CRH SIKKIM MANIPAL UNIVERSITY

CENTRAL REFERRAL HOSPITAL - SMIMS

HOSPITAL INFECTION CONTROL MANUAL

INSPIRED BY LIFE

FOREWORD

The word Infection has become synonymous with disease in the society. Although there are other causes for a person to be diseased, never the less, in every disease condition infection has a major role to play. Hospital Acquired Infection or nosocomial infections is a major cause of concerns for all heath care institution providers and Quality assurance. HAI (Hospital Acquired Infections) prevention needs simple measures but it needs to be followed and implemented by one and all working in the Health Care Establishment, and to do this a system has to be in place by way of documentation, policies, which can be implemented, referred to and be a reference point for audit.

This booklet of infection control has been prefaced after extensive discussion, referring to good practice as advised by WHO and CDC Atlanta and also referring to such measures adopted by AIIMS, Delhi and JIPMER (Pondicherry). A major consideration was customization to our needs.

We aspire for zero tolerance to Hospital Acquired Infection and this booklet is a stepping stone in this direction.

The Infection Control Team urges everyone to follow the laid down guidelines to make it a success and provide Quality Health Care.

Dr Gautam Dey
Medical Superintendent
Central Referral Hospital

FOREWORD

Healthcare associated infections (HAI) are one of the most common adverse events seen in healthcare delivery system. Healthcare –associated infections (HAIs) affect all countries, irrespective of their level of development. Transmission in healthcare facilities is mainly due to failure to apply basic standard infection prevention and control (IPC) precautions such as hand hygiene, failure to properly don and doff personal protective equipment, inadequate cleaning, disinfection and sterilization of reusable items and equipment and lack of effective cleaning of healthcare environment. Also, infections caused by Multidrug Resistant Organisms (MDROs) may result in treatment failure and death among hospitalized patients.

The WHO estimates that over 1.4 million patients worldwide acquire infections in healthcare facilities. Prevention and control of HAIs are clearly a major priority for all countries.

This manual of The Hospital Infection Control (HIC) is a reference guide containing policies as well as procedures to prevent nosocomial infection among patients and staff. The overall aim of this document is to provide evidence-based information on the prevention and control of infection. The manual brought out by the Infection Control Committee of the Central Referral Hospital is an effort towards better infection-free health care practices by the management of the hospital.

I hope that this Infection Control Manual as an aid to the concept of better patient care will help achieve a safe health care environment for all patients and will provide critical means of controlling antibiotic resistance in the long run.

Dr Dechen C. Tsering
Member Secretary, HICC, CRH

TABLE OF CONTENTS:

INSPIRED BY LIFE

CURRENT MEMBERS OF THE INFECTION CONTROL COMMITTEE:

1. Dr.Gautam Dey, Medical Superintendent & Chairman, Hospital Infection Control Committee
2. Dr.Dechen C. Tsering, Professor of Microbiology& Member Secretary, HICC
3. Dr. Hari Shankar Sharma Professor &Head, Department of ENT
4. Dr. Kumar Nishant, Professor & Head, Department of Surgery
5. Dr.Parvati Nandy, Professor & Head, Department of Medicine
6. Dr.B.K.Gandhi , Professor & Head, Department of Anaesthesia
7. Dr.Rekha Sharma, Tutor, Department of Microbiology
8. Dr. Mala Sharma, Executive, Department of Hospital Operations
9. Ms Pema Laden, Infection Control Nurse
10. Ms. Karma Dolma Bhutia, Infection Control Nurse
11. Mr Sachidananda, Nursing Superintendent
12. Mr. Biman Chakraborty, In charge CSSD

COMPOSITION OF BIOMEDICAL WASTE CELL:

1. Dr.Dechen C. Tsering, Professor of Microbiology & Member Secretary HICC
2. Dr Mala Sharma, Executive, Department of Hospital Operations
3. Mrs. Tika Adhikari,ADNS
4. Mrs. Chandrarekha Sharma, ADNS
5. Ms Bandana Moktan Sr. Nursing Educator
6. Mr Sanjay Gupta,Chief Engineer
7. Mr Biswadeep, Assistant Engineer, Electricals

The Function of the Biomedical Waste cell is to supervise the collection, segregation, storage, transportation, and disposal as per the Central Pollution Control Board guidelines and to comply with Sikkim State Pollution Control Board guidelines. Any clarification related to Biomedical Waste Management can be addressed to this cell

CHAPTER-1: INTRODUCTION

ORGANISATION OF THE INFECTION CONTROL PROGRAM AT CENTRAL REFERRAL HOSPITAL GANGTOK, SIKKIM

- In order to provide better and safer hospital facilities for its patients and personnel, CRH has a program of infection control called as 'hospital infection control program' involving all sections of the hospital community.
- The hospital infection control program is organized and run by the Medical Superintendent
  (MS), CRH for which he constitutes the Hospital Infection Control Committee (HICC).
- The HICC is advisory to the MS and makes its recommendations to the MS.

HOSPITAL INFECTION CONTROL COMMITTEE (HICC)

Hospital Infection Control Committee (HICC) of CRH provides a forum for multidisciplinary and cooperation and information sharing. The members are as follows:

HICC Composition

The following are the members of Hospital Infection Control Committee (HICC), CRH.

1. Chairperson: Medical Superintendent
2. Member Secretary: Professor, Dept .of Microbiology
3. HODs of Medicine, Surgery, ENT, Anaesthesia
6. Officer in-charge, Nursing Section
7. Hospital Infection control nurse
8. Hospital Operations- Member
9. Tutor Microbiology
10. CSSD (Central Sterile Supply Department) in-charge

Hospital Infection Control Team (HICT)

HICT is the functional unit of HICC which actually engages in implementation of Hospital Infection Control Programme.

GOALS AND OBJECTIVES OF HOSPITAL INFECTION CONTROL COMMITTEE

The HICC will be engaged in implementation of the Hospital Infection Control Programme. Specifically, the committee shall:

1. **Educating** CRH nurses, MBBS students, intern, residents and other staffs about principal of infection control and stressing individual responsibility for Infection Control.
2. **Surveillance-**
   - Hospital Acquired Infection (HAl) Surveillance- Develops a system for identifying, reporting, analyzing, investigation and controlling hospital acquired infections.
   - Antimicrobial Resistance (AMR) Surveillance
   - Environmental Surveillance (Air. Water. Surface- OTs/ICUs and other high risk area)
   - Staff skin flora Surveillance
3. **Disinfectants-**
   - To check for sterilization & disinfection practices in CRH
   - In-use test of disinfectants
4. **Outbreak Investigation-**
   - Continuous surveillance of infections for early detection of outbreak for which control measures are undertaken.
   - Surveillance of any community outbreak viz. Dengue, meningitis, Diphtheria, meningococcemia etc. to prevent spread within the hospital amongst health care workers
5. **Monitoring Hospital Biomedical Waste Management –** In collaboration with the Biomedical Waste Management Department, HICC aims at monitoring the waste segregation and disposal system.
6. **Auditing-** HICC conducts regular audits for various aspects such as
   - Hand Hygiene audit
   - Monitors the BMW (Biomedical Waste Management) audit conducted by department.
7. **Needle Stick Injury Reporting System**
8. **Staff Health Care Activities-** are carried out with the objectives:
   - Vaccinating all the staffs/students (especially freshly recruited) of CRH with

Hepatitis B vaccine

9.Monitors the proper use of antibiotics, develops antibiotic policies and recommend remedial measures when antibiotic resistant strains are detected.

10.Reporting of Notifiable Diseases with collaboration with department of Community Medicine.

11..Prepare the manuals for hospital infection control as well as antimicrobial guideline and review and update hospital infection control policies and procedures from time to time.

12..Meets regularly not less than ***once a month*** and as often as required.

Infection Control Nurse (lCN)

ICN is the link between the HICC and the hospital wards/lCUs. She is the functional unit of HICC and implements the infection control measures in the hospital; identifies problems associated with implementation of infection control measures and implements the solutions after discussing with infection control officer.

Duties of infection Control Nurse includes:

1. Education of healthcare workers and patients
2. Conducts daily round for HAl surveillance, hand hygiene audits, bundle care audit and disinfection adherence audit.
3. Maintains register and data of needle stick injuries.

Member Secretary:

Member Secretary of HICC, CRH is a faculty from Dept. of Microbiology. She is overall responsible personnel for the activities of HICC and reports directly to the Medical Superintendent.

Duties of Member Secretary:

- Coordinate with the medical superintendent (chairperson) in planning infection control programme.
- Supervises the HAl surveillance.
- Keeps a track of any developing outbreaks
- Participates, guides in research activities related to infection control practices and publish them.
- Supervise the activities of department of biomedical waste.
- Ensuring safe laboratory practices to prevent infection in staff.
- Develops guidelines for sterilization, disinfection policy and updates periodically.
- Monitors the sterilization, disinfection practice of the hospital.
- Review and revision of infection Control Manual of CRH

CHAPTER-2 :TYPES OF HOSPITAL ACQUIRED INFECTIONS

The four major HAl types are:

1. Catheter-Associated Urinary Tract Infection
2. Central line associated Blood stream infection
3. Ventilator associated pneumonia and
4. Surgical site infection

1.CATHETER-ASSOCIATED URINARY TRACT INFECTIONS:

CA-UTI is the most common HAI: accounts for nearly 40 %of total HAIs.

- After catheterization risk increases by 3-10 per day.
- Overall incidence of bacteriuria with catheter is nearly 100 in 4 weeks

Pathogenesis

1. When catheter is inserted, flushing mechanism of urine is circumvented and perineal and urethral flora migrate into the bladder mucosa leading to infection
2. An additional factor is bacterial reflux from contaminated urine in the drainage bag
3. Biofilm formation once attached to the catheter
4. Presence of associated Risk factors-
   i) increased duration of catheterization, ii) female (due to short and close proximity of urethra to anus), iii)older age, iv)diabetes mellitus, v) malnutrition, vi) azotaemia (creatinine >2.0 mg/dl), v) poor aseptic technique during catheter care.

Diagnosis

1. Colony count of> 10^3 CFU/ml is significant in a patient with symptoms
2. Colony count of> 10^5 CFU/ml in an asymptomatic patient: is significant in-

- Pregnancy and TURP or any other urological procedures- take as significant, i,e true infection.
- Other conditions- Asymptomatic colonization

3. ABU persisting for 48 hours after the removal of a urinary catheter is indicative of UTI

Management of patients with bacteriuria and CAUTI:

1. Prophylactic antimicrobials, given systemically or by bladder irrigation, should not be administered routinely to patients at the time of catheter placement to

reduce CA-UTI or at the time of catheter removal or replacement to reduce CA-bacteriuria.

2. Screening for and treatment of CA-ASB are not recommended to reduce subsequent CA- Bacteriuria or CA-UTI in patients with short-term or long-term indwelling urethral catheters.
3. Screening for and treatment of CA-ASB is recommended to reduce subsequent CA-Bacteriuria.Or CA-UTI in pregnant women and patients who undergo urologic procedures for which visible clinical mucosal bleeding is anticipated.
4. The treatment of asymptomatic bacteriuria (i.e. significant bacteriuria in the absence of symptoms) in patients who require continued catheterization is not indicated.
5. In case of symptomatic CAUTI, it is essential to treat with appropriate antibiotic and replace with a new catheter if the indwelling catheter has been in place for more than 7 days.
6. Seven days is the recommended duration of antimicrobial treatment for patients with CA-UTI who have prompt resolution of symptoms and 10-14 days of treatment is recommended for those witha delayed response, regardless of whether the patient remains catheterized or not.
7. Antimicrobial treatment is recommended for CA-ASB that persists 48 hours after short-term indwelling catheter removal.

2. BLOOD STREAM INFECTION

- Catheter-related bloodstream infections (CRBSls) - used clinically (for lab diagnosis and treatment purpose)
- Central line associated bloodstream infections (CLABSI)- Used for surveillance purpose only.
  Treatment should never be based on CLABSI criteria.

Catheter-Related Bloodstream Infections (CRBSIs)

CRBSIs are an important cause of HAl, associated with morbidity, mortality and cost. CRBSI is defined as the presence of bacteremia originating from an intravenous catheter.

- **Risk factors** for CRBSI include-
  1. *Patient related risk* factors like immunodeficiency, severe underlying illness and loss of skin integrity.
  2. *Device related risk* factors like size of catheter, number of lumens in catheter, site of insertion, type of placement (cut down> percutaneous), duration of placement, active infection at other site, placement during emergency.
  3. *HIC related risk* factors: Due to inadequate infection control practices like poor hand hygiene and lack of sterile barriers, poor skill of personnel.

4. *Treatment related risk*factors like alteration in patient's cutaneous microflora.

- **Agents-** The commonest pathogen causing CRBSI are *S.aureus, Pseudomonas aeruginosa , coagulase negative Staphylococci , E. coli , Klebsiella pneumoniae , and Acinetobacter baumanii .*
- **Sources of infections-**
  1. **Intrinsic contamination**- is the contamination occurring during device or fluid production and before use. It may be the result of faulty sterilisation or damage during manufacture or storage. Common microbes responsible are *Klebsiella spp, Enterobacter spp or Pseudomonas spp.*
  2. **Extrinsic contamination-** can occur due to contamination of IV catheter at the time of insertion, poor sterile precautions during drug admixture or administration of intravenous fluid. Agents transmitted are skin commensals like CoNS and *S.aureus.*
  3. **Pathogenesis**

  - Biofilm on the inner and outer surfaces of the catheter is the first pathogenic event, which gets colonised by microorganisms and subsequently protected from host defence mechanisms.
  - This may cause local sepsis or septic thrombophlebitis or in some cases, the microorganisms in the biofilm may be released into the bloodstream causing systemic infection and CR-BSI.
  - The presence of biofilm makes treatment with antibiotics ineffective.

Other Methods

- *Direct sampling of the intraluminal surface of catheter*
  1. Passing of a guidewire with a nylon brush down the catheter to its distal end and then withdrawing a sample of the biofilm.
  2. The brush is then vortexed with buffered saline and plated onto agar; colony counts of 100 CFU/mL are significant.

- *Acridine orange leucocyte cytospin test*
  1. Taking a catheter blood sample into EDTA, lysing the red blood cells, pelleting the leucocytes by centrifugation, staining the cellular monolayer with acridine orange and examining under ultraviolet light.
  2. If any bacteria are seen, the result is considered positive. A separate sample is treated the same way but is Gram stained for bacterial characterization.
- *Molecular methods such as* PCR, random amplification of polymorphic DNA(RAPD), pulse field gel electrophoresis (PFGE) and localisation of *mecA* gene have been used .

3. VENTILATOR ASSOCIATED PNEUMONIA (VAP)

The diagnosis of VAP should be considered in patients with fever, leucocytosis, and purulent tracheobronchial secretions 48 hours after endotracheal intubation and or mechanical ventilation. These should be combined with direct bronchoscopic assessment. The risk estimated for VAP is 3% per for first 5 days, 2% per day for days 6-10, and 1% per day beyond 10 days.

Pathogenesis: The pathogenic mechanisms of VAP and their preventive strategies are described below:

Pathogenic mechanism	**Preventive strategy**
Oropharyngeal colonisation with pathogenic bacteria:	
1. Elimination of normal flora	Avoidance of prolonged antibiotic course
2. Large volume oropharyngeal aspiration around time of intubation	Short course of prophylactic antibiotics for comatose patients
3. Gastro oesophageal reflux	Post pyrolic enteral feeding, avoidance of high gastric residuals, prokinetic agents
4. Bacterial overgrowth of stomach	Avoidance of prophylactic agents that raise gastric PH, selective decontamination of digestive tract with non-absorbable antibiotics
5. Cross infection from other colonized patients	Hand washing especially with Alcohol based hand rub; intensive infection control education; isolation; proper cleaning of reusable equipment.
6. Large volume aspiration	Endotracheal intubation, rapid sequence intubation technique, avoidance of sedation
Micro aspiration around endotracheal tube:	
7. Endotracheal intubation	Non-invasive ventilation

8. Prolonged duration of ventilation	Daily awakening from sedation, weaning protocols
9. Abnormal swallowing function	Early percutaneous tracheostomy
10. Secretions pooled above endotracheal tube	Head of the bed elevated; continuous aspiration of subglottic secretions with specialised ET tubes; avoidance of reintubation; minimization of sedation and patient transport.
11. Altered lower respiratory host defenses	Tight glycemic control, lowering of haemoglobin transfusion control

Laboratory Diagnosis:

- Quantitative culture approach and,
- Clinical approach.

Quantitative culture approach:

- To discriminate between colonization and true infection
- The more distal in the respiratory tree for the diagnostic sampling, the more specific the results
- Additional tests include gram stain, differential cell counts, staining for intracellular organisms
- Purulent respiratory secretions (defined as secretions from the lungs, bronchi, or trachea contain >25 neutrophils and <10 squamous epithelial cells per low power field are to be considered for sampling.
- If an organism is cultured or noted on Gram stain, one does not know if it is the cause of the pneumonia or simply colonization, but it has got a good negative predictive value.
- For proximally obtained specimens the threshold for quantitative culture is> 1 0^6 /ml. For distally obtained specimens the threshold is> 10^3/ml.
- The detection of intracellular organisms in the poly morphonuclear leucocytes and or macrophages of bronchoalveolar lavage fluid has been a specific marker for ventilator associated pneumonia.

Clinical approach:

Clinical pulmonary infection scoring was developed by weighing of the various clinical criteria usually used for diagnosis of VAP.

Use of CPIS allows the selection of low risk patients who may need only short course antibiotic therapy or no treatment at all.

Clinical pulmonary infection scoring (CPIS)	
Criterion	**Score**
Fever	
• >38.5^{0}C but <38.9^{0}C	1
• >39^{0}C or <36^{0}C	2
Leukocytosis	
• <4000 or >11,000/ul	1
• Bands>50%	1
Oxygenation (mm hg)	
• PaO2/FiO2<250 and no ARDS	2
Chest radiograph	
• Localised infiltrate	2
• Patchy or diffuse infiltrate	1
• Progression of infiltrate	2
Tracheal aspirate	
• Moderate or heavy growth	1
• Same morphology on gram stain	1
• Maximal score	12

4.SURGICAL SITE INFECTIONS

Definition:
SSIs are defined as infection that occurs within 30 days of the operative procedure or within 90 days for some procedures.

1. Theatre-acquired infections are usually deep-seated and often occur within 3 days of the operation or before the first dressing
2. About 2% -5% surgical patients acquire SSI
3. SSI increases hospital length of stay 7-10 days and an increased economic burden

Pathogenesis of SSI
Risk factors for development of SSI have been described below.

Table: Risk factors for SSI

Host Related	Procedure Related
• Age	• Type of procedure
• Diabetes	1. Contaminated: 15-20% risk
• Smoking	2. Clean contaminated: 8-10% risk
• Obesity	3. Clean wound surgery: 1-3% risk
• Preoperative rates	• Preoperative hair removal by shaving
• Remote infections	• Duration of surgery: Risk increases with duration
• Endogenous mucosal microrganisms	• Presence of pre-existing foreign materials
• Preoperative hospital stay	• Presence of drains following surgery
	• Presence of devitalized tissue trauma
	• Emergency surgery>elective surgery
	• Antibiotic prophylaxis

$$\text{Risk of surgical site infections} = \frac{\text{Dose of bacterial contamination x virulence (toxins)}}{\text{Resistance of the host}}$$

Source of Infection:

The source of infection during a surgical procedure may be either exogenous or endogenous.

Table: Source of Infection of SSI

Endogenous Source	Exogenous Source
Patient flora-i) skin ii) GI tract iii) mucous membranes	Surgical personnel flora
Seeding from pre-existing sites of infection	Breaks in aseptic techniques
	Inadequate hand hygiene
	Contaminated garments
	Equipment
	Surgical tools
	Materials with operative field
	Operation Room (OR) environment
	Ventilation of OR
	Source of infecting pathogen

CHAPTER 3: SURVEILLANCE OF NOSOCOMIAL INFECTION

Definition

- Surveillance is defined as the continuing scrutiny of all aspects of the occurrence and the spread of a disease that are pertinent to effective control
- Surveillance is defined as "the ongoing systematic collection, analysis and interpretation of health data essential to planning, implementation of the public health practice closely integrated with timely dissemination of this data to those who need to know"
- Nosocomial infection surveillance is program designed to investigate, control and prevent hospital acquired infections.

Objectives of Surveillance

1. To recognize any unusual level of incidence or outbreak.
2. To judge the desirability of introducing special control measures
3. To assess the efficiency of regular preventive measures
4. To provide feedback.
5. To reduce the level of avoidable infection.
6. To establish endemic baseline data.
7. To identify high-risk patient

Methods of Surveillance:

1. Lab record scrutiny

Infection control nurse examine the lab reports daily and discusses it with the infection control doctor or microbiologist.
Infection control nurse visit the relevant patients and gather all necessary information. She determines whether it is hospital acquired infection and community acquired infection.
The ward staff to report to her or send samples for all patients with suspected infection.

2. **Daily visit to all wards and units**

Infection control nurse has to visit all the wards daily or several times a week and examine all records of all clinical infection.

Nosocomial infection rates:

These includes

- Surgical site infection (SSI) rates in clean as well as contaminated wounds.
- Intravascular catheter infection rates per thousand catheter days.
- Ventilator associated pneumonia rates per thousand ventilator days.
- Urinary tract infection rates per thousand catheter days
- Appropriate case definition of each nosocomial infection as described by the CDC is used

CHAPTER-4 : PREVENTION OF MAJOR HAI TYPES (BUNDLE CARE APPROACH)

PREVENTION OF CAUTI

HCWs must know the correct method of insertion of catheter. They should also know the appropriate indications of catheter use. This itself can prevent majority of CAUTI.

Appropriate uses of catheter

1. Acute urinary retention or bladder outlet obstruction
2. Need for accurate measurements of urinary output in critically ill patients
3. Patients undergoing urological or other genitourinary tract related surgeries
4. Anticipated prolonged duration of surgery (catheters should be removed after surgery).
5. Patients anticipated to receive large-volume infusions or diuretics during surgery.
6. To assist in healing of open sacral or perineal wounds in incontinent patients.
7. Patient requires prolonged immobilization, e.g. following trauma
10. To improve comfort for end of life care if needed.

Inappropriate uses of catheter

1. As a substitute for nursing care of the patient or resident with incontinence
2. For obtaining urine for culture or other diagnostic tests when the patient can voluntarily void.
3. For prolonged postoperative duration without appropriate indications, e.g. structural repair of urethra or contiguous structures, prolonged effect of epidural anaesthesia, etc.

Bundle care approach to prevent CAUTI

Current strategies to prevent CA-UTIs are based on the implementation of a 'care bundle'

Table: Bundle care approach to prevent CA UTI

Insertion bundle	Maintenance bundle
Use sterile items/equipment for catheter insertion use	Catheter care • Strict hand hygiene has to be followed • Vaginal/meatel care has to be taken daily • Perineal cleaning has to be done daily
Use closed drainage system	Check closed drainage system is maintained
Use catheter of appropriate size	Check urinary catheter secured or not
Insert catheter by strict aseptic non-touch technique	Always keep drainage bag above the floor and below the bladder

Secure catheter after insertion	Use single gloves while handling/emptying for each patient
	Make sure no contact between jug and bag
	Always use separate jug for collection of drainage bag
	Daily assessment of readiness to remove catheter has to be done and documented properly

Consideration prior to catheterization

1. Regular periodic training of health care workers on insertion and maintenance of catheters
2. Catheterisation is considered as a minor surgical procedure. Strict asepsis is required.
3. Choose appropriate catheter size. This prevents from reinsertion.
4. Antimicrobial coated catheters (e.g. silver alloy. coated) should not be used routinely, but only be reserved for patients at highest risk of complications associated with bacteriuria.
5. Routine use of prophylactic antimicrobial agents before catheter insertion is not recommended

PREVENTION OF CRBSI/CLABSI

Care Bundle for Prevention of CLABSI

A care bundle is a structural way of improving care and patient outcome. The care bundle involves grouping together key elements of care for procedures in order to provide a systematic method to improve and monitor the delivery of clinical care processes.

Table: Care Bundle for Prevention of CLABSI

Insertion bundle	Maintenance bundle
Perform hand hygiene before start	Daily aseptic CL care during handling
Follow maximal sterile barrier precautions	Hand hygiene
Site of insertion- Subclavian preferred, avoid femoral	Alcohol hub decontamination
Skin should be disinfected before insertion	CHG 2% for dressing changes
Use sterile drape	Any local signs of infection?

Blood aspirated freely from lumens	Dressing changed
Use semi permeable dressing	Assessment of readiness to remove-documented ?
Hand wash after procedure	
Document data and time of insertion	

Strategies to be considered before catheter use

1. ***Selection of catheter type:***
   - Polyurethane and silicone catheters have a lower risk
   - Hickman type is preferred
   - A dedicated single-lumen CL for total parenteral nutrition (TPN) administration is recommended.
2. ***Selection of insertion site***
   - Should not inserted to area of inflammation
   - Overall Subclavian vein is preferred rather than jugular or femoral sites.
     - Risk of infection is highest with femoral vein
     - Jugular vein has proximity to orpharynx and has higher local skin temperature, hence it is difficult to maintain occlusive dressing
     - Subclavian vein insertion- there is risk of pneumothorax, subclavian artery puncture, subclavian vein thrombosis, stenosis, air embolism
   - The date and time of CL insertion should be documented in the clinical notes.
   - Once the CL has been inserted, it must be secured with sutures or clips to prevent catheter movement, dislodgement and sepsis.

3. ***Aseptic technique***
   - Adherence to aseptic technique both during catheter insertion and maintenance is essential.
   - Any access points (e.g. hubs, connectors, or injection ports), must be disinfected using 70% isopropyl alcohol before use.
   - Drug admixtures and TPN preparation should be under strict asepsis/laminar hood

4. ***Hand hygiene and glove use***
   - Hands must be disinfected prior to catheter insertion and subsequently
   - Clean gloves for peripheral line and sterile gloves for CL

5. ***Skin antiseptic***
   - 2% chlorhexidine gluconate in 70% isopropyl alcohol

- Site should be allowed to dry before catheter insertion and at the time of dressing changes
- Contraindicated <2month children
- Povidone iodine is used as an alternate if h/o CHG sensitivity 6.JV injection ports

6. ***IV injection ports***

- Use of multi lumen catheters should be avoided if possible.
- Hub should be disinfected with 70% alcohol.

7. ***Catheter site dressing regimens***

- Sterile dressings should be used to cover the catheter site
- Should be replaced when the dressing becomes damp, loosened, or soiled, or when inspection of the site is necessary
- Semi-permeable adhesive has the advantage of allowing inspection of the site without the removal of the dressing
- The transparent dressing should be changed every 7 days, except in paediatric patients
- Gauge dressing- Preferred if site is bleeding or oozing. It can be replaced @ 2days or earlier if damp, loosened, or soiled.
- Tunnelled and implanted catheter- replace less than weekly.

8. ***Other controversial strategies***

- *Antimicrobial impregnated sponge*-Not routinely recommend. Can be used only if all measures fail and only if age is 2 months.
- *In line jilter*- though believe to prevent infusion related phlebitis but no evidence to support.
- *Antimicrobial prophylaxis*- Not recommended (both systemic and topical)
- *Antimicrobial impregnated catheters*
  - E.g. chlorhexidine-silver sulfadiazine and minocycline-rifampin
  - Should not be used routinely, as there is still high risk of infection
  - Required only for adult patients requiring >5days catheterization.

<u>Strategies to be considered after catheter use</u>

1. Replacement of catheters

- The peripheral line should be removed if the patient develops signs of phlebitis (i.e. warmth, tenderness, erythema, and palpable venous cord), infection, or a malfunctioning catheter.
  - In adults- replace PL @ 96 hours
  - In paediatric- PL is left in situ till complication develops

- CL - should not be routinely replaced unless complication occurs.
- Any catheter inserted when adherence to proper asepsis is not ensured (e.g. those inserted in an emergency) should be re-sited at the earliest opportunity, preferably within 48 hours.

2. Use of antibiotic lock solutions

- Antibiotic locks are created by filling the lumen of the catheter with an antimicrobial solution and leaving the solution in place until the catheter hub is re-accessed.
- It is not routinely used but indicated in-
  - Patients with limited venous access or when you want to salvage the CL
  - Have a history of recurrent CR-BSI despite maximal adherence to aseptic technique
  - Who are at high risk for severe sequelae from a CR-BSI, i.e. patients with recently implanted devices such as a prosthetic heart valve or aortic graft.

3. ***If CRBSI is diagnosed:*** then the catheter should be removed and re-inserted in another site.

4. Parenteral solution and administration set

- All parenteral fluid should be checked for clarity of solution and expiry date
- Use single dose vial for medications. Use alcohol wipes to clean.
- V tubing used to administer blood, blood products, or lipid emulsions should be of the infusion or within 24 hours of initiating the infusion.
- Lipid emulsion infusion should be completed within 24 hours and blood within 4 hrs of hanging.

5. Other controversial strategies

- *Anticoagulant flush solution*- Though it reduces risk of catheter thrombosis- recommended because of complication risk due to prolonged use of heparin.
- *Guide wire exchange*-
  - Always a new CL should be placed in another site
  - Replacement of CL over a guide wire with another CL is not recommended except for malfunctioning non tunnelled catheter without evidence of infection and in obese and patients with coagulopathy (as the risk of inserting CL in a new site is high)
- *Needleless connection devices*- Shown to reduce IV access-related needle stick injuries to HCWs. However, it is not routinely recommended and requires proper training of HCWs on how to use.

CHAPTER 5: STANDARD PRECAUTIONS

Standard precautions are set of strategies used to minimize transmission of health care associated infections (HAls). These work practices are applied to all Healthcare workers (HCWs), regardless of the infectious status of patients and to ensure a basic level of infection prevention and control. Components of standard precautions:

1. Hand hygiene
2. Personal protective equipment
3. Safe use and disposal of sharps
4. Routine environmental cleaning
5. Reprocessing of reusable medical equipment and instruments
6. Respiratory hygiene and cough etiquette
7. Biomedical waste management
8. Appropriate handling of linen.
9. Standard precautions should be used in the handling of: blood (including dried blood); all other secretions and excretions (excluding sweat), regardless of whether they contain visible blood; skin and mucous membrane

STANDARD PRECAUTIONS FOR HEALTH CARE WORKERS

The following precautionary measures should be followed by the staff in dealing with all patients.

1. **The clinical materials that can transmit HIV AIDS and hepatitis B and C are:**
   - Blood and blood products
   - Saliva, Semen, vaginal secretions, synovial fluid, Amniotic fluid, pleural / pericardial / peritoneal fluid and any body fluids contaminated with blood.
2. **The main routes of infection in a Health Care worker are:**
   - Needle stick/sharp injuries
   - Micro cuts and abrasions
   - Mucous membranes: Nose, oral cavity, Eyes.
3. **Hands should be washed:**
   - Before and after any patient contact
   - Immediately after contamination with blood or body fluids
   - After removal of gloves / gowns
   - If gloves are breached: remove gloves, wash hands and re glove with a new pair of gloves.
   - Before eating, drinking, smoking or leaving work place to use toilet facilities.
   - At the completion of the days works.
4. **Glove:** Gloves should be worn while handling blood/infected body fluids, handling of items on surfaces soiled with blood or body fluids, and for performing all invasive procedures venipuncture and other vascular access procedures.

- Gloves should be changed between patients.
- Gloves should be used while handling visibly soiled linen.

5. **Protective Gear:** Masks, protective eyewear and face shields should be worn during procedures which generate droplets, aerosols of blood and body fluids.
   - Major surgical procedures, obstetrical deliveries and other procedure which are likely to result in splashes of blood or body fluids require the use of an underlying plastic apron to protect the individual's clothsand skin, besides the protective eye wear and face shields mentioned above.

6. **Good work practices:**
   - Use disposables as far as possible.
   - Never try to recap / reinsert the used disposable needle.
   - Cuts and abrasions on skin of HCW's should be covered with occlusive water proof dressing.
   - HCW's with exudative lesions or weeping dermatitis should refrain from all direct patient care and from handling patient care equipment until the condition resolve
   - Eating, drinking and smoking should be prohibited at the work station.
   - Do not store eatables in laboratory / ward refrigerators.
   - Self-discipline: Avoid touching of eyes, nose and mouth at work place.
   - Avoid talking during invasive procedures.
   - Avoid sharing of articles between patients.
   - HCW's should avoid touching door knobs/lift—buttons /phone/pens/taps etc. with contaminated hands/glove.
7. **Transport of specimens:**
   - Specimens should be transported in appropriate container which is labelled properly.
   - If outside of the container is soiled it needs to be appropriately disinfected.
   - Duly filled requisition forms should accompany specimen.
   - Avoid soiling of requisition forms.
   - Specimen should be transported to the labs in appropriate boxes/carrying cases so that direct contact is minimized.
8. **Laboratory Equipment:**
   - In case of breakage or leakage inside of centrifuge, use gloves, decontaminate centrifuge, and disinfect the outside of unbroken vials.
   - Regularly wipe/disinfect instruments used to examine patient material.
   - Thoroughly clean and disinfect instruments going out for repair.

9. **Laboratory practices:**
   - Consider all specimens as infectious.
   - Laboratory access should be limited to the staff.

- All lab surfaces should be cleaned at least twice a day with a disinfectant and whenever a spill occurs.
- Other wastes generated should be disposed depending on its nature into appropriate containers.
- Mouth pipetting is strictly prohibited.
- Minimal aerosols should be created.
- Gloves should be used while handling blood, serum, plasma, and body fluids.
- All laboratory waste should be suitably decontaminated, sterilized before final disposal.

10. Precautions during Resuscitation:

- To reduce occupational exposure mouth pieces, resuscitation, bags/other.
- Ventilation devices should be used, when resuscitation is necessary.
- Resuscitation equipment like bag valve masks should be thoroughly cleaned and disinfected
- Mouth to mouth respiration should be avoided.

11. Aspiration of body fluids:

- Only needle locking syringes/one piece needle syringe unit should be used to aspirate body fluid, so that the collected fluid can safely be discarded through needle if desired. Disposable sets would be ideal.
- However, if reusable needles and syringes are employed, they must be sterilized before reuse.
- Chemical disinfections must not be used for needles and syringes.

12. Precautions in relation to invasive procedures:

- An invasive procedure may be defined as a surgical entry into tissues, cavities/organs.
- Strict blood and body fluid precautions should be observed.
- Goggles/face shield should be used wherever droplets/aerosol/splashing of blood/body fluid is expected.
- Additional plastic aprons should be used if excessive splashing of body fluid is anticipated.
- Health Care Workers (HCW's) who perform/ assist in vaginal/caesarean deliveries should wear gloves, gowns/aprons when handling placenta and until blood has been removed from neonates skin and post-delivery care of umbilical cord is complete.

CHAPTER 6: HAND HYGIENE

Hands of HCW remains common mode of transmission of HAls. Hence an effective hand hygiene (HH) is the cornerstone among all the measures of prevention of HAls.

MICROBIAL FLORA OF HAND

Before discussing HH, a knowledge about the microbial flora of hand is important.

Table: Difference between Transient Flora and Resident Flora :

	Transient Flora	Resident Flora
Site	Colonises on superficial layer of the skin surface	Stratum corneum Skin surface
Normal flora	No	Yes
Pathogenic potential	Pathogenic, Acquired by	Non pathogenic
Transmission	Easy among HCW by direct contact	Difficult
Removal	Easy, by hand wash/hand rub	Difficult, by surgical scrub
When reduction indicated	During routine health care service	Only before surgery/aseptic procedure
Examples	Gram-negative bacilli	Diptheroids

INDICATIONS AND TECHNIQUE OF HAND HYGIENE

The WHO guidelines have simplified the recommended indications to perform hand hygiene into the concept of, **My Five Moments of hand hygiene'.**

Five (5) Moments of hand hygiene:

A HCW has to perform a HH act in the following moments or opportunities. (Figure A).

1. Before touching a patient
2. Before a procedure
3. After a procedure
4. After touching a patient
5. After touching a patient's surroundings (e.g. inanimate objects in immediate patient surrounding)

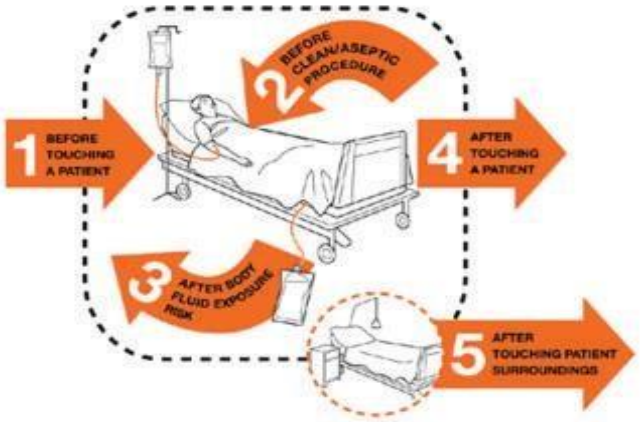


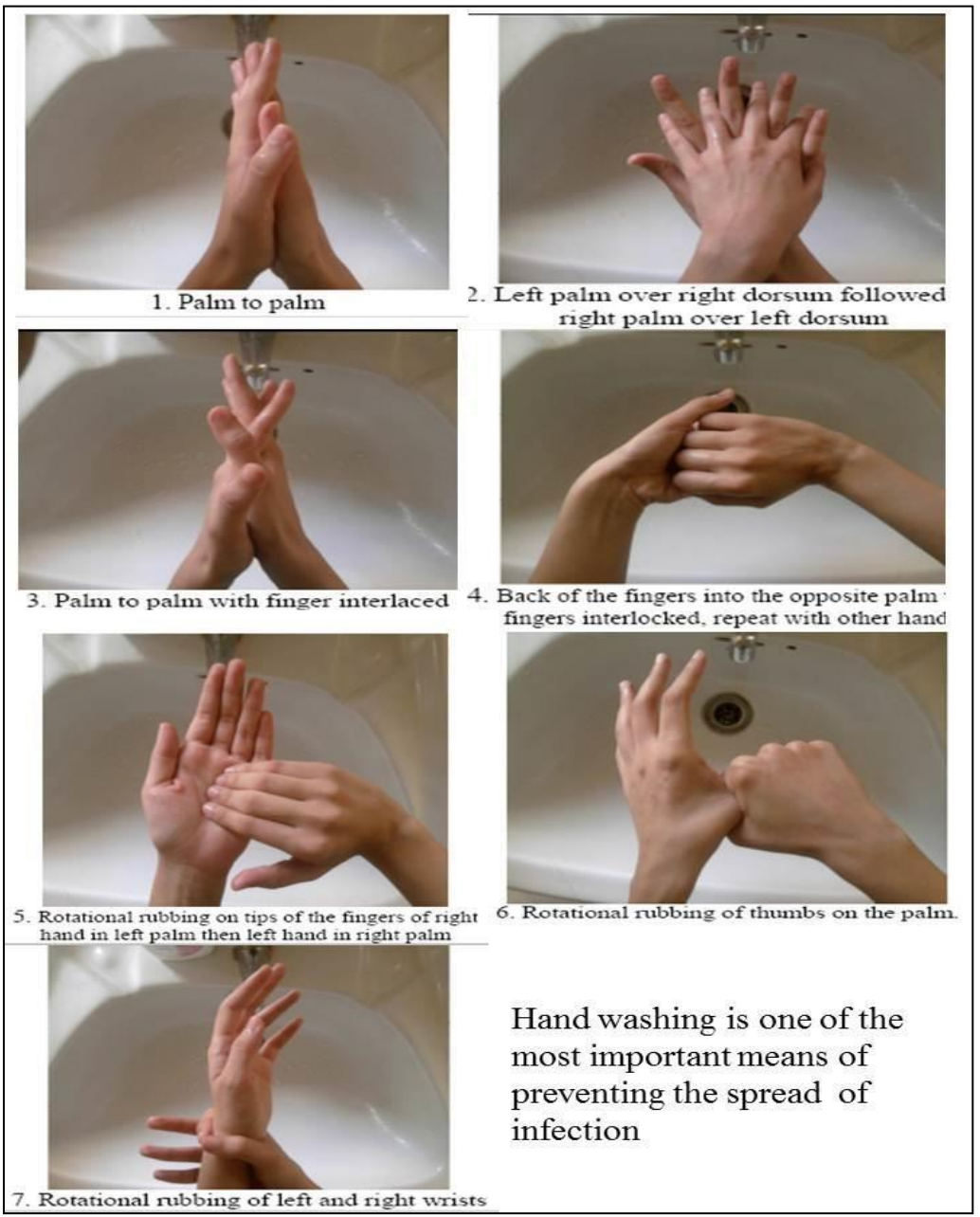
Figure: A)Five moments of Hand Hygiene

Indications for using hand rub	**Indications for using hand wash**	**Indications for using hand scrub**
• Followed during 5 moments of hand hygiene • During routine clinical rounds and handing patient • Emergency where no time or lack of facility for handwash • Hands are not visibly dirt, blood or body fluids	• Visible dirt, blood or body fluids • Potential exposure to spore forming organisms • Handling patients having diarrhoea • After using restroom • Before handling medication or food	Prior to any surgical procedure

Hand Hygiene Methods

There are three methods of hand hygiene- Hand Rub, Hand Wash and Hand Scrub. The indications are described in the table below and the method of performing is depicted in fig B.

Fig B). Methods of hand rub and hand wash



CHAPTER 7: INTRAVENOUS THERAPY RELATED INFECTIONS

1. ***IV related infections*** will be documented and brought to the attention of the attending physician and the Infection Control Nurse.
    - The entire IV system (catheter, administration set, and fluid) should be changed immediately if purulent thrombophlebitis, cellulitis, or IV related bacteraemia is noted or strongly suspected

2. ***Personal hygiene:*** Hands should be washed thoroughly under running water using a soap or alcohol rub before any intravenous therapy procedures.
    - Aseptic hand washing is required and sterile gloves must be worn before insertion of central/ peripheral catheters.

3. ***Equipment***
    - All infusion control devices and IV poles should be cleaned after its use.

4. ***Expiry dates***
    - Intravenous supplies will be checked for expiry dates.

5. ***Intravenous Trays***
    - Intravenous trays will not be placed on a patient's bed. Individual trays will be taken into isolation room.

6. **Tourniquets** used in isolation rooms must be left in the room and disinfected

7. ***Skin disinfection***
    - **Recommended disinfectants** - 7.5-10% Povidone Iodine or (2%)Chlorhexidine
    - **Recommended procedure** -The insertion site will be cleaned with recommended disinfectant and allowed to dry. Chlorhexidine can be used in case of allergy.
    - ➢ All peripheral insertion sites will be rubbed twice in succession with 1—2 ml of the disinfectant
    - ➢ Allow to the area to dry after application of disinfectant for at least 1-2 minutes.
    - ➢ Emphasis is placed on cleaning from the insertion site point to the periphery of the area.
8. ***Infuser insertion***
    - A new sterile needle will be used for each vein puncture. Infuser insertions will be done using aseptic technique.
    - The date and time of insertion will be recorded on the dressing and on the patients IV chart.

- If hub is visibly soiled or accidentally dropped on any surface, it should be replaced with new sterile hub.

CENTRAL VENOUS CATHETERS FOR TOTAL PARENTERAL INFUSIONS

1. ***The care of the central venous catheter*** for TPN infusions is the same as for other infusions. In addition, this line will not be used for the administration of medication, blood products or CVP measurements or for taking blood samples.
    - The only addition allowed to this tubing system will be Intravenous lipids. It will be connected nearest to the catheter hub as possible.
2. ***Medication additions to intravenous solutions***
    - Strict aseptic technique will be used when preparing and adding medications to intravenous solutions and systems.
    - Bottles with medication additions will be prepared as close to the time needed as possible
    - Intravenous bottles with medication additions will be labelled with name of patient, hospital number, time, date, medication, dose, expiration time and person adding the medication.
3. ***Entering an IV system***
    - When sterility of the top has been interrupted, the IV bottle tops will be cleansed with one of the disinfectants recommended for skin preparation.
    - Any port on an IV system will be cleansed with a disinfectant before it is entered.
    - Small gauge needles are preferable for inserting into injection ports to retard the breakdown of the latex injection port.
    - Avoid puncturing IV bottles to add medications

CHAPTER 8: ICU DISINFECTION AND FOGGING

The Ward In-charge is responsible for disinfection and fogging of ICUs, the nursing staffs and housekeeping staffs are informed and advised regarding precaution and use of disinfectants.

Disinfection

- All the users have to wear gloves, masks, and foot wears when chemical disinfectants are handled.
- All the chemical disinfectants are to be used strictly as per the guidelines provided by the manufacturer for optimum results.
- Exact dilution and contact time to be ensured.
- All surfaces are to be wet wiped to remove all dust and dirt.
- Wipe with disinfectant solution all up to the tile height. Tables, patients bed Chairs, Lockers.
- Mopping with disinfectant solution. Stress at corners and pathways and ICU entrance twice daily.
- Used mops should be cleaned and dried.
- A/C vents to be cleaned & disinfected weekly.
- Toilets to be cleaned with brush and detergent and pour disinfectant solution liberally on entire toilet surface and leave the surface wet for minimum 15 to 20 minutes before drying.
- ICU foot wears should wash daily with water and detergent. Immerse in hypochlorite solution 1% and dry.
- In case of accidental spillage of body fluid or blood that area has to be immediately decontaminated with hypochlorite 1% and wiped with disinfectant solution.
- All staffs who enter ICU has to maintain strict hand hygiene.

Fogging

- Fogging of ICU may be done only in the absence of patients & if found necessary.
- Fogging should be done for 45 minutes.
- Avoid overuse of water for fogging procedures.
- All medical devices are to be covered before fogging.
- Direct contact of the chemical on human skin should be avoided.
- All the users have to wear gloves, masks, and foot wears when chemical disinfectants are used
- Exact dilution and contact time to be ensured

CHAPTER 9: HANDLING HOSPITAL LINEN

Even though many different microorganisms can be found in hospital linen, they very seldom cause infections, but of course the spreading to hands, air, uniforms, etc., is inconvenient and should be avoided. Laundry staff should neither sort linen from patients with contagious diseases, nor get in touch with polluted or fouled linen
If the linen has been used by patients with a verified infection, the number of pathogenic microorganisms might have been accumulated and cause infections to the staff handling these, especially if the barriers are not intact. These could be:

1. Wounds or other skin damages, e.g. on the hands
2. The intestines (e.g. via contaminated hands)
3. The respiratory system (very high chance)

Care of Handling Hospital Linen

- Maintain the proper hand hygiene
- Least possible touching
- Do not carry soiled linen openly
- Put used linen in collection bags/Linen hamper immediately.
- Regular removal of linen bags to laundry.
- Wear gloves while handling the dirty linen

Collection of Hospital Linen

- A minimum of contagious diseases demands special attention from the laundry staff.
- Linen from isolation rooms should generally not to be handled by laundry staff and should be cleaned with disinfectant before sending to laundry.

Transport of hospital linen

- All hospital linen should be transported in closed trolleys. There should be separate trolleys for used and fresh linen.

Washing Soiled Linen: Soiled linen has to be placed in linen bags. The linen will be collected in the soiled laundry. It will undergo a normal washing operation during which the temperature is limited to 650 C for 10 minutes or 710C or 3 minutes.

CHAPTER 10 : INFECTION CONTROL POLICY IN ALL ICUs

Policies and Procedures

Infection control and other related policies for health care providers.

- All personnel entering ICU must remove their street footwear and wear footwear provided by the ICU.

Standard precautions to be followed

- Hand washing: All health care personnel working in ICU should follow WHO's 5 moments of hand hygiene
- Use of Barriers: Appropriate barriers such as gloves, face masks, and gowns must be used to prevent skin and mucous membrane exposure when contact with blood or body fluid is anticipated.
- Remove glove and gowns promptly after use before touching another patient or uncontaminated surface.

Prevention of needle sticks injuries:

- Contaminated needles should never be removed from disposable syringes by hand and should not be bent, broken, or otherwise manipulated by hand.
- Single handed technique should be used to recap the needles if it is necessary.
- Needleless system like three way taps should be used to prevent injury.
- Puncture resistant, leak proof containers for disposal of the used needles, syringes, scalpel and other sharp items should be provided.

Use of syringes

- They are sterile single patient use items.
- Medications from a single syringe should not be administered to multiple patients
- After connection with patient's intravenous infusion, the syringe and needle is considered contaminated and used only for that patient.
- Syringes should not be used beyond 24-hour period. Syringes should be kept in a sterile tray during this period.
- Unused syringes and needles should be stored in a clean area to avoid contamination by contaminated equipment

Infection control/other policies for visitors

- Only one visitor at a time.
- Visitors to be allowed only once a day
- All visitors are expected to remove the street footwear and change into the footwear provided by the ICU.

Special care in critically ill patient to prevent infection

This includes:

- Back care to prevent bed sores/pressure sores which can form a port of entry for microorganisms.
- Maintenance of oral hygiene.
- Eye care for prevention of infection for the unconscious patients.
- Care of the urinary catheter.

- Care of the peripheral intravenous cannula.
- Selective gut decontamination

Recommendations for the care of skin:

Assessment:

- The skin of the "at risk" patient should be inspected on admission and at least once daily.
- Pressure points over bony prominence should especially be examined for persistent redness or other discoloration
- Any skin change should be documented and the area given particular treatment.

Hygiene:

- Comfort alone dictates that skin should be cleansed when exposed to body fluid and other soiling
- If frequent soiling occurs, action should be taken to control the source of moisture management
- Harsh cleansing agents should be avoided as they may irritate and dry.
- Skin Moisturizes are helpful for dry skin

Nutrition:

- Nutritional assessment of the patient "at risk" should be performed
- Where possible, oral intake should be encouraged with nutrition supplements if necessary.
- If oral intake remains insufficient, more assertive nutritional measures may be required.
- Enteral feeding is initiated as per the dietician's advice.

Recommendations for pressure relieving interventions:

- Turning is useful in rotating pressure prone areas. Frequency should be based on skin inspection.
- The frequency should be increased if skin discoloration persists.
- Positioning should avoid direct pressure on bony prominences
- Pillows and foams should be used to reduce contactbetween bony prominences and support surfaces
- Massaging of bony prominences should be avoided
- Bed heads should be no higher than the lowest elevation (Not more than 30degree head up) Lifting and positioning the patient instead of dragging should be used to reduce friction when moving patients

Maintenance of oral hygiene

- Clean the oral cavity of unconscious patients with chlorhexidine solutions.
- Clean the lips and the face area with dilute soap solutions and apply moisturizing cream to prevent dry and parched lips.
- Provide a toothbrush and toothpaste to the conscious patients.
- Selective digestive decontamination is mentioned separately.

Prevention of urinary sepsis:

- Catheter insertion should be done under complete aseptic precaution.
- Visual inspection of the Catheter tubing for pus & blood should be performed. If pus or blood is present tubing's and the uro bag should be changed.
- Detection of urinary infection can be done by early cultures and gram staining.
- Early antimicrobial therapy for treatment of urinary infection.

Eye care

- In unconscious patients Moisol eye drops should be regularly instilled.
- The eyes can be padded with sterile eye pads after ensuring that the eyes are completely closed.

SPECIAL PROCEDURES

Intubation

- Disposable endotracheal tubes are to be used.
- Hand washing before the procedure.
- To wear sterile gloves for the procedure.
- Laryngoscope should be clean

Cleaning and sterilization

- ***Ventilator:*** The user inner phase is cleaned with spirit after being used for one patient.
- ***Ventilator tubing:*** They should be discarded after use for each patient. Bacterial filters should be changed once in every 48 hours. Disposable ventilator tubing's are changed for every patient but for a single patient the tubing remain the same.
- Small volume nebulizers, oxygen therapy device and self-inflating bags and components of the humidifiers, incentive spirometers and sty lets are thoroughly washed with water.
- Suction bottles are washed in running water and then dipped in 1% Sodium Hypochlorite solution and tubing are discarded after use.
- Self-inflating bags are cleaned with detergent, dried and then gas sterilized.
- Monitor items such as ECG cable, air hoses, ECG leads, saturation probes, are to be cleaned with denatured spirit. Blood pressure cuffs to be washed with soap and water and dried in the sun.
- Routine environmental disinfection is done thrice a day according to the disinfectant list.
- The Endotracheal cultures are sent at frequent intervals (as and when the secretions look yellow or become copious)
- The central venous catheter tip cultures are also sent as and when they are changed or when the site appears infected.
- Urine cultures are also sent if patients are febrile.
- Wound swabs are collected from surgical wounds if there is evidence of pus. Cleaning of all patient contact equipment and bed is done daily and after the discharge of each patient from ICU's as per the protocol

CHAPTER 11: INFECTION CONTROL POLICY IN THE HEMODIALYSIS UNIT

Chronic hemodialysis patients are at high risk for infection because the process of hemodialysis requires vascular access prolonged periods. In an environment where multiple patients receive dialysis concurrently, repeated opportunities exist for Person-to-person transmission of infectious agents, directly or indirectly via contaminated devices, equipment and supplies, environmental surfaces, or hands of personnel. Furthermore, hemodialysis patients are immune suppressed which increases their susceptibility to infection, and they require frequent hospitalizations and surgery, which increases their opportunities for exposure to nosocomial infections.

Policy & Procedure:

I***nfection Control policies and other Policies for Health Care Provider***

- Footwear to be removed before entering work area.
- Staff to wear OT dress.
- Complete Hepatitis B Vaccination for all Staff.
- Hand washing before and after procedures and before giving care to patient.
- Should not eat, drink or smoke in dialysis treatment area;
- Use of standard precautions while giving patient care, handling contaminated equipment and machines.
- Staff members should wear protective gear, this should be changed if it becomes soiled with blood, body fluids, secretions, or excretions.

Infection Control Policies for Visitors

- Visitors are not allowed during procedure.
- Separate visitor area is provided outside the dialysis room
- Foot wears to be removed before entering dialysis room.
- Cleaning and Disinfection of Machines.
- Rinsing with disinfectant solution before starting a new patient
- Disinfecting with 2% Glutaraldehyde at the end of the day
- Hydraulic rinsing after each patient
- Hemodialysis room floor is mopped with virkon1% & Monitors are disinfected with virkon 1% 4 times / day.
- Fogging is done every week end.
- Hemodialysis Reuse- Dialyzers are not reused for HBsAg positive and HIV positive patient.
- Dialyzer and blood tubing used for negative & HCV positive patients are cleaned separately after disinfection with 2% gluteraldehyde.
- Hemodialyzers for Reuse given water wash followed by hydrogen peroxide & then Glutaraldehyde till next hemodialysis for same patient. Approx. reuse: 15-20 times.

- Blood tubing's washed with water, bleach & then Glutaraldehyde is filled till next use for same patient.
- Hemodialyzer inspected visually for suitability & volume checked prior to reuse.
- In single-pass hemodialysis machines, the internal fluid pathways are not subject to contamination with blood. Post Procedure – Internal Pathways are rinsed and disinfected with 2% glutaraldehyde.
- Pressure transducer filter protectors are used primarily to prevent contamination and preserve the functioning of the pressure monitoring i.e., arterial, venous, or both components of the hemodialysis machine
- Hemodialysis machines usually have both external (typically supplied with the blood tubing set) and internal protectors, with the internal protector serving as a backup in case the external transducer protector fails. Failure to use an external protector or to replace the protector when it becomes contaminated
- Aseptic handling before, during & after procedure.
- Sterile dressing.
- Use of antiseptic ointment at entry site.
- Catheter removal as early as possible.

Policies related to patient care:

- Hand washing after each patient contact
- Standard Precautions to be followed
- Hemodialysis Catheter Care
- Screening for HIV, HBsAg, Anti HBs, At Entry, HBsAg every six month and HCV yearly and result to be known before dialyzing.
- Vaccinate all patients against hepatitis B and ideally patients should have completed vaccination prior to initiation of Hemodialysis Schedule.
- Dedicated machines & reuse area for positive patients.
- Each patient assigned separate bed, machine, separate dressing pack and antiseptics.
- Use disposable needles and protectors.
- Sterilize / disinfect non-disposable items prior to using in different patients.
- Change of linen, clean and disinfect dialysis bed & equipment after dialysis of each patient.
- Unused medication or supplies taken to the patients' station should be used only for that patient and should not be retained to a common clean area or used on other patients.
- Clean areas should be clearly designated for the preparation, handling and storage of medications and unused supplies and equipment discard all fluids. Clean and disinfect all surfaces and containers associated with Prime waste including waste buckets.
- Staff members should not take care of HBsAg positive and HBsAg negative patients at the same time.

CHAPTER 12: INFECTION CONTROL TRAINING AND EDUCATION

- Training and education is recommended for both staff members and patients (or their family care givers). for appropriate infection control behaviours and techniques to increase compliance. They should include information on the following topics:
- Proper hand hygiene technique;
- Proper use of protective equipment;
- Modes of transmission for blood borne viruses, pathogenic bacteria, and other microorganisms as appropriate;
- Infection control practices recommended for hemodialysis units and how they differ from
- Standard Precautions recommended for other health-care settings;
- Proper handling and delivery of patient medications
- Proper infection control techniques for initiation, care, and maintenance of access sites; – housekeeping to minimize transmission of microorganisms, including proper methods
- To clean and disinfect equipment and environmental surfaces.
- Centralized record keeping monitoring and preventing complications, including routine serologic testing results for HBV and HCV, hepatitis B vaccine status, episodes of bacteremia and loss of access caused by infection, and other adverse events. Records of surveillance for water and dialysate quality should also be maintained. Training and education of patients (or family members for patients unable to be responsible for their own care)

Recommendation:

- Vaccination of susceptible patients for Hepatitis B.
- Routine screening of patients for Hepatitis B, Hepatitis C.
- Infection surveillance
- Infection control training and education.

CHAPTER 13: CLEANING AND DISINFECTION OF ENDOSCOPES

Cleaning and disinfection

- Every patient undergoing endoscopy should be examined with clean, disinfected equipment. In order to ensure a uniform standard of safety for each patient, the cleaning and disinfection procedures should be carried out immediately before each individual endoscopic procedure.

Mechanical Cleaning of endoscope:

- The most important step in the prevention of infection during of infection during endoscopy is mechanical cleaning. If the endoscope is rigorously cleaned, there is a little risk of cross infection from this source. Alcohol and aldehyde compounds must not be used for mechanical cleaning because they denature and coagulate protein. Non – immiscible endoscopes should be phased out.
- Immediate action on removal from patient (Pre-Cleaning):
- Wipe down the insertion tube with a detergent soaked swab.
  Aspirate detergent, then air through suction through the channel to remove the gross debris.
- Install AW channel cleaning adopter, flush water, then air through air/water channels.
- Flush detergent then air into an elevator – wire channel /auxiliary – water channel.
- Disconnect all the detachable parts and cleaning equipment. o Attach water-resistant cap (video scopes only).

Manual cleaning:

- Wipe the outside of the instrument scope thoroughly with disposable disinfectant sponges or swabs.
- Immerse the scope in cidizyme (Enzymatic detergent – 1 Liter -15-16 ml of cidezyme) keep for 5 minutes.
- Brush endoscope distal tip with a soft brush.
- Brush the insertion tube portion of the suction channel. Repeat until all debris is removed.
- Flush each internal channel with the detergent fluid. This should be done independently for each separate channel.
- Flush all channels above using water followed by air to expel as much as water as possible prior to disinfection.
- Leaking test is done at the end of the day.

Cleaning and Disinfection:

- The endoscope and all the internal channel should be soaked in Cidex –OPA (Orthophathaldehyde 0.55%) for 5 minutes and purging of the channel is done with Cidex – OPA for 5 minutes.

Note: If the scope is used or HIV, HBsAg, Tuberculosis, Fungi the solution used has to be tested with cidex strip for potency of solution before reusing.

Rinsing: Following disinfection, rinse the instruments internally and externally with warm water to remove all traces of disinfectant

Drying: Dry the endoscope externally paying particular attention to the light guide connector, and eye piece. Flush air through each channel.

Sclerotherapy needles

Needles used for HIV, HBsAg patients are discarded.

All equipment used for procedures during ERCP are sent for ETO sterilization.

Guidelines to be followed:

- Wear all appropriate personnel protective equipment.
- Meticulous cleaning is essential for effective disinfection.
- Be sure to reprocess all remove parts (e.g.: valves).
- Visually inspect the equipment after cleaning if debris remains repeat the procedure.
- Store the endoscope hanging vertically with valves and caps removed and with locks in free position.
- Use a compatible disinfectant and test for proper concentration.
- Potency of the disinfectant to be checked once in a week.
- Environmental Cleaning and disinfectant
- Dry dusting and mopping with Virkon 1% should be done thrice daily.
- Surface cleaning should be done Virkon 1%.
- Terminal cleaning should be done once in 15 days.

Responsibility: nursing staff / Technician

CHAPTER 14: CENTRAL STERILE SUPPLY DEPARTMENT (CSSD)

Aim:

The purpose of the CSSD is to provide all the required sterile items in order to meet the needs of all patient care areas (with the exception of instruments used in the operation theatre, which are sterilized in the theatre)

Items supplied by the CSSD

Instruments sets, basin, linen, bundle gown Trolley drapes Dressing pack and all kind of cotton materials like gauze , cotton , bandages , pad roll , cotton materials ,Rubber items ICD Bottle specimen , bottles , brushes , dressing material , gauze , Pad pack , stripping pad. ETO gas sterilized and plasma sterilized items.

Sterilization

- High speed high vacuum Sterilization
- This Method used for surgical steel instruments, latex Rubber tubes, Dressing pack, gauze, cotton, bottles and OT linen materials.
- CSSD has electric autoclaves, and high pressure autoclaves. The high pressure autoclaves operate using a central steam supply

ETO Sterilization

Procedure for Ethylene oxide gas sterilization

Responsibility: CSSD Assistants/CSSD In charge

Procedure: it is effective method of sterilization in CSSD.

¬ CSSD Assistants perform this sterilization process.

¬ Warm method is for -2 Hrs. ,30 minutes ¬ Cold method -5 hrs.

- All items must be thoroughly cleaned &dried and packed with medical grade packing material with seal, using sealing machine (double wrapped plastic paper)
- Chemical indicator is printed on medical grade packing material for the test control. All packed items must be labelled as: Name of the item, date of packing / sterilization, Date of expiry, Batch No, Packing sign.
- Biological indicator test is required once a week
- Duration of aeration of ETO gas sterilized is 12 hrs.
- Duration of self-life of ETO gas sterilized, packed, double wrapped sealed items for 2
  Years

Steam sterilization by autoclaving

Procedure for Steam sterilization: Steam sterilization should be observed and cleaned daily. The chamber discharge system should be cleaned weekly. A Bowiedick test should be carried out each day prior to the first cycle in each cycle weekly biological indicator testing of the steam sterilizer is done.

- All filters are to be cleaned daily.
- Once in 3 months check by company engineer mechanical maintenance department is required
- A piece of chemical indicator (autoclave tape) should be used with every package.

- A multi parameter or chemical integrating indicator strips should be used inside one of the packs in each cycle.
- In medical grade packing material chemical indicator is printed.
- In steam sterilizer all gauze should be calibrated.
- Temperature thermograph chart recorder of each steam sterilizer is maintained.
- Register all packages/ items in autoclave register book.
- Batch number and Serial number should be given to all packages.
- Check sterilization date and expiry date of each pack.
- Load the trolley check controls, load the sterilizer and activate it, heat up and sterilization, drying, remove load, (sterile storage room)
- **Check the package and control test.**

If the packing is sterilized, transferred to storage room.
If the package is not sterilized, it should be returned for re-sterilization
Steam sterilization shelf time of sterile supplies
Temperature 121 degree centigrade pressure Pound 20 PSI.
Steam holding time 30mts, shelf time 7 days. (Expiry date-7days)

Material	**Temp**	**Pressure Pound**	**Steam holding time**	**Shelf time (Expiry date)**
Instruments sets basin, linen bundle gown, Trolley drapes, bundle and all kind of linen bundles wrapped with linen. Dressing pack and all kind of cotton materials like gauze, cotton, bandages, pad roll are wrapped with linen Instruments , cotton materials are packed in drum	121 C	20PSI	30mts	7days
Rubber items, ICD Bottle specimen, bottles, brushes are wrapped WITH LINEN.	121 C	20 PSI	20mts	7days

Instrument sets , dressing material , gauze , Pad pack , stripping pad and all kind of cotton materials are packed and sealed with medical grade packing materials	121C	20 PSI	30mts	6 mts

Cleaning- CSSD Procedure for cleaning of surgical items.

Responsibility: CSSD Assistants/ HKS

Procedure:

Disassemble & sort as needles, instruments and linen items

All instruments and reusable needles will be immersed with disinfectant solution (1% hypochlorite solution)

Manual cleaning is done and is sent to the Mechanical Washing Machine and is sent for drying. Compressed air with jet is used for drying and manual drying is done. After drying the items are sent to the set packing area. All instruments are allowed to dry prior to packing. Reusable needles are cleaned with water (flushing method). Dirty linen is sent to the hospital laundry.

Packing:

Packing sterilized materials

Responsibility: CSSD Assistants / Nursing Staff

All the cleaned and dried medical instruments are separated. Separate instruments are prepared with the set list. Sets are packed in 2 layers of linen (wrappers) & are labelled with name of the item , date of packing ,date of expiry , batch no and signature of packers. Gas sterilization articles are packed in medical grade packing material by using the sealing machine

Protocol: A one –way pattern of workflow is observed in the department. Items proceed in a step-wise manner from an unsterile area to the sterile area.

Area 1: Items are received from the wards.

Area 2: Items are disassembled to ensure effective cleaning.

Area 3: Items are cleaned.

Area 4: Assembling items that are needed for each pack.

Area 5: Checking all the items needed for each pack.

Area 6: Packing is done in such a way as to prevent any part of the contents from getting exposed to air.

Area 7: Sterilization.

Area 8: Storing is done in such a manner as to maintain sterility and the items are stored according to dates, so that older items are issued first.

Area 9: Distribution to the wards are done by the CSSD technicians along with the attenders.

Collection and distribution of items

All items are collected and distributed once daily

Unsterile items are collected & transported using trolleys that from the various areas.

The quantity of each item that is collected is recorded in a register.

Another set of personnel transport sterile items in closed system trolley to the various areas depending upon the requirements.

Items which have crossed the expiry date should be returned and new ones to be obtained

Monitoring of sterilization

All sterile items should come in packs, which are secured firmly with tapes. All packs have the chemical indicator tape showing adequate Sterilization. Users should verify this and report any batch

The autoclave has thermocouples that indicate the temperature inside the autoclave. Pressure gauges measure the pressure of the autoclave chamber. In addition to chemical indicators included for each equipment and each run, biological indicator of stearothermophilus spore suspension are kept in the autoclaves to check their efficacy every week each autoclave.

General measures taken to ensure sterility:

Entry into the sterile area is restricted.

The sterile areas are maintained at a positive pressure and laminar flow is maintained.

Fogging of the sterile area is done weekly with virkon solution 0.25 %.

Personnel with ill-health are not allowed to enter the sterile area.

Standard precaution is mandatory.

Environmental issues

Cleaning & disinfection work area

Dry dusting, mopping with water followed by virkon solution 1% mopping 2 times a day.

Manual or mechanical scrubbing of the floor once a week and as required.

Fogging with virkon solution 0.25% weekly.

Microbiological monitoring: settle plating is done as per the schedule (sterile storage area)

Waste management: Follow hospital policy

Sharp Disposal: Follow hospital policy

Responsibility: CSSD in charge and team

CHAPTER 15 : POST EXPOSURE PROPHYLAXIS GUIDELINES

Introduction

Health care workers (HCW) are normally at a very low risk of acquiring HIV infection during management of an infected patient. However, in spite of a low statistical risk of acquisition of HIV, absence of a vaccine or effective-curative treatment makes the health care worker apprehensive. Most exposures do not result in infection.

The risk of infection varies with the type of exposure and other factors such as:

- Nature of injury
- Type of body fluid.
- The volume of body fluid involved in the exposure.
- The amount of virus in patient's blood at the time of exposure
- Whether post exposure prophylaxis (PEP) was taken within the recommended time.
- Prevention is the mainstay of the strategy to avoid occupational exposure to blood/body fluids.

All the standard precautions emphasized earlier must be practiced at all times for all patients, blood and body fluids while providing medical services

Definition of an occupational exposure: An occupational exposure that may place a worker at risk of HIV/HBV/HCV infection is a percutaneous injury, contact of mucous membrane or contact of skin (especially when the skin is chapped, abraded or afflicted with dermatitis or the contact is prolonged or involving an extensive area) with blood, tissue or other body fluids

Steps to be taken after occupational exposure

***Immediate measures following an exposure*:**

- Needle sticks and cuts should be washed with soap and water.
- Splashes to the nose, mouth or skin should be flushed with water.
- Eyes should be irrigated with clean water or saline.
- Pricked finger should not be put into the mouth reflex.
- No scientific evidence exists as to the fact that the use of antiseptics for wound care or squeezing the wound will reduce the risk of transmission of HIV.
- Report the exposure immediately to duty medical officer
- There is no role for PEP beyond 72hrs and PEP should be started as soon as possible.

Instructions to DMO regarding PEP

• DMO should fill up the PEP form provided in the casualty.
• DMO should note down the details of exposure and send necessary investigations as mentioned in the form.
• Decision of starting PEP for HIV should be based on the (flow chart No 1)

• PEP should be combination of 3 antiretro viral drugs.
• DMO is authorized to start PEP but can give prescription for only 3 days.
• PEP drugs will be provided free of cost in hospital pharmacy

HCW should be warned about side effects of PEP drugs and informed to seek medical attention in case any of these symptoms occur:

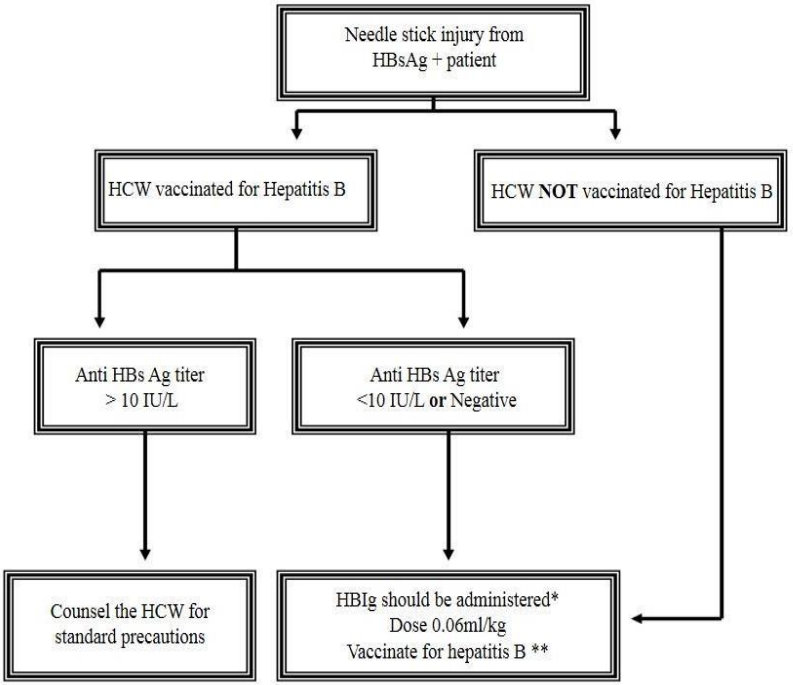
- Only Medicine unit head or infection control officer will be authorized to prescribe full course of PEP.
- Total duration of PEP is for 28 days
- Repeat HIV ELISA for exposed HCW should be done at 6 weeks, 12 weeks after exposure.
- During the course of PEP HCW should use barrier method of contraception.
- Casualty in charge nurse should collect PEP forms and hand over to infection control nurse periodically.
- Infection control nurse should periodically document and audit all exposures.

EXPOSURE RISK	**SOURCE**	**RECOMMENDATION**
1. Skin and mucosal contact		
Intact skin	HIV positive or unknown	No prophylaxis
Intact mucosa Abraded skin/mucosa with brief/small exposure	HIV positive or unknown*	Start PEP*
Abraded skin/mucosa with prolonged / large exposure	HIV positive	Start PEP
2. Needle stick injury		
Solid needle/ superficial injury	HIV positive/unknown*	Start PEP
Hollow needle /deep injury	HIV Positive/unknown*	Start PEP

*If source is identified and found to be negative, PEP can be discontinued after consulting infection control officer.

PEP Regimen
Zidovidine 300mg 1-0-1 + Lamivudine 150mg 1-0-1 **OR** Tenofovirdisoproxil fumarate(TDF) 300 mg 1-0-0 + Emtricitabine 200mg 1-0-0 **Or** Tenofovirdisoproxil fumarate(TDF) + Lamivudine 150mg 1-0-1 **+** Atazanavir +ritonavir (300+100) 0-0-1(with food) **Or** Raltigravir 400mg 1-0-1*

*Raltigravir should be prescribed only if atazanavir is contraindicated and after consulting infection control officer.



- Administration HBIg should be done only under the supervision of medicine unit head/ infection control officer.

Immunization for health care workers

- All health care workers should receive Hepatitis B immunization
- The dose and schedule is 1 ml (20 mg) IM Deltoid at 0,1 and 6 months
- If the schedule is interrupted there is no need to restart the dose
- Health care workers should be checked for anti HBS Titre levels 1 months after completion of the schedule
- If anti HBS levels are more than 10 IU/ml then they do not need further testing of HBS levels following exposure or any boosters in future
- If anti HBS level <10 IU/ml they should be checked for HBs Ag zero positivity and if negative reacquire one more course of vaccine (3 doses) preferably with different brand name.
- If still no response after second course HCW should be educated about hepatitis B and HBIG should be administered following an exposure. A booster hepatitis B vaccine is recommended once in 5yrs if anti HBsAg titre is less than 10 IU/ml.

CHAPTER 16 :WATER AND AIR CONDITIONING POLICY

Air conditioning and water are handled by the respective sections of the facility management services.

Air Conditioning

- HEPA filters are used and changed once in 12 months/ as recommended by the manufacturer
- Micro filters in AHU of each should be cleaned every 15days and changed whenever needed.
- An air exchange cycle of 10-15 per hour is maintained.
- Periodic checking is done with a checklist and a log is maintained.

Water Handling

- Water purification is done regularly by maintaining chlorine content of 2 PPM in the tank. Level of available chlorine is checked daily and a log is kept.
- The storage tank cleaning is done every 6 month. A log for the same is maintained. More frequent cleaning may be performed as indicated.
- Water samples are sent to Microbiology Department once in 2 months Coliform counts are monitored and reports sent to the Facility Manager who maintains a log

CHAPTER 17 : DEALING WITH OUTBREAKS

Outbreaks of nosocomial infections should be identified and promptly contained because of their importance in terms of morbidity, costs and institutional image. Outbreak of a communicable disease in the surrounding community also will have an enormous bearing on patient care and safety of patient population inside the hospital. However, in view of enormity of problem and various administrative issues being involved it will be handled in consultation with university and state government authorities.

Institutional outbreak management:

It includes following steps.

- Recording of the suspected outbreak reporting in the outbreak register
- Constitution of outbreak investigation team
- Investigation by the outbreak investigation team and Confirmation of the outbreak
- Notification
- Institution of control measures
- Final report submission

Recording of the suspected outbreak reporting in the outbreak register

Doctors, nurses or microbiologists may initially report outbreak. It may also be suspected through routine infection control surveillance activities. It should be immediately recorded in the register maintained for the same purpose in the infection control office by infection control nurse and HICC chairman and medical superintendent should be informed about it.

Outbreak investigation team

Infection control team and any other member/members of the hospital infection control committee nominated for the purpose shall act as outbreak investigation team. Secretary of HICC will be the team leader and organize the investigation process in consultation with chairperson of HICC.

Investigation by outbreak investigation team:

The team will investigate the suspected outbreak by reviewing preliminary information on the number of potential cases, microbiology reports, and severity of the problem.

Once the outbreak is confirmed it will also search for possible cause of the outbreak such as any major breach in implementing infection control measures, sick health care personnel etc.

Notification:
Once the outbreak is confirmed it will be notified to medical superintendent and through him to concerned individuals and departments in the institution by the HICC chairperson.

Control measures:
Aim of the control measures are to interrupt the current outbreak and prevent future such outbreaks. The measures to be undertaken will be based on the type of outbreak and its root cause.

Some of the general suggestions can be such as:

- Prevention of cross transmission by patient isolation and barrier precaution for organisms transmitted through contact. Nature of isolation and barrier precautions to be decided based on the magnitude of individual outbreak and patient population.
- Control of airborne agent outbreak by patient isolation and appropriate ventilation.
- Control of waterborne agent outbreak by checking water supply, water dispensers and purifiers of concerned areas.
- Food borne infection outbreaks require elimination of the food at risk, screening of food handlers and inspection of food preparation and storage areas

Final report:
A final report on the investigation should be prepared by the officer of HICC.This should include description of the outbreak, interventions and their effectiveness. Same Should be presented to HICC committee and after approval should be recorded for future reference.

CHAPTER 18 : KITCHEN SANITATION PROCEDURE

- Hospital diet is managed by vendors, however periodical inspection done by the Dietician
- Health checkup and vaccination status of the employees of the vendors are done periodically.
- Food handling and transport in secured and hygienic manner is maintained by vendors and monitored by the diet department of the Hospital.
- Periodic monitoring of food handling procedure, attire, hand hygiene will be conducted by the Dietician.
- If any deviation in the process will be reported to Medical Superintendent by the Dietician.
- Random / surprise rounds will be conducted by the Infection control team.

Food handling policy

- This policy describes the proper assessment, handling and monitoring of safe food by the Dietician.

General Instructions

- Preliminary nutrition assessment will be done by the treating / concerned Doctors
- Patients are referred to dietician for diet therapy, if required dietician will assess
  the patient and also make note of any allergy to food and likes and dislikes of food
- If the patient does not use hospital diet, Dietician will give diet chart and explain to the patient /patient relatives.
- If the patient is willing to take food from the hospital; Dietician will explain about the menu card and inform the team leader of dietary department.
- Team leader after collecting all the requisitions forms and instructions by the Dietician, order food in bulk to the Kitchen In charge.
- After food is prepared, it will be transferred to the diet department in a hot trolley
- Food is placed on plates and transported to wards (Private) in a hot trolley. According to their demands and cross checked by the Dietician.
- General diet is transported to the ward in covered containers and distributed in a clean plates provided by the dietary department.

CHAPTER 19 : LIST OF NOTIFIABLE DISEASES

Following list of communicable diseases will be notified to district surveillance office

AIDS	Hepatitis A
Cholera	Leptospirosis
Enteric fever	Malaria
Dengue	Plague
Gastroenteritis	Suspected polio
Filaria	KFD
Dracunculosis	Rabies
Antharax	Food poisoning
Leprosy	Chickenpox
Snake bite	Chikungunya

CHAPTER 20 :RENOVATION WORK IN PATIENT CARE AREAS

- Renovation and up gradation of electrical and plumbing etc. in the patient care areas are happening regularly. It must be carried out with least disturbance to patient care and without any risk of transmission of infection. All the activities must be informed to hospital infection control cell except in emergency situation.
- Infection control team should verify the nature of activities disturbances it is likely to result in infection control measures in the area. If there is likelihood of contamination of critical patient care areas like procedure room, infection, injection area, sterile material, storage areas, that facility should be temporally closed or transferred. If those areas are spared, only patient wards or corridors are involved, patients must be shifted from those areas. In all these situation, before restarting the thorough surface cleaning and in critical areas fogging should be done.
- All the construction material Transportation and construction worker's movement should be in ramps and should not be mixed with patients in lift. The construction / renovation areas should be identified by display boards to be placed.
- The Repair Technicians working in critical area like ICU, OT etc. should follow the dress code and other standard precautions like regular staffs.

CHAPTER 21 :REUSE POLICY

Policy on repeated uses of bone marrow biopsy needles and other reusable needles and catheters

1. **Bone marrow biopsy and aspiration needles**

- These needles sometimes are used indefinitely till they get visibly damaged leading to pain and increased risk of transmission of infection. To avoid such a thing to happen following protocol to be followed.
- Have a tracking system whereby CSSD knows how many times a needle is used
- Discard a needle (both asp &bx) after 5 uses or 6mths (whichever is earlier)
- They can tag the 5th use with red, use it for the last time for a HIV/HBsAg positive patient and discard the needle
- Whenever possible use disposable biopsy needles for HIV patients
- The disposable biopsy needles cannot be autoclaved. It can be gas sterilized after use and kept aside to be used for HIV/HBsAg positive patients who cannot afford disposable needles.

2. **Reusage of Disposable or single use cardiac catheter and angioplasty equipment**

- This equipment are for single use only. They cannot be autoclaved. However, it can be gas sterilized after use and kept aside and if required can be used on patients who cannot afford disposable catheters.
- Cleaning of these equipment's before sending for gas sterilization are to be carried out as per the protocol described under cardiac catheter lab infection control procedures.

CHAPTER 22: SAFE INJECTION PRACTICES

- Injections are an important mode of administration of drugs. It may be the only mode of administration in some situations, however it is also misused frequently. Infections like HIV, Hepatitis B and C virus can be transmitted through needles and unsafe injection practices. Keeping this in mind following guidelines is recommended for injections use in the hospital.
- The following recommendations apply to the use of needles, cannulas that replace needles, and, where applicable intravenous delivery systems
- Eliminate unnecessary injections
- Use aseptic technique to avoid contamination of sterile injection equipment
- Do not administer medications from a syringe to multiple patients, even if the needle or cannula on the syringe is changed. Needles, cannula 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
- 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
- Use single-dose vials for parenteral medications whenever possible
- Do not administer medications from single-dose vials or ampules to multiple patients or combine leftover contents for later use
- If multi dose vials must be used, both the needle or cannula and syringe used to access the multi dose vial must be sterile. Before pricking the vial cap must be cleaned with spirit.
- Do not keep multi dose vials in the immediate patient treatment area and store in accordance with the manufacturer's recommendations; discard if sterility is compromised or questionable.
- Do not use bags or bottles of intravenous solution as a common source of supply for multiple patients
- Follow safe sharp disposable practices.

CHAPTER 23: PERIODICAL TEST DONE:

Test done on	Tested for	Frequency
1. water culture	a. Biochemistry: Level of chlorine microbiology: coliform bacilli	Once in 3 months
2. Settle plate All OT`s C ward NICU Post op ICU Cath lab CSSD	Any Gram positive bacilli and cocci, gram negative cocci, fungi	Once in a month
3. Food handlers	Stool for salmonella or other parasites	Annually
4 House keeping	Linen handling Disinfectant use Waste management handling	Weekly

CHAPTER 24: BIOMEDICAL WASTE MANAGEMENT

Biomedical wastes are defined as waste generated during the laboratory diagnosis, treatment or immunization of human beings or animals, or in research activities pertaining thereto, or in the production of biologicals.

Waste generated in hospitals:

- It is estimated that quantity of solid waste generated in hospitals varies from ½ to 2 kg/bed in govt. hospitals, private hospitals and nursing homes.
- In developing countries, waste generated from hospitals falls into following categories-
- ***General waste (80%)-*** Vast majority of waste falls in the general waste category, which may be disposed with usual domestic and urban waste management system. They do not cause any harm to humans.
- ***Biomedical waste (20%)***
- ***Pathological and infectious waste (15%)-*** Pathogens in the infectious waste may enter through ingestion, inhalation or direct skin to skin contact.
- ***Chemical and pharmaceutical waste (3%)-***Most of the chemicals (eg disinfectants) and pharmaceuticals are toxic, genotoxic, corrosive, flammable, explosive or shock sensitive.
- ***Sharp waste (1%)-*** Needle stick and other sharp injuries are of great concern as they are capable of transmitting blood borne pathogens such as HIV, hepatitis B and C virus etc.
- ***Less than 1%*** accounts for special waste such as cytotoxic drug, radioactive waste, broken thermometers ad used batteries.

Treatment and Disposal Methods-

Incineration

- Incineration is a high temperature dry oxidation process that reduces organic and combustible waste into inorganic incombustible matter, resulting in a very significant reduction of waste volume and weight.
- Incineration is usually done for those wastes that cannot be reused, recycled or disposed off in a landfill site, for eg, human and anatomical waste, microbiological waste, solid non-plastic infectious waste.
- Incineration should not be done for-
    - Pressurised gas containers
    - Reactive chemical waste
    - Halogenated plastics such as PVC
    - Waste with high heavy metals such as mercury, silver salts, radiographic waste, broken thermometers
    - Chlorinated chemicals or wastes pretreated with chlorine should not be incinerated because of the release of furans which are highly carcinogenic.

Autoclave:

Autoclaving is a thermal process where steam is brought into direct contact with waste in a controlled manner and for sufficient duration to sterilise the wastes

- The system should be horizontal type and exclusively designed for the treatment of biomedical waste
- For optimum results, prevacuum based system is preferred against the gravity type system
- It shall have tamper proof control panel with efficient display and recording devices for critical parameters such as time, temperature, pressure, date and batch number etc.

Hydroclaving:

- It is a double walled cylindrical pressurised motor system
- It involves fragmenting and mixing, crushes the waste, while high temperature steam is introduced inside.
- Continuous mixing of the fragmented waste and the contents of the vessel
- Total waste sterilisation, no harmful air emissions and total dehydration of the final materials.

Chemical disinfection:

- Chemicals are added to waste to kill or inactivate the pathogens within it. It results in disinfection rather than sterilisation.
- 10% sodium hypochlorite is used as chemical disinfectant.
- It is more suitable for liquid waste such as blood, urine and hospital sewage
- However, solid waste microbiological cultures and sharps, etc may be disinfected chemically with certain limitations.

Effluent Treatment plant

- The liquid effluent generated during the process of washing containers, vehicles, floors etc is first subjected to chemical treatment and disposed in effluent treatment plant

Shredder-

- Shredding is a process by which waste are cut into smaller pieces so as to make the wastes into smaller pieces.

Sanitary landfill-

- It is a small deep burial pit of 2 meters depth. It should be half filled with waste, then covered with lime within 50 cm of the surface, before filling the rest of the pit with soil. It is specially designed for disposal of hospital waste.
- For health and safety, a landfill site should be constructed away from residency, forests and coastal waters.
- If the facilities are not available to treat the waste before disposal, landfills are regarded as acceptable route of disposal.

Encapsulation:

- Disposal of untreated health care waste in municipal landfill is not advisable.
- Encapsulation method involves filling containers with waste, adding immobilising material and sealing the containers

Inertisation-

The process of inertisation involves mixing waste with cement and other substances before disposal to minimize the risk of toxic substances contained in the waste migrating into surface or ground water.

Biomedical wastes categories and their segregation, collection, treatment and disposal.

Biomedical waste management rule 2016			
Category	**Type of waste**	**Type of bag/container**	**Treatment/disposal options**
Yellow	Human anatomical waste	Yellow coloured non chlorinated plastic bags	Incineration/plasma pyrolysis/ deep burial
	Animal anatomical waste		
	Soiled waste		Incineration/plasma pyrolysis/ deep burial/autoclaving + shredding
	Expired/discarded medicines-pharmaceutical waste, cytotoxic drugs	Yellow coloured containers/non chlorinated plastic bags	Incineration (cytotoxic drugs at temperature>1200 degree C)
	Chemical waste	Yellow coloured containers/non chlorinated plastic bags	Incineration/plasma pyrolysis/ encapsulation
	Chemical liquid waste	Separate collection system leading to ETP	Pretreated before mixing with other waste water
	Discarded linen contaminated with blood/body fluids	Non chlorinated yellow plastic bags/suitable packing material	Non chlorinated chemical disinfection followed by incineration

	Microbiology, other clinical lab waste, blood bags, live/attenuated vaccines	Autoclave safe plastic bag/container	pretreat to sterilize with non chlorinated chemicals on site as per NACO/WHO guidelines
Red	Contaminated waste	Red coloured non chlorinated plastic bags or containers	Autoclaving + shredding
			Treated waste sent to authorised recyclers or for energy recovery
White	Waste sharps including metal sharp	Puncture proof, leak proof, tamper proof containers	Autoclaving + shredding
			Encapsulation in metal container or cement concrete
			Sanitary landfill/ designated concrete waste sharp pit
Blue	Glassware	cardboard boxes with blue coloured marking	Disinfection through autoclaving,, recycling
	Metallic body implants		

Biomedical waste management rules 2016-

The ministry of environment and forests has recently enforced the new biomedical waste management rules 2016. This is the rule which should be followed in all health care facilities. It has simplified the categorisation into 4 categories-yellow bag, red bag, transparent/white puncture proof box and blue card board box.

Basic principles of biomedical waste handling-

1. Health care setting should have authorisation to handle BMW
2. BMW should not mix with general waste
3. Segregation should be done at the generation site in accordance with colour coded system mentioned in BMW rules 2016
4. Labelling of bags is MUST with details of ward number, weight and date
5. Transportation of waste should be done safely without spillage and leakage in closed vehicle
6. BMW should be treated and disposed within 48 hrs as per the rules
7. HCW handling BMW should be vaccinated for hepatitis b and tt

8. Major accidents should be reported immediately
9. Annual report of BMW should be submitted.

Yellow	Red	Blue
• Bandage soiled and unsoiled • Gauge soiled and unsoiled • Swabs soiled and unsoiled • Linen soiled and unsoiled • Gloves soiled and unsoiled • Blood bags • Disposable cap • Apron • Face mask • Disposable shoe covers • Disposable bed sheets • Bed protection pads • Body parts • Dead foetus • Placenta • Nails • Histopathology tissue • Specimen paraffin wax • Discarded medicines • Expired antibiotics • Cytotoxic drugs including items with cytotoxic drugs with glass or plastic ampoules, vials	• IV sets • Plastic IV bottles • Urobags • Catheters • All plastic tubings • Nebulisation masks • Syringes, (without needles and fixed needle syringes) • Plastic test tubes • Pippettes • Disposable tips • Trough used for labs • Plastic vaccutainers • Nasogastric tubes • Suction catheters • Cardiac cannulas • Folleys catheters • ET tube • ICD tubes • Blood set • Drains • Blood sheath • Needle cap	• Glass test tubes • Empty glass bottles • Contaminated glass bottles • Glass ampoules containing discarded medicines except chemotherapeutic medicines • Metallic body implants • Reusable glass slide

• Lab cultures, stocks/specimens of microrganisms • Live/attenuated vaccines • Cotton balls • Chemicals • Lab stocks used for cultures • Used HIV kits • Diaper, napkins	• Empty alcohol wash and alcohol rub	
	Microwave-Shredding	Disinfection-recycling
	Black	Puncture proof box
	• Kitchen waste-food materials • Tea cups, papers, empty boxes • All covers and wrappers • Covers of blades, suture materials	• Lancets • Broken ampoules • Broken slides • Scalpels • Blades • Microtome slides • Disposable needles • Vacutainer needles • Razer needles • Glass syringe with fixed needles • Disposable needles • Veinflonstilett • LP needle • Suture needles
	Taken by municipal corporation vehicle	Disinfection-sharp pit

PROTOCOL FOR HANDLING MERCURY WASTE

Mercury is a chemical element with the symbol Hg, and its atomic number is 80.It is a very poisonous silver-colored metallic liquid and is called as quick silver.

Common sources of Mercury:

- Thermometers
- Sphygmomanometers
- Boiler &AC Chemical
- Esophageal Dilators
- Thermostats
- Fluorescent Lamps
- Batteries

All wards will have display of management of mercury spill. Mercury containment kits will be placed in wards identified as high risk for mercury spill.

Equipment: Mercury Containment Kit

• Gloves
• Face Mask
• Eye Shield
• Syringe
• Two Stiff pieces of Card Board
• Container (Plastic Box)
• 2 Plastic Bag- Red Color
• Torch

CHAPTER 25 : ANTIBIOTIC POLICY

Introduction

Antimicrobial resistance

Antimicrobial resistance (AMR) has emerged as a major public health problem globally. Infections caused by drug resistant microbes fail to respond to treatment, resulting in prolonged illness and greater risk of death. The situation is alarming in India where inappropriate uses of antimicrobial agents and poor infection control practices have compounded the burden of untreatable infections by MDR bacteria mostly in hospital settings. Treatment failures also lead to longer periods of infectivity, with increased numbers of infected people moving in the community. This in turn exposes the general population to the risk of contracting resistant strains of microorganisms. When these bacteria become resistant to first-line antimicrobials, the prohibitive high cost of the second-line drugs may result in failure to treat these diseases in many individuals. Most alarming of all are the diseases caused by multidrug-resistant microbes, which are virtually non-treatable and thereby create a scenario of "post-antibiotic era".

In the last five years, there is a sharp rise in the MDR bacteria which are as follows:
Methicillin resistant *Staphylococcus aureus* (MRSA)
Escherichia coli, *Klebsiella and Enterobacter* resistant to Beta lactam – beta lactamase inhibitor combinations, and carbapenems
Acinetobacter baumannii, resistant to carbapenems
Pseudomonas aeruginosa, resistant to carbapenems
Increasing use of broad spectrum and last resort antibiotics have clearly put unnatural selection pressure on bacteria and led to emergence of MDR strains which circulate in the healthcare environment. As a result there have been few documented infections by vancomycin resistant Enterococci (VRE), linezolid resistant Enterococci (LRE) and vancomycin resistant *Staphylococcus aureus* (VRSA). Alarming is the MIC creep of colistin by *Pseudomonas aeruginosa* and vancomycin by *Staphylococcus aureus.*
While excessive and inappropriate use of antibiotics have selected the MDR organisms, non-adherence to infection control practices facilitate dissemination of these organisms across patients. Considering the explosive nature of antimicrobial resistance, limiting the inappropriate use and encouraging rational administration of antimicrobial agents is an urgent priority.

National action plans to control antimicrobial resistance

Government of India formed a task force in 2011 to formulate 'National policy for containment of antimicrobial resistance'. As a result, the first version of 'National Treatment Guidelines for Antimicrobial Use in Infectious Diseases' has been prepared by National center for disease control (NCDC) in 2016 to aid judicious use of antibiotics.

Scope of the document

The Antibiotic policy of Central Referral Hospital provides guidelines for the recommended treatments for common infectious diseases that are based on scientific evidence, literature review and are consistent with the already existing international guidelines and the recently introduced national guidelines. The topics covered in this

document include empiric treatment choices for different syndromes and infections of specific body sites.

It is emphasized that antimicrobials should be prescribed only when they are necessary in treatment following a clear diagnosis. Not all patients need antibiotics; non−drug treatment may be suitable and this has been emphasized in these guidelines.

These recommendations are for initial antibacterial therapy in adult patients with normal renal function. It is necessary to review therapy once microbiology results are available. These guidelines undergo regular review and updated every year to take account of emerging evidence, national guidance and local resistance patterns. Prescribers are encouraged to follow these empirical guidelines to ensure that patients receive therapy in line with current recommendations.

Syndrome approach for empirical therapy of common infections

Appropriate antibiotic therapy can improve survival when administered **adequately** in the correct dose, via the right route, given in a **timely** fashion, and with penetration to the site of infection. Empiric antibiotic prescribing guidelines lead to quality, standardized care for common infectious diseases by helping prescribers select an initial therapy for a variety of infections.

Empirical or presumptive anti-infective therapy is based on a clinical diagnosis combined with evidence from the literature and from the educated experience of the probable pathogens causing the infection. To optimize an accurate microbiological diagnosis, clinicians should ensure that diagnostic specimens are properly obtained and promptly submitted to the microbiology laboratory, preferably before the institution of antimicrobial therapy. All attempts should be made to establish diagnosis of the patients based on the facilities available to the treating doctor and affordability of the patients.

Definitive OR targeted therapy depends on the microbiologic diagnosis by isolation or other direct evidence of pathogen.

Choice of EMPIRICAL therapy is based on:

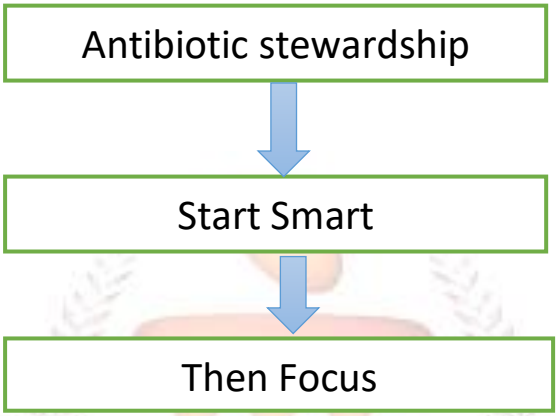
- The site of infection.
- Common pathogens encountered.
- Local epidemiology and resistance patterns.
- Evidence and clinician consensus.

Antimicrobial stewardship principles*.

- Formulary availability.
- Antimicrobial costs.

Prescriber should always consider patient-specific information (e.g., prior culture results, recent antimicrobial therapy and immune status) when selecting therapy. They should also reassess their initial treatment choice (continue, modify, de-escalate, discontinue) once cultures are available.

Knowledge of the common causative pathogens is essential to choose the most appropriate antibiotic. When a bacterial pathogen is isolated from a clinical specimen and sensitivities are known, Targeted therapy should be adjusted to use the narrowest-spectrum antibiotic. This will reduce the likelihood of Clostridium difficile selection and of emerging bacterial resistance and other adverse effects.



Start Smart

Do not start antibiotics in the absence of clinical evidence of bacterial infection

If there is evidence/suspicion of bacterial infection, use local antibiotic policy guidelines to initiate prompt effective antibiotic treatment within one hour of diagnosis (or as soon as possible) in patients with life-threatening infections such as severe sepsis. Avoid inappropriate use of broad-spectrum antibiotics.

For antibiotic(s) prescribed, document each of the following on the drug chart and in the clinical notes: clinical indication (including disease severity if appropriate), dose, route and duration or review date.

Antibiotics in hospitals are often continued unnecessarily because clinicians caring for the patient do not have information indicating why the antibiotics were initially commenced and how long they were planned to be continued. This problem is compounded where primary responsibility for patient care is frequently transferred from one clinician to another. Ensuring that all antibiotic prescriptions are always accompanied by an indication and a clear duration or review date will help clinicians change or stop therapy when appropriate. In children the dose of antimicrobials should be prescribed according to the individuals weight/age

Obtain cultures first whenever possible

Knowing the antibiotic susceptibility of an infecting organism can help clinicians to prescribe the most appropriate antibiotic. This is useful for narrowing of broad-spectrum therapy, changing therapy to effectively treat resistant pathogens and stopping antibiotics when cultures suggest an infection is unlikely. Samples should be good specimens e.g. a

sample of pus rather than a swab. Relevant clinical details should be given when submitting samples e.g. clinical presentation, details of current and recent antibiotics, date of onset etc. Samples should reach the laboratory as soon as possible.
Do not delay treatment for patients with life-threatening infections e.g. severe sepsis.

Then Focus

Review the clinical diagnosis and the continuing need for antibiotics by 48–72 hours and make a clear plan of action – the 'antimicrobial prescribing decision'
Antibiotics are generally started before a patient's full clinical picture is known. By 48–72 hours, when additional information is available, including microbiology, radiographic and clinical information, it is important to re-evaluate why the therapy was initiated in the first place and to gather evidence on whether there should be changes to the therapy.

The four 'antimicrobial prescribing decision' options are Stop, Switch, Change and Continue:

1. Stop antibiotics if there is no evidence of infection
2. Switch antibiotics from IV to oral
3. Change antibiotics – ideally to a narrower spectrum – or broader if required. Prescribers should seek expert advice when necessary
4. Continue and document next review date or stop date for IV and oral antibiotics

It is essential that the review and subsequent decision be clearly documented in the clinical notes. The decision should also be documented clearly on the drug chart.

How to use this document

In the antibiotic policy of CRH,the treatment guidelines are provided in the form of tables describing the infective syndromes, likely causative agents and the empirical antibiotic therapy advocated against them.
The alternate antibiotic may be prescribed in cases when the first line antibiotics cannot be used due to hypersensitivity or patient's clinical parameters or non-availability of first line drugs.

The table is divided into following subsections:

1. Empiric treatment of CNS bacterial infections
2. Empiric treatment of Respiratory Tract infections
3. Empiric treatment of Urinary tract infections
4. Empiric treatment of Skin and Soft tissue infections
5. Empiric treatment of Gastro-intestinal and Intra-abdominal infections
6. Empiric treatment of Cardio-vascular infections
7. Empiric treatment of infections in burns patients
8. Empiric treatment of Obstetric and gynaecological infections
9. Empiric treatment of Bone and Joint infections
10. Empiric treatment of ENT infections
11. Empiric treatment of Pediatric infections
12. Empiric treatment of Eye infections