV infected patients: follow universal precautions.

10.3 Concept of Standard Precautions

They are a set of precautions designed to protect health care workers from exposure to blood borne pathogens. Since the majority of patients infected with HIV/HBsAg/ HCV are asymptomatic at the time of presentation all patients are approached as having potentially infectious blood and body fluids. Precautions may vary based on anticipated exposure.

Features of standard precautions

10.3.1 Precautions against Blood Borne Transmission

1. **Admission:** Patients with HIV / HBV / HCV disease but presenting with unrelated illnesses may be admitted in any ward as per existing rules. Confidentiality shall be maintained with appropriate precautions to prevent healthcare associated transmission.
2. **Preparation of patients:**
   - It is the responsibility of the attending physician to ensure that patients, testing positive are informed about the result and receive counseling.

- The nursing staff will explain to patients, attendants and visitors (when necessary), the purpose and methods of hand washing, body substance and excreta precautions, and other relevant precautions.

3. **Red bag (Reusable non-sharp material):** The ward sister must ensure that the prescribed bag is obtained from CSSD when a patient with HIV, HBV or HCV infection is admitted. All contaminated items that are to be sent to CSSD for disinfection are placed in the bag and sent for autoclaving. Sharps are not to be discarded in the red bag. Linen and procedure trays to be sterilized separately.
4. **Specimens:** Adequate precautions are to be taken while collecting specimens. The specimens are to be transported in leak-proof containers placed inside a leak-proof plastic cover. Ensure that the cover and the outside of the container are not contaminated.
5. **Waste disposal:** A bin lined by a Red plastic bag is placed in the patient's room for infectious waste. When the bag is 2/3rd hs full it is sent for disposal.
6. Non-infectious waste does not require special precautions and is disposed in a manner similar to non-infectious waste generated from any other patient.
7. **Death of a patient:** Those cleaning the body should use gloves and other protective gear. Before leaving the ward, the body is backed as for any case.

10.3.2 Precautions against Airborne Transmission

These precautions are designed to reduce the risk of airborne and droplet transmission of infectious agents, and apply to patients known or suspected to be infected with epidemiologically important pathogens that can be transmitted by these routes.

Components of respiratory isolation:

1. Place the patient in a single / private room with closed doors. Patients with same illness (but no other infection) can be cohorted in one room.
2. Masks to be worn by those who enter the patient's room. Susceptible persons should not enter the room of patients known or suspected to have measles or varicella (chicken pox).
3. Gowns are not routinely necessary. Use gowns if soiling is likely.
4. Gloves are necessary while handling patients.
5. Hand must be washed after touching the patient or potentially contaminated articles and before taking care of another patient.
6. Articles contaminated with infective material must be discarded or bagged and labeled before being sent for decontamination and reprocessing.

10.3.3 Precautions against Contact Transmission

Contact isolation precautions are recommended for specified patients known or suspected to be infected or colonized with epidemiologically important microorganisms that can be transmitted by direct contact with the patient (hand or skin-to-skin contact that occurs when performing patient – care) or indirect contact (touching) with contaminated environmental surfaces or patient-care items.

Components:

1. Gowns are indicated if soiling is likely.
2. Gloves are indicated for touching infected material / area
3. Hands must be washed after touching the patient or potentially contaminated articles and before taking care of another patient.
4. When possible, dedicate the use of non critical patient – care equipment to a single patient (or cohort of patients infected or colonized with the pathogen requiring precautions) to avoid sharing between patients. If use of common equipment or items is unavoidable, then adequately clean and disinfect them before use for another patient.
5. Articles contaminated with infective material must be discarded or bagged and labeled before being sent for decontamination and reprocessing

10.4. List of diseases which need isolation precautions

Table 10.1 List of diseases which needs isolation precautions

Condition	**PPE REQUIRED**	**Comment**
Chicken-Pox (Varicella)	Gloves, plastic apron for contact.	Preferably Single room. **Staff who have not had Chicken-Pox should not nurse these patients.**
German Measles (Rubella)	Gloves/apron for direct contact	Single room. Check on any non-immune pregnant staff.
Hepatitis Type A Infection Type B Serum Type C Serum	 Gloves Gloves Gloves	 None Single room if bleeding. Single room if bleeding
HIV/AIDS	Gloves/apron. In contact with body fluids	Single room if bleeding or has an opportunistic infection.
Herpes Zoster	Gloves/apron for direct contact	Single room. Staffs who have not had Chicken-Pox /vaccinated should not nurse these patients.
Impetigo	Gloves for direct contact.	Single room.
Measles (including encephalitis)	Gloves/apron in direct contact.	Isolation room.
Infection with Multi – resistant organisms, including MRSA,VRE	Gloves/Apron for direct contact	Strict hand washing is essential. Isolation room/cohort nursing
Scabies	Gloves for contact until treated. 24 hours after treatment not infectious.	All staff in contact need treatment also other patients.
Tuberculosis Pulmonary	Gloves/apron for direct contact. Masks to be worn by staff for 2 weeks after patient starting treatment.	Masks must be worn in open cases of tuberculosis. Transfer to infectious disease hospital

10.5. Transmission Based Precautions

Besides standard precautions, specific transmission based precautions are observed according to the mode of transmission of the various conditions to protect health care workers and other patients from cross infections.

Table 10.2: Transmission based Precautions

Precautions	Mode of Transmission is Contact (category I)	Mode of Transmission is Droplet (category II)	Mode of Transmission is Airborne (category III)
Mask	No	Yes	Yes
Gown	Yes	No	NO
Gloves	Yes	No	No
Patient Transport	• Receiving department to be informed of precautions	• Mask the patient • Receiving department to be informed 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	• Routine
Patient Care Equipment (Special Handling)	• Yes, dedicated equipments	• No	• No
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 respiratory protection • Wash hands when entering or leaving

Table 10.3. Reference Table of Standard and Transmission based precautions for Various Diseases and Conditions

Diseases / Condition	Precaution Category	Infective Material	Duration for Precautions	Comments
Abscess Draining, major	Contact	Drainage	Until drainage contained	Major = drainage not contained by

				dressing
Acid Fast Bacillus Positive	See Tuberculosis			
Acquired immunodeficiency syndrome (AIDS)	Standard	Blood and bloody body fluids	All patients all the times	AIDS is specified communicable disease.
Actinomycosis	Standard		All patients all the times	
Amebiasis (Dysentery) Adult	Standard	Faeces	All patients all the times	Consider Contact precautions for adults with poor hygiene and/or who contaminate the environment.
Pediatric	Contact	Faeces	Until formed or normal stools for 24 hours	
Arthropod borne viral encephalitis (Jap B)	Standard	Blood and bloody body fluids	All patients all the times	
Arthropod borne viral fevers (Dengue)	Standard	Blood and bloody body fluids	All patients all the times	Arthropod borne viral fever is a specified communicable disease.
Aspergillosis	Standard		All patients all the times	
Bronchiolitis Adult	Standard		All patients all the times	
Pediatric	Contact	Respiratory secretions	Duration of symptoms	Various etiologic agents, such as respiratory syncytial virus, parainfluenza viruses, adenoviruses have been associated with this condition
Candidiasis All forms, including mucocutaneous (moniliasis, thrush)	Standard		All patients all the times	
Cellulitis (Uncontrolled drainage)	Contact	Drainage	Until drainage contained	

Chancroid (Soft chancre)	Standard		All patients all the times	
Chickenpox (Varicella) Caused by Varicella zoster virus.	Airborne AND Contact	Respiratory Secretion and Lesions	Until all lesions are crusted	Negative pressure room is required. Neonates born to mothers with active Varicella should be placed on Airborne and Contact isolation at birth. Exposed susceptible patients should be placed on Airborne and contact isolation beginning 10 days after first exposure and continuing until 21 days after last exposure (up to 28 days if VZIG given). First exposure is defined as day one. Consult attending physician to assess need for VZIG Period of communicability beings 2 days before onset of rash until all lesions are crusted.
Cholera	Contact	Faeces	Until formed or normal stools × 24 hours	
Clostridium difficile diarrhea	Contact	Faeces	Until formed normal stools or no stools × 48 hours.	
Clostridium perfringens (Gas gangrene)	Standard		All patients all the times	
Congenital rubella	Contact and Droplet	Respiratory secretions	During any admission for the	Susceptible persons should stay

		and urine	1st year after birth unless nasopharyngeal and urine cultures after 3 months of age are negative for rubella virus	out of room.
Conjunctivitis (Pink eye Acute bacterial Chlamydia, Gonococcal Acute Viral	Standard Standard contact	Eye Discharge	Duration of symptoms	
Croup Pediatric	Contact	Respiratory secretions	Duration of symptoms	Viral Agents such as parainfluenza viruses and influenza A virus have been associated with this condition
Cryptosporidiosis	Standard		All patients all the times	
Cryptosporidiosis Adult	Standard		All patients all the times	Consider contact precautions for adults with poor hygiene and/or who contaminate environment
Pediatric	Contact	Faeces	Until formed or normal stools 24 hours	
Cytomegalovirus infection	Standard		All patients all the times	
Decubitus ulcer major	Contact	Drainage	Until drainage contained	Major = drainage not contained by dressing.
Dengue	Standard		All patients all the times	
Diarrhea, acute	Contact	Faeces	Until formed or normal stools × 24 hours	
Diarrhea, acute	Contact	Faeces	Until formed or normal stools × 24 hours	
Diphtheria (Corynebacterium	Contact	Lesion secretions.	Until 2 cultures from skin lesions	

diphtheriae Cutaneous			taken at least 24 hours apart after cessation of antimicrobial therapy are negative	
Diphtheria Pharyngeal	Droplet	Respiratory secretions	Until 2 cultures from both nose and throat taken at least 24 hours apart after cessation of antimicrobial therapy are negative for corynebacterium diphtheriae	
Epiglottitis Haemophilus influenza Type B	Droplet	Respiratory secretions	For 24 hours after start of effective therapy.	
Epstein-Barr virus infection (including infectious mononucleosis)	Standard		All patients all the times	
Food Poisoning (Botulism, /clostridium perfringens or Staphylococcus)	Contact	Faeces	Until formed or normal stools for 24 hours.	
Furunculosis, staphylococcal (Pediatric)	Contact	Drainage	Until drainage stops	
Gonorrhea	Standard		All patients all the times	
Guillain-Barre' syndrome	Standard		All patients all the times	
Helicobacter pylori	Standard		All patients all the times	
Hepatitis Viral Hepatitis A, Hepatitis E Adult	Standard		All patients all the times	For Hepatitis A & E consider contact precautions for adults with poor hygiene and/or who contaminate the environment.

Pediatric	Contact	Faeces	For 7 days after onset of symptoms	
Hepatitis B (HBsAg +)	Standard	Blood and bloody fluids		Hepatitis B and C are specified communicable disease. For staff issues for all types of Hepatitis.
Hepatitis C and other specified non A, non B	Standard			
Herpes simplex (Herpes virus hominis) Encephalitis Neonatal	Contact	Lesion, secretions, possibly all body secretions and excretions.	Duration of symptoms.	Precautions are indicated for infants delivered either vaginally or by caesarean section (if membranes have been ruptured more than 4-6 hrs) to women with active genital herpes simplex infections, until neonatal HSV infection has been ruled out.
Mucocutaneous, disseminated or primary severe	Contact	Lesion secretions.	Duration of symptoms.	
Mucocutaneous, recurrent skin, oral or genital	Standard			
Herpes Zoster Caused by Varicella zoster virus				

(shingles) Localized in normal patient. Localized in immunocompromised patient, and/or disseminated in any patient.	Standard Airborne and Contact	Lesion secretions and possibly respiratory secretions.	All patients all the times For 72 hours after start of effective anti viral therapy or if untreated until all lesions are crusted.	For localized lesions, try to contain with dressings. Roommates should not be susceptible to chickenpox. Negative pressure isolation room required. Exposed susceptible patients should be placed on Airborne and contact isolation beginning 10 days after first exposure and continuing until 21 days after last exposure (up to 28 days if VZIG given). First exposure is defined as day one.
Human immunodeficiency virus (HIV)	Standard	Blood & Bloody body fluids	All patients all the times	
Influenza	Droplet	Nasopharyngeal secretions.	For 7 days after onset of symptoms. Viral shedding may occur longer in young children	If private room is unavailable, consider cohorting patients with influenza.
Leprosy (Hansen's disease)	Standard		All patients all the times	
Leptospirosis	Standard		All patients all the times	
Malaria	Standard		All patients all the times	
Measles (Rubella)	Airborne	Respiratory secretions.	For 4 days after start of rash,	Negative pressure room is required.

			except in immunocompromised patients for whom precautions should be maintained for duration of illness.	Exposed susceptible patients should be placed on Airborne isolation beginning 5 days after first exposure through 21 days after last exposure.
Meningitis				
Unknown etiology	Droplet	Possibly Respiratory Secretions	Until etiology Known	Bacterial Meningitis is a specified communicable disease.
Neisseria meningitidis (meningococcal) known or suspected	Droplet	Respiratory secretions	For 24 hours after start of effective therapy	
Haemophilus influenzae Type b known or suspected	Droplet	Respiratory secretions	For 24 hours after start of effective therapy	
Other Bacterial, Fungal	Standard		All patients at all times	
Aseptic (Viral or non (bacterial)	Standard		All patients at all times	
Meningococcemia (meningococcal sepsis)	Droplet	Respiratory secretions	For 24 hours after start of effective therapy	Meningococcemia is a specified communicable disease.
Methicillin Resistant Staphylococcus aureus (MRSA)	Contact	Any body fluid or site		
Mucormycosis	Standard		All patients all the times	
Mumps (infectious parotitis)	Droplet	Respiratory secretions	For 9 days after onset of swelling	Exposed susceptible patients should be placed on Droplet isolation beginning 12 days after first contact through 26 days after last exposure.

Mycobacterium (non-tuberculosis, atypical, non TB complex) Pulmonary	Standard		All patients all the times	
Mycoplasma pneumonia (Primary atypical pneumonia)	Droplet	Respiratory secretions.	Duration of symptoms	
Nocardiosis	Standard			
Pertussis (Whooping cough)	Droplet	Respiratory secretions	For 5 days after start of effective therapy or 3 weeks after onset of paroxysms if not treated	
Pharyngitis	Standard		All patients all the times	
Plague (Yersinia pestis) Bubonic	Standard		All patients all the times	Bubonic plague is a specified communicable disease.
Plague (Yersinia pestis) Pneumonic	Droplet	Respiratory	For 3 days after start of effective therapy	
Pneumococcal Infections, Invasive	Standard		All patients all the times	Invasive (cultured from sterile site) pneumococcal infections are a specified communicable disease.
Pneumonia				
Haemophilus influenzae Type b Adult	Standard		All patients at all times	Ensure roommate not immunocompromised
Pediatric	Droplet	Respiratory secretions.	For 24 hours after start of effective therapy	
Neisseria meningitidis (meningococcal) known or suspected	Droplet			
Mycoplasma	Droplet	Respiratory	For 24 hours after	

(Primary atypical pneumonia) known or suspected.		secretions	start of effective therapy	
Pneumocystis carinii	Standard			
Staphylococcus aureus	Standard			
Streptococcus. Group A Adult Pediatrics	Standard Droplet Standard	Respiratory secretions.	Duration of symptoms. For 24 hours after start of effective therapy	
Other bacterial including gram – negative and etiology unknown	Standard	Respiratory secretions.		
Fungal	Standard			
Viral Adult Pediatrics	Droplet	Respiratory secretions	Duration of symptoms	
Poliomyelitis	Standard		All patients all the times	Acute poliomyelitis is a specified communicable disease.
Pseudo membranous colitis	Contact	Faeces	Until Clostridium difficile ruled out.	
Rabies	Standard		All patients all the times	Rabies is a specified communicable disease.
Rheumatic fever	Standard		All patients all the times	
Ritter's disease (Staphylococcal scalded skin syndrome) Adult Pediatric	 Standard Contact	 Faeces	 All patients all the times Until formed or normal stools × 24 hrs.	Consider contact precautions for adults with poor hygiene and/or who contaminate the environment

Rubella (German measles)	Droplet	Respiratory Secretions	Until 7 days after onset of rash	Exposed susceptible patients should be placed on Droplet isolation beginning 12 days after first contact through 26 days after last exposure.
Salmonellae Including Typhoid fever or Salmonella typhi (case/carrier) Adult Pediatric	Standard Contact	Faeces	All patients all the times Until formed or normal stools x 24 hours	Consider contact precautions with poor hygiene and/or who contaminate the environment. Typhoid fever is a specified communicable disease.
Shigellosis Pediatric	Standard Contact	Faeces	All patients all the times Until formed or normal stools × 24 hours	Consider Contact precautions for adults with poor hygiene and/or who contaminate the environment
Streptococcal infection (Group A Streptococcus) Skin, wound or major burn	Standard Contact	Drainage	All patients all the times For 24 hours after start of effective therapy	Major = drainage not contained by dressing.
Necrotizing fascitis, myositis or other	Contact	Drainage	For 24 hours after start of effective	

soft tissue necrosis. Pneumonia Adult Pediatric Scarlet fever Pediatric Toxic Shock Syndrome (TSS)	 Standard Droplet Droplet Droplet Standard	 Respiratory secretions Respiratory secretions Respiratory secretions	therapy. For 24 hours after start of effective therapy. For 24 hours after start of effective therapy. For 24 hours after start of effective therapy.	
Syphilis	Standard		All patients all the times	
Tetanus	Standard		All patients all the times	
Toxoplasmosis	Standard		All patients all the times	
Trachoma	Standard		All patients all the times	
Tuberculosis (Mycobacterium tuberculosis. M. africanum M. bovis) Confirmed or suspected pulmonary, laryngeal, or military. Skin-test (mantoux), positive with no evidence of current pulmonary disease. Extra pulmonary, meningitis, and drainage lesion (including	Airborne Standard Standard	Respiratory secretions.	Prior to discontinuing isolation	Negative pressure isolation room is required. Assess for pulmonary disease.

scrofula).				
UTI Including pyelonephritis with or without urinary catheter	Standard		All patients all the times	

Standard Precautions are a group of infection prevention practices that apply to all patients and residents, regardless of suspected or confirmed infection status, in any setting in which healthcare.

Standard precautions must be taken in all patients all the times. *(See also Chapter 4)*

11. SPECIAL CARE UNITS

11.1 Intensive Care Units

11.1.1 Design of the Unit

- Space around and between beds are adequate for placement and easy access to equipment and to patients.(6-8 feet)
- A single, closed cubicle is used only for patients needing isolation; e.g open tuberculosis, anthrax, enteric fever, cholera, MRSA colonization or infection with other multi-drug resistant organisms.
- Good housekeeping practices are followed. This includes regular cleaning of all areas, maintenance, linen and curtain changes etc. Clean floor at least four times a day.

11.1.2 Procedures to be followed by health care personnel

- Hand washing: Importance of this need not be over-emphasized in the ICU setting. Five moments of hand hygiene must be complied with hand hygiene actions. Appropriate steps must be performed while doing hand hygiene.
- Standard Precautions: as appropriate, are followed by all staff while handling patients or samples. Wear plastic aprons and gloves for all procedures.
- Remove and discard them immediately after each patient. Use gloves for / all patient contact. Wear
- masks while examining patients with 'uncertain' diagnosis.

11.1.3 Instruments

Although disposable *items* are ideal, reusable items are often used, for reducing the cost. Separate thermometers are used for each patient or must be disinfected before reuse in other patients. *Separate AMBU bag and mask are used for each patient. These must be reused after proper disinfection procedures in CSSD*. Trolleys are to be adequately loaded and are used for bedside procedures.

11.1.4 Microbiological monitoring

Environmental surveillance will be done as per guidelines for high risk areas mentioned in chapter 3 Passive surveillance will be used to detect healthcare associated outbreaks.

11.1.5 Visitors policy

Minimum Visitors are allowed inside intensive units for control of infections.

11.2 Dialysis Unit

The purpose of this policy is to optimize the treatment and minimize the risk of the transmission of infections from patient to patient and between patients and employees.

To prevent cross infection following disinfection and equipment maintenance should be done as per provisions in Schedules.

11.2.1 Haemodialysis machines:

i. Priming of kit (Haemodialyser and Arteriovenous tubing) should be done thoroughly with Normal saline without coming in contact with the floor surface and priming bucket surface area.

ii. Kit has to be kept in recirculation mode by connecting Hansen connectors to dialyzer and giving 2000 IU inj. Heparin.
iii. Machine should be disinfected with 4% sodium hypochlorite/ citric acid on daily basis.
iv. Bleaching of machines should be done with 5% chlorine once a month
v. Conductivity of the haemodialysis machine shall be monitored by lab method on a weekly basis
vi. Dialysate sterility should be checked on a monthly basis
vii. Calibration of machines should be undertaken on a quarterly basis

11.2.2 RO Unit

RO maintenance should be done on weekly basis by regeneration of softener and giving backwashes

Disinfection of RO unit including loop lines and storage tanks should be done using 1% sodium hypochlorite solution on a monthly basis

The following tests on the RO unit output water should be undertaken:

- Conductivity: Daily
- Hardness test: Once/week
- Chloramine test: Once/week
- Culture: Once/month
- Endotoxin Assay: Once/month

A detailed examination of RO water should be undertaken on quarterly basis as per AAMI guidelines.

11.2.3 Reprocessor machine:

i. Reprocessing machine should be sanitized with sodium hypochlorite on a weekly basis
ii. Ends of dialyzer connectors should be dipped in disinfectant solution after every process
iii. Fibre Bundle Volume and number of times Haemodialyser was being used should be recorded
iv. Haemodialyser kits should be stored in separate boxes for multiple uses

11.2.4 Blood lines and multidose vials should not be re-used

11.2.5 Staff members shall be vaccinated properly and proper care needs to be taken reardin isolation to prevent cross infection

11.2.6 Log of disinfection activities should be maintained for verification.

11.2.7 Disinfection Schedule for Hemodialysis

i. Disinfection of HD machine with Hemoclean.
ii. Hot disinfection of HD machine with calfree: After every dialysis.
iii. Front cleaning of HD machine with Hemoclean:
iv. Disinfection/ washing of R.O. inlet filter of H.D. Machine with Hemoclean:
v. Disinfection of R.O tank with hemoclean: 1st week of every month.
vi. Charging of R.O system: as per the recommendations.
vii. Culture of dialysate & R.O water: 1st week every month.
viii. Washing Biocarbonate container: After every dialysis.
ix. Carbolization of Hemodialysis room: Daily.

x. Changing gluteradehyde container : Every 14 Days.
xi. Washing of H.D. Room : 1st week every month.
xii. Fumigation of H.D. Room with (Hydrogen peroxide+ Silver nitrate) e.g. Ecoshield: 1st week every month.

11.2.8 Catheter Infection on Treatment

a) Localized Exit Site Infection:
Erythema or crust but no purulent discharge, it can be treated with local applicator of antibiotics.

b) Septicemia Infection: Fever with chills at the initiation of the dialysis. Two set of blood samples with culture, with atleast one drawn percutaneous site and other through the catheter are obtained in the case of CLABSI (Central line Associated Blood Stream Infection). Empirical antibiotic therapy is initiated after taking samples for Blood culture. Antibiotics will be discontinued if the blood culture has no growth and antibiotic regimen adjusted only when bacterial sensitivity is available. Antibiotics are continued in complicated case of CLABSI.

11.2.9 Specimen Collection and Handling

1. Extreme caution must be employed when drawing blood for laboratory testing. Gloves and face shields will be worn while drawing specimens.
2. Blood spills will be cleaned immediately with solution of bleach. During cleaning, gloves will be worn.
3. Any specimen collected from a patient on Isolation is labelled according to Infection Control policy.
4. Bacterial monitoring of water for preparing dialysis fluids and dialysate fluid are collected and immediately sent to Microbiology department on a monthly basis.
5. Specimens are clearly labelled and should include the following information: initials of person collecting specimen, date, time, specimen source (*i.e.,* dialysate fluid or dialysis water), and the machine from which the source was collected.

11.2.10 Environment

- The environment shall be thoroughly cleaned between each treatment and as necessary for spills of blood and body fluids.
- Terminal cleaning procedures must be used between the patients.

11.3 Dental Units

11.3.1 Scope

Applies to what is the best practice in the infection control aspects of Dental Hand-pieces, Pre-procedural Mouth Rinses, Oral Surgical Procedures and Handling Biopsy Specimens.

11.3.2 Definitions

i. Handpiece is a small, high-speed drill used during dental procedures.
ii. Mouthwash or mouth rinse is a chemotherapeutic agent used as an effective home care system by the patient to enhance oral hygiene.
iii. Pre-procedural Mouth Rinse is a mouth rinse used by patients before a dental procedure.

iv. Oral Surgery is a specialty in dentistry. It includes the diagnosis, surgical and related treatment of diseases, injuries and defects involving both the functional and esthetic aspects of the hard and soft tissues of the head, mouth, teeth, gums, jaws and neck.
v. **A biopsy** is a medical test commonly performed by a surgeon or an interventional radiologist involving sampling of cells or tissues for examination.
vi. **A specimen** is a portion/quantity of material for use in testing, examination, or study.

11.3.3 Procedure

11.3.3.1 Dental Hand-pieces and Other Devices Attached to Air and Waterlines

i. Clean and heat-sterilize handpieces and other intraoral instruments that can be removed from the air and waterlines of dental units between patients.
ii. Follow the manufacturer's instructions for cleaning, lubrication, and sterilization of handpieces and other intraoral instruments that can be removed from the air and waterlines of dental units.
iii. Do not surface-disinfect, use liquid chemical sterilants on handpieces and other intraoral instruments that can be removed from the air and waterlines of dental units.
iv. Do not advise patients to close their lips tightly around the tip of the saliva ejector to evacuate oral fluids.

11.3.3.2 Pre-procedural Mouth Rinses

i. A pre-procedural antimicrobial rinse (e.g., chlorhexidine gluconate,essential oils, or povidone-iodine) can reduce the level of oral microorganisms in aerosols and spatter generated during routine dental procedures and can decrease the number of microorganisms introduced in the patient's bloodstream during invasive dental procedures. However no recommendation is offered regarding use of pre-procedural antimicrobial mouth rinses to prevent clinical infections among DHCP or patients.

11.3.3.3 Oral Surgical Procedures

The following apply when performing oral surgical procedures:

i. Perform surgical hand antisepsis by using an antimicrobial product (e.g., antimicrobial soap and water, or soap and water followed by alcohol-based hand scrub with persistent activity) before donning sterile surgeon's gloves.
ii. Use sterile surgeon's gloves.
iii. Use sterile saline or sterile water as a coolant/irrigant whenperforming oral surgical procedures. Use devices specifically designed for delivering sterile irrigating fluids (e.g., bulb syringe, single-use disposable products, and sterilizable tubing).

11.3.3.4 Handling Biopsy Specimens

i. During transport, place biopsy specimens in a sturdy, leak-proof container labeled with the biohazard symbol.
ii. Care must be taken when collecting specimens to avoid contaminating the outside of the container and the laboratory form accompanying the specimen.
iii. If a biopsy specimen container is visibly contaminated, clean and disinfect the outside of a container or place it in an impervious bag labeled with the biohazard symbol.

11.3.4 Dental waste management

Apart from waste generated in any other healthcare facility following are points to remember:

i. Extracted teeth containing dental amalgam should not be placed in amedical waste container (e.g., a red bag, biohazard bag, or sharpscontainer) or regular trash intended for incineration for final disposal.

ii. Extracted teeth containing amalgam restorations must not be heat- sterilized because of the potential health hazards associated with mercuryvaporization and exposure.

iii. Extracted teeth containing amalgam restorations should be discarded in the regular waste container after cleaning and disinfection.

12. CARE OF SYSTEMS AND INDWELLING DEVICES

12.1 General Guidelines

To be followed for all procedures:

1. Hand washing is mandatory before, after and in-between procedures and patients.
2. Each health care worker are familiar with the personal protection (Universal precautions) required for each procedure. These precautions are strictly adhered to.
3. Follow proper waste segregation & disposal after each procedure.

12.2 Vascular Care

12.2.1 Hand washing

Wash hands before every attempted intravascular catheter insertion. Antimicrobial handwashing soaps are desirable, and are preferred before attempted insertions of central intravenous catheters, catheters requiring cut downs, and arterial catheters.

12.2.2 Preparation of skin

- Povidone-iodine (PVP) or 70% alcohol may be used for cleaning the skin. Insertion sites are scrubbed with a generous amount of antiseptic. Beginning at the centre of the insertion site, use a circular motion and move outward. Antiseptics should have a contact time of at least 30 seconds prior to catheter insertion.
- Antiseptics should not be wiped off with alcohol prior to catheter insertion.

12.2.3 Applying dressings

Sterile dressings are applied to cover catheter insertion sites. Unsterile adhesive tape should not be placed in direct contact with the catheter-skin interface.

12.2.4 Inspecting catheter insertion sites

Intravascular catheters are inspected daily and whenever patients have unexplained fever or complaints of pain, tenderness, or drainage at the site for evidence of catheter related complications. Inspect for signs of infection (redness, swelling, drainage, tenderness) or phlebitis and also palpate gently through intact dressings.

12.2.5 Manipulation of intravascular catheter systems

Strict aseptic techniques are maintained when manipulating intravascular catheter systems. Examples of such manipulations include the following:

- Placing a heparin lock
- Starting and stopping an infusion
- Changing an intravascular catheter site dressing
- Changing an intravascular administration set

12.2.6 Flushing IV lines

Solutions used for flushing IV lines should not contain glucose which can support the growth of microorganisms. Do not reuse syringes used for flushing. One syringe is used for flushing only one IV line once. ***The saline bottle/ampule used to fill the syringe should be discarded immediately and should not be kept for reuse. The cost of treating one HAI is much more than cost of few hundreds of such bottles.***

12.2.7 Peripheral IV sites (short term catheters)

12.2.7.1 Dressing changes .

- Peripheral IV site dressings should not usually require routine changes, since peripheral IV catheters, are removed within 72 hours.

12.2.7.2 Replacement of Peripheral IV Catheters

Peripheral lV catheters are removed 72 hours after insertion, provided no IV-related complications, requiring catheter removal are encountered earlier. A new peripheral IV catheter, if required, may be inserted at a new site.

Central intravascular catheters (long term catheters)

- **Dressing changes**.
- Central IV catheter dressings are changed every 72 hours.
- **Replacement of central IV catheters**
- Central IV catheters do not require routine removal and reinsertion. The catheter can be kept for a maximum of 3 months, provided there is no sign of catheter related infection or other complications.

Central line associated blood stream infections (CLABSI)

At the time of catheter removal, the site is examined for the presence of swelling, erythema, 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, the wound is milked in an attempt to express purulence. For catheters upto 5.7 cm, the entire length, beginning several millimeters inside the former skin surface catheter interface, is aseptically cut and sent for culture. With longer catheter, (20.3 cm and 60.9 cm in length), two 5-7 cm segments are cultured a proximal one beginning several millimeters inside the former skin catheter interface and the tip. Catheter segments are transported to the laboratory in a sterile container. These catheter segments should never be sent alone for culture. They must accompany atleast one blood culture specimen collected from peripheral vein of the patient.

Three way with extension is used only when multiple simultaneous infusates or Central Venous Pressure monitoring are required.

12.3 Respiratory Care

i. In addition to the general guidelines that are to be adhered to, the following should also be noted with regard to respiratory care:
ii. Mouth flora influences development of healthcare associated pneumonia in ventilated patients.
iii. Frequent chlorhexidine mouthwashes minimise the chances of pneumonia.

12.3.1 Ventilator Care

i. Sterile water is to be used in nebulizers and humidifiers. This are replaced once or twice a day.
ii. Pneumatic circuits (masks, Y connection and tubes) are to be changed every 24-48 hours. Condensate in tubing should not be drained into the humidifier or airway as they contain large numbers of pathogenic organisms. This are drained only into water traps. Use disposable circuits if cost permits.
iii. Use heat and moisture exchanging filter (HMEF) at Y connection for all patients if feasible and cost permits. Heat and moisture exchanging filter (HMEF) is to be

changed every 24- 48 hours. It should not be removed from circuit except at the time of changing.

iv. Do not change routinely, on the basis of duration of use, the breathing circuit (i.e., ventilator tubing and exhalation valve and the attached humidifier) that is in use on an individual patient. Change the circuit when it is visibly soiled or mechanically malfunctioning.

v. Periodically drain and discard any condensate that collects in the tubing of a mechanical ventilator, taking precautions not to allow condensate to drain toward the patient. Gloves should be worn when performing this procedure or handling the fluid, decontaminate your hands with soap and water or an alcohol based hand rub.

vi. Use sterile (not distilled, non-sterile) water to fill bubbling humidifier.

vii. A heat-moisture exchanger (HME) should be changed when it malfunctions mechanically or becomes visibly soiled. An HME that is in use on a patient should not be routinely changed more often than every 48 hours.

viii. The breathing circuit attached to an HME while it is in use on a patient should not be changed routinely (in the absence of gross contamination or malfunction).

ix. The manufacturer's instruction for the use of oxygen humidifiers should be followed. The humidifier tubing (including any nasal prongs or mask) should be changed when it malfunctions or becomes visibly contaminated.

x. Between treatments on the same patient, small-volume medication nebulizer (in-line and hand-held) should be cleaned, disinfected, rinsed with sterile water (if rinsing is needed), and dried. Use only sterile fluid for nebulization, and dispense the fluid into the nebulizer aseptically. Whenever possible, use aerosolized medications in single-dose vials.

xi. Oxygen masks, venture devices and nebulizer chambers are cleaned carefully and then send to CSSD for HLD.

xii. Humidifier domes are periodically send to CSSD. Ambu bags are cleaned thoroughly and periodically send to CSSD for HLD.

xiii. Microbiological surveillance of respiratory therapy equipment is practised in our hospital.

12.3.2 Tracheostomy Care / Endotracheal Tube

i. Careful attention to post-operative wound care is mandatory.

ii. 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 is cleaned with betadine (Povidone-iodine 5%) every four hours or more frequently, if necessary.

iii. In case of metal tracheostomy tubes, the inner cannula is cleaned every four hours and more often if necessary to prevent the formation of crusts. The inner cannula is cleaned with water, immersed in hydrogen peroxide for 15 minutes and then rinsed with fresh & sterile normal saline. The plastic tracheostomy tubes are removed, another plastic tube is inserted, and the tube is cleaned, with hydrogen peroxide, and rinsed well before reuse.

iv. The tracheostomy tape securing the tube are changed every 24 hours. This tape must be tied securely at all times.

v. The first complete tube change are performed no earlier than 4-5 days to allow time for the tract to be formed. Subsequent changes are done weekly or as necessary.
vi. Clean technique is used to change the tracheostomy tube unless there is a medical indication for sterile technique.
vii. The obturator are at the bedside (preferably taped to the head of the bed) to be used if the tracheostomy tube accidently is dislodged or is removed for any reason.

12.3.3 Suctioning of endotracheal / tracheostomy tube

Employees are instructed and supervised by trained personnel in proper technique before performing this procedure on their own. Assess the patient using auscultation and vital signs prior to suctioning.

12.3.3.1 Sterile Suctioning

i. Wash your hands.
ii. Use a catheter with a blunt tip.
iii. The wall suction are set no higher than 120 mm Hg for adults and between 60 and 80 mm Hg for children.
iv. Attach the suction catheter to the suction tubing; do not touch the catheter with bare hands (leave it in its protective covering).
v. Put on sterile gloves. The wearing of a mask is also strongly recommended.
vi. However, if saline does need to be instilled, ½ cc of sterile saline is put into the tracheostomy tube on inspiration only.
vii. If on a respirator, pre-oxygenate the patient by connecting the resuscitation bag to the artificial airway and ventilating the patient with three or four deep breaths. A mechanical ventilator on 100% oxygen may also be used by depressing the manual ventilation button three or four times.
viii. Insert the catheter gently through the inner cannula until resistance is met. Do not apply suction during insertion.
ix. Withdraw the catheter approximately 1 cm and institute suctioning.
x. Carefully withdraw the catheter, rotating it gently between the thumb and forefinger applying intermittent suctioning.
xi. Continuous suctioning for longer than 10 seconds may create an unacceptable level of hypoxia.
xii. The patient are given time to rest between suctioning episodes. If possible, this time are from two to three minutes. If the patient is receiving oxygen or ventilatory support, reapply the oxygen or ventilator for at least two minutes before re-suctioning.
xiii. Observe for unfavourable reactions such as increased heart rate, hypoxia, arrhythmia, hypotension, cardiac arrest, etc.
xiv. If oral suctioning is necessary, it are done after the tracheostomy is suctioned.
xv. When suctioning is completed, clear the catheter and tubing of mucous and debris with sterile water or saline.
xvi. Discard the catheter, water container, and gloves appropriately.
xvii. Wash hands.
xviii. The tubing and suction canister are changed every 24 hours. The canister are labeled with the date and time when they are changed. If debris adheres to the side of the

tubing or the canister, either or both are changed. The tubing are secured between suctioning periods so that it will not fall to the bed, floor, etc.

12.4 Urinary Catheter

12.4.1 Urethral catheterization

12.4.1.1 Personnel

Only persons who know the correct technique of aseptic insertion and maintenance of catheters should handle catheters.

12.4.1.2 Catheter Use

Urinary catheters are inserted only when necessary and left in place only as long as medically necessary and are changed after 7 days.

12.4.1.3 Hand hygiene

Hand hygiene is performed immediately before and after any manipulation of the catheter site or
apparatus.

12.4.1.4 Catheter Insertion

Catheters are inserted using aseptic technique and sterile equipment. Use an appropriate antiseptic solution for periurethral cleaning. As small a catheter as possible, consistent with good drainage, are used to minimize urethral trauma. Indwelling catheters are properly secured after insertion to prevent movement and urethral traction.

12.4.1.5 Anchoring the catheter

Strapping of the catheter is done to the lower anterior abdominal wall in male patients. This is to prevent direct transmission of the weight of the bag on the catheter, so that pulling and inadvertent dislodgment of the catheter does not occur. This also helps to prevent stricture of the penile urethra if the patient is on a catheter for a long duration.

12.4.1.6 Catheter associated urinary tract infections

In suspected urinary tract infections with the patients on indwelling urinary catheter urine specimen should be sent for culture. Under no circumstances catheter tips should be tips/segments should be sent for culture.

12.4.1.7 Specimen collection from patient with indwelling catheter

Specimen collection from patients with indwelling catheters requires strict aseptic technique. The catheter tubing should be clamped off above the port to allow the collection of freshly voided urine. The catheter port or wall of the tubing should then be cleaned vigorously with 70% ethanol, and urine aspirated via a needle and syringe; the integrity of the closed drainage system must be maintained to prevent the introduction of organisms into the bladder. Specimens obtained from the collection bag are inappropriate, because organisms can multiply there, obscuring the true relative numbers. Cultures should be obtained when patients are ill; routine monitoring does not yield clinically relevant data.

12.5 Wound Care

12.5.1 Surgical wound care

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

For perisurgical prophylaxis see chapter Antibiotic Stewardship Programme.

12.5.2.1 . Surgical Wound Classification

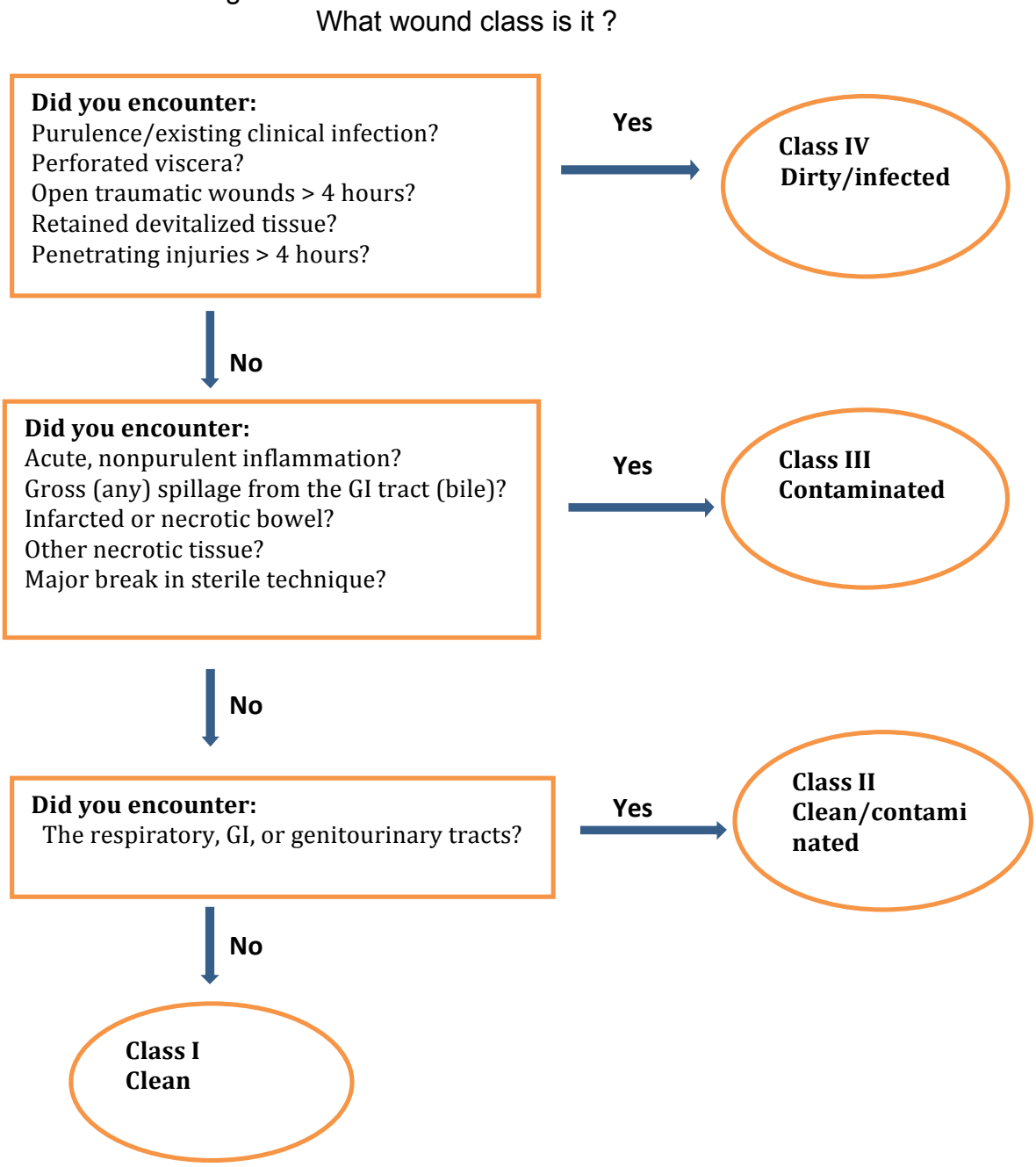
Class I: An uninfected operative wound in which no inflammation is encountered and are closed primarily and if necessary, drained with closed drainage. Operative incision wound following non-penetrating blunt trauma should be included in this category.

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

Class III: Open, fresh, traumatic wounds. .In addition, operation with major breaks in sterile technique or gross spillage from the gastrointestinal tract and incisions in which acute, non-purulent inflammation is encountered are included in this category.

Class IV: Old traumatic wounds with retained devitalized tissue and those that involve existing clinical infection or perforated viscera. This category includes operations where acute bacterial inflammation is encountered or clean tissue must be transgressed for surgical access to a collection of pus.

Wound-classification algorithm



Ref: Quality-improvement initiative: Classifying and documenting surgical wounds: Jennifer Zinn, Vangela Swofford. Wound care advisor 32-38, 2014 vol 3

12.5.2.2 Antibiotic uses

1. To be given at the time of incision while complying to the surgical safety Checklist.
2. The antibiotic should be administered by the anesthetist and documented into the anaesthesia notes.
3. Second dose to be given if operation lasts longer then 3hrs,or massive hemorrhage has occurred
4. No prophylaxis for class I patient, except

a. Abdominal cases
b. Surgery exceeding 2hrs
c. Having three concomitant diagnosis

5. No Prophylaxis for urological procedures with sterile urine
6. Prophylaxis for 24hrs to be given in all class II cases
7. Bowel preparations in colorectal surgeries
8. Therapeutic antibiotics to be given for all class III and class IV wounds

12.5.2.3 Key Priorities – Before Surgery

1. Preoperative showering
    a. Advise patients to shower or have a bath (or help patients to shower, bath or bed bath) using soap, either the day before, or on the day of, surgery.
2. Hair removal
    a. Do not use hair removal routinely to reduce the risk of surgical site infection.
    b. If hair has to be removed, use electric clippers with a single-use head on the day of surgery. Do not use razors for hair removal, because they increase the risk of surgical site infection.
3. Patient theatre wear
    a. Give patients specific theatre wear that is appropriate for the procedure and clinical setting, and that provides easy access to the operative site and areas for placing devices, such as intravenous cannulae. Consider also the patient's comfort and dignity.
4. Staff theatre wear
    a. All staff should wear specific non-sterile theatre wear in all areas where operations are undertaken.
5. Staff leaving the operating area
    a. Staff wearing non-sterile theatre wear should keep their movements in and out of the operating area to a minimum.
6. Nasal decontamination
    a. Do not use nasal decontamination with topical antimicrobial agents aimed at eliminating *Staphylococcus aureus* routinely to reduce the risk of surgical site infection.
7. Mechanical bowel preparation
    a. Do not use mechanical bowel preparation routinely to reduce the risk of surgical site infection.
8. Hand jewelry, artificial nails and nail polish
    a. The operating team should remove hand jewelry before operations.
    b. The operating team should remove artificial nails and nail polish before operations.

12.5.2.4 Antibiotic prophylaxis – General principles

1. Do not use antibiotic prophylaxis routinely for clean non-prosthetic uncomplicated surgery.
2. Give antibiotic treatment (in addition to prophylaxis) to patients having surgery on a dirty or infected wound.

3. Give antibiotic prophylaxis to patients before:
    - Clean surgery involving the placement of a prosthesis or implant
    - Clean-contaminated surgery
    - Contaminated surgery
4. Consider giving a single dose of antibiotic prophylaxis intravenously on starting anaesthesia. However, give prophylaxis earlier for operations in which a tourniquet is used.
5. Before giving antibiotic prophylaxis, consider the timing and pharmacokinetics (for example, the serum half-life) and necessary infusion time of the antibiotic. Give a repeat dose of antibiotic prophylaxis when the operation is longer than the half-life of the antibiotic given. Administer prophylaxis within 1 hour before incision to maximize tissue concentration.
    - Two hours are allowed for the administration of vancomycin and fluoroquinolones.
    - Select appropriate agents on the basis of the surgical procedure, the most common pathogens causing SSI for a specific procedure, and published recommendations.
    - Discontinue prophylaxis within 24 hours after surgery for most procedures
6. Inform patients before the operation, whenever possible, if they will need antibiotic prophylaxis, and afterwards if they have been given antibiotics during their operation.
7. Studies with results showing a beneficial effect of supplemental oxygen included patients who underwent colorectal surgery. It has been observed that 30%-35% supplemental FiO_2 levels are useful in minimising SSI. Higher /lower concentrations are less helpful.
8. Maintaining normothermia (temperature higher than36^0C) immediately after colorectal surgery is helpful in reducing the incidence of SSI.

12.5.2.5 Categories of Surgeries

Clean Surgeries:

a) Uninfected, no inflammation
b) Respiratory, Gastrointestinal and Genitourinary tracts not entered
c) Closed primarily

Examples: Exploratory laparotomy, mastectomy, neck dissection, thyroid, vascular, hernia, splenectomy

Clean-contaminated Surgeries:

a) Respiratory, Gastrointestinal and Genitourinary tracts entered, controlled, no spillage
b) No unusual contamination

Examples: Cholecystectomy, small bowel resection - anastomosis, Whipple's procedure, liver transplantation, gastric surgery, bronchoscopy, colon surgery

Contaminated Surgeries:

a) Open, fresh, accidental wounds
b) Major break in sterile technique
c) Gross Spillage from GI tract
d) Acute non-purulent inflammation

Examples: Inflamed appendectomy, bile spillage in cholecystectomy, diverticulitis, Rectal surgery, penetrating wounds

Dirty Surgeries:

a) Old traumatic wounds, devitalized tissue
b) Existing infection or perforation
c) Organisms present BEFORE procedure

Examples: Abscess I&D, perforated bowel, peritonitis, wound debridement, positive cultures pre-operatively.

12.5.2.6 Classification of major surgical procedures

Type of Surgery	Examples of surgery	
Clean	• Mastectomy • Diagnostic laparoscopy • Exploratory laparoscopy • Thyroidectomy • Parathyroidectomy • Total hip replacement • Total knee replacement • Inguinal, femoral or incisional hernia repair • Splenectomy • Transverse rectus abdominis myocutaneous brest reconstruction • Ventriculoperitoneal shunting • Lumpectomy • Axillary node dissection • Carpal tunnel repair	• Open herniotomy • Lipoma excision • Lap. Orchidopexy • Lap. Pyloromyotomy • Lap. Herniotomy • Subcutaneous cyst excision • Orchidopexy • Prepucial dilatation • Penoscrotal transposition correction • Thoracotomy • Pyloromyotomy • Umblical hernia umblical polyp mini lap • CDH repair • Umblical polyp excision
Clean contaminated	• Cholecystectomy with chronic inflammation • Colectomy • Colostomy reversal • Bowel resection for ischemic bowel • Laryngectomy • Appendectomy with chronic	• Duhamel's pull through • Fistula closure (U.C. fistula) • Fundoplication (hiatus hernia) • Genitoscopy • Kasai's procedure

	inflammation • Small bowel resection • Vaginal hysterectomy • Dental extractions • Alveoloplasty • Total abdominal hysterectomy • LSCS • Whipple pancreaticoduodenectomy • Roux-en-Y gastric bypass • Abdominal perineal resection • Gastrostomy tube placement • Transurethral resection of prostate • Cholecystectomy • Choledochal cyst excision • Circumcision • Cleft lip repair • Cysto lithotomy • Cystoscopy • D.J. stent insertion • D.J. stent removal	• Lap. Appendicetomy • Lap. Cholecystectomy • Lap. Nephrectomy • Meatotomy • Nephrectomy • Oesophageal atresia repair • Open appendicectomy • Palate repair • Pyelolithotomy • Pyeloplasty • Sacrococcygeal teratoma excision • Splenectomy • Suprapubic cystotomy • Ureteric re - implantation • Ureterolithotomy • Ureterostomy • Urethral cyst excision • Urethroplasty
Contaminated	• Cholecystectomy with acute inflammation • Appendectomy with acute inflammation • Bile spillage during cholecystectomy • Bowel resection for infarcted or necrotic bowel • Limb amputation with dry gangrene	• Ileostomy • Fistulectomy • Exploration of foreign body • Colostomy closure • Anoplasty • ASARP • PSARP • Rectal biopsy
Dirty	• Incision or drainage of perirectal abscess • Perforated bowel repair • Peritonitis • Appendectomy with perforation and/or pus • Perforated gastric ulcer • Open fracture with prolonged time in the field before treatment	• Dental extraction with abscess • Limb amputation with wet gangrene • Ruptured appendectomy • Decortication

12.5.3 Collection of wound swabs (Levine's Technique)

12.5.3.1 Indications for swabbing wound

Clinical infection may be indicated when the following symptoms are observed:

1. Swelling
2. Redness
3. Heat
4. Purulent discharge, or increase in level of exudate
5. Wound deterioration, or bridging
6. Change in appearance of tissue, e.g. normal granulation becomes dark and bleeds easily.
7. Systemic temperature

There is considerable evidence suggesting that, in the absence of clinical signs of infection, wound swabs will not provide any information useful for routine treatment, routine swabbing therefore is not justified.

12.5.3.2 Procedure of wound swab collection

i. Perform hand hygiene
ii. Wear gloves.
iii. Before collecting a swab remove all excessive debris and dressing product residue without unduly disturbing the wound with a gentle stream of sterile normal saline. (Stotts 2007)
iv. Remove excess saline with a sterile gauze.
v. Wait for 1-2 minutes to allow the organisms to rise to the surface of the wound.
vi. Depending on type of wound:
    a. ***Exudating wound***- do not pre-moisten the swab.
    b. ***Non-exudating wound***- pre-moisten the swab with sterile normal saline.
    c. *If fresh/active pus is coming out, this has to be collected on the swab.*
    d. **Levine technique-** It is the preferred technique for collecting the swab. A swab is rotated over a 1cm2 area of the wound for 5 seconds (from center to outside of wound) with sufficient pressure to express fluid from within the wound tissue.

i. Collect two swabs: one for Gram staining and the other for culture and sensitivity.
ii. Correctly label the specimen(s).
iii. Ensure the following information is on the request form:
    - Area the swab was collected from.
    - Patient condition or diagnosis
        - If the patient is receiving antibiotics.

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13. INJECTION SAFETY & SAFE DRUG ADMINISTRATION (INCLUDING BLOOD AND BLOOD COMPONENTS)

WHO defines a safe injection as "A safe injection does no harm to recipient, does not expose the health care worker to any risk, and does not result in waste that is dangerous for the community"
To achieve is, the injection need to be administered using a sterile gloves and needle and employing the correct techniques .

Anatomy and physiology of skin/vein/artery

The skin has three layers:

- ***Epidermis*** - The Epidermis is the superficial layer of the skin which consists of various openings for sweat glands and sebaceous glands. Sebaceous glands secrete "sebum" - an oily substance which keeps the skin soft Epidermis also has hair and contains melanocytes which gives the skin its color.
- ***Dermis*** - Dermis lies below the epidermis, is thicker than epidermis and contains sweat glands, sebaceous glands and hair follicle. Dermis also has some blood vessels in it.
- ***Subcutaneous tissue*** - Subcutaneous tissue is the layer which lies beneath the dermis, contains fat tissue and areolar tissues and is the layer for subcutaneous injections.

Vein have three layers:
Tunica Adventitia is the outer layer of the vein consists of connective tissue. This provides support & protection to the vein. Blood vessels to the vein are also present in this layer. A hematoma may be formed, if one of the vessels is penetrated.
Tunica media is the middle layer of the vein consists of muscle & elastic tissue. Nerve fibers are present in this area and stimulation of this layer by cold infusions and irritating medications can cause Vasospasm. Patients may feel pain during venepuncture, when the needle penetrates this layer.
Tunica Intima is the inner layer of the vein, consists of smooth, elastic endothelial lining. Damage to this lining or presence of foreign material induces an inflammatory response resulting complications - Phlebitis, Thrombus formation.

Veins are marked by structures within the lumen, formed by endothelial lining of the Tunica Intima, called valves. They are present as bumps along the course of the vein & also at bifurcations. They are predominantly found in large veins of the extremities
The common veins used for cannulation include –
Basilic veins
Cephalic veins
Metacarpal veins
Median Cubital veins
Veins in the foot
Veins in the scalp
Jugular, Subclavian and Femoral veins

The arteries on the other hand do not have valves. Pressure within the artery keeps blood moving in appropriate direction. Arterial flow is downward - with gravity and are located much deeper than veins & surrounded by nerve endings.

13.1 Risk Factors

The risk associated with unsafe injections is transmission of blood borne pathogens such as HBV, HCV and HIV. In addition, unsafe injection can cause local abscesses and can also lead to septicemia.

13.2 Safe Injection Practices

1. To make sure that entire process of administering an injection is safe, the equipment used, techniques applied and process involved should be in a most safe and hygienic member **.**
2. Hand Hygiene is one of the most important standard precautions for preventing the spread of diseases/infection. Hand must be decontaminated before and after every episode of care that involve direct contact with patients
3. Medicines
   It is the nurse's responsibility safely to prepare and give the drugs ordered by the doctor. If not given properly, medicines can be harmful or even fatal. Before giving any medication the nurse needs to know:
   i. The doses of the drug which are safe to administer
   ii. The dose of the drug which has been prescribed for the patient
   iii. The method of administration (route and rate of administration)
   iv. The drug's actions and expected effects
   v. Possible side effects (unintended effects).
   It is also important to know if a patient is allergic to a drug. Ask your patients about any bad reactions they have had to drugs in the past or any medicines forbidden for them. For safe administration of drugs: give the right dose of the right drug to the right patient in the right route at the right rate at the right time.
4. When giving medications, the nurse needs to be aware of possible interactions between the patient's different drugs. Drug interactions can sometimes harm the patient.

Seven rights of drug administration are
1. Right Patient
2. Right Drug
3. Right Dose
4. Right time
5. Right route and rate of administration
6. Right documentation
7. Right disposal

It is the nurse's responsibility to protect the patient from harm and give right drug and right dose. If in doubt check with the nurse or the doctor in-charge.

13.2.1 Right dose

The nurse needs to know the doses of the drug which are safe to administer. Sometimes the pharmacy gives out drugs in grams when the order specifies milligrams, or the other way around. You need to convert these. Remember that:

1000 mg (milligrams) = 1 g (gram)
1000 g = 1 kg (kilogram)
1000 ml (millilitre) = 1 l (litre)

Liquid medicines

Sometimes liquid medicines are given in a vial or an ampoule. A vial is a glass or plastic bottle that may hold one or more doses of a drug. An ampoule is a small sterile plastic or glass container that holds one dose of a drug. Usually it has a small neck with a coloured mark to show where the neck can easily be snapped off and the drug drawn out . Sometimes the vial may contain more than the dose you need to give. You need then to work out how much of the solution to give in order to have the correct dose. You can calculate using this formula:

Dose you want give (mg)

---------- X volume on hand = amount (volume in ml) needed

Dose on hand (mg)

(Dose in hand implies mg strength of the liquid medicine available)

Thus, if you need to give a dose of 500 mg of Ampicillin and it is in a solution containing 250 mg in 5 ml, you would work out this formula:

500
------x 5 ml = 10 ml
250

The correct dose would be 10 ml.

Pills or capsules

If the drug is in pills or capsules, look at the container to see how much of the drug is in each pill. If the drug is not separately packaged in the amount you need, calculate the amount to use. The correct number of pills is the desired dose divided by the amount of drug in each pill. If you need to give 100 mg of the drug, and each pill in the bottle has 50 mg, then you need to give the patient two pills. Sometimes you have to calculate a fractional or smaller dose, particularly when giving a drug to a child. Adult dosages of most drugs are standard, but children's doses are not standard. A child's dose is normally based on his or her body weight in kilograms.

13.2.2 Right Route

There are several routes for administration of drugs:.

- **By mouth** (orally), in pills, capsules or liquids
- **By injection** (parenterally), into the body tissues by a needle and syringe
- **On a certain area** (topically), applied to the skin or mucous membranes
- **In the eye or ear**
- **Into the rectum** (rectally), in suppositories or by inserting some fluid.

Always make sure that you are using the right route.

13.2.3 Right Drug

To make sure that you give the right patient the right drug, check what you are doing at every step.

Guidelines for administering medication:

1. Check the patient's medication card or record against the doctor's order. Make sure that what is on the card is what the doctor ordered.
2. Compare the label on the medicine bottle or package wrap with the patient's medication card or record. Make sure that you have the right medicine.
3. After you have prepared the medication, recheck the label before taking the medicine to the patient's room.

13.2.4 Right Patient

Make sure you give the right medication to the right patient. Many patients have similar last names. Therefore you must:

1. Check the medication card/record against the patient's name on the bed or other patient identification
2. Ask the patient to tell you his or her name.

13.2.5 Right Time

Many drugs are ordered for certain times of the day. Insulin, for example, is normally given before meals. Antibiotics are usually ordered every 6, 8 or 12 hours, throughout the day and night (around the clock), not just during waking hours. They must be given around the clock to maintain high enough levels of the drug in the patient's body. Diuretics are usually given in the morning rather than the evening, so that the patient's sleep is not disturbed by frequent urination. Know the medication schedule of your hospital or institution uses and give drugs at the scheduled times.

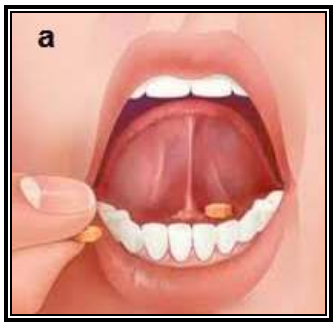
13.3 Oral Medications

The easiest, safest and most convenient way to give medication is through the mouth. If you know that it is difficult for the patient to swallow, you can crush tablets into a powder. Then mix the powder with some soft food that the patient can swallow. Not all drugs can be crushed. For example, drugs with a protective coating (enteric coated) or those in a slow or modified release form should not be crushed. Wash your hands. Calculate the amount you need. Take the liquid or solid medicine to the patient's room on a cart or tray, and make sure that you have the right patient. If you are giving any medicines that require you to assess the patient, do that first. If the vital signs indicate problems, check with the doctor or the nurse in charge before giving the drug.

Drugs that require you to check vital signs more frequently include:
All high risk drugs (check the list available in your patient care unit). Examples: • Digoxin--check pulse • Hypotensive drugs (drugs that reduce blood pressure)--check blood

pressure
- Narcotics--check breathing.

Figure: Images showing (a) sublingual, (b) transmucosal (buccal) routes of drug administration



If this is the first time the patient is getting a medication, explain what the drug is for. If it has side effects, tell the patient what to expect. Help the patient to sit up or lie on one side. This makes it easier to swallow the medicine.

If the patient says that this medicine is not the same as he or she was given before, check the order again to make sure that it is correct. Give liquid medicine in a cup to the patient to swallow. Give a glass of water to the patient with the pills. This will help the patient to swallow. If he or she cannot hold the cup, you should hold it, and give one pill at a time, followed by a sip of water. Always go back and check the patient for any adverse reactions or side effects from the medication. Note down the medication taken by the patient as well as those refused or withheld. Give the name of the drug, dose, method of administration, time of administration and any important patient information such as the pulse rate.

13.3.1 Oral medication for children

i. Check before adminsitaration if the medicine comes in suspension form, shake well before using.
ii. Check the strength of the formulation.
iii. Check that the dose calculation of mg/kg x weight of child matches the volume to be administered (compare to written information provided).
iv. Check the measuring device to ensure the units match the volume to be administered. Always use a proper measuring device for administering liquid preparations usually supplied with the medicine. Do NOT use household spoon for giving medication. They are not all the same size. A teaspoon could be as small as a half teaspoon or as large as 2 teaspoons and also spill easily.
v. Many medications are given to children in a dropper, a syringe or measuring cup. It is important to measure small amounts of medicine accurately. For volumes less than 1 ml, use a tuberculin syringe, if one is available, or other syringe, with no needle attached. You can put the medication directly into the child's mouth from the syringe, or pour it from a small cup.

vi. Young children and some older children have trouble swallowing pills. If a liquid preparation is not available, crush the tablets and mix them with soft food after checking in the product label/package insert. Also check manufacturer's instructions before crushing tablets.

13.3.2 Other Liquid Medication Safety Tips

i. Never allow children/adults to drink directly from bottle.
ii. After administering the medicine, always wash the dosing device and dry well otherwise bacteria can grow and cause contamination with any future use and liquid residue on the device can interfere with dosing accuracy.
iii. If a cup or dosing syringe is overfilled while measuring, discard the excess medicine down the sink. Don't try to pour any excess or unused medicine back into the container. Doing so will contaminate the medicine that is left in the container.
iv. To ensure accurate dosing, don't combine more than one liquid medicine in a dosing device at the same time. The medicines may not be compatible.
v. Do not combine any medicine with foods or drinks unless specified in the product labelling.
vi. Monitor for adverse effects following administration of a medicine.

The safest and cheapest way to give medicine is by mouth.
Stay with the patient until he or she has swallowed all the medicines.
Give medication to children while they are sitting up, so that they do not choke on it.

13.3.3 Medication Administration through Enteral Feeding Tubes

While many medications may be given through a feeding tube, some drug formulations should not be altered for enteral administration e.g., Enteric-coated products should not be crushed. The enteric coating allows for medication to be released in the small intestine rather than the stomach. As a result, less GI irritation occurs, and the medication is protected from destruction by gastric acid. Adverse effects may occur or the drug's effectiveness may be reduced if it is crushed.

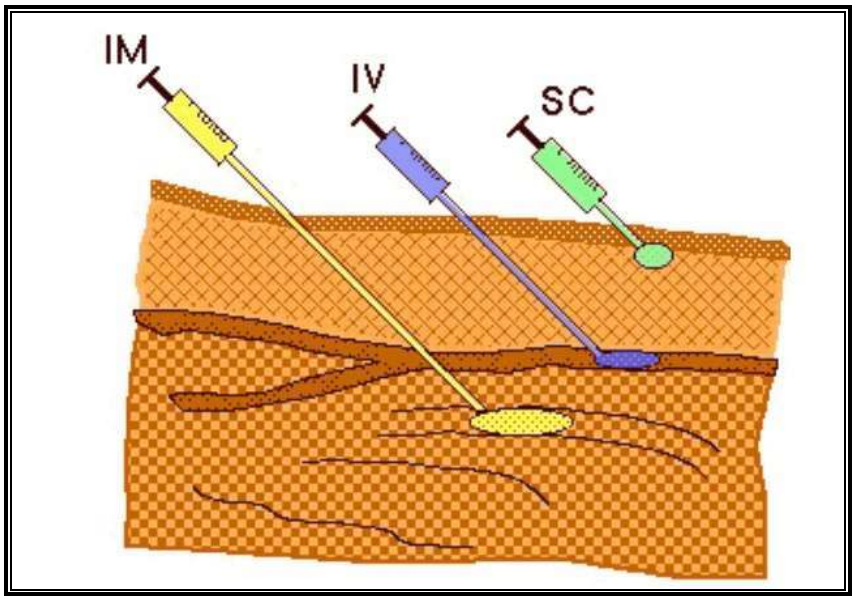
Buccal or sublingual preparations should also not be altered. These medications are not designed for absorption in the GI tract, and crushing them for administration via the enteral tube may result in reduced drug absorption and lack of efficacy.
Also, excipients in some oral solutions and suspensions, such as sweeteners, gums, stabilizers, and suspension agents, can increase viscosity and osmolality, causing diarrhoea, clogged tubes, and/or undelivered medication left in the tube. Also crushing extended-release tablets is not recommended because crushing of extended release dosage forms.
Use another dosage form if the medication cannot be crushed.
Check before addition of medication directly to the enteral formula for physical incompatibilities, decreased drug absorption, increased risk of tube occlusions, and potential microbial contamination.

13.4 Injecting Medication

Medicine may be injected (given parenterally) into the skin, under the skin, into a muscle, or into a vein. Drugs given in any of these ways are absorbed more quickly than drugs taken by

mouth. Therefore it is especially important to be sure that you give the right drug to the right person in the right amount. To give medicines parenterally, the nurse uses a vial or ampoule, a syringe and a needle.

Diagramatic representation of various types of intravenous, intramuscular and subcutaneous injection



The following recommendations apply to the use of needles, cannulas that replace needles, and, where applicable intravenous delivery systems:

i. Follow hand hygiene before preparing injections and wear gloves.
ii. Use aseptic technique to avoid contamination of sterile injection equipment
iii. Use sterile hypodermic syringes for single use with a sharps injury protection feature (SIP devices) or auto disable or syringes with a reuse prevention feature (RUP devices),
iv. Ensure one needle, one syringe and one patients.
v. Do not administer medications from a syringe to multiple patients, even if the needle or cannula on the syringe is changed. Needles, cannulae and syringes are sterile, single-use items; they should not be reused for another patient nor to access a medication or solution that might be used for a subsequent patient
vi. Do not enter a vial with a used syringe or needle HCV, HBV, and HIV can be spread from patient to patient when these simple precautions are not followed. Use fluid infusion and administration sets (i.e., intravenous bags, tubing and connectors) for one patient only and dispose appropriately after use. Consider a syringe or needle/cannula contaminated once it has been used to enter or connect to a patient's intravenous infusion bag or administration set. **Once IV solution bags have been spiked; administration must begin within 1 hour.**
vii. Use single-dose vials for parenteral medications, whenever, possible.
viii. Do not administer medications from single-dose vials or ampoules to multiple patients or combine leftover contents for later use

ix. Assign medications packaged as multi-use vials to a single patient whenever possible. If multidose vials must be used, both the needle or cannula and syringe used to access the multidose vial must be sterile. Do not leave needle in the septum. Mention date of opening of the multidose vial or mention use before date to demarcate the shelf life of the opened vial.

x. Do not keep multidose vials in the immediate patient treatment area.Store in accordance with the manufacturer's recommendations; discard if sterility is compromised or questionable

xi. Do not use bags or bottles of intravenous solution as a common source of supply for multiple patients.

xii. Absolute adherence to proper infection control practices be maintained during the preparation and administration of injected medications.

xiii. Vials are discarded if sterility compromised, expired, not stored properly, is more than 28 days (unless specified by the manufacturer) or sooner after opening

xiv. Discard, if not dated.

xv. Do not prepare medication in one syringe to transfer to another syringe.

xvi. Assess the patient to decide on the right size of the needle. Use of **correct needle is the key to delivering to correct area with max effect with least discomfort**

- **Discard used syringes, needles and cannulas at the point of use in an approved sharps container immediately after use.**
- **Never leave a needle in the septum of a vial.**

13.5 Giving Injections

i. Hand washing before and after injections.

ii. Use soap and water instead of an alcohol-based hand rubWear gloves.

iii. The cleaning of injection site should be circular – from inwards to outwords. Wipe from the center of the injection site without going over the same area again.

iv. Apply single use alcohol solution swab and let it dry for 30 sec completely before administering injection. Avoid alcohol for vaccination

v. Avoid pre-soaked swabs in a container

vi. Take all precautions to avoid needle stick injury. Do no tattempt to recap or bend needles. Where recapping of a needle is unavoidable, DO use the one-hand scoop technique.

vii. After giving injection, if using reuse Prevention syringe, break the plunger of syringe and needle through hub cutter. Discard syringe and needle as a single unit in a puncture resistant sharps container immediately after use and discard appropriately.

viii. If using multidose vial, do not keep the needle inserted in the rubber septum/stopper.

13.6 Safe Blood glucose monitoring practices

i. Always perform hand hygiene and use new gloves before conducting BGM and between each person tested.

ii. Restrict use of lancet/penlet devices to prick the skin to individuals only.

iii. NEVER share fingerprick devices/pens/cartridges between persons; they are for single-

patient use only.

iv. Assign individual blood glucose monitors. If sharing, clean and disinfect the monitor after every use according to the manufacturer's instructions. If the manufacturer does not specify, then do not share.

v. Dispose of used lancets in an approved sharps container and empty container appropriately.

13.7 Safe injection practices: do's and don'ts

DOs	DON'TS
• Maintain hand hygiene (use soap and water or alcohol rub) • Use fresh alcohol swab to clean the site for injections and plain sterile swab for vaccinations • Use a single-use device for blood sampling and drawing • After giving injection, if using ReUse Prevention syringe, break the plunger of syringe and needle through hub cutter • Where recapping of a needle is unavoidable, DO use the one-hand scoop technique • Seal the sharps container with tamper-proof lid • Ensure One needle, One syringe and One patient • Take post exposure prophylaxis in case of Needle Stick Injuries and Blood & Body Fluid splash.	• Don't Forget to clean your hands • Don't Pre Soak cotton wool in a container • Don't Re use a syringe, needle or lancet for more than one patient • Don't Re use a syringe, needle or lancet for more than one patient • Don't Use a single loaded syringe to administer medication to several patients • Don't Touch the puncture site after disinfecting it. Don't Change the needle in order to reuse the syringe • Don't use the same mixing syringe to reconstitute several vials • Don't Leave an unprotected needle lying outside anywhere • Don't Recap a needle using both hands • Don't Overfill or decant a sharps container • Don't Delay PEP beyond 72 hours, delayed PEP is NOT effective

13.8. Multidose Vial Policy

To establish a uniform policy on shelf life and handling of all multidose vials, bottles, droppers, unit dose ampoules/syringes, and single dose medications in use in the THE HOSPITAL.

13.8.1 Multidose vials

Multiple dose/multi-dose medication vials must be handled in accordance with the manufacturer's instructions to include:

i. Place the expiration date on the opened vial. The expiration date is 28 days after the vial is opened or the manufacturer's recommended expiration date (whichever comes first) and discard at time of expiration.

ii. Refrigerate multi-dose vials after they are opened if recommended by the manufacturer.

iii. Cleanse the access diaphragm of multi-dose vials with 70% alcohol (such as alcohol swabs) before inserting a device into the vial.

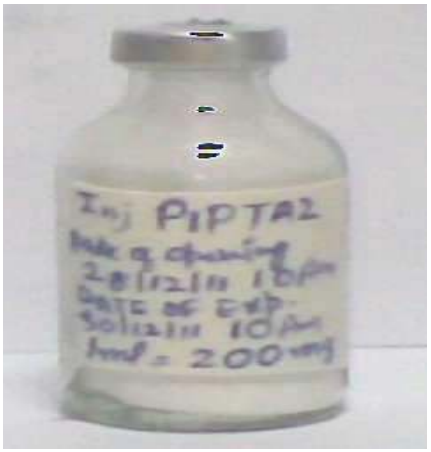
iv. Use a sterile device to access a multi-dose vial and avoid touch contamination of the device before penetrating the access diaphragm.

v. Discard the multi-dose vial be if user suspects vial sterility has been compromised.

vi. Vials of saline or water may be used as multi-dose only if they contain a preservative

vii. Visual inspection of the vial should be accomplished each time medication is withdrawn to determine that the stopper is intact and that no unusual particulate matter is in the vial.

viii. Check the vial for
   a. Turbidity
   b. Discoloration
   c. Integrity of rubber stopper seal.



ix. Avoid opening more than one multidose vial of the same medication at the same time.

x. Refrigeration of opened multidose vials is product specific (i.e., insulin, heparin, etc., will be refrigerated).Routine refrigeration of opened multidose vials is not recommended.

xi. Read the label.

Components on labels include:

a) Name of Drug:
b) Drug dilution/concentration:
c) Date and Time of Opening:
d) Date and Time of Expiry (28 days of opening date or expiry by manufacturer whichever is earlier)
e) Signature of the staff labelling the vial.

13.8.2 Single use vials

i. Single use parenteral drugs do not contain preservatives and should be immediately discarded by the original user after the dose is withdrawn. Those vials containing medications that have *limited storage capability* should be dated and initialed and disposed of in accordance with the manufacturer's recommended instructions.

ii. Single dose containers are preferred over multidose containers. If this is not possible, the smallest multidose container available should be used. This lessens the risk of contamination/cross contamination.

iii. A sterile needleless device or blunt syringe must be used to withdraw the required amount of medication from single dose vials.

iv. Unit dose glass ampoules/syringes are specifically designed for single dose only. Any unused portions of medications must be discarded immediately and not left on the unit for any period of time.

13.8.3 Precautions for maintaining drug integrity

i. All drugs will be clearly labeled. The identification of a drug shall not be assumed if unlabeled. When drugs are unlabeled or labels are defaced, these drugs will not be used.

ii. Instructions on drugs should be read carefully to determine the temperature range at which the drugs are to be kept.

iii. Some medications are clearly labeled: DO NOT REFRIGERATE. Thus the refrigeratorshould not be used arbitrarily as a storage place for drugs.
iv. All drugs will be checked prior to use and monthly for expiration to ensure that outdated drugs are not used. If drugs have only lot number but no expiration date, the lot number may be checked by pharmacy for expiration date.
v. A multidose vial labeled to expire in a given month will expire on the **last day of that month**.
vi. **Label the opned vial appropriately, including date & time of opening or mention use before date etc.**

13.8.4 Multidose Ophthalmic Drops

Multidose Ophthalmic Drops for inpatients may be ordered from unit dose and used only for that patient.

Other multidose ophthalmic drops may be used for more than one patient provided the dropper surface is not contaminated by touching any part of the eye, eyeball, face, or eyelid. ***It must be remebred to do hand hygiene when using same eye drops bottle in multiple patients (e.g. Homatropine drops for pupil dilation). Also care must be taken that no part of vial touches the patient while administrating eye drops. If this happens, this vial should not be used in other patients.***

13.8.5 Ampoules

All ampoules formulations without preservative should be discarded immediately after use. ***Broken ampoules with drugs should not be kept for use at later times.***

13.8.6 Responsibilities

a. Nursing Staff
- Must follow the requirements of the policy.
- It is the responsibility of each person using a multiple-dose vial to determine its safety for future use based on any suspected or known compromise to the solution's sterility.

b. Unit incharges of all departments

Must ensure employee compliance with the policy.

c. Surveillance and infection control Division
- Will bring these policies to the HICC for review and approved

13.8.7 Multi dose Uses and Period of Storage

Multi-dose vials with limited shelf life – storage conditions and maximum permissible period of use.

S. No.	**Item**	**Recommendations**
1.	Marking the date and time when opening vials.	Mark all injectables, ophthalmic, and reconstituted oral products with the date and time of first use or reconstitution. Discard all open products without a date.
2.	Ophthalmic products	Use within 28 days if stored properly, not contaminated, and manufacturer does not specify a shorter expiration date.
3.	Multidose vials with	Use within 28 days if stored properly, not contaminated, and manufacturer does not specify a shorter expiration date.

	preservatives (not insulin or vaccines)	Most manufacturers only have data for 28 days. If the company has data, the vial may be used for a longer period of time. Haloperidol decanoate, if stored properly and not contaminated, may be used for up to 90 days after the first use based on data from the manufacturer.
4.	Insulin	Use opened vials of insulin within 28 days whether refrigerated or stored at room temperature. Most manufacturers have changed their storage limits for most products to 28 days, including regular insulin. Keep between 2-8^{o}C in refrigerator
5.	Vaccines	Multidose vaccine vials may be used until the expiration date on the vial if stored properly, not contaminated, and the manufacturer does not specify a shorter expiration date. All manufacturers have data to support this practice. Use preservative-free single-dose vaccine vials immediately.

13.9. Needle selection criteria

	LOCATION OF INJECTION	MAXIMUM INJECTION VOLUME	NEEDLE LENGTH	NEEDLE GAUGE	NEEDLE ANGLE
INTRAMUSCULAR (IM)*					
		PEDIATRIC			
Infants < 18 months	Deltoid	Not Recommended	**7/8" – 1" (22 – 25 mm)	25 – 27 G	90^{0}
	Rectus Femoris	0.5 ml			
	VastusLateralis	0.5 ml			
	Ventrogluteal	Not Recommended			
	Dorsogluteal	Not Recommended			
Toddlers < 3 years	Deltoid	0.5 ml	7/8" – 1 ¼ " (22 – 32 mm)	25 – 27 G	90^{0}
	Rectus Femoris	1 ml			
	VastusLateralis	1 ml			
	Ventrogluteal	Not Recommended			
	Dorsogluteal	Not Recmooended			
Preschoolers < 6 years	Deltoid	0.5 ml	7/8" – 1 ¼ " (22 – 32 mm)	22 – 25 G	90^{0}
	Rectus Femoris	1.5 ml			
	VastusLateralis	1.5 ml			
	Ventrogluteal	1.5 ml			
	Dorsogluteal	1.5 ml			
School Age < 13 years Old	Deltoid	1 ml	7/8" – 1 ¼ " (22 – 32 mm)	22 – 25 G	90^{0}
	Rectus Femoris	1.5 ml			
	VastusLateralis	2 ml			
	Ventrogluteal	2 ml			
	Dorsogluteal	2 ml	7/8" – 2" (22 – 51 mm)	22 – 25 G	

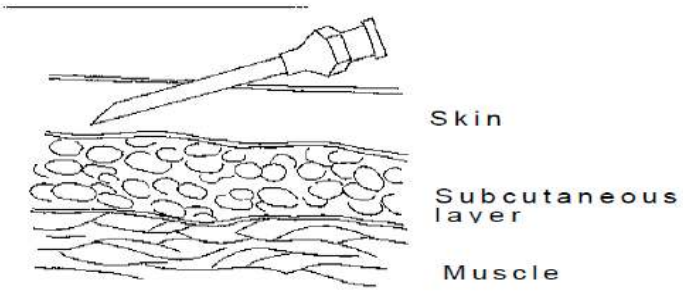
		ADULT			
Adolescene and Adult	Deltoid	2 ml	7/8" – 1 ½ " (22 – 38 mm)	21 – 24 G	90^0
	Rectus Femoris	2 ml			
	Vastus Lateralis	5 ml			
	Ventrogluteal	5 ml			
	Dorsogluteal	5 ml	7/8" – 3 (22 – 76 mm)	21 – 24 G	
SUBCUTANEOUS (SC)					
Padiatric to Adult	Anterolateral thigh	1 ml	3/8" – 5/8" (10 – 16 mm)	26 – 31G	45^0- 90^0
	Upper outer Tricep area; Upper buttocks				
	Abdomen (avoid 2" radius around umbilicus)				
INTRADERMAL (ID)					
Pediatric to Adult	Anterior aspect of forearm	0.5 ml	3/8" – 3/4" (10 – 19 mm)	26 – 28G	10^0 - 15^0
	Upper chest				
	Upper back				
	Back of upper arm				

1 Adapted from Craven R.P. &Hirnle C.J. (2006) Fundamentals of Nursing Human Health and Function, 5thedn. Lippincott, Philadlphia
2 Edmunds M.W. (2003) Introduction to Clinical Pharmacology, 4thedn. Mosby, St Louis; 74
3 Kyle T. (2008).Essentials of Pediatric Nursing. Lippincott, Philadelphia; 361
4 Springhouse Corporation. (2003) Medication Administration Made Incredibly Easy. Lippincott, Philadelphia; 225

5 Prior to administering an IM injection, refer to your procedure manual to determine the injection site utilizing body landmarks.
6 Needle length dependant on age, physical condition and medication requirements.

13.10 Injections Into The Skin /Intradermal Injection

An intradermal injection is given in the dermal layer of the skin, just below the top layer, which is called the epidermis. Intradermal injections are used for allergy tests, tuberculin tests, and many immunizations. The most common site for this type of injection is the lower arm. Other sites include the upper chest and the back beneath the shoulder blade. BCG vaccination is also given intradermally. The most common sites are the upper arm, forearm and buttocks or upper thigh. To give a BCG injection or other intradermal injection:



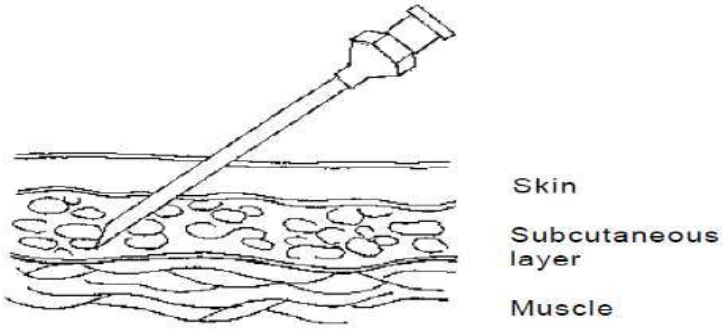
Intradermal injection

i. Do hand hygiene before you begin.
ii. Check the name of the patient.
iii. Tell the patient that the injection will cause a small lump,like a mosquito bite or small blister, but it will disappear quickly. Select a site that has no discoloration or rash or broken skin.
iv. Clean the site with alcohol using a circular motion.
v. Pull the patient's skin flat. Hold the syringe at about a 15^{o} angle, and insert the needle through the epidermis into the dermis.
vi. Inject the fluid slowly until a lump appears. This indicates that the fluid is in the dermis.
vii. Take the needle out quickly and lightly wipe the site with an antiseptic swab.

- **Do not massage the injection site because that might make the medication go into the tissue or out of the injection site.**

13.11 Injections under the Skin/ Subcutaneous Injection

Subcutaneous injections go into the fatty tissue just below the skin. Many drugs are injected subcutaneously, including vaccines, preoperative medications, narcotics insulin and heparin. Common sites for subcutaneous injections are: the backs of the upper arms and the fronts of the thighs, the upper back, and the fat pads on the abdomen.



Subcutaneous injection

i. Do hand hygiene.
ii. Before giving the medicine, check the patient's name and registration number.
iii. Draw the medication into the syringe.

iv. Get rid of any air bubbles in the syringe by tipping the syringe upside down and slowly pushing the plunger until you can see a drop of solution in the needle's bevel or end.
v. Grasp the patient's skin with the thumb and forefinger of your left hand (right if you are left -handed) to raise up the subcutaneous tissue and form a fat fold.
vi. With your right hand, put the needle in at a 45^{o} or 90^{o} angle(if you have subcutaneous needle gauze no-26 you can give at 90^{o} angle otherwise with other needle give at 45^{o} angle.) and pull slowly back on the plunger to see whether you have entered a blood vessel.
vii. If no blood comes into the syringe, give the injection by slowly and steadily pushing the plunger.
viii. Quickly take the needle out and press down on the skin.
ix. There is usually no bleeding from subcutaneous injections. However, if there is bleeding, press gently until it stops.

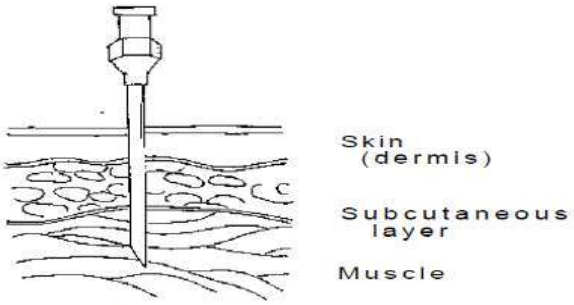
If blood comes into the syringe on pulling the plunger back means that vein has been hit. Then you must withdraw the needle, discard the syringe and prepare a new injection. That is because subcutaneous injections can be dangerous if they go directly into the bloodstream, where they are absorbed more quickly than from the fatty tissue.

13.11.1 Insulin Injection Technique

i. Insulin is given subcutaneously 30-45 min before meals. Use shortest possible needle length to avoid intramuscular injections which can result in hypoglycemia and glucose variability. Using short needles also causes less lipohypertrophy.
ii. Abdominal wall is common injection site. The back of arm, the outer side of the thigh and the upper buttocks are also used for injection.
iii. Rotate within injection site frequently to prevent lipohypertrophy and follow the same general location at the same time each day. There is no need to use spirit swab, if the skin is clean.
iv. Use thin needles i.e. with higher gauge numbers are recommended. Lipohypertrophy is less frequent with 32-gauge needles.
v. Use pen needles and syringes only once.

13.12 Injections into the muscle

Intramuscular injections (that is, injections into the muscle) are absorbed faster than subcutaneous injections. Large injections (up to 1-2 ml for a child and 3 ml for an adult) can be given this way because muscle can absorb more fluid than fatty tissues. The preferred sites for intramuscular injections are the dorsogluteal site in the gluteus medius muscle in the posterior hip or the ventrogluteal site in the gluteus medius muscle in the lateral hip (see below).

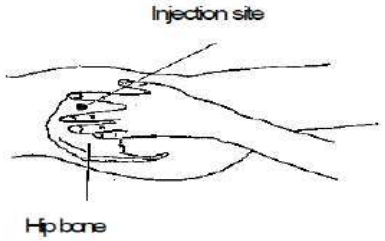


Intramuscular injection

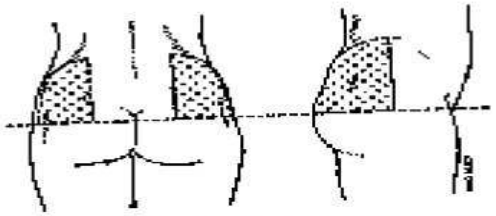
13.12.1 Selection of injection site

Ventrogluteal site: The ventrogluteal injection site is easy to identify and safe to use. It avoids major nerves and blood vessels.

Dorsogluteal site: If dorsogluteal site is selected, be careful to avoid the sciatic nerve, because accidental injection into this nerve can cause permanent or partial\ paralysis of the leg.



Ventrogluteal site for intramuscular injection

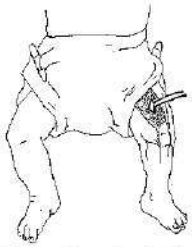


Dorsogluteal site for intramuscular injection

Never use the dorsogluteal site in the posterior hip for infants or children who have not yet begun to walk. Give the injection in the rectus femoris muscle or the vastus lateralis site in the middle third of the thigh.

Intramuscular injection sites for infants and small children

Intramuscular injection sites for infants and small children



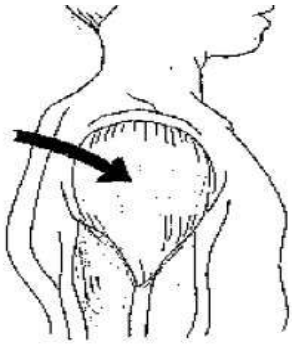
Rectus femoris site for intramuscular injection

Giving intramuscular injection to child. Vastus lateralis site for intramuscular injection

Deltoid muscle: The muscle of the upper arm, the deltoid muscle, can also be used for an older child or an adult. However, remember that you cannot inject as much fluid into the arm as into the muscles of the hip.

13.12.2 Procedure to give injections into the muscle

i. Do hand hygiene.
ii. Protect the patient's privacy by putting a sheet over body parts that do not need to be exposed.
iii. If you are giving an injection to a child, show the mother how to hold the child.
iv. Choose a site for the injection that has no broken skin, swelling, hardness, tenderness, redness or warmth. Locate the exact site and clean it
v. With an antiseptic swab or cotton ball using a circular motion and extending outward about 5 cm on each side or 10 cm in total.
vi. Using your left hand, stretch the skin at the site. This makes it firmer so that it is easier to insert the needle.
vii. Insert the needle quickly at a 90o angle through the skin and into the muscle.
viii. Aspirate by pulling back on the plunger. If blood appears in the syringe, pull out the needle, throw away the syringe and prepare a new injection.
ix. If blood does not appear, then slowly, steadily push the plunger to inject the medication.
x. Quickly remove the needle and apply firm pressure to the site using an antiseptic swab.
xi. Wash your hands.

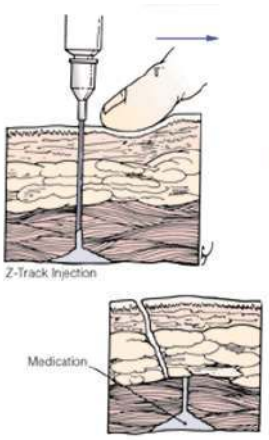


Injection into deltoid muscle

Do not inject more than 1 ml into the arm of an adult or a child.

Z-Track Method

- **Discard needle after medication is drawn up, and use new needle for injection to minimize tissue staining or irritation by preventing back flow to subcutaneous tissue.**
- **Use this method when administering injection in ventrogluteal or dorsogluteal sites.**
- **Displace skin to one side (laterally) before inserting needle.**
- **Cleanse site and inject drug**
- **Wait 10 seconds, withdraw needle and allow skin to return to normal position**



13.13 Steps of the cannula Insertion procedure

a. Preparation of equipment (Tray)
b. Preparation of environment.
c. Preparation of patient.
d. Preparation of equipments for inserting peripheral lines

13.13.1 Materials required

1. Examination Gloves
2. Sterile Drapes
3. Surgical Scissors
4. Cotton Swabs
5. Betadine Swabs
6. Spirit Swabs
7. 5ml / 10ml Syringe
8. Bivalve
9. Normal saline flush (10ml)
10. I/V Cannula
11. Gauze pieces
12. Dressing
13. Site label (to record time & date of insertion)
14. IV sets (as required)
15. IV bottles (as required)

13.13.2 Procedure of intravenous cannulation

1. Assemble all articles at patient bedside
2. Thorough hand washing (Follow 6 steps)
3. Wear clean gloves
4. Support the choosen limb
5. Apply the tourniquet
6. Assess and select the vein by gently tapping the site.
7. Cleaning the site. Clean the chosen area covering about 2-3 inches in radius, with spirit /100% alcohol, and let it dry. Thereafter chlorhexidine / betadine solution is used to

clean the same area in circular motion and allow to dry. Do not repalpate or touch the site after cleaning.

8. I/V Cannula should be selected according to the purpose, vein size and fluid requirement.

13.13.3 Cannula Insertion

i. Disinfect the injection site as described above.
ii. Remove the catheter from the packaging and lower the wings
iii. Adopt your preferred grip and remove the needle cover.
iv. Insert the catheter at an angle
v. Upon primary flashback (back flow), lower the angle almost parallel to the skin. Withdraw the styllete slightly just sufficient to have bevel inside the catheter. Advance the catheter slightly, 2- 3 millimetres, to ensure catheter tip is in vein.
vi. Consider stabilizing the catheter by holding one of the wings.
vii. Ease the needle back 2- 3 millimetres.
viii. Check for secondary flashback between the needle & catheter will confirm correct placement of the catheter in the vein.
ix. Advance the catheter completely into the vein.
x. Remove the tourniquet
xi. Stabilize the catheter by holding one wing.
xii. Occlude the vein just above catheter tip & withdraw the needle holding the needle grip or grip plate
xiii. Recording – Upon Insertion of the catheter one should always record the date and Time of insertion

13.14 Intravenous line management

i. Use aseptic technique at all times
ii. All IV ports should be closed
iii. Verify patency of line by gently flushing with normal saline.
iv. Ensure that lines are labelled (date, time, signature)
v. Remove line on any sign of redness, swelling, pain .
vi. Change IV set after every 72 hrs.
vii. Cannula to be inspected in every shift.
viii. For giving antibiotics or bolus drugs **SAS (Saline followed by Antibiotic followed by Saline) must be followed.**

13.14.1 Dressings and after care of IV Line

The purpose of a dressing is:

i. to minimize the potential for micro-organisms to breed (change dressing immediate if soiled with blood)
ii. to protect the puncture site
iii. to secure the catheter in place
iv. to prevent catheter movement which could damage the vessel

13.14.2 After care of Catheter

Some of the procedures to be followed are –

1. Documentation
    a. Date and Time, when therapy is initiated
    b. Type and amount of solution

c. Additives and dosages
d. Flow rate
e. Gauge, length and type of venipuncture device or catheter used
f. Insertion site

2. Site Inspection - Assess site and surrounding area for signs of local complications and other complications like
    a. Infiltration
    b. Extravasations
    c. Phlebitis
    d. Haematoma
    e. Thrombosis
    f. Fragmented or broken cannula
    g. Occluded cannula
    h. Cannula site care and occlusiveness
3. Frequency of inspection
    a. In every shift
4. Termination of infusion therapy
    a. Assessment
    b. Determination
    c. Patient need
    d. Patient response to therapy
    e. Achievement of expected outcome
    f. Patient refuses to continue therapy
    g. Physician's orders
    h. Order must be clearly written and signed
    i. Verbal orders to be signed within 24h

13.14.3 Complication of IV site and its management

Bacteria, viruses, fungus and parasites may infect and complicate the infusion site. It is essential to understand the complications and treat them as early as possible.

Some preventive measures include Hand Hygiene, Patient Placement, Transport of Infected Patient, Use of Personal Protective Equipment (PPE) - Gowns & other protective apparel, Gloves, Face Protection Masks/respiratory protection and Eye Protection.

Some of the IV related complications include:

1. Thrombophlebitis
    a. Infusion related
    b. Infection related
    c. Mechanical related
2. Other IV complications
    a. Transfixation
    b. Haematoma
    c. Infiltration
    d. Extravasation
    e. Occluded cannula
3. Systemic complications
    a. Septicaemia

b. Embolism
c. Speed shock

13.15 Intravenous Therapy (DRIP)

Intravenous therapy is putting a sterile fluid through a needle directly into the patient's vein. Usually the sterile fluid contains electrolytes (sodium, calcium, potassium), nutrients (usually glucose), vitamins or drugs Intravenous (IV) therapy is used to give fluids when the patient cannot swallow, is unconscious, is dehydrated or is in shock, to provide salts needed to maintain a balance of electrolytes, or glucose needed for metabolism, or to give medication. Drugs given intravenously enter the bloodstream directly and are absorbed faster than any other kind of medication. Therefore, drugs are given in this way when a rapid effect is needed, or when the drug is too irritating to body tissues to be given any other way. Drugs given in this way are usually put in (infused) slowly to prevent reactions.

Guidelines for intravenous therapy

1. Know the fluid or drug that is ordered, its actions and side effects
2. Know the amount of fluid or drug to be given over what period of time
3. Know the amount and type of solution in which drugs can be diluted
4. Know how long a drug can be safely administered
5. Know the compatibilities of all the drugs the patient is receiving
6. Monitor carefully both the patient and the rate of infusion

13.14.1 How to give intravenous fluids and drugs safely

You must take special care to avoid errors in calculating doses and in preparing drugs, because intravenous drugs take effect immediately. Double check the five "rights" of drug administration: right dose, right drug, right patient, right route, right time. You must also know the desired action and potential side effects of all the intravenous drugs you give.

- Most drugs require a minimum dilution and/or rate of flow.
- Many drugs are very irritating or damaging to tissues outside the veins.
- Only one antibiotic is given at a time intravenously. The IV line is washed out (flushed) between antibiotics.
- Never give medications, sterile water, or dextrose water with blood or blood products.
- You must carefully monitor all patients on IV therapy. Watch the patient for any signs of an adverse reaction, including a rash, trouble with breathing, increased pulse rate, vomiting, and signs of dehydration or fluid overload (for these last two signs see the chapter on caring for the patient who has problems with elimination).
- Check the insertion site for swelling, redness, hardness, pain or warmth.
- Check the IV flow rate to make sure it is correct. The flow rate must be monitored extremely carefully and frequently in infants, children, the elderly, acutely ill patients and patients with dehydration, heart or kidney disease or diabetes.

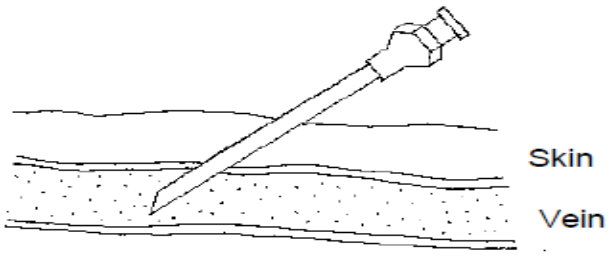
How to determine how fast the IV fluid should be going in:

Amount of Fluid to be given in ml X drops per 1 ml
Total time in minutes

Microdrip tubing delivers 60 drops per 1 ml and IV set deliver 15 drops per 1 ml

13.14.2 Starting intravenous therapy

The site for venepuncture (inserting the needle into the vein) is usually one of the veins of the forearm or hand. Patients requiring faster running infusions or blood transfusions require larger needles and therefore larger veins.



Intravenous injection

Starting IV therapy requires sterile technique.Pick a vein that is easy to feel and that is fairly straight. The vein should be full, soft, and easy to feel. It should not feel hard or rubbery. Avoid veins that are inflamed (red and warm), irritated or painful. Try not to use a vein that has been used before, because it may be damaged.

13.14.3 How to add medication to an IV line

The term "IV infusion" implies that a medication or fluid will be given in a slower pace, or for a large or indeterminate period of time. Intravenous medication can be given slowly from a bottle or bag containing a solution. This is called a continuous infusion and is similar to other intravenous therapy. Alternatively, the drug can be given all at once, and this is called an intravenous push or bolus. For a continuous infusion, the drug can be added to a new fluid container before it is hung or added to a container that is already running.

1. Carefully check the medication order against the patient's medication card or record, just as you would for other routes of administration. Also make sure that the medication is compatible with the solution it is to be mixed with.
2. Put the patient's name on the container with the name and amount of the drug, the flow rate, the time infusion begins, and your name or initials.
3. Always check the patient to be sure that there is no adverse reaction to the drug being infused. Look for a change in pulse rate, chills, nausea, vomiting, headache or trouble with breathing. If the patient has a reaction, stop or slow the infusion rate and tell the doctor or the nurse in charge immediately.
4. Record the name and amount of the drug, the solution to which it was added, and the time it was given.

13.14.4 Intravenous bolus

i. The term "intravenous bolus" is usually used to specify either 1) set volume or 2) a faster speed, or 3) both. However, sometimes "IV Push" is also used. Generally the term is used if the medication is less than 20ml
ii. A relatively large dose of medicine is administered into a vein in a short period usually within 1-30 minutes. E.g., "bolus" of a 1 or 2 liters (set volume) of IV fluids to be given rapidly (speed) to increase the patient's blood pressure.
iii. The IV bolus is commonly used when rapid rate of administration is needed such as in emergency e.g., in patient presenting with shock; when drugs cannot be diluted or the therapeutic purpose is to achieve a peak drug level in the blood. E.g., during code blues most of the IV medications are given as boluses, contrast media.
iv. Check before administering drugs by IV bolus since some drugs should NEVER be given as IV bolus e.g., Potassium chloride where rapid administration may be life threatening.
v. IV bolus is usually not adminstered in patients with decreased cardiac output, decreased urinary output, pulmonary congestion and systemic oedema.
vi. Carefully monitor rate of administration per minutes while administering drugs by IV bolus using wrist watch. Before adminsitrering the check the appropriate amount of diluent required and its compatibility with the primary IV solution.

13.14.5 IV push

For an intravenous push, you give the medication all at once, injecting the drug into an existing continuous infusion IV line.

- After inserting the needle, draw back the plunger to withdraw blood (to be sure the needle is in a vein).
- Inject the drug at the rate ordered. Be careful not to inject the drug too fast.

13.15 Blood Transfusion

Timely access to safe and quality blood and blood components is an important component of patient management. Rational use involves using the ***right product, in the right dose and on the right time*** to reduce unnecessary and unsafe transfusions and to improve patient outcomes and safety along with minimizing the risk of adverse events including transfusion reactions and transmission of infections.

Before giving a blood transfusion, send a sample of the patient's blood to the laboratory for typing and cross matching, unless you already have clear information about this on the chart.

i. When the blood arrives, doubly verify and make sure the patient's name, blood type and Rh factor are the same as those on the blood to be transfused. Do not give the blood if the information is not exactly the same.
ii. To prevent bacterial growth, transfuse the blood within 30 minutes of its arrival on the ward.
iii. Check the patient's vital signs before beginning.
iv. Make sure the drip chamber has a filter to trap clots or debris.
v. Stay with the patient for at least 15 minutes and observe him or her carefully for signs of acute reaction. These signs include chills, nausea and vomiting, headache, muscle aches, difficulty with breathing, wheezing, fever, sweating, chest pain,

tingling, numbness, and rapid pulse. **The sooner a reaction occurs, the more severe it is likely to be.** Transfusion reaction can occur in spite of all relevant laboratory tests. The severity of the reaction varies from being relatively mild to more severe, and at times can be fatal. Delayed reaction may present 5-10 days post-transfusion with fever, anaemia, jaundice, increased bleeding tendency, thrombocytopenia. Graft-vs-host disease and transfusion transmitted diseases can present late.

vi. If there are any signs of reaction, stop the transfusion and notify the doctor immediately.

vii. If the patient shows no signs of reaction, continue the infusion. Check the vital signs 15minutes after beginning the infusion. Then check again every 30 minutes until 1 hour after the transfusion is complete. Tell the patient to call a nurse immediately if he or she notices anything unusual.

viii. Record the time, the type of blood, the amount, and drip rate.

ix. Fill transfusion reaction form and send it back to blood storage centre along with used blood bag and drip set in red bag. (Send form even if there is no reaction – Nil reporting is as important as transfusion reaction).

x. Dispose off blood transfusion set with tubing in yellow bag.

13.15.1 Transfusion reaction management

i. In case of transfusion reaction stop transfusion immediately

ii. Maintain venous access using normal saline. Any other solution is incompatible with blood products.

iii. Inform doctor on duty and seek help immediately from skilled anaesthetist or emergency team, if required. For reactions like itching, urticaria, rashes administer medications as per hospital protocol.

iv. Inform Blood Bank. Send the following to the blood bank: the implicated unit along with transfusion set, blood samples (post-transfusion sample in 2 ml EDTA vial and 5 ml PLAIN vial), along with completed Adverse Transfusion Reaction Report Form.

v. Send first void urine sample.

vi. Repeat all clerical and identity checks.

vii. Request for another unit after sending fresh sample from the patient to the blood bank.

viii. Documentation: Complete documentation of transfusion in the case file is essential and should include recipient consent for transfusion, name and type of blood/components, unit number, the blood transfusion compatibility report, date and time of transfusion, pre- and post-transfusion vital signs, volume transfused, any adverse event, identification of bedside transfusion staff. The records should be kept in the record for future reference.

13.15.2 Indications for use of blood and blood components and their storage requirements are given in table ….

Indications for blood and blood components, storage requirements and shelf life of blood/components

Blood/blood components	Indication	Volume/unit	Hb/ haemat-ocrit /platelet count/ rise	Storage temperature	Average shelf life	Administration time
Whole Blood*	Acute blood loss (>30% of total blood volume); Exchange transfu-sion (reconstituted whole blood pre-ferred) if PRBC not available.	350-450 ml	Hb rise 1g/dl Haematocrit rise 3% ; the increase may not be apparent until when patient blood volume adjusts to normal	2-6°C	35 days	Administer within 30 minutes of is-sue and complete within 4 hours
Packed red blood cells (PRBC)	Chronic anaemia <6 g/dl; Preopera-tive Hb <7 g/dl; in patients with cardiac disease the Hb trig-ger is around 10 g/dl	250-300 ml	as above	2-6°C	35 days	Administer within 30 minutes of is-sue and complete within 4 hours
Random donor platelets (RDP)**	Thrombocytopenia	50-60 ml	Platelet count rise 5,000-10,000 / microlitre	22-24°C with agitation	5 days	Immediately administer after issue and com-plete within 30 minutes
Single donor platelet (SDP)**	Thrombocytopenia	250-300 ml	Platelet count rise 30,000-40,000 / microlitre	20-24°C with agitation	3-5 days	As above
Fresh frozen plasma (FFP)	Clotting factor deficiency	200-220 ml	20% increase in coagulation factors	-40°C	1 year	Administer within 30 minutes of is-sue and complete within 6 hours
Cryoprecipi-tate (CP)	Haemophilia A when there is non-availability of FVIII	One Cryo unit/10 kg	Rise of FVIII	-40°C	1 year	Immediately administer after issue and com-plete within 30 minutes
Cryo poor plasma (CPP)	Plasma exchange, in burns	200 ml	-	-40°C or below	1 year	Administer within 30 minutes of is-sue and complete within 4 hours

• Unrefrigerated whole blood, less than 24 hours old is labelled as fresh whole blood (FWB). Intracellular pathogens (CMV, HTLV), treponema and malarial parasite survive in fresh blood leucocytes, thus increased the risk of transfusion transmitted infections. Due to presence of viable lymphocytes, there are more chances of transfusion reaction (TA GVHD).

** In stable non-bleeding patients, platelets are withheld till counts of 10,000/microlitre. Do not use platelets in patients with autoimmune thrombocytopenia, thrombotic thrombocytopenic purpura except for life-threatening bleeding.

13.5.3 Do's and Don'ts for achieving blood safety are given in Table 13.15

Do's and Don'ts for achieving blood safety

Don'ts		Do's	
Ask for fresh whole blood	×	Always give specific component therapy, if blood components are available following appropriate guidelines	√
Delay transfusion after issue of blood component from blood bank	×	PRBC – start within 30 minutes and complete within 4 hours	√
	×	Platelets – start immediately and complete within 30 minutes	√
	×	FFP – start within 30 minutes and complete within 6 hours	√
Warm blood before transfusion	×	Warm blood during rapid/massive transfusion	√
Thaw FFP in hot running water	×	FFP may be thawed in water bath with monitored temperature (30-37°C). The unit should be placed in plastic over wrap before insertion into water bath	√
Store blood unit in domestic refrigerator in wards	×	Start transfusion immediately after issue. Return the blood unit to blood bank within 30 minutes, if not required.	√
Refrigerate platelet–they become nonviable	×		
Label the blood sample away from the patient	×	Always label the blood sample at bed side of the patient using gum pasted labels	√
Use IV set for transfusion	×	Always use BT set with appropriate filter for transfusion. It must be changed at prescribed interval	√
Leave patient unattended after staring transfusion	×	Patient must be appropriately monitored to detect transfusion reactions as soon as possible. Never ignore mild transfusion reaction. It may be a start of severe transfusion reaction	√

13.16 How To Give Eye Medication Or Irrigate The Eye

Sometimes the eye needs to be washed out, to clean it or to get rid of foreign particles. Also, medication may be given in the eye. Sterile technique should always be used to wash (irrigate) the eye or put in medication.

13.16.1 Irrigating the eye

i. Tell the patient what you are going to do and explain that it will not hurt.
ii. Ask the patient to tilt his or her head towards the side of the eye you are going to wash and place a small basin below the eye.
iii. Wash your hands. Using cotton balls moistened with sterile solution or saline, wipe the eyelids, working from the inner part to the outer side.
iv. Now separate the lids of the eye with your thumb and forefinger and gently press on the cheekbone beneath the eye to hold the eyelids apart and make a gutter.
v. Hold the irrigator above the eye and direct the solution to the gutter. Work from the inner to the outer part of the eye.

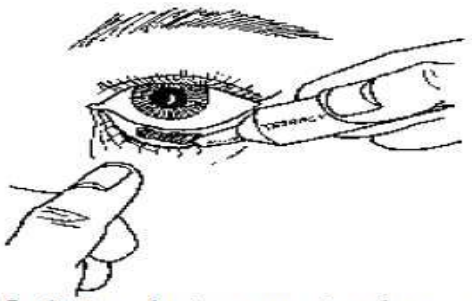
vi. Then tell the patient to close his or her eye and move the eyeball around from time to time, to make sure the solution reaches the entire eye.

13.16.2 Instilling liquid medication into the eye

i. Tell the patient what you are going to do. Explain that it will not hurt, though the medicine may sting briefly.
ii. As the patient looks up, with the head tilted backward, gently pull the lower eyelid downward to make a gutter.
iii. Stand to the side of the patient as you work. He or she is less likely to blink if you are not directly in front.
iv. Put the correct number of drops into the gutter in the lower part of the eye, not directly onto the cornea.

13.16.3 Instilling ointment into the eye

i. To put ointment into the eye, ask the patient to hold his or her head back and look up.
ii. Discard the first amount of ointment that comes out of the tube. It is considered to be contaminated.
iii. As the patient looks up, gently pull the lower eyelid downward to make a gutter.
iv. Hold the tube as close as possible above the eye, **without touching it,** and squeeze out 2 cm (about 1/4 the size of the fingertip) of the ointment into the gutter, working from the inner to the outer edge of the eyelid.
v. Tell the patient to close the eye for two minutes but not to squeeze it shut. When you have finished, give the patient a gauze sponge or cotton to wipe off the excess ointment on the eyelid.



Medicine being put in the eye

13.17 How to give medication in the ear

The ear sometimes needs to be irrigated to soften earwax, remove pus, or take out a foreign object in the ear canal. If the ear is inflamed or the patient feels pain there, you may need to put medicine in the ear.

i. Have the patient lie on one side.
ii. Warm the medicine container in your hands so that the medicine will not feel cold to the patient. Then fill the ear dropper with the correct amount of medication.
iii. Pull the patient's earlobe up and back. Put the correct number of drops along the side of the ear canal.

13.17.1 Medicine being put in the ear

Tell the patient to continue lying on one side for five minutes to keep the medication from going out of the ear. Put a small sterile cotton ball in the ear to keep the medicine inside when the patient is standing up.

14. ANTIMICROBIAL STEWARDSHIP PROGRAMME

The past 30 years have brought multidrug-resistant pneumococcal, gonoccocci, and *Salmonella* spp. and extremely drug-resistant tuberculosis to patients in the community. Vancomycin-resistant enterococci and vancomycin-resistant *S. aureus* have also emerged. Extremely drugresistant gram-negative bacteria, such as carbapenemase-producing *Klebsiella pneumoniae* and other carbapenem-resistant *Enterobacteriaceae* spp., extended spectrum beta-lactamase-producing *Enterobacteriaceae*, *P. aeruginosa*, and *Acinetobacter baumannii* have spread widely among patients in healthcare settings; in some cases these pathogens have been pan-resistant, that is, resistant to all available antibiotics.

Unfortunately, during the last decade there has also been a dramatic drop in the development and approval of new antibacterial agents. The antimicrobial armamentarium has been depleted and our ability to treat infectious diseases has been severely compromised. Resistant infections not only result in increased morbidity and mortality but also dramatically increase healthcare costs. It is ironic that in the twenty-first century we are encountering bacterial infections for which we have no treatment. A multifaceted approach is necessary to prevent, detect, and control the emergence of antimicrobial-resistant organisms. This includes ensuring the availability of adequate and appropriate therapeutic agents, the existence of diagnostic capacity to rapidly and reliably detect specific pathogens and their antimicrobial susceptibilities, and the promotion of robust infection prevention, control, and antimicrobial stewardship programs. This document focuses on issues relating to antimicrobial stewardship. Other issues important to the emergence, transmission, and management of antimicrobial resistance are addressed else.

14.1 Definition

Antimicrobial stewardship refers to coordinated interventions designed to improve and measure the appropriate use of antimicrobial agents by promoting the selection of the optimal antimicrobial drug regimen including dosing, duration of therapy, and route of administration.

14.2 Objectives

The major objectives of antimicrobial stewardship are to achieve best clinical outcomes related to antimicrobial use while minimizing toxicity and other adverse events, thereby limiting the selective pressure on bacterial populations that drives the emergence of antimicrobial-resistant strains. Antimicrobial stewardship may also reduce excessive costs attributable to suboptimal antimicrobial use.

14.3 Key components for implementing ASP

1. Assess the ground level situation
2. Ensure accountability and leadership
3. Set up structure and organization
4. Define priorities and how to measure progress and success
5. Identify effective interventions for your setting
6. Identify key measurements for improvement
7. Educate and Train
8. Communicate

Effective interventions for ASP - When establishing a new stewardship program, it is best to start with the core strategies and focus on achieving and maintaining them before adding some of the supplemental strategies.

14.4 Core Strategies:

Front–end strategies where antimicrobials are made available through an approval process (e.g. formulary restrictions and preauthorization)

Back-end strategies are where antimicrobials are reviewed after antimicrobial therapy has been initiated (e.g. prospective audit with intervention and feedback)

14.5 Supplemental strategies

1. Streamlining / timely de-escalation of therapy
2. Dose optimization
3. Parenteral to oral conversion
4. Guidelines and clinical pathways
5. Antimicrobial order forms
6. Education
7. Computerized decision support,
8. Surveillance
9. Laboratory surveillance and feedback
10. Combination therapies
11. Antimicrobial cycling

14.6. Antimicrobial stewardship (ASP) committee

A Multidisciplinary inter professional **antimicrobial stewardship (ASP) committee** with multidisciplinary membership including clinicians, surgeons of major clinical departments, microbiologist (if available in the hospital or link hospital for microbiology services), pharmacists, nursing staff etc. The ASP Committee to assist the Drug and Therapeutics Committee (DTC) in finalizing the list of antibiotics in the hospital formulary.

There should be Antibiotic Management Team (AMT) for daily monitoring of antibiotic use. Team members include:

a) A clinical microbiologist.
b) An infection control nurse

14.7 Antibiotic policy

Antibiotic policy is to be prepared by the antimicrobial stewardship team in consultation with microbiology, pharmacologists, if available and physicians and surgeons from major departments. The policy is reviewed and updated annually.

14.8 Antimicrobial Stewardship Program

14.8.1 Antimicrobial Stewardship Program monitoring activities

1. Rational use of antibiotic is being monitored – On daily basis for restricted use indicator antibiotics ***(Vancomycin, Meropenam, Ofloxacin, Ciprofloxacin, Cefalosporin with Sulbactam combination, Colistin, Levofloxacin, Daptomycin, Tigecycline, Ceftaroline and non-TB use of rifampicin or any other antibiotic outside hospital formulary***) by ICNs on daily rounds and details recorded on preformatted template. Other antibiotics are also checked for rational combinations, doses and duration prescribed. Treating doctors are asked to explain the reasons for initiating these antibiotics in writing. These patients are the discussed for rationality with Clinical Microbiologists. Irrational antibiotic therapy, if identified is communicated to treating physician or surgeon for immediate discontinuation/modification. Irrational combination of antibiotics or doses is also monitored. The continued need for antimicrobial therapy should be reviewed at least daily. For most types of infection treatment should continue until the clinical signs and symptoms of infection have resolved – exceptions to this are indicated in the relevant sections. Parenteral therapy is normally used in seriously ill patients and those with gastrointestinal upset. Oral therapy can often be substituted as the patient improves.
2. Pre – surgical prophylaxis and post operative antibiotic therapy are also monitored on daily basis whether in line with perisurgical antibiotic prophylaxis guidelines. In case of irrationality concerned department is informed and necessary actions are taken.
3. Defined Daily Dose (DDD) for antibiotics per thousand days are calculated and monitored for the antibiotic usage pattern.
4. No. of doses administered are also monitored per thousand patient days.
5. The data analysis is done and discussed periodically during HICC meetings and feedback provided to the users.
6. Adherence to antibiotic policy is also discussed in the HICC meeting.
7. Prescription audits of in patients and outpatients are conducted periodically.
8. ABC analysis of medicines done annually by drug stores and records are submitted to HICC atleast once in six months.
9. Antibiotic usage monitored particularly if any of the seven indicator antibiotics come in the top 10 medicines.

14.8.2 Aims of antimicrobial therapy

1. To provide a simple, best empirical/specific treatment of common infections
2. To promote the safe, effective, economic and rational use of antibiotics
3. To minimize the emergence of bacterial resistance in the community

14.9 General antibiotic use guidelines

i. All antibiotic initiations are done after sending appropriate samples for cultures or any changes in antibiotic is done after receiving culture report.
ii. Rapid tests e.g. Gram stain, is done to determine therapeutic choices when decision on empiric therapy is required.
iii. Hospital has categorized usage of antibiotics for restricted use, limited access and under surveillance based on antibiogram, if available and/or in consultation with Drugs & Therapeutic Committee (DTC) of the Hospital.
iv. Hospital has a list of antibiotics available for OPD, IPD, emergency and respective ICUs in consultation with Drugs & Therapeutic Committee (DTC) of the Hospital.
v. List of all available antibiotics are communicated to the prescribers every month or from time-to-time if there is any change in the list or medicine is not available for some reasons.
vi. Antimicrobials are chosen following hospital policy and National Standard Treatment guidelines for infectious diseases and Delhi State Standard Treatment Guidelines. If alternatives are chosen, reason for the same is documented in the case records.
vii. Prescribe an antibiotic only when there is likely to be a clear clinical benefit.
viii. Do not prescribe an antibiotic for viral sore throat, simple coughs and colds and viral diarrhoea.
ix. Empiric Therapy is given where delay in initiating therapy awaiting microbiological results would be life threatening or risk serious morbidity, antimicrobial therapy based on a clinically defined infection is justified. Necessary specimens are drawn before commencing therapy. Where empiric therapy is used the accuracy of diagnosis is reviewed regularly and treatment altered/stopped when microbiological results become available.
x. Once culture / sensitivity report available:
    a. Presumptive therapy antibiotic may require to be changed
    b. Consult Microbiologist to decide the choice of antibiotic (based on narrowest spectrum antibiotic which covers the pathogen isolated).
xi. Following factors affecting antimicrobial choices and route of administration are checked e.g., age, type and site of infection (respiratory, intra-abdominal, pneumonia, blood stream, urinary tract and skin and soft tissue), renal & hepatic function, interactions, allergy, if any.
xii. A dose and duration of treatment is suggested but can be modified by consultants based on clinical scenarios
xiii. Use simple generic antibiotics first whenever possible. Avoid broad spectrum antibiotics (e.g. Amoxycillin+Clavulanate, quinolones and cephalosporins) when standard and less expensive antibiotics remain effective, as they increase risk of *Clostridium difficile*, MRSA and resistant UTIs.
xiv. Avoid widespread use of topical antibiotics (especially those agents also available as systemic preparations).
xv. All allergies are recorded prominently in red ink in the allergy box on the patient's case sheet. Drug chart is completed when a new prescription chart is written or transcribed. If no allergy - "No known allergy or allergic to name of the drug ……." is recorded. The box is signed and dated. If allergy history cannot be obtained, then "history not available" is specified. Under no circumstances allergy box is left blank. The allergy box is completed before prescribing a new drug, except in exceptional

circumstances. If patients have a suspected drug allergy then the drug and suspected reaction is documented in the case sheet and the drug chart.

xvi. Check that the appropriate dose is prescribed. If uncertain, contact Infectious disease physician, Pharmacy, or check in the formulary.

xvii. The need for antimicrobial therapy is reviewed on a daily basis. For most types of infection treatment is continued until the clinical signs and symptoms of infection have resolved – exceptions to this are noted. For most infections 5 – 7 days of antimicrobial therapy is sufficient (simple UTIs can be adequately treated with 3 days of antibiotic).

xviii. Parenteral therapy is normally used in seriously ill patients and those with gastrointestinal upset. All IV antibiotics are initially given for 48 – 72 hours without review and switching over to oral alternatives is considered after 48 hours. Oral therapy can often be substituted as the patient improves. Switching to oral is indicated by fever defervescence for at least 24h, marked clinical improvement; low CRP.

xix. Antimicrobials are de-escalated or stepped down to the narrowest spectrum, most efficacious and most cost-effective option as per culture reports. If no step down availed, the reason is documented and is subjected to clinical audit.

xx. Where treatment is apparently failing, advice from the microbiologist and ID Physician is sought rather than blindly changing to an alternative choice of antimicrobial agent.

14.10. Steps to follow the protocols

1. Identify the type of infection — bloodstream, respiratory, intra-abdominal or urinary tract
2. Define the location — OPD, ICU or floor patient
3. Identify the patient type based on described parameters — Type 1, Type 2 or Type 3.
4. Refer to the empiric/specific therapy for that patient type 1, 2 or with first second or third line antibiotic respectively.
5. Wait for at least 48 h of antimicrobial therapy before labelling patient as non-responding to the therapy and to switch to the higher next line of therapy. Also consider if patient condition deteriorates.
6. Send respective cultures and or primary set of investigations before starting antibiotic therapy
7. Once culture / sensitivity report available initiate specific antimicrobial therapy. Antimicrobial may require to be changed/de-escalated.

14.11 Patient types

- **Patient Type 1**: No contact with health care system. No prior antibiotic treatment No procedures done Patient with few co-morbid conditions
- **Patient Type 2**: Contact with health care system (e.g. recent hospital admission, nursing home, dialysis) without invasive procedure - within last 90 days Recent antibiotic therapy -within last 90 days Minimum procedures done. Patient with multiple co-morbidities. Patient

- **Patient Type 3**: Long hospitalization and or invasive procedures –within last 90 days. Recent & multiple antibiotic therapies - within last 90 days Major invasive procedures done. Cystic fibrosis, structural lung disease, advanced AIDS, neutropenia, other severe immunodeficiency.

PATIENTS RISK STRATIFICATION

PATIENT TYPE 1 (CAI)	PATIENT TYPE 2 (HAI)	PATIENT TYPE 3 (NI)
No contact with health care system	Contact with health care system(eg. Recent hospital admission, nursing home, dialysis) without INVASIVE procedure	Long hospitalization and or invasive procedure
No prior antibiotic treatment	Recent antibiotic therapy	Recent & multiple antibiotic therapies
Patient young with few co-morbid conditions	Patient old with multiple co-morbidities	Cystic fibrosis, structural lung disease, advanced AIDS, neutropenia, other severe immunodeficiency.

- **Patient Type 4.** Patients with suspected INVASIVE fungal infection.

14.12 Antibiotic Protocol

14.12.1 OPD

1. For treating the Indoor patients, the microbiology data should be considered mainly for patients belonging to Patient Types 2 and 3. Patient type 1 refers to the patients reporting with community acquired infections, and for them the treatment options are based on the guidelines.
2. Avoid Antipseudomonal Fluoroquinolones (e.g., ciprofloxacin and levofloxacin) and Antipseudomonal 3rd generation cephalosporins (e.g., ceftazidime and cefoperazone) in Patients Type 1 and 2 since they have potent antipseudomonal activity.
3. Treatment of serious infections caused by ESBL +ve pathogens with BL-BLI combinations (e.g., Piperacillin-Tazobactam, Cefepime-Tazobactam and Cefoperazone-Sulbactam) should be avoided as there is limited clinical data and evidence available for the use of these drugs in such infections.
4. **OPAT - Out Patient Parenteral Antibiotic Therapy** allows patients requiring intravenous antibiotics to be treated outside hospital but is otherwise stable and well enough not to be in hospital. These patients may be discharged early to an OPAT service or may avoid

hospital admission altogether. Early OPAT programs facilitate the discharge of stable in-patients with infections who, other than the requirement for prolonged intravenous antibiotic therapy, had no other need for inpatient care. OPAT are suitable for many infections, especially cellulitis, bone and joint infections, and infective endocarditis. Antibiotics can be administered in an outpatient unit, at home by a nurse, or at home by the patient or a carer, however, patients should be assessed by a doctor to determine medical and social suitability to minimise risk. ***System for OPAT can be created in OPD in minor OT recovery room or Injection room as per discreation of OPD nursing incharge in consultation with respective MO I/C. Post injection monitoring program should be defined and documented by individual patient care unit.***

14.12.2 Antibiotic Protocol: ICU

i. For treating the Indoor patients, the microbiology data should be considered mainly for patients belonging to Patient Types 2, 3 and 4. Patient type 1 refers to the patients reporting with Community acquired infections, and for them the treatment options are based on the guidelines.
ii. Avoid Antipseudomonal Fluoroquinolones (e.g., Ciprofloxacin and Levofloxacin) and Antipseudomonal 3rd generation Cephalosporins (e.g., Ceftazidime and Cefoperazone) in Patients Type 1 and 2 since they have potent antipseudomonal activity.
iii. Treatment of serious infections caused by ESBL +ve pathogens with BL-BLI combinations (e.g., Piperacillin-Tazobactam, Cefepime-Tazobactam and Cefoperazone-Sulbactam) should be avoided as there is limited clinical data and evidence available for the use of these drugs in such infections.
iv. In infections with MDR Pseudomonas/ Acinetobacter, Carbapenems should be used as Extended Infusions e.g., Imipenem (2-3 hours infusion), Meropenem (3 hours infusion), Doripenem (4 hours infusion)
v. Linezolid and Daptomycin are reserved drugs for inpatients and should be used only in cases of Vancomycin Resistant *S. aureus* (VRSA) or Vancomycin Resistant Enterococci (VRE)
vi. # De-escalation to Fluconazole if: Isolates susceptible to Fluconazoie (e.g., *Candida albicans*) + Patient clinically stable.
vii. Deescalation to Voriconazole if: *C. krusei* or Voriconazole susceptible *C. glabrata* + Patient clinically stable. De-escalation to fluconazole or voriconazole not recommended without confirmation of isolate susceptibility.

14.12.3 Antibiotic Protocol: IPD

i. For treating the Indoor patients, the Microbiology data should be considered mainly for patients belonging to Patient Types 2 and 3. Patient type 1 refers to the patients reporting with Community acquired infections, and for them the treatment options are based on the guidelines.
ii. Avoid Antipseudomonal Fluoroquinolones (e.g., Ciprofloxacin and Levofloxacin) and Antipseudomonal 3rd generation Cephalosporins (e.g., Ceftazidime and Cefoperazone) in Patients Type 1 and 2 since they have potent antipseudomonal activity
iii. Treatment of serious infections caused by ESBL +ve pathogens with BL-BLI combinations (e.g., Piperacillin-Tazobactam, Cefepime-Tazobactam and Cefoperazone-Sulbactam) should

be avoided as there is limited clinical data and evidence available for the use of these drugs in such infections.

iv. In infections with MDR Pseudomonas/ Acinetobacter, Carbapenems should be used as Extended Infusions e.g. Imipenem (2 -3 hours infusion), Meropenem (3 hours infusion), Doripenem (4 hours infusion)

v. Linezolid and Daptomycin are reserved drugs for inpatients and should be used only in cases of Vancomycin Resistant *S. aureus* (VRSA) or Vancomycin Resistant Enterococci (VRE).

vi. The marker used in the laboratory to assess potential ESBL production among enterobacteriacae is resistance to Cefotaxime and Ceftazidime.

vii. The marker used in our laboratory to assess potential MRSA production is the resistance of *S. aureus* to cefoxitin.

14.13 Categorization of antibiotics

These needs to be defined by the drugs and therapeutic committee of the hospital. The categories should be revised/revised atleast once in six months. HICC should be informed of the same on periodic basis.

14.13.1 Restricted use

A pre use authorization from an ID Physician / Clinical Microbiologist needs to be taken before prescribing these antibiotics. A written documentation to be maintained which captures the request along with justification for use by the clinician and also captures the approval for use by the authority in charge

14.13.2 Limited access

Unrestricted use of these antibiotics may be allowed for empirical use for first 48-72 hours but after that a clinical justification by clinician and approval from authority in charge needs to be documented that why these antibiotics cannot be de-escalated and need to be continued further

14.13.3 Under Surveillance

A close monitoring to check their usage (indication, quantity and pattern) in OPD/Type 1 Patients/ Surgical prophylaxis. Audits to be done at regular intervals to assess their consumption.

14.13.4 Restricted Use Antibiotics

Colistin: It is the last resort for managing gram negative MDRs and its use, dose and duration needs to be rationalized. Liberal use should be restricted

Doripenem: It is the last carbapenem (at least in near future). If Imipenem and Meropenem are working, we need to conserve the use of Doripenem

Rifampicin: (For Non-TB use) - This is a valuable drug for TB. The use of rifampicin in MDR, Pseudomonas, Acinetobacter or MRSA should be restricted

Linezolid: Alternatives available e.g., Vancomycin/Teicoplanin. Linezolid is bacteriostatic and available as oral - more prone for misuse VRSA / VRE rare

Daptomycin: Alternatives are available for MRSA e.g., Vancomycin and Teicoplanin. Moreover VRSA and VRE are still not a major cause of concern.

Tigecycline: Bacteriostatic, one of the most broad spectrum drugs, has limited role in MDR infections like SSTI, IAI where ESBL/MRSA and or Acinetobacter are feared.

Sulbactam: Reserved for PDR Acinetobacter. Dose has to be correct (4-12 g/day for PDR Acinetobacter).

14.13.5 Limited Access Antibiotics

Imipenem/Meropenem: Use as empirical in sick patients is allowed looking at the antibiograms in most hospitals showing better sensitivity of these antibiotics over other classes, however after culture and sensitivity report is available, if it shows a susceptible pathogen to other classes of antibiotics plus if patient condition improves – then de-escalation should be advised.

Piperacillin-Tazobactam/Cefoperazone-Sulbactam: These are as broad spectrum as carbapenems (this fact is not appreciated generally). Use as empirical in sick patients is allowed looking at the antibiograms in most hospitals showing decent sensitivity of these antibiotics over other classes, however after culture and sensitivity report is available, if it shows a susceptible pathogen to other classes of antibiotics plus if patient condition improves - then de-escalation should be advised.

Vancomycin/Teicoplanin: Use as empirical in sick patients may be allowed specially in BSI, SSTI where MRSA is suspected but if after 48-72 h culture and sensitivity report shows no *S. aureus* or MSSA then Vancomycin/Teicoplanin have absolutely no role and should be discontinued.

14.13.6 Under Surveillance Antibiotics

3rd generation cephalosporins (both oral and IV) and Flouroquinolones: One of the main reasons for widespread ESBLs in India in the community is due to overuse of 3rd generation cephalosporins and flouroquinolones at OPD level-Type 1 patients, pediatric patients and surgical prophylaxis.

It is must to educate the clinicians about these antibiotics and the collateral damage they cause. Also it is imperative to exercise control on liberal usage of these antibiotics in a phased manner and perform regular audits on the rate of consumption of these antibiotics. This could be the single most valuable intervention to curb resistance in India in community.

14.13.7 Irrational combinations or less evidenced combinations

1. Amoxicllin - tazobactam
2. Cefadroxil-clavulanic acid
3. Cefepime + Amikacin
4. Cefepime-sulbactam
5. Cefepime-tazobactam
6. Cefixime + Ofloxacin
7. Cefixime + Ornidazole
8. Cefixime-clavulanic acid
9. Cefotaxime-sulbactam
10. Cefpodoxime-clavulanic
11. Ceftazidime-tazobactam
12. Ceftriaxone-sulbactam
13. Ceftriaxone-tazobactam
14. Cefuroxime-clavulanic acid
15. Cefuroxime-sulbactam
16. Meropenem-sulbactam
17. Vancomycin + Ceftriaxone
18. Cefoperazone –Tazobactam
19. Ampicilin-Amoxicilin-Cloxacillin
20. Ceftazidime-Sulbactam
21. Ofloxacin- Ornidazole/Tinidazole
22. Gatifloxacin-Ornidazole
23. Fluconazole-Tinidazole
24. Doxycycline-Tinidazole
25. Tetracycline-Metronidazole
26. Cefixime/Cefadroxil + Ambroxol + Lactobacillus
27. Ciprofloxacin/Gatifloxacin + Ambroxol
28. Roxithromycin + Ambroxol

14.14 Diluents, storage conditions and methods of administration of common antimicrobial agents.(Appendix 9)

14.15 Perisurgical antibiotic use

Aim of surgical antibiotic prophylaxis is to:

- Prevent surgical site infection (SSI) & related morbidity and mortality
- Reduce the duration and cost of health care (when the costs associated with the management of SSI are considered, the cost effectiveness of prophylaxis become evident)
- Antibiotic chosen should not produce any adverse effects as well as no adverse consequences for the microbial flora of the patient or the hospital.

Surgical antibiotic prophylaxis is an adjunct to, not a substitute for, good surgical technique. Antibiotic prophylaxis should be regarded as one component of an effective policy for the control of hospital-acquired infection such as attention to basic infection-control strategies, the surgeon's experience and technique, the duration of the procedure, hospital and operating-room environments, instrument sterilization issues, preoperative preparation (e.g., surgical scrub, skin antisepsis, appropriate hair removal), perioperative management (temperature and glycaemic control) and the underlying medical condition of the patient.

14.15.1 Perisurgical Antibiotic prophylaxis – General principles

i. Do not use antibiotic prophylaxis routinely for clean, non-prosthetic, uncomplicated surgery.
ii. Give antibiotic treatment (in addition to prophylaxis) to patients having surgery on a dirty or infected wound.
iii. Give antibiotic prophylaxis to patients before:
iv. Clean surgery involving the placement of a prosthesis or implant
v. Clean-contaminated surgery
vi. Contaminated surgery
vii. Consider giving a SINGLE DOSE of antibiotic prophylaxis intravenously on within 1 hour before incision to maximize tissue concentration. However, give prophylaxis earlier for operations in which a tourniquet is used. Two hours are allowed for the administration of vancomycin and fluoroquinolones.
viii. Before giving antibiotic prophylaxis, consider the timing and pharmacokinetics (for example, the serum half-life) and necessary infusion time of the antibiotic. Give a repeat dose of antibiotic prophylaxis at one to two half lives of the antibiotic when the operation is longer than the half-life of the antibiotic given or if there is excessive blood loss (usually more than 1500 ml in adults) during the procedure, extensive burns.
ix. Antibiotics should also be administered immediately after unexpected contamination of the tissues.
x. **Post operative antibiotic administration is NOT required *where antibiotics are given prophylactically only (esp. Clean Surgeries).***
xi. There is no data to support the continuation of antimicrobial prophylaxis until all indwelling drains and intravascular catheters are removed.

xii. Antibiotic prophylaxis should be confined to the perioperative period (less than 24 hours for most procedures). The prophylaxis duration in cardiothoracic procedures may be up to 48 hours. Prolonged prophylaxis is associated with an increased risk of acquired antimicrobial resistance.

xiii. Discontinue antibiotics given for implantation of a pacemaker or defibrillator within 24 hours of surgery.

xiv. Select appropriate agents on the basis of the surgical procedure, the most common pathogens causing SSI for a specific procedure, and published recommendations (Details given below).

xv. Inform patients before the operation, whenever possible, if they will need antibiotic prophylaxis, and afterwards if they have been given antibiotics during their operation.

xvi. Studies with results showing a beneficial effect of supplemental oxygen included patients who underwent colorectal surgery. It has been observed that 30%-35% supplemental FiO_2 levels are useful in minimizing SSI. Higher /lower concentrations are less helpful.

xvii. Maintaining normothermia (temperature higher than 36^0C) immediately after colorectal surgery is helpful in reducing the incidence of SSI.

14.15.2 Categories of Surgeries

Clean Surgeries:

a) Uninfected, no inflammation
b) Respiratory, Gastrointestinal and Genitourinary tracts not entered
c) Closed primarily Examples: Exploratory laparotomy, mastectomy, neck dissection, thyroid, vascular, hernia, splenectomy

Clean-contaminated Surgeries:

a) Respiratory, Gastrointestinal and Genitourinary tracts entered, controlled, no spillage
b) No unusual contamination Examples: Cholecystectomy, small bowel resection - anastomosis, Whipple's procedure, liver transplantation, gastric surgery, bronchoscopy, colon surgery

Contaminated Surgeries:

a) Open, fresh, accidental wounds
b) Major break in sterile technique
c) Gross Spillage from GI tract
d) Acute non-purulent inflammation Examples: Inflamed appendectomy, bile spillage in cholecystectomy, diverticulitis, Rectal surgery, penetrating wounds

Dirty Surgeries:

a) Old traumatic wounds, devitalized tissue
b) Existing infection or perforation
c) Organisms present BEFORE procedure Examples: Abscess I&D, perforated bowel, peritonitis, wound debridement, positive cultures preoperatively

14.15.3. Antibiotic prophylaxis for surgical wounds

No prophylaxis for class I wounds patient, except

i. Abdominal cases
ii. Surgery exceeding 2 h
iii. Having three concomitant diagnosis
iv. No prophylaxis for urological procedures with sterile urine
v. Prophylaxis for 24 h to be given in all class II cases
vi. Bowel preparations in colorectal surgeries
vii. Therapeutic antibiotics to be given for all class III and class IV wounds

For details of surgical wound classification see wound care
For surgical site infections see appendix on case definitions

14.15.4 Choice of antibiotic for perisurgical prophylaxis

i. Antibiotic selection is influenced by the organism most commonly causing wound infection in the specific procedure, characteristics of the ideal agent, the comparative efficacy of the antimicrobial agent for the procedure, the safety profile, and the patient's medication allergies and cost of the antibiotic agent. In certain gastrointestinal procedures, oral and intravenous administration of agents with activity against Gram-negative and anaerobic bacteria is warranted, as well as mechanical preparation of the bowel. Cefazolin provides adequate coverage for most types of procedures.
ii. Antimicrobial agents with the narrowest spectrum of activity are required for efficacy in preventing infection and the chosen antibiotics must reflect local, disease-specific information about the common pathogens and their antimicrobial susceptibility. A past history of a serious adverse event should preclude administration of a particular antibiotic like penicillin.
iii. Choice of antibiotic is influenced by the organism most commonly causing wound infection in the specific procedure, characteristics of the ideal agent, the comparative efficacy of the antimicrobial agent for the procedure, the safety profile, and the patient's medication allergies and cost of the antibiotic agent.
iv. In certain gastrointestinal procedures, oral and intravenous administration of agents with activity against Gram-negative and anaerobic bacteria is warranted, alongwith mechanical preparation of the bowel. Cefazolin provides adequate coverage for most types of procedures.
v. Do not routinely use vancomycin prophylaxis for any procedure.

15. STORAGE, ADMINISTRATION AND DISPOSAL OF VACCINES

15. 1 Persons responsible for vaccine procurement, storage and distribution

1. Sister and staff nurse posted in immunization room is responsible for procurement, storage and distribution.
2. Vaccines are store in ice lined refrigerator (2^oC - 8^oC) in immunization room. Distribution of vaccines is done by nursing staff posted at immunization room.

15.2 Storage and dispensing of vaccines

- Vaccines are stored in the ice lined refrigerator with temperature monitoring atleast twice daily and preferably with chart recorder.

15.3 Vaccination place, timings and schedule

- Vaccination is done at immunisation room.
- **Patient's immunization Room:** Room No. 505, 5th floor OPD Building
- **Staff Vaccination Room:** Room No. 318, 3rd floor OPD building

- Catch up immunisation is also initiated.

15.4 List of vaccines available at Govt of NCT of Delhi Hospitals

S. No	Name of vaccine
1.	BCG
2.	Hepatitis B Vaccine
3	Oral polio vaccine (OPV), IPV
4	Pentavalent Vaccine
5	Measles
6	Measles Mumps Rubella (MMR)
7	Typhoid
8	Tetanus Toxoid (TT)
9	Anti-rabies vaccine (ARV)
10	Other vaccines e.g. Menningoccocal vaccine, influenza vaccine, for the healthcare care worker from time to time as per advisory issued by Delhi Govt.

15.5 Person to be contacted in case of adverse event in immunization room

In case of adverse event adverse drug reaction form is filled and sent to drug and therapeutic committee and must be reported through MRD to designate authorities in Govt of NCT of Delhi. MO I/C OPD should also be informed.

15.6 Immunization Schedule

NATIONAL IMMUNISATION SCHEDULE FOR INFANTS, CHILDREN AND PREGNANT WOMEN

Vaccine	Due age	Max age	Dose	Diluent	Route	Site
FOR INFANTS						
BCG	At birth	Till 1 year of age	(0.05 ml until 1 month) 0.1 ml beyond 1 month age	YES Manufacturer supplied diluent (sodium chloride)	Intra-dermal	Upper Arm - LEFT
Hepatitis B- birth dose	At birth	Within 24 hours	0.5 ml	NO	Intra-muscular	Antero-lateral side of mid-thigh LEFT
OPV-0	At birth	Within the first 15 days	2 drops		Oral	Oral
OPV 1,2 & 3	At 6, 10, 14 weeks	Till 5 years of age	2 drops		Oral	Oral
DPT 1,2 & 3	DPT 1,2 & 3 are replaced by Pentavalent 1,2 & 3					
Hepatitis B 1,2 & 3	Hepatitis B 1,2 & 3 are replaced by Pentavalent 1,2 & 3					
Pentavalent 1,2 & 3[2] (Diphtheria + Pertussis +Tetanus + Hepatitis B + Hib)	At 6,10, 14 weeks[2]	1 year of age	0.5 ml	NO	Intra-muscular	Antero-lateral side of mid-thigh LEFT
IPV (Inactivated polio vaccine)	At 14 completed weeks	1 year of age	0.5 ml	NO	Intra-muscular	Antero-lateral side of mid-thigh RIGHT
Rotavirus[3] (where applicable)	At 6,10, 14 weeks	1 year of age	5 drops	NO	Oral	Oral
Measles/MR 1st dose[5]	At 9 completed months – 12 months	5 years of age	0.5 ml	YES Manufacturer supplied diluent (sterile water)	Sub-cutaneous	Upper Arm-RIGHT
Japanese Encephalitis-1[6] (where applicable)	At 9-12 months[6]	15 years of age	0.5 ml	YES Manufacturer supplied diluent (Phosphate buffer solution)	Sub-cutaneous	Upper Arm-LEFT
Vitamin A (1st dose)	At 9 months	5 years of age (1 lakh IU)	1 ml	-	Oral	Oral

Vaccine	Due age	Max age	Dose	Diluent	Route	Site
FOR CHILDREN						
DPT Booster 1	16-24 months	7 years of age	0.5 ml	NO	Intra-muscular	Antero-lateral side of mid-thigh LEFT
Measles/MR 2nd dose [5]	16-24 months	5 years of age	0.5 ml	YES Manufacturer supplied diluent (sterile water)	Sub-cutaneous	Antero-lateral side of mid-thigh LEFT
OPV Booster	16-24 months	5 years	2 drops	NO	Oral	Oral
Japanese Encephalitis-2 [6] (where applicable)	16-24 months [6]	Till 15 years of age	0.5 ml	YES Manufacturer supplied diluent (Phosphate buffer solution)	Sub-cutaneous	
Vitamin A (2nd – 9th dose)	At 16 months. Then 1 dose every 6 months	Up to the age of 5 years	2 ml (2 lakh IU)	-	Oral	Oral
DPT Booster 2	5-6 years	7 years of age	0.5 ml	NO	Intra-muscular	Upper Arm
TT	10 & 16 years	16 years	0.5 ml	NO	Intra-muscular	Upper Arm

Vaccine	Due age	Max age	Dose	Diluent	Route	Site
FOR PREGNANT WOMEN						
TT-1	Early in pregnancy	Give as early as possible	0.5 ml	NO	Intra-muscular	Upper Arm
TT-2 [1]	4 weeks after TT-1 [1]		0.5 ml	NO	Intra-muscular	Upper Arm
TT-Booster	If received 2 TT doses in a pregnancy within the last 3 years [1]		0.5 ml	NO	Intra-muscular	Upper Arm

1. Give TT 2 or Booster doses before 36 weeks of pregnancy. However give these even if more than 36 weeks have passed. Give TT to a woman in labour if she has not previously received TT.
2. Pentavalent vaccine is introduced in place of DPT and Hep 1,2 and 3.
3. Rotavirus vaccine has been introduced in initially 4 states- Andhra Pradesh, Haryana, Himachal Pradesh and Odisha.
4. IPV-fractional dose (0.1 ml) intradermal at ages 6 weeks and 14 weeks introduced in select states.
5. MR vaccine has been recommended and approved for introduction in place of measles vaccine in the UIP schedule. If 1st dose delayed beyond 12 months, ensure minimum 1 month gap between 2 MR doses.
6. JE vaccines have been introduced in select endemic districts. If 1st dose delayed beyond 12 months, ensure minimum 3 months gap 3 months gap between 2 doses.
7. The 2nd to 9th doses of Vitamin A can be administered to children 1-5 years old during biannual rounds, in collaboration with ICD's.
8. Pneumococcal conjugate vaccine (PCV)- recommended by NTAGI not yet in program- schedule 6 and 14 weeks with booster at 9 months.
9. Human Papilloma Virus (HPV) vaccine – presently not in schedule.

Catch Up Immunization Schedule For Unimmunized Child

Category 1: 6 weeks to 9 months
*Give Measles at 2nd or 3rd visit if age is more than 9 months

Category 2: 9 months to 5 years

Visit	Suggested Vaccines
First	BCG OPV1 Pentavalent Vaccine -1
Second visit (After 1 month of first visit)	Measles * OPV2 Pentavalent Vaccine -2
Third visit (After 1 month of second visit)	OPV3 Pentavalent Vaccine -3
Subsequently immunize as per schedule	

Note: if age at 4th visit < 4 y, give DPT-2nd Booster and OPV 5 at 5 years also

Category 3: Age more than 5 years

Visit	Suggested Vaccines
First	MMR DPT1 (if less than 7 years) Or TT(if Age > 7 years) Hep B1
Second (After 1 month of first visit)	DPT2 (if less than 7 years)) Or TT(if Age > 7 years) Hep B2
Third (After 6 months of first visit)	DPT3 (if less than 7 years) Or TT(if Age > 7 years) Hep B3

Note: If child is partially immunized, resume the lapsed immunization as per the above schedule. There is no need to repeat the vaccines already received.

16. INVESTIGATION OF AN OUTBREAK

The occurrence of two or more similar cases relating to place and time is identified as a cluster or an outbreak and needs investigation to discover the route of transmission of infection, and possible sources of infection in order to apply measures to prevent further spread. 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 e.g an operation, it is termed a common source outbreak, implying a common source for the occurrence of the disease.

16.1 Epidemiological Methods

The investigation of an outbreak may require expert epidemiological advice on procedures. 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 for investigation of an outbreak

Step 1

i. Recognition of the outbreak. Is there an increase in the number of cases of a particular infection or a rise in prevalence of an organism? Such findings indicate a possible outbreak.
ii. Preliminary investigation must be begun by developing a case definition, identifying the site, pathogen and affected population. Define the outbreak in time person and place.
iii. 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 are immediately applied.
iv. Verification of the diagnosis. Each case are reviewed to meet the definition.
v. Confirmation that an outbreak exists by comparing the present rate of occurrence with the endemic rate are made.

Step 2

i. The appropriate departments and personnel and the hospital administration are notified and involved.

Step 3

i. Additional cases must be searched for by examining the clinical and microbiological records.
ii. Line listings for every case, patient details, place and time of occurrence and infection details are developed.
iii. An epidemic curve based on place and time of occurrence are developed, the date analyzed, the common features of the cases e.g age, sex, exposure to various risk factors, underlying diseases etc. are identified.
iv. A hypothesis based on literature search and the features common to the cases; are formulated to arrive at a hypothesis about suspected causes of the outbreak.
v. Microbiological investigations depending upon the suspected epidemiology of the causative organism are carried out. This will include (a) microbial culture of cases, carriers and environments (b) epidemiological typing of the isolates to identify clonal relatedness.
vi. The hypothesis is tested by reviewing additional cases in a case control study, cohort study, and microbiological study.

Step 4

i. Specific control measures are implemented as soon as the cause of outbreak of identified.
ii. Monitoring for further cases and effectiveness of control measures are done.

iii. A report are prepared for presentation to the HICC, departments involved in the outbreak and administration.

16.2 Immediate Control Measures

Control measures are initiated during the process of investigation. An intensive review of infection control measures is made and general control measures initiated at once. General measures include:

i. Strict hand washing
ii. Intensification of environmental cleaning and hygiene.
iii. Adherence to aseptic protocols, and
iv. Strengthening of disinfection and sterilization.

16.3 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.

16.4 Specific Control Measures

Specific control measures are instituted on the basis of nature of agent and characteristics of the high-risk group and the possible sources. These measures may include:

i. Identification and elimination of the contaminated product ;
ii. Modification of nursing procedures ;
iii. Identification and treatment of carriers, and
iv. Rectification of lapse in technique or procedure

16.5 Evaluation of efficacy of control measures

i. The efficacy of control measures are 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.
ii. The outbreak should be documented.

17. VISITORS POLICY

17.1 Introduction

Although instructing and preparing visitors for patients in isolation is time consuming and often frustrating, their presence is valuable to the emotional well-being of the patient.

i. 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 is done at admission of the patient.
ii. The patient and the relatives must be given health education about the cause, spread and prevention of the infection, in detail. The need for isolation and restriction of visitors are discussed with them.
iii. Hand washing after all contact with the patient will have to be stressed.
iv. No more than one adult visitor are allowed 'at a time' during the hospital visiting hours and the length of stay are governed by the needs of the patient.
v. Children below 12 years are not allowed into the isolation areas. The policy of our hospital is to allow one female attendant to stay in the ward with the patient. The attendants are individually trained to avoid infection.
vi. 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., are left outside the room. Only articles that can be discarded, disinfected or sterilized are taken into the room.
vii. Visitors are not allowed to sit on the patient's bed.
viii. Visitors should wash their hands well with soap and water before entering and when leaving the room.
ix. Active immunization of attendants and other follow up steps, where applicable must be conducted by the physician in-charge.

17.2. Number of visitors

To restrict foot falls to mitigate risk of transmission of infection from visitors to the patients.

i. No more than one person should accompany the patient at emergency.
ii. In Wards only one visitor is allowed “at a time”. During visiting hours no more than two visitors can be allowed. These additional vistors must visit the patient with “one at time” only.
iii. For ICUs, no vistors are allowed, except under exceptional circumstances as a part of end of life care.
iv. In outpatient department only one visitor is allowed with the patient. In case of child also,no siblings or other parents are allowed in OPD.

17.3 Emergency Service

Standard precautions are to be strictly adhered and all patients are to be treated as potentially infected with blood – borne pathogens. Importance of this cannot be over emphasizes in this area.

i. Wash hands with soap and water before and after patient contact.
ii. Wear gloves preferably for all patient contact. It is a must for all invasive procedures, however minor. Examination gloves are placed in the shelves in all patient care areas.
iii. Wear masks for all situations where a splash is expected, and where infection that spreads through the respiratory route is possible diagnosis.
iv. Wear plastic aprons, in addition to a mask if splash to the body area is expected.

v. Use disposal needles and discard them into the sharps container which is placed in al patient care areas. Dispose IV cannula, styllettes, scalpel blades and razor blades into the sharps containers immediately after use.

vi. Attendants and Sweepers are to wear gloves while handling lab samples and performing sanitation work.

17.4 Additional precautions for patients known to harbor blood borne pathogens

i. Use plastic aprons during procedures where body fluids may be spilt.

ii. Disinfect all items following discharge, transfer or death of the patient (as per hospital protocol refer to the chapter on housekeeping). Mattress, pillow and mackintosh are to be disinfected with 1% sodium hypochlorite solution and dried in sunlight.

18.4.1 Infectious Diseases

Refer to the chapter on Isolation Policies

17.4.2 Wound and Skin Infections

i. Hands are to be washed before and after handling the patient.

ii. Wear gloves while handling infected wounds.

iii. Cover the wounds (as far as possible) before transferring the patient

iv. Dispose waste as per hospital guidelines

17.4.3 Trauma

Use protective equipment such as gloves, mask, gown, apron and goggles under appropriate situations.

17.4.4 Housekeeping

i. The treatment rooms and trauma resuscitation room is cleaned with soap and water after every patient. Blood spills are disinfected by using 1% Sodium hypochlorite for a contact time of 10 minutes.

ii. Equipment and instruments that are to be reused are cleaned before sending it for sterilization.

iii. Discard medical waste as per the guidelines given in the chapter on Hospital Waste Management.

18. FOOD SAFETY

18.1 Background

Experience has shown that outbreaks of food poisoning in hospitals are notable not only because of the public interest that is generated, but because they are clinically serious and can result in the deaths of patients.

18.2 Aim

The aim is to ensure that food is provided to patients and staff in a safe and hygienic manner.

18.3 Principles of food safety

i. Within the hospital, any worker who handles food, or whose actions could affect its safety, must includes workers who clean articles or equipment that come into contact with food. Food and personal hygiene regulations are enforced by dietician of THE HOSPITAL who will make periodic visits to assess compliance.
ii. The Infection Control Team also performs an audit.
iii. The dietician incharge of an area that contains a kitchen is the person deemed to be responsible for all acts of omission and commission in Kitchen area.
iv. The dietician incharge must:
    - Make sure that food is supplied in a hygienic way
    - Identify food safety hazards
    - Know which steps in the processes are critical for food safety
    - Ensure that safety controls are in place, maintained and reviewed.

18.4 Basic Requirements

A. As a minimum kitchen should:

i. be clean and maintained in good repair;
ii. be designed and constructed to permit good hygiene practices;
iii. have an adequate supply of drinking water;
iv. be protected against pests;
v. contain facilities for the disposal of kitchen waste;
vi. have adequate hand washing facilities;
vii. be provided with adequate drainage.

B. **Food trolleys** must be:

i. Be adequate clean and maintained in good repair;
ii. Are be reserved for food only;
iii. Allow for separation of different products;
iv. Are cleaned between loads.

C. **Food handlers** must:

i. Staff must maintain a high degree of personal cleanliness and their practice must also be clean and hygienic. Food handlers must wear a clean uniform and protective over-clothes such as a plastic apron.
ii. Routinely wash their hands when handling food;
iii. Report any illness such as infected wounds, skin infections, diarrhoea or vomiting to their manager and occupational health immediately. If such illness is reported they must be

excluded from food handling areas. Such action is the responsibility of the dietician of THE HOSPITAL, his or her manager.

iv. **It is the responsibility of staff to ensure that the equipment and facilities are clean and fit for use.**

18.5 Refrigerator and Freezer Use

The use of refrigerators/freezers must be carefully controlled by the dietician responsible.
Controls to ensure food safety include:

i. The removal of outer packaging when possible;
ii. The immediate storage of chilled foods after delivery checks are completed;
iii. Food will be stored at temperatures below 8oC refrigerator;
iv. Food will be packaged, wrapped or covered as protection;
v. Food must be labelled with:
    a. the name of the product;
    b. date before which it must be used;
    c. date of refrigeration;
vi. Food is stored within the shelf life.

18.6 Microwave Ovens

Microwave Ovens are not to be used for the heating or re-heating of patient's food.
When used for the processing of food belonging to staff, the following applies:

i. Only containers approved for use by the manufacturer are to be used.
ii. A core temperature of 75oC must be achieved.

18.7 Training

Food handlers must be trained in food hygiene matters to a level appropriate to their job.

18.8 Standard of Food

Guidelines to ensure that food served to patients, visitors and employees is processed in a manner that avoids contamination:-

1. 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.
    i. Cold storage temperatures are maintained appropriately and scrupulously.
    ii. Hot and cold food is transported in such a manner that appropriate temperatures will be maintained during transportation.
    iii. Food returned to the kitchen is discarded into black bags. Mouths of bags are tied before disposal.
    iv. Housekeeping is done according to the set procedures of the department
    v. The arrangement of work stations in the kitchen are such that there is no contamination of cooked food from raw food. There are no interchange of personnel working on raw food and those on cooked food.
    vi. Personnel handling and serving the food are trained to observe universal precautions to protect themselves.
    vii. Personnel are also trained to protect food consumers from body substances of handling personnel.
    viii. Cleaning of vegetables is done with 2% sodium chloride

2. Training should include the following aspects.
   i. Hand washing should cover exposed portions of arms and hands with special attention to fingernails and areas between fingers.
   ii. Clothing is free from obvious dirt and food spills.
   iii. Food should not be consumed in preparation or serving areas.
   iv. Utensils are used to handle food.
   v. Clean gloves may be used.
   vi. Pest control of entire facility and thorough cleaning with disinfectants should be done at defined intervals to ensure pest free food operations and safe environment.

18.9 Screening of Kitchen Workers

i. Kitchen Workers must be screened for Nasal MRSA carriage, and stool parasite examination.
ii. Surveillance is conducted biannually for detection of carriage of *Salmonella* and MRSA. Stool samples and nasal swabs are submitted to the microbiology laboratory. Surveillance is also done after worker re-joins duty after period of leave more than two weeks.
iii. Records are maintained by in-charge of the department

19.9.1 Food borne diseases

Bacterial diseases	Typhoid and paratyphoid fever, Salmonellosis, Staphylococcal intoxication, *Cl. perfringens, B.cereus* food poisoning, *E.coli* diarrhoea, Streptococcal infection, Shigellosis, Brucella
Viral diseases	Viral hepatitis, gastroenteritis
Parasites	Taeniasis, Hydatidosis,Trichinosis, Ascariasis, amoebiasis, Oxyuriasis

18.10 Cleaning procedures for food service department facilities

S.No.	Equipment/ Work area	Cleaning Procedure & Frequency	Responsibility
		PRODUCTION AREA	
1.	Cold storage	Daily mop/ Sweeping	Kitchen mates
2.	Wet grinder	After every use thorough cleaning with water	Cooks/ Mates
3.	Knife	After every use. Cleaning with cold water	Cooks/ Mates
4.	Work Table Sinks	Twice a day cleaning with soap/water. And regular mopping with water after every use.	Cooks / Kitchen mates
		PANTRY	
1.	Work Tables	Twice a day cleaning with soap/ water. And regular mopping with water after every use.	Kitchen mates
		HOT KITCHEN	
1.	Tilting pans	After every use washed with water	Cooks/ Kitchen Mates.
2.	Sinks / Work Tables	As often as required	As often as required
3.	Provisions Stores	Weekly cleaning.	Kitchen Mates/ Cooks
		DISHWASH AREA	
1.	Tables & Sinks	Twice a day with water and soap	Food Attendants.

19. LAUNDRY AND LINEN MANAGEMENT

19.1 Introduction

The purpose of this policy is the prevention of infection or injury in patients and health care staff involved in the use, handling or laundering of hospital linen.

19.2 Categories of Linen

14.2.1 Dirty Linen

Dirty Linen is Used linen, but not visibly soiled with blood or blood tinged body secretions.
Used linen, which may be slightly contaminated with excreta, blood and body fluids are not classed as infected.

19.2.2 Soiled Linen

Soiled linen is Known, or potentially, infected/infested linen.
All linen which is:

- Grossly contaminated with excreta, blood or body fluids,
- Or contaminated linen from a patient who is known, or clinically suspected, to be infectious. For example salmonella, hepatitis A, B or C, open pulmonary tuberculosis, HIV.

19.3 Specific Items

19.3.1 Mattress overlays

These must be protected by waterproof covers, which are cleaned with soap and water between patients. Alcohol wipes **MUST NOT** be used to clean these items as alcohol damages the cover which may allow fluid to pass through to the mattress foam, the life of the mattress and its ability to protect patients form cross infection is then reduced. If the cover is damaged or punctured, and the article itself is contaminated it must be condemned and disposed of as clinical waste. Replacement covers can be purchased and may be used providing the mattress itself is not soiled stained or has a smell.

19.3.2 Staff uniforms

Must be sent to the laundry contained in the appropriate bags and labelled with the name of the individual, ward and hospital to ensure it is returned. After washing, uniforms are protected from contamination with dust during storage.

19.4 Handling and storage of used linen in ward/department

i. Used linen must be handled with care to prevent environmental contamination with excretion or secretions, skin scales or bacteria. Linen must be bagged at the bedside, never shaken or allowed to touch the floor. Dirty linen must be collected into black bags and soiled linen into red bags.
ii. No extraneous items must be placed in the laundry bags, especially sharp objects. This may contribute to a health & safety risk for the laundry workers.
iii. All linen bags must be placed in the correct colour bag, securely tied, labelled as appropriate and stored in a room or area designated for the purpose, which is safe and separate from patient areas (dirty corridor).
iv. Bags must be less than 2/3 full.
v. All items that are sent to the laundry must be appropriately marked including mattress overlays, clothing.

vi. Gloves may also be required if linen is wet. Hands must be washed after handling soiled or infected linen
vii. Linen are held away from the body to prevent contamination of clothing.
viii. While counting is done in front of laundry worker, full PPE must be worn. Laundry worker should transport the bagged linen in covered trolleys specifically designated for this purpose with clearly labeled as "Used linen".
ix. No seprate treatment for known HIV positive patient's linen should be attempted and should be collected and transported as mentioned above.

19.5 Transporting Used Linen from Ward / Department to Pick-Up Point

i. Laundry bags must be securely tied.
ii. The pick-up point must be dry and secure and separate from the clean linen area
iii. The frequency of collection will depend on the volume of laundry.
iv. Linen handlers must have heavy-duty rubber gloves available. Guidance on hand washing technique and frequency must be given.

19.6 Transporting Used Linen from the Pick-Up Point to the Laundry

i. Frequency of collection will be dependent on the volume of laundry and the predefined schedule.
ii. Laundry is responsible for cleaning and disinfection of their trolleys:
    a. After any spillage
    b. After transportation of dirty laundry
    c. Through cleaning with soap and water at least weekly
iii. Dedicated covered trolleys must be used for transporting the clean linen.
iv. There must be no contact between clean and soiled linen at any time. So, clean and dirty/ soiled linen are transported separately from separate corridors, clean linen are transported in white trolleys while dirty linen are transported in a red trolley, if the linen is soiled it are first tied in a red bag.

19.7 Return of Clean Linen to the User

Contamination of clean linen must be prevented by:

1. Storage in a clean, dry area or cage
2. Transport in a white trolley which is cleaned and disinfected prior to loading with clean linen. Linen that is (or thought to be) contaminated must be returned to the laundry for re-processing.

19.8 Infection control issues in the laundry

1. No person shall be permitted to work in or about the processing or handling of any article to be supplied to the hospital while suffering from an infection or skin disease. All contractors' staff must report such conditions to the contractor.
2. Personal protective clothing will be available and worn when handling linen.
3. All personnel working in laundry must wear clean hospital clothes. All such clothing must be removed and changed each time the person leaves the department.
4. Disposable items must not be re-used. Reusable gloves must be cleaned and dried at least daily.
5. A hand hygiene facility complete with soap and paper towels, must be available close to the working areas.
6. Staff must be aware of the possibility of extraneous items and sharps containers must be available.
7. Staff must be aware of actions to take in the event of a sharps injury.

8. Systems and machinery will be designed and operated so as to reduce the risk of re-infection of linen during the course of the laundering process and, to prevent articles being re-infected after laundering and prior to re issue to the hospital.
9. All sharps obtained during sorting at laundry must be recored in designated register, and respective unit and HICC should be provided with the aleast monthly feedback.

19.9 Spillage of contaminated linen

1. Wear gloves, replace the linen in an appropriate bag.
2. Clean the surface as per spill management policy and wash the surface with detergent and water and dry. Wash hands thoroughly after removing gloves.

19.10 Thermal disinfection times and temperatures and environmental issues in the laundry

19.10.1 Disinfection of used (soiled and fouled) linen

i. A sluice cycle is incorporated into washing machines for the removal of organic matter from fouled linen.
ii. Put 200 g of bleaching powder (25 Lwater) in one sluice cycle to disinfect soiled linen.
iii. Wash loads will have a mixing time of 8 minutes added to the temperature holding times.
iv. The wash temperatures will be maintained:

19.10.2 Disinfection of suspected (or known) infected linen

i. The temperatures described previously will adequately disinfect linen.
ii. This linen must not be processed in a batch continuous washing machine, but are processed in a washer extractor.

19.10.3 Disinfection of heat-labile linen (Blanket)

i. If soiled, than first dip the blanket in Bleaching powder (0.5%) for 20 minutes, than sluicing will be done to wash off any organic material stick to it.
ii. Linen in this category must be laundered in a machine at 40°C and dried at 60°C using tumble dryers.
iii. Bleaching powder (0.5%) may be used in the penultimate rinse.

19.11 Disposal of Linen

The linen that required to be dispose off must be disinfected (for e.g. in sluicing machine) and duly washed as soiled linen described above. After drying this linen records are presented to the condemnation committee. After due certification from the committee such linen should be shreded or cut in small pieces and then dispose off in yellow bag to bio-medical waste collector for final dispoosal.

19.12 General measures to prevent infection

i. All surfaces will be kept free from dust, debris and pests. There will be a system for regular cleaning of the environment including high level surfaces.
ii. All washing machines will be kept clean and free from algae.
iii. All washing machines are fitted with accurate heat sensors that are correctly positioned. These must be tested at predefined interval and calibrated. Records must be kept of this and of regular monitoring of wash temperatures.

References:

1. NHS Executive (1995). “Hospital Laundry Arrangements for Used and Infected Linen”. Health Service Guidelines (HSG(93)18). Lancashire: BAPS2.Barrie, D (1994).
2. “Infection Control in Practice: How hospital linen and laundry services are provided”. Journal of Hospital Infection 27 pp 219-2.

20. VEHICLE DISINFECTION

Patient care areas must be cleaned and disinfected after each patient use.
Some general guidelines for vehicle disinfection while the vehicle is in use are outlined as below:

1. Cot linen and pillow will be changed between patient use A separate bed sheets should be used for each patient .
2. The spill kit will be used for cleanup of body fluids.
3. All hard surfaces are wiped with disinfectant used for terminal cleaning as needed. It should also be done weekly routinely.
4. The floor is washed as needed and done each shift routinely.
5. Garbage bags will be emptied between calls.
6. Cab and patient care area are kept free of litter or expendable supplies used on a previous patient.
7. Entire vehicle are cleaned each shift as needed.
8. Sister Incharge (Emergency Ward) will be responsible for monitoring of cleaning & medical kit maintenance in each shift.

21. ENGINEERING CONTROL

21.1 Scope

Area in and around the hospital building.

21.2 Responsibility

PWD Engineers – Civil and Electrical are responsible for maintenance and engineering control of the facility.

The preventive maintenance of all equipment will ensure efficiency of all staff and reduce chances of contamination of air and water. The proper care and maintenance of the entire physical structure will also reduce accumulation of dust and spores in the environment. Thus the engineering dept and its personnel are important links in the chain of activities towards hospital infection control.

All personnel should apply universal precautions when in contact with patients or blood and body fluids.

21.2.1 General

1. Engineering personnel shall report to the ward sister prior to commencing work in a patient's room or area, and follow her directions with regard to dressing, scrubbing etc. Engineering personnel shall check out with the ward sister upon completion of work.
2. Engineering employees shall maintain a neat, clean appearance at all times. All engineering personnel must be aware of universal precautions.
3. Prior to entering areas requiring sterile attire such as the OT, engineering employees shall wear the prescribed clothing. Engineering personnel shall check in and out with the permission of the supervisor.
4. Hand washing are followed before and after leaving the patient care area.

21.2.2 Plumbing Job Guidelines

1. Hospital water supply systems shall not be connected with any other piping system or fixtures that could allow contamination without the use of adequate air gaps or approved back flow preventers or vacuum breakers.
2. When using implements to unstop faulty drains, wear rubber gloves.
3. When robbing out main sewer lines, or when exposed to gross contaminated wastes, wear rubber boots and rubber gloves.
4. After exposure to sewer lines or gross contaminated waste, clean exposed areas of body with soap and water. Change uniform if necessary. Do not return to patient care areas before cleaning up.

21.2.3 Physical Barriers Between Repair Area And Patient Care Facility

i. When any construction or repair work is carried out in patient care areas the supervisors must inform the medical administrator, who will inform the heads of the concerned departments so that patient may be shifted if required.

ii. When work is carried out in areas where immune compromised patients or that requires a sterile atmosphere, adequate physical barriers must be present to prevent the spread of fungus and other such microbes, through dust and debris generated.

iii. All areas that require a sterile atmosphere must be fumigated before use following construction work.

iv. Ventilation Systems

v. Every six months cleaning of all AC ducts and AC filters must be carried out in a systematic manner throughout the hospital.
vi. AC filters are placed in water and soap solution for at least an hour at each cleaning.
vii. In areas such as the microbiology labs where handling of infected material is carried more frequent checks atleast once in two months and cleaning of AC filters is required.
viii. In areas where central air-conditioning is used the moisture of the air and the ventilator air changes must be carefully monitored. All ducts must be clean thoroughly at every six months.
ix. The following parameters of the Air Conditioning system are monitored**Temperature: 21 ± 3^{o}C**

a. Humidity – 40-60% with variation +/-5%**HEPA Filter Monitoring Air sampling is not routinely recommended for routine monitoring of ventilation system**

b. Air sampling is required before commissioning of a new OT, after any repair or maintenance of ventilation system, any new construction or repair of hospital building.

c. In case of suspected outbreak, fogging & Surveillance is initiated in OTs ICUs & Wards respectively.

22. BODY HOLDING AREA PRACTICES

22.1 Scope

in case of death either the body is being handed over to the families, or unclaimed bodies and MLC cases are transferred to the Mortuary

22.2 Purpose

By taking into consideration the infection control issues and feelings of the family with the body and other patients and family present in the same ward.

22.3 Responsibility

Treating team of doctors and nurses

22.4 Policy

1. In case of death body can be kept maximum three hours in the ward, for the documentation and other formalities and handed over to the family.
2. If the family members are not available or due to some other circumstances unable to shift the body, than the body will be shifted to the designated Body Holding area of the ward, where it can be kept maximum six hours, after that body will be transferred to the Mortuary.

APPENDIX 1. HIC INDICATORS

Various indicators used for hospital associated infections include:

1. Healthcare associated infections.
2. Catheter related blood stream infections (CRBSI)
3. Surgical site infections (SSI)
4. Catheter associated urinary tract infections (CAUTI)
5. Ventilator associated pneumonia (VAP)
6. Hospital acquired blood stream infections (HA BSI)
7. Device utilisation rates for central line catheters, Foley's catheter and ventilators.
8. Antibiotic usage and resistance monitoring (AUR)

1. To calculate **Hospital acquired infections** in various units:

   Data to be calculated include:

   No. of patients with healthcare associated infections in particular unit X 1000

   No. of patient days in that particular unit

2. To calculate **CRBSI**, data to be collected include:

   No. of patients developed CRBSI X 1000

   Total no. of catheter days

3. To calculate **SSI** in surgical unit, data to be collected include:

   No. of patients with SSI in surgical department X 100

   No. of patient undergoing surgery in the department

4.To calculate **CAUTI**, data to be collected include:

   No. of patients developed CRUTI X 1000

   Total no. of urinary catheter days

5.To calculate **VAP**, data to be collected include:

   No. of patients developed VAP X 1000

   Total no. of Ventilator days

6. To Calculate **Hospital acquired BSI**

   No. of patients developed BSI (HAI) X 1000

   Total No.of patient days

7. To calculate **Device (**Ventilator, central line, Foley's Catheter**) Utilization Rate:**

   No. of Device days

   No. of Patient days

Device-days are the total number of days of exposure to the device (ventilator, urinary catheter or central line) by all of the patients during the selected time period.

Patient-days are the total number of days that patients are in a particular unit during the specified time period

Calculation of device associated infection rate (DAIR):

DAIR = No. of DAIR for a specific site X 1000

Number of device days

This is done for 3 devices namely.

1. Central line- Sample from CVP tip
2. Ventilator -Sample from endotracheal tube secretions
3. Foley's Catheter - Urine sample

Data is collected in a prescribed format.

8. **Antibiotic Utilization rate:** Antibiotic used (g)
Defined drug Dose (g)

Calculation of Hand Hygiene Compliance:

Compliance (%) = Actions x 100
Opportunities

APPENDIX 2: CASE DEFINITIONS USED FOR DIAGNOSIS OF HCAIS

Case definitions as described by National Healthcare Safety Network (NHSN), CDC are being used. The summary diagrams of the common HCAIs are summarized below:
Healthcare associated infection (HAI) is acquired in a hospital by a patient, that is, it was not present or incubating at the time of admission. This also includes infection acquired in the hospital but appearing after discharge. These infections can occur from inadvertent exposure to pathogenic bacteria's, viruses, fungi or spores.

A2. 1 BLOOD STREAM INFECTIONS

Laboratory confirmed blood stream infection			**Central line-associated blood stream infection**
LCBI -1	**LCBI -2**	**LCBI -3**	**CLABSI**
Patient has a recognized pathogen cultured from one or more blood cultures AND organism cultured from blood is not related to an infection at another site	Patient has at least one of the following signs or symptoms: fever (>38.0°C), chills, or hypotension AND organism cultured from blood is not related to an infection at another site AND the same common commensal (i.e., diphtheroids [Corynebacterium spp. not C. diphtheriae], Bacillus spp. [not B. anthracis], Propionibacterium spp., coagulase-negative staphylococci [including S. epidermidis], viridans group streptococci, Aerococcus spp., and Micrococcus spp.) is cultured from two or more blood cultures drawn on separate occasions.	Patient ≤ 1 year of age has at least one of the following signs or symptoms: fever (>38.0°C), hypothermia (<36.0°C), apnea, or bradycardia AND organism cultured from blood is not related to an infection at another site AND the same common commensal (i.e., diphtheroids [Corynebacterium spp. not C. diphtheriae], Bacillus spp. [not B. anthracis], Propionibacterium spp., coagulase-negative staphylococci [including S. epidermidis], viridans group streptococci, Aerococcus spp., and Micrococcus spp.) is cultured from two or more blood cultures drawn on separate occasions.	A laboratory-confirmed bloodstream infection (LCBI) where central line (CL) or umbilical catheter (UC) was in place for >2 calendar days on the date of event, with day of device placement being Day 1, AND a CL or UC was in place on the date of event or the day before. If a CL or UC was in place for >2 calendar days and then removed, the date of event of the LCBI must be the day of discontinuation or the next day.

A2.2 SURGICAL SITE INFECTION (SSI)

Must meet the following criteria:

Superficial SSI	Deep SSI	Organ/Space SSI
Infection occurs within 30 days after any NHSN operative procedure (where day 1 = the procedure date), including those coded as 'OTH'***** **AND** involves only skin and subcutaneous tissue of the incision **AND** patient has at least ***one*** of the following: a. purulent drainage from the superficial incision. b. organisms isolated from an aseptically-obtained culture from the superficial incision or subcutaneous tissue. c. superficial incision that is deliberately opened by a surgeon, attending physician** or other designee and is culture positive or not cultured AND patient has at least ***one*** of the following signs or symptoms: pain or tenderness; localized swelling; erythema; or heat. A culture negative finding does not meet this criterion. d. diagnosis of a superficial incisional SSI by the surgeon or attending physician** or other designee.	Infection occurs within 30 or 90 days after the NHSN operative procedure (where day 1 = the procedure date) according to the list in Table under section A2.3 (see below) **AND** involves deep soft tissues of the incision (e.g., fascial and muscle layers) **AND** patient has at least ***one*** of the following: a. purulent drainage from the deep incision. b. a deep incision that spontaneously dehisces, or is deliberately opened or aspirated by a surgeon, attending physician** or other designee and is culture positive or not cultured AND patient has at least ***one*** of the following signs or symptoms: fever (>38°C); localized pain or tenderness. A culture negative finding does not meet this criterion. c. an abscess or other evidence of infection involving the deep incision that is detected on gross anatomical or histopathologic exam, or imaging test. ** The term attending physician for the purposes of application of the NHSN SSI criteria may be interpreted to mean the surgeon(s), infectious disease, other physician on the case, emergency physician or physician's designee (nurse practitioner or physician's assistant).	Infection occurs within 30 or 90 days after the NHSN operative procedure (where day 1 = the procedure date) according to the list in Table under section A2.3 (see below) **AND** infection involves any part of the body deeper than the fascial/muscle layers, that is opened or manipulated during the operative procedure **AND** patient has at least ***one*** of the following: a. purulent drainage from a drain that is placed into the organ/space (e.g., closed suction drainage system, open drain, T-tube drain, CT guided drainage) b. organisms isolated from an aseptically-obtained culture of fluid or tissue in the organ/space c. an abscess or other evidence of infection involving the organ/space that is detected on gross anatomical or histopathologic exam, or imaging test **AND** meets at least ***one*** criterion for a specific organ/space infection site listed in Table 4. These criteria are in the Surveillance Definitions for Specific Types of Infections chapter.

A2.3 Surveillance Period for Deep Incisional or Organ/Space SSI

Following list is of Selected NHSN Operative Procedure Categories. Day 1 = the date of the procedure

30-day Surveillance

Operative Procedures

Limb amputation
Appendix surgery
Kidney surgery
Shunt for dialysis
Bile duct, liver or pancreatic surgery
All bladder surgery
Colon surgery
Caesarean section
Gastric surgery
Abdominal hysterectomy
Laminectomy
Neck surgery
Prostate surgery
Rectal surgery
Small bowel surgery
Spleen surgery
Thyroid and parathyroid surgery
Vaginal hysterectomy
Exploratory laparotomy

90-day Surveillance

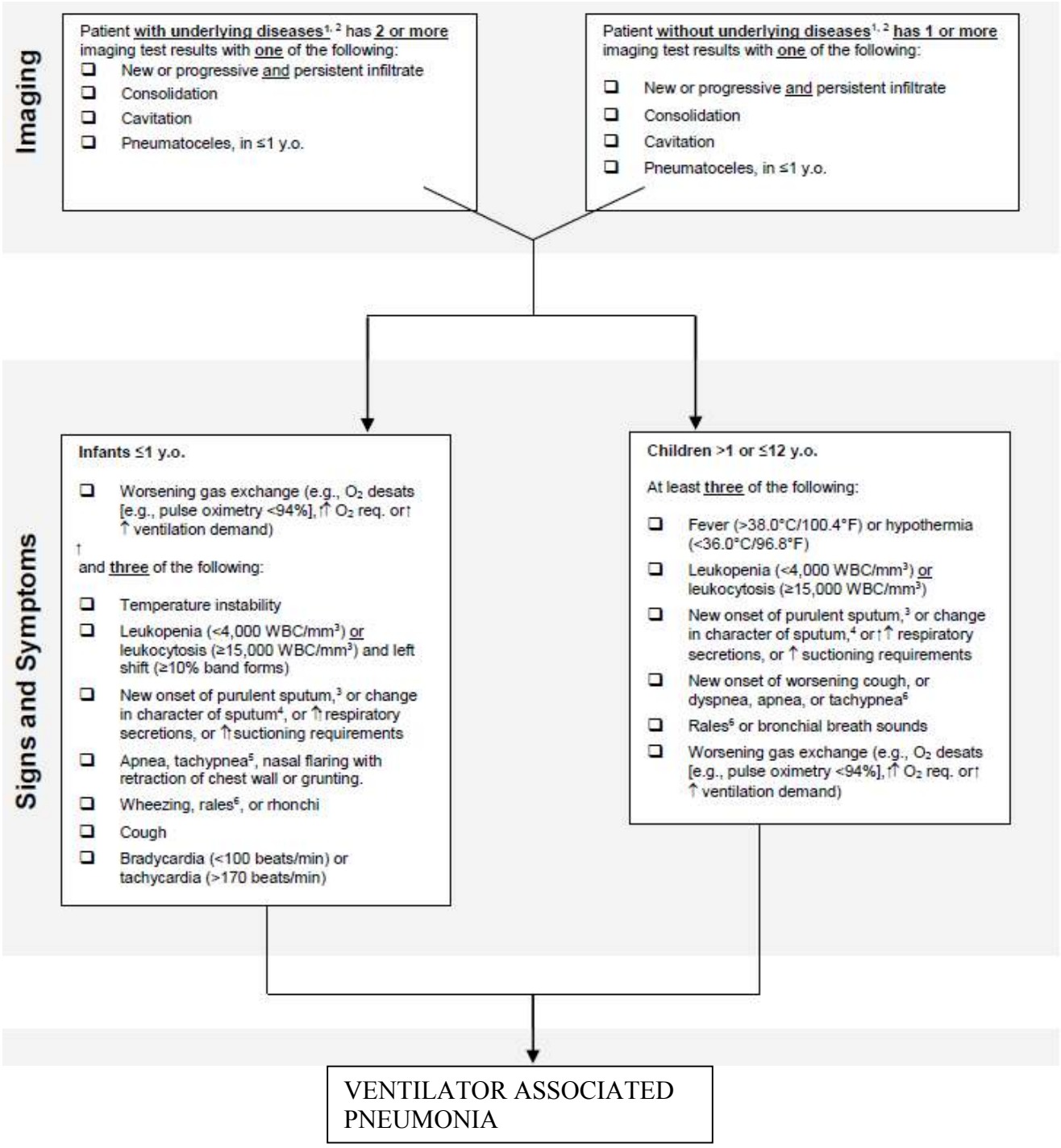
Operative Procedure

Breast surgery
Craniotomy
Spinal fusion
Open reduction of fracture
Herniorrhaphy
Hip prosthesis
Knee prosthesis

A2.4 URINARY TRACT INFECTION

Symptomatic UTI (SUTI) Must meet at least ***one*** of the following criteria:			**Asymptomatic bacteremic UTI (ABUTI)** Must meet the following criteria
SUTI 1a Catheter-associated Urinary Tract Infection (CAUTI)	**SUTI 1b Non-Catheter-associated Urinary Tract Infection (Non-CAUTI)**	**SUTI 2 CAUTI or Non-CAUTI in patients 1 year of age or less**	**ABUTI**
Patient must meet 1, 2, and 3 below:			
1.Patient had an indwelling urinary catheter that had been in place for >2 days on the date of event (day of device placement = Day 1) AND was either: Still present on the date of event†, OR Removed the day before the date of event‡ 2.Patient has at least ***one*** of the following signs or symptoms: •fever (>38.0°C) •suprapubic tenderness •costovertebral angle pain or tenderness •urinary urgency •urinary frequency •dysuria 3.Patient has a urine culture with no more than two species of organisms,at least one of which is a bacteria of ≥10^5 CFU/ml	1. One of the following is true: Patient has/had an indwelling urinary catheter but it has/had not been in place >2 calendar days on the date of event† **OR** Patient did not have a urinary catheter in place on the date of eventnor the day before the date of event 2. Patient has at least ***one*** of the following signs or symptoms: • fever (>38°C) in a patient that is ≤ 65 years of age • suprapubic tenderness • costovertebral angle pain or tenderness • urinary frequency • urinary urgency • dysuria 3.Patient has a urine culture with no more than two species of organisms,at least one of which is a bacteria of ≥10^5 CFU/ml.	1.Patient is ≤1 year of age (withor without an indwelling urinarycatheter) 2.Patient has at least ***one*** of the following signs or symptoms: •fever (>38.0°C) •hypothermia (<36.0°C) •apnea •bradycardia •lethargy •vomiting •suprapubic tenderness 3.Patient has a urine culture with no more than two species of organisms,at least one of which is a bacteria of ≥10^5 CFU/ml	1.Patient with or without an indwelling urinary catheter has no signs or symptoms of SUTI 1 or 2 according to age 2.Patient has a urine culture with no more than two species of organisms,at least one of which is a bacteria of ≥105 CFU/ml (see Commentsection below) 3.Patient has a positive blood culture with at least ***one*** matching bacteriato the urine culture, or meets LCBI criterion 2 (without fever) andmatching common commensal(s) in the urine.

A2.5 VENTILATOR ASSOCIATED PNEUMONIA (VAP)



APPENDIX 3. List of disinfectants currently available in the hospital and their use.

(Representative table. Will vary from hospital to hospital depending on availability of agents)

#	Department	(70% ethyl alcohol or Isopropyl alcohol)	0.5%-1% Sodium Hypochlorite	2% Glutaraldehyde	(5% Glutaraldehyde + 11.2% chemically bound formaldehyde + 5% benzalkonium chloride) Currently available formulation- Sanillocid	Bleaching powder (70% available chlorine)	(0.5% chlorhexidine + 70% ethyl alcohol) Currently available formulation- Nanzilon	5% Povidone iodine
1.	O.T.	For skin disinfection, Trolley tops, cautery leads	Disinfection of infected plastics (syringes, cannula caps)	Disinfection of sharp instruments or heat labile instruments (scissors, laryngoscope)	(0.5%) Tables, trolleys, tiles, floor cleaning, surgery tables.	Spill management	Hand hygiene	Preoperative Skin preparation
2.	ICU	For skin disinfection, Trolley tops, monitors leads, BP cuff	Surface disinfection (Bed frames, trolleys, tiles). Disinfection of infected plastics (syringes, cannula caps), for cleaning of patient's furniture and fittings.	Disinfection of suction jars & tubings, laryngoscope, O_2 Humidifiers	Terminal cleaning of furniture of patients on weekly basis (Bed frames, trolleys, tiles).	Spill management	Hand hygiene	
3.	Lab	Surface cleaning(tables, Biosafety cabinets, work	Disinfection of used syringes, slides, cover slips & culture	NR	NR		Hand hygiene	NR

		stations	loops etc.					
4.	Ward	For skin disinfection, & Surface cleaning (Trolley tops etc)	Disinfection of infected plastics (syringes, cannula caps, patient patientfurniture and fixtures.)	Disinfection Heat labile and other instruments(scissors etc)	Terminal cleaning of furniture of patients on weekly basis (Bed frames, trolleys, tiles).		Hand hygiene	
5.	Dressing room	For skin disinfection, Trolley tops etc	Disinfection of infected plastics (syringes etc)	Disinfection of instruments	NR	NR	Hand hygiene	

NR – Not required

APPENDIX 4. Housekeeping Check List for OTs

Before start of OT daily cleaning of parts surrounding

Date															
OT Table															
OT Light															
Boyle's App/ Anaesthesia trolley															
IV Stand															
Cautery Machine & Cautery, Paddle															
Instrument trolley(Especia lly trolley top)															
Door Handle															
Suction Machine															
Hand Washing Area/ Scrubbing Area															
AC Point checking															
Floor Cleaning															
Prepare bleach solution															

During Surgery

Date															
Any Spillage															
Management of Spill															

In between surgery

Date															
OT table															
Patients surroundings															
Cleaning of suction tubing and jar															

At the end of day

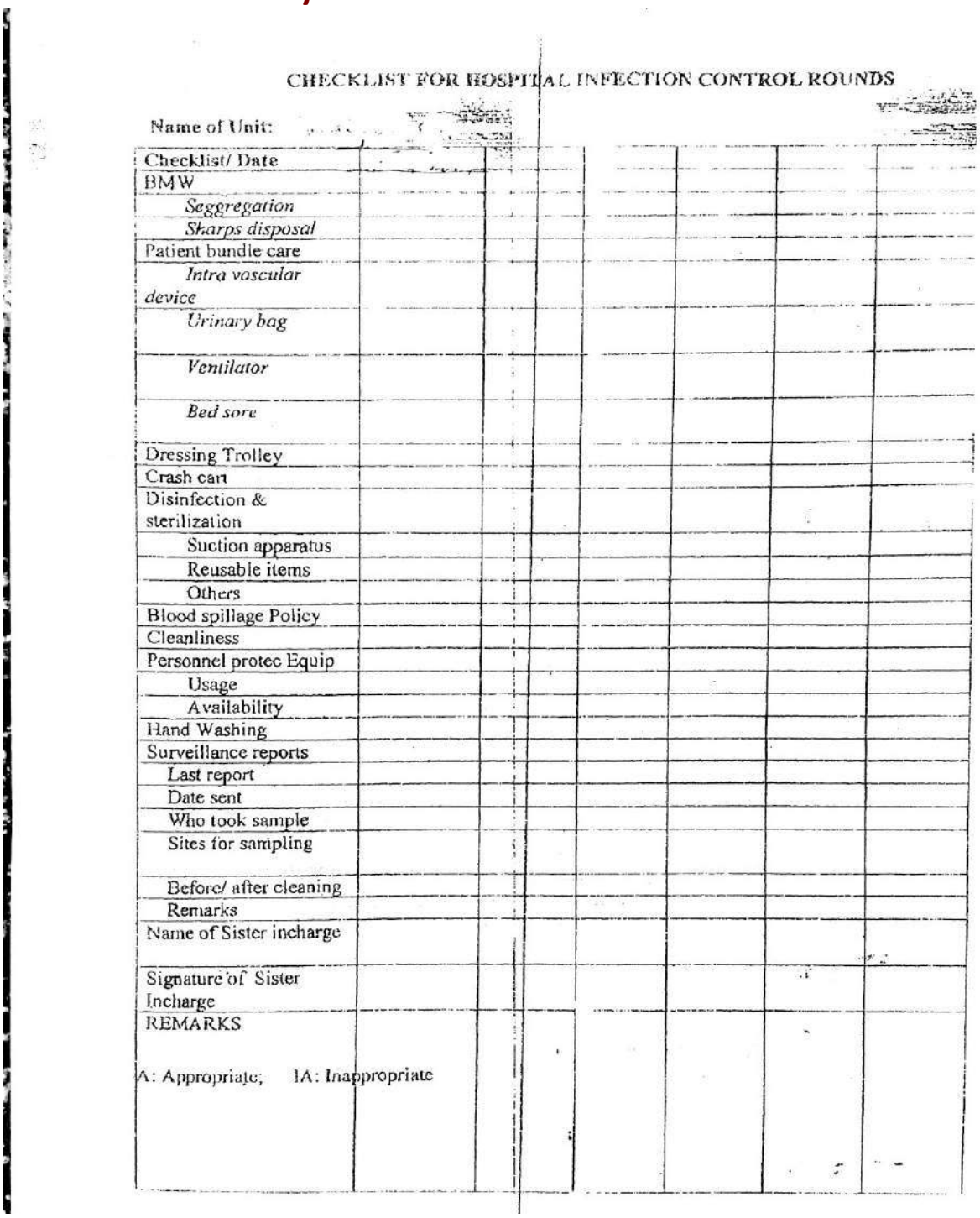
Date															
OT Table															
OT Light															
Boyle's App															
IV Stand															
Cautery Machine & Cautery, Paddle															
Instrument trolley/ Specially trolley top															
Door Handle															
Cleaning of suction jar followed by sterilization															

Date															
Cleaning done by 1.NO(M) 2.HK(M)															
1. NO(E) 2. HK(E)															
Supervised by Sister incharge															

Weekly cleaning

Date				
Check all suction and ac points working				
Remove all portable items.				
Remove dust from inaccessible area with wet mop				
Thorough cleaning of surfaces by three bucket system				
Wash the OT floor with soap & water				
Clean AC filters/ AC ducts				
Clean doors, walls, windows				
Seal all crevices, holes before fumigation				
Replace all portable items back after cleaning				
All the AC point sealed				
Complete fumigation process as per protocol				

APPENDIX 5. Daily ICN round format



CHECKLIST FOR HOSPITAL INFECTION CONTROL ROUNDS

Name of Unit:

Checklist/ Date						
BMW						
Seggregation						
Sharps disposal						
Patient bundle care						
Intra vascular device						
Urinary bag						
Ventilator						
Bed sore						
Dressing Trolley						
Crash cart						
Disinfection & sterilization						
Suction apparatus						
Reusable items						
Others						
Blood spillage Policy						
Cleanliness						
Personnel protec Equip						
Usage						
Availability						
Hand Washing						
Surveillance reports						
Last report						
Date sent						
Who took sample						
Sites for sampling						
Before/ after cleaning						
Remarks						
Name of Sister incharge						
Signature of Sister Incharge						
REMARKS A: Appropriate; IA: Inappropriate						

Appendix 6. Proforma for occupational exposure to blood, body fluids and sharp injuries

Nature Of Injury: Percutaneous Injury (Nsi)/Sharp Cut/ Laceration / Splash Of Blood Or Body Fluids

Date of injury:	Time:	Location:
Date of reporting:	Time:	

HEALTH CARE WORKER		**SOURCE PATIENT**
Name:		Name:
Age/Sex:		Age/sex:
Designation:		Diagnosis:
H/O Blood transfusion:		History:
HBV Immunization status	a. Complete b. Partial c. No	Ward/ICU/OT:
If yes then D/M/Y:		
Categories of Exposure : **Mild:** Mucous membrane/non-intact skin with small volumes e.g: a superficial wound (erosion of the epidermis) with a low calibre needle, or contact with eyes mucous membrane, subcutaneous injection following small-bore needle. **Moderate:** Mucous membrane /non-intact skin with large volumes OR percutaneous superficial exposure with solid needle e.g: a cut or needle stick injury penetrating the gloves **Severe:** Percutaneous with large volume e.g. (a)- an accident with a high calibre needle(>18 G) visibly contaminated with blood. (b)- a deep wound. (c)- transmission of a significant volume of blood.		**Categories of Source:** HIV Negative Low risk High risk Unknown
Practice of Standard Precautions: Yes/No		Whether on ART: Yes/No
First Aid measures: (Wash/Bleed/Antiseptic/TT)		Risk factors for HIV/STD :
Action taken in Casuality Hepatitis B Vaccination HBIG Anti HBSAg Titre If yes; Level of antibody PEP advised/taken	 Yes/No Yes/No Yes/No Responder/Non-responder Yes/No	
Consent/Signature:		**Consent/ Signature**:
Contact no. :		Contact no.
Address:		Address:

SIGNATURE AND STAMP OF UNIT INCHARGE/CMO

FOR MICROBIOLOGY LAB USE ONLY

LAB NO……. DATE:----------

HEALTH CARE WORKER					SOURCE PATIENT	
***TEST**	**DAY 0**	**6 weeks**	**3 MONTH**	**6 MONTH**	**TEST**	**DAY 0**
HIV					HIV	
HBsAg					HBsAg	
HCV					HCV	

*Above tests done by Rapid testing methods only

** All Reactive / Positive results must be correlated clinically and confirmed by ELISA

TECHNICIAN: **MICROBIOLOGIST**

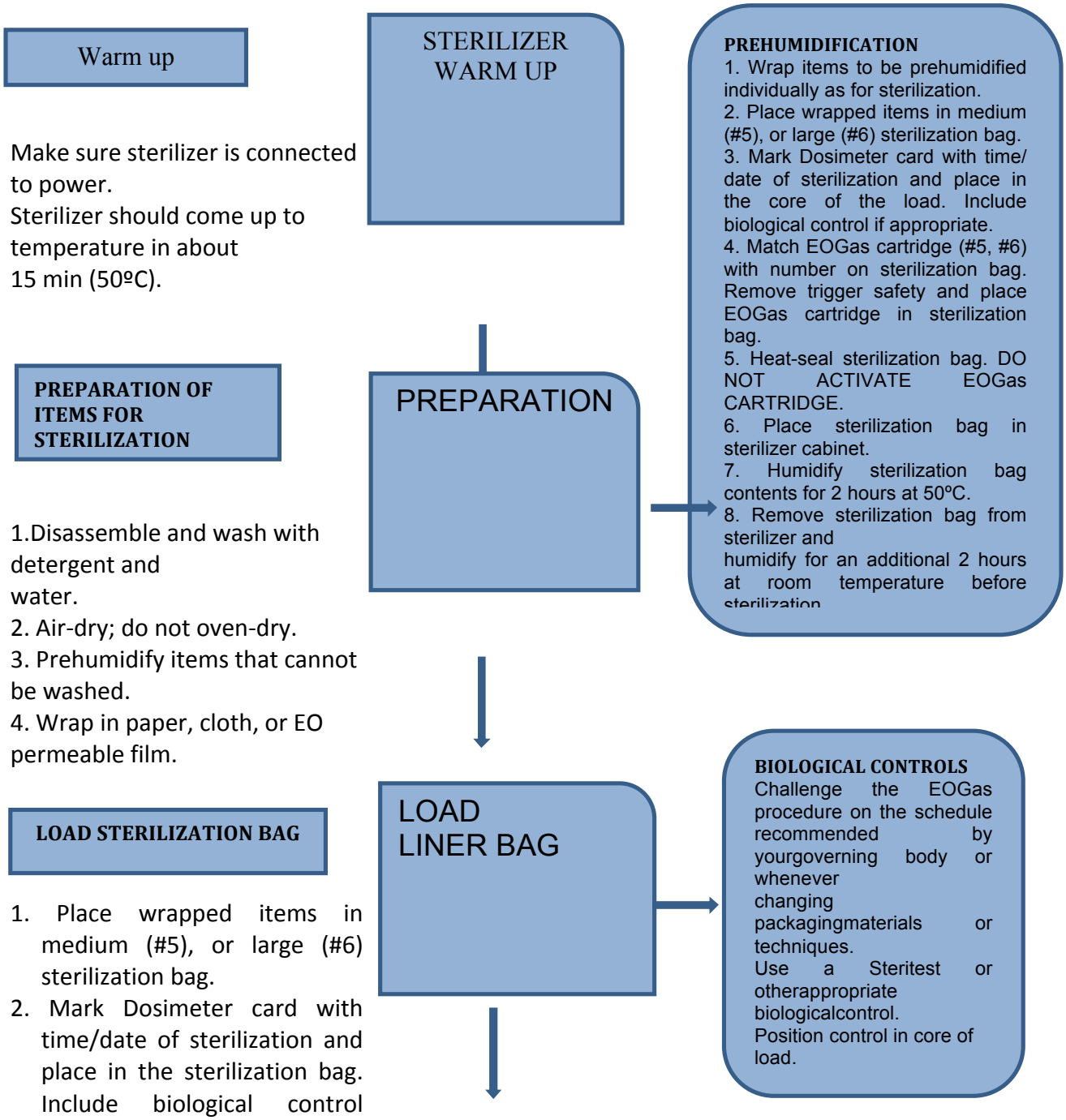
DATE / TIME:

Appendix 7. CHECKLIST FOR INFECTION CONTROL ROUND IN DIALYSIS UNIT

Action Expected	Expected Frequency	Last 2 dates when complied	Overall compliance (Yes/No/Partial)
1. HAEMODIALYSIS MACHINE			
AV tubing completely immersed in disinfectant after use	After every use		
Disinfection of Haemodialysis machine with 4% Hypochlorite	Once in a day		
Disinfection of Haemodialysis machine surface area with 1% Hypochlorite	Once in a day		
Bleaching of machines with 5% chlorine	Once in a week		
Conductivity test of RO water	Once in a month Expected value:		
Dialysate sterility	Once in a month		
Calibration of machine	Quarterly		
2. RO UNIT			
Conductivity test	Once in a day Expected value:		
RO maintenance by backwashes and regeneration of softener	Once in a week		
Hardness test	Once in a week		
Chloramine test	Once in a week		
Disinfection of RO unit including Loop lines and Storage tanks	Once in a month		
Culture of RO unit output water	Once in a month		
Endotoxin assay of RO water	Once in a month Expected value:		
Detailed examination of RO water under AAMI guidelines	Quarterly		
REPROCESSOR MACHINE			
Ends of dialyzer connectors dipped in disinfectant	After every use		
Number of times haemodialyser used	Expected frequency:		
Disinfection of reprocessor machine with 1% Hypochlorite	Once in a week		

Date of round:

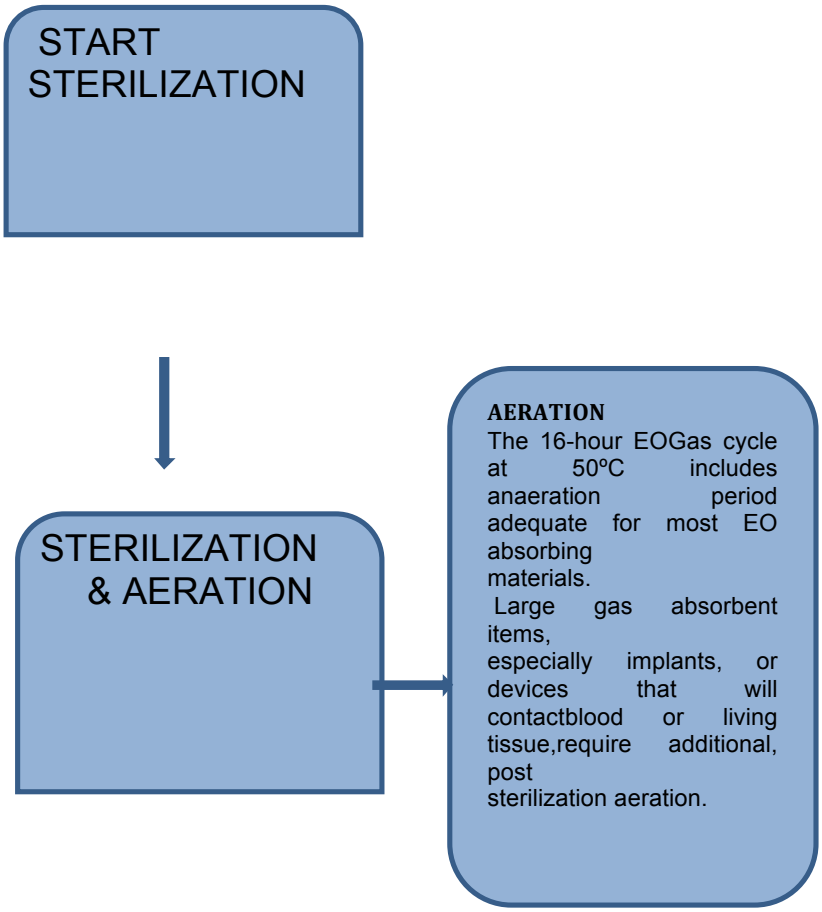
Appendix 8: EO_2 Gas Sterilizer Operation Reference Chart



5. Heat-seal sterilization bag.

START STERILIZATION CYCLE

1. Press Load button on sterilizer control panel.
2. When purge cycle is complete, the door is unlocked and the cabinet can be opened.
3. Activate EOGas cartridge within sterilization bag by depressing trigger button.
4. Immediately place sterilization bag into sterilizer cabinet and close door.



STERILIZATION AND AERATION

1. Leave sterilization bag undisturbed in the sterilizer for 16 hours.
2. Sterilization and aeration proceed simultaneously during the 16-hour cycle.
3. After 16 hours, remove the sterilization bag from the cabinet. Check the Dosimeter; make sure the blue line has progressed beyond the triangular mark.
4. Removed the sterile items from the sterilization bag. Discard the sterilization bag and used cartridge.

Appendix 9: Drug storage and dilution charts

Multi-dose vials with limited shelf life – storage conditions and maximum permissible period of use.

MULTI DRUGS USES AND PERIOD OF STORAGE:

	Item	Recommendations
6.	Marking the date and time when opening vials.	Mark all injectable, ophthalmic, and reconstituted oral products with the date and time of first use or reconstitution. Discard all open products without a date.
7.	Ophthalmic products	Use within 28 days if stored properly, not contaminated, and manufacturer does not specify a shorter expiration date.
8.	Multidose vials with preservatives (not insulin or vaccines)	Use within 28 days if stored properly, not contaminated, and manufacturer does not specify a shorter expiration date. Most manufacturers only have data for 28 days. If the company has data, the vial may be used for a longer period of time. Haloperidol decanoate, if stored properly and not contaminated, may be used for up to 90 days after the first use based on data from the manufacturer.
9.	Insulin	Use opened vials of insulin within 28 days whether refrigerated or stored at room temperature. Most manufacturers have changed their storage limits for most products to 28 days, including regular insulin.
10.	Vaccines	Multidose vaccine vials may be used until the expiration date on the vial if stored properly, not contaminated, and the manufacturer does not specify a shorter expiration date. All manufacturers have data to support this practice. Use preservative-free single-dose vaccine vials immediately.
11.	Meropenem	8hrs at 15 -25 ^{0}c (if diluted with NS/sterile water)
12.		48hrs at 4 ^{0}c (if diluted in NS/sterile water)
13.	Albumin	4 hrs after container has been entered
14.	Amphotericin B	Stable up to 7days when stored at 2 -8 ^{0}c
15.	Pipracillin +Tazobactam	24hrs in 25 ^{0}c, 48 hrs in 2-8 ^{0}c
16.	Amino acid preparations	Stored in a cool place
17.	Salbutamol solution vials	48 hrs at controlled room temperature
18.	Cyclophosphamide	Should be used immediately after preparation.
19.	Etoposide	Stored in a cool place.
20.	Doxorubicin	Use immediately after preparation. Discard unused solution
21.	Human insulin	Keep between 2-8^0 C in refrigerator

S. No	Name of the antibiotic	Diluent to be used	Storage temperature	Time for which reconstituted drug can be stored	Method of administration (D5 can be used for infusion)
1	Amikacin	Normal Saline	Room temperature	One day	I.V. infusion through a period of 30 min
			In refrigerator	Seven days	
2	Ceftazidime	Normal Saline	Room temperature	One day	
			In refrigerator	Seven days	
3	Fluconazole	Normal Saline	Discard immediately after use	Do not refrigerate	
4	Erythromycin	Normal Saline	In refrigerator	24 hours	
5	Gentamicin	Normal Saline	Room temperature	24 hours	I.V. infusion through a period of 30 min
			In refrigerator	4 Days	
6	Levofloxacin	Normal Saline	In refrigerator (refrigerate only)	14 days	
7	Chloramphenicol	Normal Saline, D5	Room temperature	24 hours	
8	Piperacillin + Tazobactam	Normal saline	In refrigerator (refrigerate only)	7 days	I.V. infusion through a period of 30 min
9	Amoxicillin + Clavulanic acid	Normal saline, ringer lactate	Should be used immediately within 20 min		
10	Cloxacillin	Sterile water	In refrigerator	24 hours	
11	Ampicillin	Normal Saline	Room temperature	8 hours	Slow I.V. push(I min)
			In refrigerator (4ºC)	48 hours	
12	Azithromycin	Normal Saline	Room temperature	24 hours	
			In refrigerator (5ºC)	7 days	
13	Cefoprazone	Normal Saline	Room temperature	24 hours	
			In refrigerator (2ºC-8ºC)	5 days	
14	Amphotericin B	Sterile water	Room temperature	24 hours	I.V. infusion through a period of 2 hours
			In refrigerator	7 days	
15	Ceftriaxone	Normal Saline	Room temperature	24 hours	
			In refrigerator	10 days	
16	Vancomycin	Normal Saline	Room temperature	2 days	
			In refrigerator	14 days	
17	Clindamycin	Normal Saline	Room temperature	16 days	
			In refrigerator (4ºC)	32 days	
18	Colistin	Normal Saline	In refrigerator (4ºC)	48 hours	
19	Cefotaxime	Normal Saline	Room temperature (22ºC)	24 hours	I.V. infusion through a period of 30 min
			In refrigerator (<5ºC)	5 days	
21	Meropenem	Normal saline, D5	Refrigerator,		I.V. infusion through a period of 15-30 min
22	Ciprofloxacin	Normal saline, D5	Refrigerator,	14 days	I.V. infusion through a period of 60 minutes
23	3% Normal Saline		Discard immediately after use		