Essentials of HOSPITAL INFECTION CONTROL

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HOSPITAL INFECTION CONTROL PROGRAM[1,2]

Healthcare-associated infections (HAIs) are increasingly recognized as a major cause of morbidity and mortality worldwide. Therefore, in order to provide safer environment for its patients and personnel, every healthcare facility must adopt "**infection control program**" as a part of the patient safety and quality improvement program of the organization.

An effective hospital infection control program would have the following components:

- Hospital infection control committee (HICC) with defined composition and function
- Hospital infection control manual with policies, guidelines, recommendations, and working protocols including activities and practices under the program
- Antimicrobial stewardship program (AMSP)
- Ongoing educational programs for all healthcare workers (HCWs) in the use of such policies and guidelines
- Annual budget for implementation of infection control measures in the hospital.

The administrative arrangements for infection control will vary in different countries, but most will include an infection control officer (ICO), an infection control nurse (ICN), and a HICC.

HOSPITAL INFECTION CONTROL COMMITTEE[1,2]

Hospital infection control committee (HICC) is an integral component of the healthcare facility, which is responsible for establishing and maintaining infection prevention and control, its monitoring, surveillance, reporting, research, and education related activities.

HICC Composition

HICC should include wide representation from all relevant disciplines or departments in the healthcare facility **(Box 2.1)**. Important members are:

- **Chairperson:** The committee is headed by its chairperson, who is the hospital administrator such as medical superintendent or medical director or a person who has direct access to the head of the hospital.
- **Member secretary:** Head of the Department of Microbiology or a senior physician usually acts as member secretary of the committee.
- **Infection control officer (ICO):** ICO is either a clinical microbiologist or an infectious disease physician or any physician working fulltime in infection control. In small hospitals, where only one clinical microbiologist is available, ICO can also act as a member secretary.

Box 2.1 Composition of hospital infection control committee (HICC).

Administrative control

- *Chairperson:* Medical superintendent or medical director
- *Member secretary*: Head, Department of Microbiology

Hospital infection control team (core committee)

- *Infection control officer (ICO):* Clinical microbiologist or infectious disease physician or physician of any specialty
- Infection control nurses (ICNs)
- Infection control laboratory technician
- Data entry operator

Other members

- Head of all clinical departments
- Officer in-charge, nursing section
- Officer in-charge, biomedical waste management
- *Support services:* Officer in-charges of:
  - Operation theatre complex
  - Central sterile supply department (CSSD)
  - Linen and laundry department
  - Housekeeping or sanitary department
  - Kitchen department
  - Pharmacy department
  - Engineering department
  - Store or material department

- **Infection control nurses (ICNs):** ICNs are specialty nurses who are at the forefront of HICC in implementing infection control measures at ground level. The ICN is the link between the HICC and the wards or intensive care units (ICUs), etc. in identifying problems and implementing solutions.

Hospital Infection Control Team

Hospital infection control team (HICT) is the functional unit of HICC. It represents the core committee members [such as ICO, hospital infection control nurses (ICNs), technician, and data entry operator], who actually performs the various functions of HICC (refer below) at ground level and implement the infection control program in the hospital.

They are responsible for the day-to-day functioning of the infection control program, and also for setting priorities, applying evidence-based practice, and advising hospital administrators on issues relating to infection control.

Functions of HICC[1,2]

The HICC supervises the implementation of the hospital infection control program. The various functions of the committee include:

- **Healthcare-associated infection surveillance:** Maintains surveillance of various HAIs. The four key parameters used for HAI surveillance are as follows (for detailed description refer chapter 4):
  1. CA-UTI (catheter-associated urinary tract infection)
  2. CLABSI (central line-associated bloodstream infection)
  3. VAP (ventilator-associated pneumonia)
  4. SSI (surgical site infection).
- **Develops a system** for identifying, reporting, analyzing, investigating, and controlling hospital-acquired infections.
- **Antimicrobial stewardship program (AMSP):** Develops antibiotic policies, monitors the antibiotic usage, advises the Medical Superintendent on matters related to the appropriate use of antibiotics, and also recommends remedial measures to prevent spread of drug resistant nosocomial pathogens (for detailed description refer chapter 19).
- **Education:** Conducts teaching sessions for HCWs regarding infection control practices. Both induction training at the commencement of job and periodic training annually or biannually must be provided to all HCWs. Formal assessment must be conducted at the end of the session to ensure adequate delivery of training programme.
- **Staff health:** Monitors employee health activities regarding matters related to needle stick injury prevention, hepatitis B vaccination, etc.

- **Outbreak management:** Develops strategies to identify infectious outbreaks, their source and implements corrective and preventive measures.
- **Other departments:** Communicates and cooperates with other departments of the hospital with common interests such as—pharmacy, central sterile and supply department (CSSD), linen and laundry department(s), antimicrobial stewardship committee, and biomedical waste management.
- **Reviews** risks associated with new technologies, and monitor infectious risks of new devices and products, prior to their approval for use.
- **Prepare the manual** for hospital infection control as well as antimicrobial guideline and review and update hospital infection control policies and procedures from time to time.
- **HICC meeting:** HICC should take an active lead in organizing HICC meeting, with all committee members under the chairmanship of medical superintendent.

Hospital Infection Control Committee Meeting[1,2]

The HICC shall meet regularly not less than once a month and as often as required. However, in an emergency (such as an outbreak), this committee must be able to meet promptly.

- Hospital infection control team should take a lead in conducting the meeting. The circular should be sent to all the members at least a week prior via mail or letter with a reminder alert on the day of meeting.
- Infection control officer shall present the monthly report of HICC pertaining to various activities of HICC such as educational and training sessions conducted, HAI surveillance, needle stick injury report, hand hygiene audit report, care bundle report, etc. The key problem areas are identified and discussed.
- A review of last meeting and implementation of action plan shall also be carried out.
- The minutes of the meeting should be documented with clear action points and responsibility to implement on the medical or nursing or operational personnel.

Responsibility of Various Stakeholders[1,2]

Hospital Administration

The hospital administration has a major role in implementing infection control program and must provide leadership in initiating the activities. Responsibilities of the hospital administrators include:

- Establish a multidisciplinary HICC
- Provide adequate resources, support, and managerial back-up to HICC, so that the infection prevention program can be implemented effectively
- Ensure availability of appropriate infrastructure, financial, and human resources
- Ensure availability of hand hygiene products, personal protective equipment (PPE), disinfectants, etc.
- Approve and review policies and guidelines for infection control practices formulated by the HICC
- Promote educational and training activities for all categories of HCWs. Administrators have a legal obligation to ensure that all their staff are appropriately trained and educated on various infection control activities pertaining to their work
- Establish antibiotic stewardship program
- Establish HCWs safety program such as staff immunization, and needle stick injury management including postexposure prophylaxis.

Infection Control Officer (ICO)

The ICO can either be a clinical microbiologist or an infectious disease physician or any physician working fulltime in infection control. In small hospitals where only one clinical microbiologist is available, he can act

as both member secretary and ICO. He takes the overall responsibility for the activities of HICT and reports directly to the member secretary and chairman of HICC.

- Regardless of their professional background, the ICO should have knowledge and experience in clinical and diagnostic microbiology, infectious disease, hospital epidemiology and surveillance, disinfection, and sterilization practices.
- **Requirement:** It is recommended that at least one ICO doctor is required for every 1,000 beds. However, this may vary greatly depending on their role and responsibility in the organization and type of healthcare facility.

Duties of ICO

The followings are the duties of ICO.

- Involves in meticulous planning and implementation of infection control measures such as hand hygiene, care bundle, appropriate use of PPE, etc.
- Supervises the HAI surveillance activities—both data collection and analysis.
- Plays active role in investigation of outbreak with consultation from clinical and Microbiology department.
- Conducts research activities related to infection control practices such as hand hygiene.
- Supervises the activities of department of biomedical waste.
- Acts as the nodal officer for management of needle stick injury and other occupational exposures.
- Ensures implementation of safe work practices in all healthcare service sectors including laboratory.
- Ensures immunization of all HCWs (hepatitis B and influenza) as recommended by institutional policy.
- Formulate and implement guidelines for sterilization of equipment and instruments (CSSD policy), disinfection policy including housekeeping policy, and then updates it periodically.
- Involves in drawing up annual plans, policies, and long-term programs including educational and surveillance activities for the prevention of HAIs.
- Conducts regular surveys and surprise visits to objectively monitor ongoing implementation of all infection control measures.
- Performs antimicrobial resistance (AMR) surveillance and disseminates cumulative and stratified antibiogram.
- Actively participate in implementing AMSP and also coordinates formulation of antibiotic policy.
- Assists in the preparation of annual budget and tender document for other support services.
- Periodic review of infection control manual.

Infection Control Nurse

An ICN is a registered nurse with an additional academic education and practical training in infection control, clinical and diagnostic microbiology, epidemiology, and computer technology.

- They should undergo competency assessment tests at the beginning and then periodically to continually expand on their existing knowledge, understanding, and skills.
- **Requirement:** It is recommended that at least 0.8–1.0 dedicated fulltime ICN is required per 100 beds in acute-care centers and one per 150–250 beds in long-term care facilities.

Duties of ICN

The duties of ICNs include the following.

- ICN is the bridge between the HICC and hospital wards and ICUs. He or she goes on rounds and visits all hospital locations and monitors the compliance of HCWs to infection control measures in the hospital; identifies problems associated and implements the appropriate measures after discussing with ICO.
- Performs data collection for HAI surveillance, hand hygiene audit, care

bundle audit, PPE audit, etc. by performing daily visits to ICUs and wards.
- Oversee the implementation of transmission-based precautions wherever necessary.
- Monitors the implementation of disinfection policy at the hospital.
- Identifies the high-risk areas for conducting environmental surveillance.
- Involves in education of HCWs and patients.
- Provides postexposure prophylaxis for needle stick injury exposures. They also maintain registers and data on needle stick injuries.
- Conducts or oversees staff vaccination program for hepatitis B, influenza, etc.
- In certain healthcare facility, ICNs are also involved in conducting antimicrobial stewardship activities.

Infection Control Link Nurse

If adequate ICNs are not available, then the existing nursing staff working in ICUs can be trained so that they can be part-time engaged in monitoring infection control activities of their concerned ICUs.
- It has been shown that competent infection control link nurses can motivate ward staff by enabling more effective practice.
- This practice can be very much useful, provided the link nurses are adequately trained and backed up by a strong infection control team.
- However, lack of adequate training, frequent turnover of nurses, lack of recognition of their role, and bias during observation (as they are evaluating their own ICU) are the problem areas, which need to be addressed while implementing link nurses program.

Infection Control Laboratory Technician

Infection control technician bears the following responsibility.
- Conducts air and surface surveillance culture from operation theatre (OT), ICUs, and other high-risk areas—involves in drawing the schedule (annual calender as well as on request) for collecting the specimen, and processing and identification of the cultures.
- Performs water surveillance to test the quality of water of hospital campus.
- Performs endotoxin detection assays for dialysis water and medical equipment such as endoscopes.
- Conducts rapid diagnostic tests for blood borne viruses in cases of needle stick injury.
- Performs bacteriological screening of breast milk collected from milk bank.
- Conducts staff and/or patient surveillance for methicillin resistant *Staphylococcus aureus* (MRSA) and other multidrug-resistant organisms (MDROs).
- Carries out disinfectant testing when indicated.

MEDICOLEGAL ASPECTS OF HAI[1,2]

The HAIs are a major challenge in public health systems. Medicolegal issues related to HAIs have been increasingly reported in recent years. Both patients and HCWs may raise medicolegal issues pertaining to HAIs.

Patients Acquiring HAIs

The patient suing the hospital in the court of law with regards to medical negligence leading to development of HAI is a common practice in western world. It is also a raising area of concern in developing countries. This is largely because of growing patient awareness which in turn is due to various factors such as easy access through internet, higher baseline education, and public awareness through social media such as Facebook, WhatsApp, Instagram, Twitter, etc.

Therefore, hospitals must have documentation of highest standard of infection control practices. Patient caregivers must be informed about the infection status of the patient at the time of admission, risk involved in acquiring HAI and about progression of the disease process and its prognosis, etc. time to time following admission. They should

be informed that acquiring certain HAIs are inevitable, for example post-operative infection of dirty surgical wounds.

Healthcare Workers Acquiring Infection Following Occupational Exposures

Occupational exposures such as needle stick, sharp, or splash injury are very common in hospital. It is the duty of every hospital to provide a safe working environment to the HCWs. It is observed that HCWs positive for infections acquired by occupational exposure (such as hepatitis B, HIV, etc.) claim the healthcare facility for compensation.

Hospitals should have the following provisions to prevent such situations.

- The hospital should ensure providing immunization to HCWs (for examples, hepatitis B vaccine at the time of joining, annual influenza vaccination, etc.). They should also provide the testing facility to confirm the protective status of HCWs following immunization.
- A designated nodal center should be identified for reporting of occupational exposure, where provision of testing facility and postexposure prophylaxis must be available round the clock.
- Basic education and training on prevention of occupational exposure (e.g. safe injection practices) must be provided to the HCW at the time of joining and also periodically thereafter.
- The nodal center must maintain all the registers of occupational exposures, mentioning the documentation of measures taken. Electronic registers are preferred than manual registers as records may have to be stored for longer periods.

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Essentials of
Hospital Infection Control

Infection Control is an essential component of any healthcare delivery system. In the light of paucity of quality book on infection control in India, *Essentials of Hospital Infection Control* will serve as a platform to guide the medical professionals in mastering infection control.

- **Organization of infection control program in Indian context included**
- **Major HAI types** such as CAUTI, CRBSI, VAP and SSI covered; giving insight into pathogenesis, laboratory diagnosis, treatment and prevention
- **HAI surveillance** elaborated according to patient safety component manual, NHSN-CDC 2019; covering common terminologies, surveillances of CAUTI, CLABSI, VAE (including latest concept of PedVAE) and SSI, and data collection and analysis. Step-by-step illustrations and numerous problem solving exercises included for better understanding of the concept.
- **Standard precautions** such as hand hygiene, personal protective equipment along with detailed elaboration on **transmission based precaution** included
- **Infection control in special situations** or infection type such as transplant units, dialysis units, ICUs, operation theater and outpatient department, autopsy, infection with *C. difficile, M. tuberculosis,* viral hemorrhagic fever, *Legionella*, etc. included
- **Disinfection policy** covering various areas such as Spaulding's classification of devices and HiTouch areas disinfection, housekeeping policy, endoscopy reprocessing, spillage management, reuse of single use device and disinfectant testing
- **Environmental surveillance** (air, water and surface including endotoxin detection method) and **screening for MDROs** included
- Infection control policy at **CSSD** (including sterilization indicators), **laundry and kitchen** included
- **Biomedical Waste Management** covered according to 2016 guidelines with inclusion of 2018 amendment
- Infection control requirement for NABH **accreditation** included
- **Staff health issues** included—needle stick injury (NSI), work restriction and immunization for healthcare professionals including CDC strategies for hepatitis B vaccination
- **Outbreak investigation** included
- **Antimicrobial Stewardship Programme** (AMSP) covering strategies of AMSP, role of **laboratory stewardship**, antimicrobial policy and monitoring of AMSP

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