2.5

Hospital Infection Control (HIC)

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Prevention of Healthcare Associated Infections (HAIs) represents one of the major safety initiatives a hospital can undertake. A large number of patients admitted to hospitals acquire infections that were not related to the condition for which they were hospitalized, which results in a considerable number of deaths and add to treatment costs. These standards provide the framework for hospitals to develop and implement plans to prevent and control infections by using an integrated approach across all programs, services and settings. The standards call on healthcare establishments to educate and collaborate with leaders throughout the hospital, including physicians, to participate in the design and implementation of an effective Infection Control Program.

STANDARD-14. HIC-1: THE ORGANIZATION HAS A WELL-DESIGNED, COMPREHENSIVE AND COORDINATED INFECTION CONTROL PROGRAMME AIMED AT REDUCING/ELIMINATING RISKS TO PATIENTS, VISITORS AND PROVIDERS OF CARE

IND.84 THE HOSPITAL INFECTION CONTROL PROGRAM IS DOCUMENTED WHICH AIMS AT PREVENTING AND REDUCING RISK OF NOSOCOMIAL INFECTIONS.

Documented Hospital Infection Control (HIC) Program

It is required that the HCE must have a documented HIC Program which aims at preventing and reducing the risk of nosocomial infections. National[40] and International Guidelines, scientific knowledge, professional bodies and statutory requirements shall be considered for developing an IC program. CDC and WHO guidelines should be used as reference documents.

Each Healthcare Facility must;

i. Develop an IC Program (or use the national guidelines) to ensure the wellbeing of both patients and staff.
ii. Develop an Annual Work Plan (AWP) to assess and promote good healthcare; appropriate isolation, sterilization and other practices; staff training and epidemiological surveillance.
iii. Provide sufficient resources to support the IC program.
iv. Ensure that risk prevention for patients and staff is a concern of everyone in the facility, and must be supported by the senior administration.

Salient Components of the Infection Control Program are;

a. Basic measures for IC, i.e. standard and additional precautions.
b. Education and training of healthcare workers.
c. Protection of healthcare workers, e.g. immunization, post exposure prophylaxis.
d. Identification of hazards and minimizing risks.
e. Routine practices essential to IC such as aseptic techniques, use of single use devices, reprocessing of instruments and equipment, antibiotic usage, management of blood/body fluid exposure, handling and use of blood and blood products, sound management of medical waste.
f. Effective work practices and procedures, such as environmental management practices including management of hospital/clinical waste, support services (e.g., food, linen), use of therapeutic devices.
g. Incidence monitoring.

[40] Pakistan National Infection Control Guidelines, 2006.

h. Outbreak investigation.
i. Surveillance.
j. IC in specific situations.
k. Research.

Of these the **first 8 are absolutely essential** regardless of the size of the facility or resources since they directly determine the quality and nature of the care that is provided. In addition to implementing basic measures for IC, healthcare facilities should prioritize their IC needs and design their programs accordingly.

For sustained effectiveness, the IC program will have to be comprehensive, include surveillance and prevention activities and staff training. It must also be able to draw upon effective support at national and regional levels.

Organization of an Infection Control (IC) Program

The primary responsibility lies with the Medical Superintendent/hospital who should:

1. Establish an Infection Control Committee (ICC) which will in turn appoint an IC team.
2. Provide adequate resources for effective functioning of the IC program.
3. An IC team (or an officer in smaller facilities) with dedicated and protected time which can enforce rules and attend to daily needs of the program in real time.

The Hospital IC plan should address interalia the following important components:

Nosocomial Infection Surveillance

Surveillance is a systematic, active on-going observation of the occurrence and distribution of a disease within a population and of the events that increase or decrease the risk of the disease occurrence.The primary role of surveillance is to monitor **Nosocomial Infection Rate** as thefirst step to identify local problems and priorities, and evaluate the effectiveness of IC activity. Surveillance, by itself, is an effective process to decrease the frequency of hospital-acquired infections.

I. **Objectives:**

The ultimate aim of surveillance programme is the reduction of nosocomial infections and the cost of treatment whereas the specific objectives include:

A. To improve awareness of the clinical staff and other hospital workers (including administrators) about nosocomial infections and antimicrobial resistance so that they may appreciate the need for preventive action.

B. To monitor trends: incidence and distribution of nosocomial infections, prevalence and, where possible, risk-adjusted incidence for intra- and inter-hospital comparisons.

C. To identify the need for new or intensified prevention programmes, and evaluate the impact of prevention measures.

D. To identify possible areas for improvement in patient care, and for further epidemiological studies (i.e. risk factor analysis).

II **Strategy**

urveillance system must meet the following criteria:

A. *Simplicity*, to minimize costs and workload, and promote unit participation by timely feedback.

B. *Flexibility*, to allow changes when appropriate.

C. *Acceptability,* (e.g. evaluated by the level of participation, data quality).

D. *Consistency*, (use standardized definitions, methodology).

E. *Sensitivity,* although a case-finding method with low sensitivity can be valid in following trends, as long as sensitivity remains consistent over time and cases identified are representative.

F. *Specificity,* requiring precise definitions and trained investigators.

III. **Implementation at the hospital level**

The HCE must ensure that a valid surveillance system with specific objectives for units, services, patients, specific care areas and defined time lines for all partners: e.g. clinical units, laboratory staff, Infection Control Practitioner (ICP)/nurse, and administration is in place and functioning.

Initially, discussion should identify the information needs, and the potential for the chosen indicators to support implementation of corrective measures (what or who is going to be influenced by the data). This discussion will focus on key elements including:

A. The patients and units to be monitored (defined population).

B. The type of infections and relevant information to be collected for each case (with precise definitions).

C. The frequency and duration of monitoring.

D. Methods for data collection.

E. Methods for data analysis, feedback, and dissemination.

F. Confidentiality and anonymity.

IV. Organization For Efficient Surveillance

Nosocomial infection surveillance includes data collection; analysis and interpretation, feedback leading to interventions for preventive action, and evaluation of the impact of these interventions. The Infection Control Officer (ICO)/physician and/or nurse from the IC team must be a trained professional specifically responsible for surveillance, including training of personnel for data collection. A written protocol must describe the methods to be used, the data to be collected (e.g. patient inclusion criteria, definitions), the analysis that can be expected, and preparation and timing of reports.

The optimal method is dependent on hospital characteristics, the desired objectives, resources available (computers, investigators) and the level of support of the hospital staff (both administrative and clinical). The surveillance system must report to hospital administration, usually through the ICC, and must have a dedicated budget to support its operation.

V. Priority Infections and Their Definitions

Surveillance of infectious conditions requires strict definitions. In many cases there are no universally agreed definitions therefore the infection rate will vary with the definition used. For this reason, comparisons can be made between units or institutions only if the same set of definitions is used and applied in exactly the same way. It is often more meaningful and more useful to use surveillance data from a single institution to measure trends over time, either to alert staff to increasing problems or to monitor the effectiveness of interventions.

VI. Surveillance Methods

Simply counting infected patients (numerator) provides only limited information which may be difficult to interpret. Further data is necessary to fully describe the problem on a population basis, to quantify its importance, to interpret variations, and to permit comparisons. Risk factor analysis requires information for both infected and non-infected patients. Infection rates, as well as risk-adjusted rates, can then be calculated. Hospitals shall imply a combination of passive and active surveillance techniques to control nosocomial infection.

VII. Outcome of Surveillance

An effective surveillance system must identify priorities for preventive interventions and improvement in quality of care. By providing quality indicators, surveillance enables the IC programme, in collaboration with patient care units, to improve practice, and to define and monitor new prevention policies. The ultimate aim of surveillance is to decrease nosocomial infections and reduce costs.

VIII. Evaluation of Surveillance

Surveillance is a continuous process which needs to evaluate the impact of interventions to validate the prevention strategy, and determine if initial objectives are attained.

A surveillance system must be continuing if it is to be credible. Periodic contacts with staff will also help to maintain a high level of compliance. Once the surveillance system is functioning, validation of the surveillance methods and data should be undertaken at regular intervals.

IX. Principal Points For Surveillance of Nosocomial Infections

A. Valid quality indicators (risk-adjusted rates, etc.)

B. Effective, timely feedback (rapid, useful)

C. Appropriate implementation of interventions

D. Evaluation of the impact of interventions by continued surveillance (trends), and other studies

X. Infection Control Practices

Infection control practices can be grouped in two categories;

A. Standard Precautions: Transmission of infections in healthcare facilities can be prevented and controlled through the application of basic IC precautions which can be grouped into Standard Precautions, that must be applied to all patients at all times, regardless of diagnosis or infectious status

B. Additional Precautions, which are specific to modes of transmission or transmission-based i.e. airborne, droplet and contact.

Standard Precautions:

Treating all patients in the healthcare facility with the same basic level of "standard" precautions involves work practices that are essential to provide a high level of protection to patients, healthcare workers and visitors.

These include the following:

i) Hand washing and antisepsis (hand hygiene).
ii) Use of Personal Protective Equipment (PPE) when handling blood, body substances, excretions and secretions.
iii) Appropriate handling of patient care equipment and soiled linen.
iv) Prevention of needle prick/sharp injuries.
v) Environmental cleaning and spills-management.
vi) Appropriate handling of waste.

1. HAND HYGIENE

Appropriate hand washing can minimize micro-organisms acquired on the hands by contact with body fluids and contaminated surfaces. Hand washing breaks the infection transmission chain and reduces person-to-person transmission. All healthcare personnel and family caregivers of patients must practice effective hand washing. Patients and primary care givers need to be instructed in proper techniques and situations for hand washing.

Compliance with hand washing is, however, frequently sub-optimal. Reasons for this include: lack of appropriate equipment; low staff to patient ratios; allergies to hand washing products; insufficient knowledge among staff about risks and procedures; the time required; and casual attitudes among staff towards bio-safety.

Purpose

Hand washing helps to remove micro-organisms that might cause disease. Washing with soap and water kills many transient micro-organisms and allows them to be mechanically removed by rinsing. Washing with antimicrobial products kills or inhibits the growth of micro-organisms in deep layers of the skin. Use of alcohol based gel is the preferred method of hand cleansing.

Types of Hand Washing

Simple hand washingis usually limited to hands and wrists; the hands are washed for a minimum of 10 – 15 seconds with soap (plain or antimicrobial) and water.

Hand antisepsis/decontaminationremoves or destroys transient micro-organisms and confers a prolonged protective effect. It may be carried out in one of the following two ways;

i) Wash hands and forearms with antimicrobial soap and water, for 15-30 seconds (following manufacturer's instructions).
ii) Decontaminate hands with a waterless, alcohol-based hand gel or hand rub for 15-30 seconds. This is appropriate for hands that are not soiled with protein matter or fat. Immersion of hands in bowls of antiseptics is not recommended.

Surgical hand antisepsis removes or destroys transient micro-organisms and confers a prolonged effect. Hands and forearms are washed thoroughly with an antiseptic soap for a minimum of 2-3 minutes and are dried using a sterile towel. Surgical hand antisepsis is required before performing invasive procedures.

Facilities and Materials Required For Hand Washing

Running water

Access to clean water is essential. It is preferable to have running water, large washbasins having anti-splash devices, hands-free controls requiring little maintenance.

When running water is not available use either a bucket with a tap, which can be turned on and off, a bucket and pitcher, or 60% - 90% alcohol hand rub.

Materials Used For Hand Washing/Hand Antisepsis

Use plain or antimicrobial soap depending on the procedure.

Plain Soap: Used for routine hand washing, available in bar, powder or liquid form.

Antimicrobial Soap: Used for hand washing as well as hand antisepsis.

i) If bar soaps are used: Use small bars with soap racks that can be drained.
ii) Do not allow bar soap to sit in a pool of water as it encourages the growth of some micro-organisms such as pseudomonas.
iii) Clean dispensers of liquid soap thoroughly every day.
iv) When liquid soap containers are empty they must be discarded, not refilled with soap solution.

Specific antiseptics recommended for hand antisepsis:

i) 2%-4% chlorhexidine
ii) 5%-7.5% povidone iodine
iii) 1% triclosan
iv) 70% alcoholic hand rubs

Waterless, alcohol-based hand rubs: with antiseptic and emollient gel and alcohol swabs, which can be applied to clean hands. Dispensers should be placed outside each patient room.

Facilities for Drying Hands

i) Disposable towels, reusable single use towels or roller towels, which are suitably maintained, should be available.
ii) If there is no clean dry towel, it is best to air-dry hands.
iii) Equipment and products are not equally accessible to all HCEs. Flexibility in products and procedures, and sensitivity to local needs will improve compliance.
iv) In all cases, the best possible procedure should be instituted.

Hand Washing-Steps

Preparing for hand washing:

i) Remove jewellery (rings, bracelets) and watches before washing hands.
ii) Ensure that the nails are clipped short (do not wear artificial nails).
iii) Roll the sleeves up to the elbow.
iv) Wet the hands and wrists, keeping hands and wrists lower than the elbows (permits the water to flow to the fingertips, avoiding arm contamination).
v) Apply soap (plain or antimicrobial) and lather thoroughly.
vi) Use firm, circular motions to wash the hands and arms up to the wrists, covering all areas including palms, back of the hands, fingers, between fingers and lateral side of fifth finger, knuckles, and wrists. Rub for minimum of 10-15 seconds.
vii) Repeat the process if the hands are very soiled.
viii) Clean under the fingernails.
ix) Rinse hands thoroughly, keeping the hands lower than the forearms.
x) If running water is not available, use a bucket and pitcher.
xi) Do no dip your hands into a bowl to rinse, as this re-contaminates them.
xii) Collect used water in a basin and discard in a sink, drain or toilet.
xiii) Dry hands thoroughly with disposable paper towel or napkins, clean dry towel, or air dry them.
xiv) Discard the towel if used, in an appropriate container without touching the bin lids with hand.
xv) Use a paper towel, clean towel or your elbow/foot to turn off the faucet to prevent recontamination.
xvi) A general procedure for hand washing is given in the figure below and **must be conducted over at least one full minute** using antiseptics, hand rubs, gels or alcohol swabs for hand antisepsis.
xvii) Apply the product to the palm of one hand. The volume needed to apply varies by product.
xviii) Rub hands together, covering all surfaces of hands and fingers, until hands are dry.
xix) Do not rinse.
xx) When there is visible soiling of hands, they should first be washed with soap and water before using waterless hand rubs gels or alcohol swabs.
xxi) If soap and water are unavailable, hands should first be cleansed with detergent containing towelettes, before using the alcohol-based hand rub, gel or swab.

Figure No. 20

A **surgical scrub** is performed before each surgical procedure with the aim of removing and killing the transient flora and decreasing the resident flora in order to reduce the risk of wound contamination if surgical gloves become damaged. It ensures the removal or killing of transient micro-organisms and a substantial reduction and suppression of the resident microbial flora. Agents are the same as for the hygienic hand wash.

2. Personal Protective Equipment (PPE)

Adequate and appropriate PPE, soaps, and disinfectants should be available and used correctly. These should be available at the point of use and the organization shall ensure that it maintains an adequate inventory and stock of items.

Using PPE provides a physical barrier between micro-organisms and the wearer and offers protection by helping to prevent micro-organisms from:

i) Contaminating hands, eyes, clothing, hair and shoes.

ii) Being transmitted to other patients and staff.

PPE includes:

a) Gloves

b) Protective eye wear (goggles)

c) Masks

d) Aprons

e) Gowns

f) Boots/shoe covers

g) Caps/hair covers

PPE should be used by:

a) Healthcare workers who provide direct care to patients and who work in situations where they may have contact with blood, body fluids, excretions or secretions.

b) Support staff including medical aides, cleaners, and laundry staff in situations where they may have contact with blood, body fluids, secretions and excretions.

c) Laboratory staff, who handle patient specimens.

d) Family members who provide care to patients and are in a situation where they may have contact with blood, body fluids, secretions and excretions.

Principles for use of PPE

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

The following principles guide the use of PPE:

a) PPE should be chosen according to the risk of exposure. The healthcare worker should assess whether they are at risk of exposure to blood, body fluids, excretions or secretions and choose their items of personal protective equipment according to this risk.

b) Avoid any contact between contaminated (used) PPE and surfaces, clothing or people outside the patient care area.

Examples of use of PPE

a) Discard the used PPE in appropriate disposal bags, and dispose off as per the policy of the hospital.

b) Do not share PPE.

c) Change PPE completely and thoroughly wash hands each time you leave a patient to attend to another patient or another duty.

3. Patient care equipment

Handle patient care equipment soiled with blood, body fluids secretions or excretions with care, in order to prevent exposure to skin and mucous membranes, clothing and the

environment. Ensure all reusable equipment is cleaned and reprocessed appropriately before being used on another patient.

4. Prevention of needle prick/sharps injuries

Take care to prevent injuries when using needles, scalpels and other sharp instruments or equipment. Place used disposable syringes and needles, scalpel blades and other sharp items in a puncture-resistant container with a lid that closes and is located close to the area in which the item is used. Take extra care when cleaning sharp reusable instruments or equipment. Never recap or bend needles. Sharps must be appropriately disinfected and/or destroyed as per the national standards or guidelines.

5. Cleaning of the hospital environment

Routine cleaning is important to ensure a clean and dust-free hospital environment. There are usually many micro-organisms present in "visible dirt", and routine cleaning helps to eliminate this dirt. Administrative and office areas with no patient contact require normal domestic cleaning. Most patient care areas should be cleaned by wet mopping. Dry sweeping is not recommended. The use of a neutral detergent solution improves the quality of cleaning.

Hot water (80°C) is a useful and effective environmental cleaner. Bacteriological testing of the environment is not recommended unless seeking a potential source of an outbreak. Any areas visibly contaminated with blood or body fluids should be cleaned immediately with detergent and water.

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

6. Management of Healthcare Waste

i) Uncollected, long stored waste or waste routing within the premises must be avoided.
ii) A sound waste management system needs to be developed and closely monitored.

Additional Precautions (transmission- based)

Additional (transmission-based) precautions are taken while ensuring Standard Precautions are maintained. Additional precautions include:

1) Airborne precautions
2) Droplet precautions
3) Contact precautions

Isolation Procedures

Isolation for the control of infection (Infection Control Measures Against Viral Infections) is used

to prevent infected patients from infecting others (source isolation), and/or prevent susceptible patients from being infected (protective isolation). The **methods** of physical protection are:

a. Barrier nursing - special nursing procedures which reduce the risks of person to person transmission, especially by direct contact or by fomites.

b. Segregation into single rooms, cubicles, or plastic isolators - which reduces airborne spread to and from patients, and facilitates nursing techniques.

c. Mechanical ventilation - which reduces the risks of airborne spread by removing bacteria from the patient's room and by excluding bacteria present in the outside air from the room.

The transfer of infection by the airborne route can be controlled only by confining the patients in a single room, whether source or protective isolation. On the other hand, diseases spread by contact such as enteric fever, depends primarily on barrier nursing. The term isolation is commonly used in the sense of segregation of the patient in a single room. Barrier nursing is one of the basic components of patient isolation and can be used on its own or together with the other components. There are various **types of isolation** offering different **degrees of protection**;-

a. **High security isolation units:** These are usually part of an infectious diseases hospital. Total environmental control is usually achieved by the use of negative pressure plastic isolators. These units are designed for treating viral pathogens such as Lassa, Marburg, and Ebola fevers.

b. **Infectious diseases hospitals**: These units are usually separate from other hospitals but may be situated in the premises of a general hospital with separate ventilation and nursing staff.

c. **General hospital isolation units**: These provide source isolation facilities for hospital-acquired infections; they also provide facilities for protective isolation and for the screening of patients with suspected infections before admission to a general ward or transfer to a communicable diseases unit.

d. **Single rooms of a general ward**: These provide less secure source isolation than the above because of the close proximity to other patients and sharing of nursing and domestic staff with a general ward. Their value in protective isolation depends on the type of patient in the general ward, on the thoroughness of barrier nursing, on whether the room is self-contained (with WC), and on the type of ventilation used.

e. **Barrier nursing in open wards**: This can be effective in controlling infections transferred by contact but not by air.

f. **Isolators in open wards**: Plastic enclosures for individual patients have been shown to be of value as a form of protective isolation for high risk patients and of source isolation for infected patients.

g. **Ultra-clean wards**: Experimental units have been set up in specialized centers for organ transplantation, treatment of leukaemia and other diseases associated with extreme susceptibility to infection.

IND.85 THE HOSPITAL HAS A MULTI-DISCIPLINARY INFECTION CONTROL COMMITTEE.

Notification of Infection Control Committee

To provide a forum for multidisciplinary input, cooperation, and information sharing, the Management of the HCE must notify the Infection Control Committee (ICC) with its Composition and Responsibilities as given below;

i. Wide representation from the relevant departments: e.g.
   a. Management (Medical Superintendent/Administrator or AMS/DMS)
   b. Medical Specialist
   c. Surgical Specialist
   d. Microbiologist
   e. Operation theatre in-charge
   f. Infection Control Nurse
   g. Pharmacist
   h. In Charge CSSD
   i. In Charge Maintenance
   j. In Charge Catering
   k. In Charge Housekeeping
   l. In Charge Sanitary services
   m. Bio-Medical/Civil Engineer
   n. In Charge Training

ii. One member of the committee should be elected as the chairperson (who should have direct access to the head of the hospital administration, to promote program visibility and effectiveness).

iii. Must meet regularly on Quarterly basis.

iv. In case of an emergency, such as on an outbreak of disease, this committee must be able to meet earlier than quarterly on emergent basis.

v. Appoint an ICP (healthcare worker trained in the principles and practices of infection control, e.g. a doctor/physician, microbiologist or a nurse) as secretary.

vi. Secretary of the ICCwill be responsible for taking notes and preparingminutes of each meeting and reminding the Chairpersonto follow up on the recommendations.
vii. Oversee, monitor and evaluate the performance of the IC program and team.
viii. Enforce compliance with basic IC standards.
ix. Review and approve a yearly program of activity for surveillance and prevention.
x. Assess and promote improved practice at all levels of the health facility.
xi. Ensure appropriate staff training in IC and safety management, provision of safety materials such as PPE and products.
xii. Oversee training of health workers.
xiii. Oversee the development of facility specific IC manual, if needed.
xiv. Review epidemiological surveillance data and identify areas for intervention.

IND.86 THE HOSPITAL HAS AN INFECTION CONTROL TEAM.

Notification of Infection Control Team

i. An IC team will be put together with responsibility for the day-to-day activities of the IC program. Ideally 2 members (Infection Control Officer [ICO] and/or Infection Control Nurse[ICN]) should suffice as IC Team Leader 1 and 2 for most facilities although in smaller facilities this could mean a single person (part or full time) with additional IC responsibilities. These professionals may be administratively part of another unit (e.g. a microbiology laboratory, medical or nursing administration, public health services). The optimal structure shall include one Ward Nurse or other suitably trained Paramedic from each ward/department, sanitation staff and waste disposal staff but it will vary with the type, needs, and resources of the facility.
ii. The In-Charge ICO/ICN is required to enforce approved ICpractices directly by the ward/departmental staff as needed and enjoy a direct daily/incidental reporting relationship with senior administration.
iii. The team is responsible for the day-to-day functions of IC, as well as preparing the daily/monthly/quarterly/yearly work plan for review by the ICC and administration.
iv. These teams/individuals should be notified/put on rosters by the HCE and should have scientific and technical support/responsibilities, e.g. surveillance and research, developing and assessing policies and practical supervision, evaluation of material and products, overseeing sterilization and disinfection, ensuring the sound management of medical waste and the implementation of training programs.

HCEs must have access to specialists in IC, epidemiology, and infectious disease, including physicians and infection control practitioners. Often this would mean that such access may be

arranged so that these resources are available at district or provincial levels in resource constrained situations.

IND.87 THE HOSPITAL HAS DESIGNATED A QUALIFIED INFECTION CONTROL NURSE(S) FOR THIS ACTIVITY.

Designated Infection Control Officer/Infection Control Nurse

i. The criteria for designating shall be either by qualification or based on training. It is preferable for ICO/ICN to have undergone a short term training program on IC nursing by a recognized institute. The nurse/officer in charge of IC is a member of the ICC and leads the IC Team for ensuring implementation of IC SOPs.

ii. **Responsibilities of ICO/ICN**

a. Develop/adapt and get IC Manual endorsed.
b. Disseminate SOPs of IC based on the IC Manual.
c. Coordinate and conduct training activities related to IC.
d. Enforce minimum IC standards.
e. Identifying and Investigating nosocomial infections.
f. To collaborate with the microbiologist on surveillance of infection and detection of outbreaks due to improper sterilization of instruments.
g. To liaise between Sterilization Department and clinical departments for detection and control of Hospital Acquired Infection (HAI).
h. Carry out the surveillance program and monitor and manage critical incidents.
i. Ensuring compliance with local and national regulations.
j. Liaison with public health and with other facilities where appropriate.
k. Providing expert consultative advice to staff health and other appropriate hospital programmes in matters relating to transmission of infections.
l. Compile periodic (at least 3 monthly) reports of hospital infections.
m. Report directly to the MS or Hospital Administrator and the ICC.

IND.88 THE ESTABLISHMENT HAS APPROPRIATE CONSUMABLES, COLLECTION AND HANDLING SYSTEMS, EQUIPMENT AND FACILITIES TO MANAGE THE CONTROL OF INFECTION.

Resources/Facilities for Infection Control[41]

Requirement of various materials will depend on the workload of the healthcare facility. The calculation of the daily requirement of gloves, gowns, masks, etc., helps in organizing the everyday logistics, and annual planning.

An example to this calculation is given as follows:

Table 16: Calculation of Materials

Disposable Gloves		
Number of staff using gloves	S =	
Average number of gloves pairs used per staff per day	Id =	
Total number of gloves pairs used daily	Sd =	Sd = S × Id
Disinfectants		
Number of locations that need disinfectants	S =	
Average amount (*nos. or litres*) of disinfectants used per location per day	Id =	
Total amount (*nos. or litres*)of disinfectants used daily	Sd =	Sd = S × Id

Some general considerations are given below:

i. Use of protective clothes, shoes, gloves and masks has been described in **Indicator No. 84**.
ii. Gloves should be worn when handling bedpans and urinals. The contents should be disposed of directly into the sluice or bedpan disinfector. The bedpan or urinal should then be heat disinfected and dried. A bedpan washer/disinfector and a high temperature washing-up machine should be available in the ward.
iii. All clinical waste should be disposed of in a colour-coded bag for incineration.
iv. Disposable or autoclavable equipment should be used whenever possible. Essential items of patient care such as sphygmomanometers and stethoscopes should be left in the room and disinfected when the patient is discharged or before being used on another patient. Hard surfaces may be disinfected by wiping with a phenolic or hypochlorite solution. Other equipment may be disinfected by wiping with 70% alcohol.

[41] National Guidelines on Injection Safety, Device Control and Hospital Waste Management, 2008

Sphygmomanometer cuffs may be disinfected by low temperature steam. Thermometers should be kept in the isolation room until the patient is discharged.

v. Needles and syringes should be disposable and placed in a hardened container which is sealed before disposal.

vi. Linen from infected patients should be placed in a colour-coded linen bag for transfer to the laundry. Linen which may present a hazard to the laundry staff e.g. hepatitis B should first be sealed in labelled bag.

vii. Disposable items may be used when a dishwasher heating the items to over 80°C is not available. Food should be placed in polythene bags and discarded with ward waste.

viii. **Immunization** against Viral hepatitis and Tetanus is recommended for all personnel handling waste and infectious material with Hepatitis B vaccination/immunoglobulin if a hospital employee has not been vaccinated against Hepatitis B.

a. Hep. B results show insufficient antibodies, Hep . B immunoglobulin must be administered within 72 hours.

b. If sufficient antibodies are present, a Hep . B vaccination booster will only be required.

c. A Tetanus injection will be required if not received within the last 5-10 years.

d. HIV/Hep. C results must be collected (in person) within 7 days.

i) Follow-up blood tests (after 1st initial blood test)

ii) Further blood tests will be required for

e. Hepatitis B 3 months after injury (titer levels)

f. Hepatitis C 3 months after injury, then 6 months

g. HIV 3 months after injury, then 6 months

IND.89 ALL STAFF INVOLVED IN THE CREATION, HANDLING AND DISPOSAL OF MEDICAL WASTE SHALL RECEIVE REGULAR TRAINING AND ONGOING EDUCATION IN THE SAFE HANDLING OF MEDICAL WASTE.

Training in Safe Handling of Medical Waste

Health administrators should be oriented towards the importance of the IC program. Healthcare workers should be equipped with requisite knowledge, skills and attitudes for good IC practices. The ICC should:

i. Assess training needs of the staff and provide required training through awareness programs, in-service education and on-the-job training.

ii. Organize regular training programs for the staff for essential IC practices that are appropriate to their job description.
iii. Provide periodic re-training or orientation of staff.
iv. Review the impact of training.

All staff who work in areas where infectious waste is handled, is trained on the hazards of waste, management of waste and IC. All staff shall be trained in and use procedures for different types of waste;

a. Collection
b. Segregation at source
c. Storage
d. Transportation

Hospital waste in Pakistan is regulated by the Hospital Waste Management Rules, 2005. According to the rules, every hospital shall be responsible for the proper management of the waste, through developing a **'Hospital Waste Management Plan'**. The plan will be facility specific, containing a list of activities, quantity of required materials with cost and a timeline. Development of the plan is the responsibility of **Waste Management Officer** (a designated member of the Hospital Waste Management Team (WMT), with details given under the relevant Section. The plan will be reviewed and finalized by the Hospital WMT and should aim to:

1. Protect public health and safety.
2. Provide a safer working environment.
3. Minimize waste generation and environmental impacts of waste treatment/disposal.
4. Ensure compliance with legislative requirements.

STANDARD-15. HIC-2: THERE ARE DOCUMENTED PROCEDURES FOR STERILIZATION ACTIVITIES IN THE ORGANIZATION.

IND.90 THERE IS ADEQUATE SPACE AVAILABLE FOR STERILIZATION ACTIVITIES.

Documented Layout and Processes

i. The definition of 'adequate' includes enough space (or at least physical barriers) to ensure separation of 'clean' and 'dirty' considering the workload. The defined Sterilization department/area should have provision to physically separate the functions of cleaning, processing, sterile storage and distribution. This includes suitable location, proper layout and separation of clean and dirty areas. Sufficient space as recommended by the Original Equipment Manufacturer (OEM) shall be available to ensure that the activities can be performed properly. It is preferable to have separate areas for receiving, washing, cleaning, sterilization, packing, sterile storage and dispatch. This entire layout is required to be documented and displayed like a Layout Map.

ii. Each HCE needs to develop a programme for the implementation of good IC practices. ICC, besides other functions, also oversees the provision of **sterile supplies** to the Facility.

iii. A **CentralSterilization Services Department** (CSSD) is vital for an effective Infection Control and Prevention program. The expertise and knowledge of CSSD personnel is important to ensure high standards of sterilization. CSSD typically comprises of four major areas to accomplish the functions of sterilization; collection/washing/packaging, sterile processing, sterile storage, and sterile distribution.

In the disinfection area, reusable equipment, instruments, and supplies are cleaned and disinfected using manual or mechanical cleaning processes and chemicals.

From the washing area, clean items are moved to the assembly/packaging area. Instruments and OT linen are then packed with indicators, sterilized in the sterilization section, stored and issued/dispatched. The sterile packs should be stored in well ventilated clean stores ready for dispatch to the wards and OT. Collection should be regular and there should be a written record of receipt and delivery. This helps to monitor the use and the loss of instruments.

iv. **Layout of the CSSD**

Ideally, physical barriers should separate dirty and clean areas in the reprocessing room. However, if this is not possible due to shortage of space or funds, the same room can be used with partitions, provided that:

a. The air moves from the clean area to the dirty area to avoid cross-contamination.

b. Both areas have separate storage facilities.

c. There are adequate hand disinfection facilities.

d. SOPs are established to ensure that soiled objects never cross paths with clean, sterilized, or high-level disinfected instruments and other items.

e. The doors are kept closed in the reprocessing rooms in order to minimize dust contamination and to eliminate insects.

f. There is separate equipment for each area.

g. The staff works in either area, never in both.

Figure No. 21

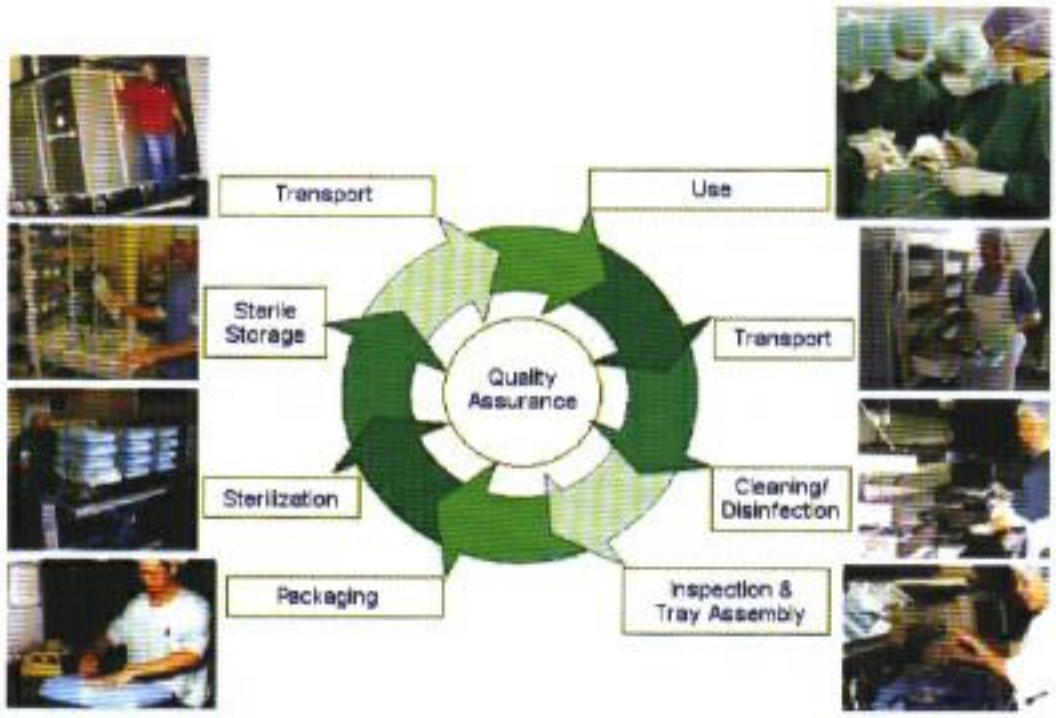
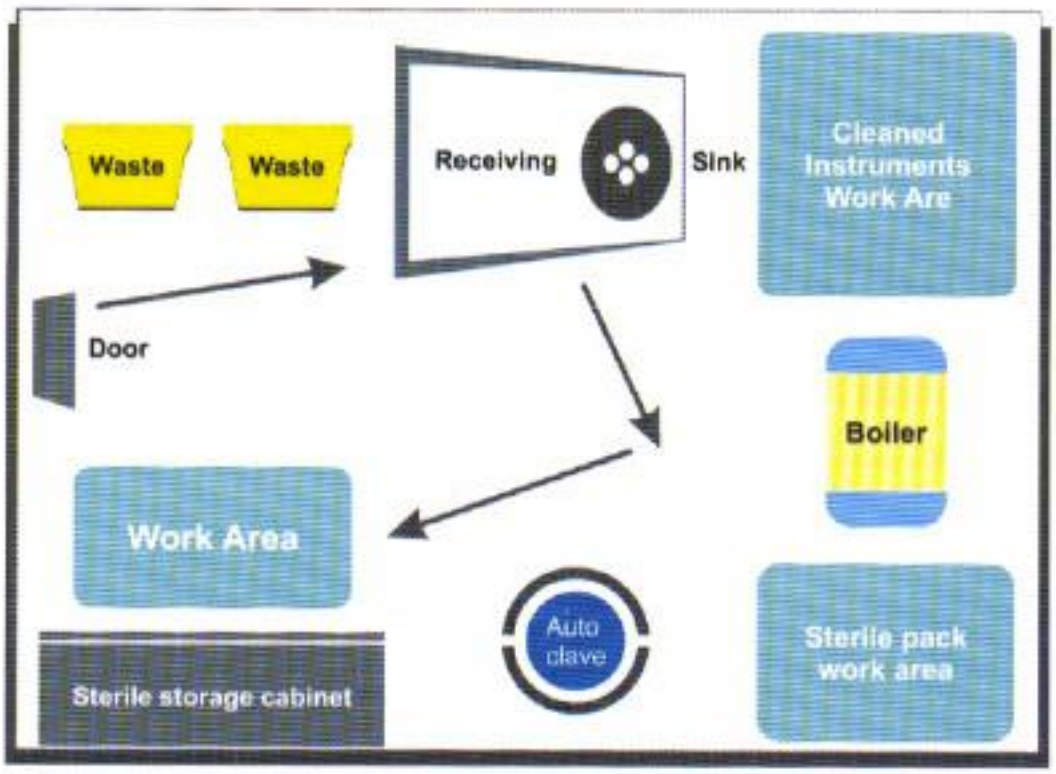


Figure No. 22



Workflow of the CSSD - in the ward, dirty re-usable instruments are collected and put into clearly labelled containers and delivered to the CSSD. Cotton wool and dressing should be discarded as clinical waste for incineration. The dirty instruments are then received in the dirty area of the CSSD. All equipment is first washed in hot water and detergent either mechanically or manually. Manual washing requires the use of appropriate protective clothing such as heavy-duty gloves, plastic aprons, and eye-protection. The equipment is then inspected for cleanliness and damage. Instruments are then packed into individual trays for ward use and autoclaved and/or disinfected as required. The packaged trays are then inspected to ensure that they are dry and then sorted for ward collection. The sterile packs should be stored in well-ventilated rooms ready for dispatch to the wards. Collections should be regular and there should be a written record of receipt and delivery.

Disinfection/Sterilization of Instruments

It is mandatory for healthcare workers to disinfect soiled medical instruments before using them on other patients. Sterilization of medical instruments prevents the spread of infectious diseases and is the first sterilization process to protect patients from contaminants like HIV and Hepatitis C that can live on instruments. Liquid bleach, as well as isopropyl and ethyl alcohol, are extremely effective in disinfecting medical instruments if a hospital grade germicidal cleanser is not available.

SOPs for Disinfection

1. Place your washbasins and supplies in a cleaning station or utility room. Decide which chemical you will use to disinfect the medical instruments - germicidal spray, liquid bleach or alcohol. These are all highly effective disinfectants and the medical community approves of them.

2. Put on your protective wear - gloves, goggles, mask and apron. Gloves should be the heavy-duty utility style for handling sharp instruments like scalpels and knives. Dispose of gloves and use a new pair if they tear during the disinfecting process.

3. Spray each individual instrument heavily with germicidal spray and disinfect one piece at a time. Allow each item to stay for two minutes in the washbasin. Place the instruments into a separate basin of clean water to rinse. Dried blood or fluids on instruments may require an additional application of germicidal spray and light scrubbing with a toothbrush for removal.

4. In case of liquid bleach, mix one ounce of bleach with one quart of boiled water in a washbasin and add the soiled medical instruments. Allow the instruments to stay in the bleach solution for five minutes to kill any infectious organisms. Remove the instruments and check for any remaining blood or fluids. Use a

toothbrush to remove any visible contaminants left on the instruments and rinse the instruments with clean water in a separate basin.

5. In case of using isopropyl or ethyl alcohol, place the soiled instruments in the washbasin, pour alcohol into a spray bottle and spray the instruments thoroughly. Use a toothbrush to remove any dried fluids. Apply more spray and scrub vigorously if the contaminant is still visible on the object. Place the instruments into another basin and rinse with clean water.

Cleaning Instruments with Sterile Water

While using medical equipment or instruments that need to be sterilized for safety and disinfection, use a solution of sterile water to ensure that all bacteria and viruses are killed and eliminated from the instrument or the tool. Using a mix of enzymatic detergent and sterile water can assist you in effectively cleaning and eliminating unwanted microbes from surgical and medical tools and equipment.

SOPs for Cleaning Instruments with Sterile Water

1. Remove debris and residue from the instruments by rinsing them under sterile water and using a toothbrush or other scrubbing tools.
2. Mix proper amounts of sterile water and enzymatic detergent in a clean container large enough to hold the instruments. The proper ratio of enzymatic detergent and sterile water will be determined and followed as per manufacturer instructions
3. Place the instruments in the container with the enzymatic detergent and sterile water formula, making sure that they are fully covered by the solution.
4. Soak the tools in the solution for 20 minutes to effectively sterilize the instruments before reuse.

IND.91 REGULAR VALIDATION TESTS FOR STERILIZATION ARE CARRIED OUT AND DOCUMENTED.

Record of Validation Tests

Documented processes/procedures should be there to provide guideline for complete sterilization. This should be uniformly done on each "batch" that is sterilized. There are several methods that can be used (such as colour change strips). Every method used must be documented and effective. The date of sterilization and expiry are clearly indicated on the packaging. This should be done by accepted methods, e.g., bacteriologic, strips, etc.

Engineering validations like Bowie Dick tape test and leak rate test need to be carried out. WHO recommends each load to have number, content description, temperature, pressure and time-record chart, physical/chemical tests daily, weekly biological tests and steam processing.

IND.92 THERE IS AN ESTABLISHED RECALL PROCEDURE WHEN BREAKDOWN IN THE STERILIZATION SYSTEM IS IDENTIFIED.

Breakdown Recall

The HCE should develop and have a written recall procedure and the staff members should be trained on these procedures. The HCE shall ensure that the sterilization procedure is regularly monitored and in the eventuality of a breakdown it has a procedure for withdrawal of such items. A batch processing system with date and machine number for effective recall should be in place.Whenever a breakdown in the sterilization system is noted, all packs sterilized by the faulty machine should immediately be called back from the respective area where the sterile packs has been supplied. The packs called back should be sent for re-sterilization using a proper machine/technique.

The ICC shall ensure that institutional policies are consistent with provincial/national guidelines (if existing) and conduct IC audit periodically (e.g., at least monthly in areas where materials are reprocessed to ensure policy compliance). Breaches in policy should be documented and corrective action instituted.