Chapter-6
Infection Control

Chapter

6 Infection Control

Infection Control Management

Health care associated infections are major burdens for patients, society and health care management. An infection control program is considered efficient which, when used appropriately, restricts the spread of infection among patients and staff in the hospital. Infection control practices are important in maintaining a safe environment for everyone by reducing the risk of potential spread of diseases.

Figure-3: Various aspects of infection control

6.1 Aspects of infection control

6.1.1 Standard Operating Procedure and Checklist for infection control

To prevent hospital acquired infection in patients, visitors and staff, it was required under IPHS to frame standard practices for cleaning and disinfection of patient care areas known as Standard Operating Procedures (SOPs). As per the NHM Assessor's Guidebook a checklist for hygiene and infection control is required to be maintained in each hospital.

"Kayakalp" initiative was launched by the Ministry of Health & Family Welfare on 15 May 2015 with the objectives:

- ***to promote cleanliness, hygiene and infection control practices in public healthcare facilities, through incentivising and recognising such public healthcare facilities that show exemplary performance in adhering to standard protocols of cleanliness and infection control;***
- ***to inculcate a culture of ongoing assessment and peer review of performance related to hygiene, cleanliness and sanitation;***
- ***to create and share sustainable practices related to improved cleanliness in public health facilities linked to positive health outcomes.***

It was observed that SOP for infection control was issued by the Directorate of Health, Government of Uttarakhand. Further, the detailed checklist included in Kayakalp guidelines issued by Ministry of Health and Family Welfare, Government of India for cleanliness, hygiene and infection control at public healthcare facilities was being followed during 2015-19 by the test checked hospitals. The deficiencies noticed in the implementation of the Kayakalp guidelines are given in subsequent paragraphs.

6.1.2 Hospital Infection Control Committee

The role of the Hospital Infection Control Committee (HICC) is to implement the infection control programme and policies. Further, as per Kayakalp guidelines, the committee is required to meet at least once in a month and review the progress made for meeting the criteria for cleanliness and infection control.

It was observed that the HICC of the test checked hospitals did not meet regularly to review and ensure that the facility and the employees complied with the requirements of infection control. Year wise details of review meetings held against minimum required 12 meetings are shown in the **Table-50** given below:

Table-50: Number of meetings held

Year	Number of meetings held					
	DHs		JHs		DFHs	
	Almora	Haridwar	Chamoli	Udham Singh Nagar	Almora	Haridwar
2015-16	Nil	Nil	03	2	7	8
2016-17	2	Nil	06	4	6	5
2017-18	3	Nil	01	4	7	2
2018-19	2	Nil	07	6	3	7

Source: Test checked hospitals.

It was further observed that due to posting of Hospital Managers from the year 2012 in JH Udham Singh Nagar and from 2014 in DFH Haridwar, the position of these test checked DHs improved which was reflected in the six tier assessment carried out under Kayakalp by way of internal-assessment, peer review and external assessment process on various aspects such as Hospital upkeep; Sanitation and Hygiene; Support Services, Waste Management; Infection control; and Beyond hospital.

Year wise rating of the test checked DHs under Kayakalp is given in the **Table-51** below:

Table-51: Rating of Health Care Facilities under Kayakalp

Year	Grading in percent's given by State bodies						Awarded
	DHs		JHs		DFHs		
	Almora	Haridwar	Chamoli	Udham Singh Nagar	Almora	Haridwar	
2015-16	60.60	NQ	74.80	73.40	55.60	**81.40**	50 lakh
2016-17	NQ	NQ	**80.80**	NQ	NQ	85.51	50 lakh
2017-18	NQ	NQ	77.50	**84.50**	NQ	81.30	50 lakh
2018-19	80.00	NQ	83.16	79.00	NQ	**84.50**	50 lakh

Source: Information collected from the test checked DHs.
NQ-Not Qualified.

DH Haridwar and DFH Almora could not qualify for external assessments during 2018-19 as they were not able to meet 70 *per cent* bench mark in peer review which indicates that these DHs were unable to promote cleanliness, hygiene and infection control practices as desired in Kayakalp guidelines.

Positive feature
DFH Haridwar, JH Udham Singh Nagar and JH Chamoli were recognised for performing well in six tier assessment under Kayakalp.

6.1.3 Pest and rodent control records not maintained

As per Kayakalp guidelines, hospitals are required to engage a pest control agency for carrying out pest control activities including anti-termite treatment for wooden furniture and fixtures and maintain records of pest control activities. Hospital boundary wall should be intact (at least 2.5 metres) and cattle traps installed at all entrances and exits of the hospital to restrict entry of stray animals.

Pests and animals are attracted to health facilities in search of food, water, shelter and optimal temperatures and pose a number of health threats through spreading of microbial infections and communicable diseases.

The records of pest and rodent control activities were not maintained in all the test checked hospitals except in JH Chamoli. In the absence of records, audit could not derive an assurance on whether pest and rodent control practices were actually followed in these hospitals. It was further noticed that:

i) Anti-termite protection of wooden furniture was done only by two hospitals[1], however, life of such treatment in DH Haridwar had already expired (October 2018).

ii) Cattle traps were installed in all test checked hospitals except DFH Almora.

Kayakalp guidelines envisage that security personnel also need to be vigilant for any stray animals within the premises. However, several instances of presence of stray dogs and other street animals in the premises were noticed in three out of six test checked hospitals as depicted in ***Photographs-6, 7*** and ***8*** below:

Photograph-6:
JH Udham Singh Nagar

Photograph-7:
DH Haridwar

Photograph-8:
JH Chamoli

[1] JH Chamoli and DFH Haridwar.

In the Exit Conference, Government accepted the facts and stated that clear directions would be issued to the hospitals for effective compliance of prescribed norms.

6.2 Laundry Services

The provision of clean linen is a fundamental requirement for patient care. Incorrect procedure for handling or processing of linen can present an infection risk both to staff and patients who subsequently use it. Hence, linen management is important to prevent Hospital Acquired Infection and ensure a hygienic hospital environment. As per Kayakalp guidelines, the patient's linen including bed sheets and patient gowns need to be changed on a daily basis.

6.2.1 Availability of linen

IPHS prescribe the number of different types of linen[2] facilities that are required for patient care services in hospitals.

In test checked hospitals, audit observed shortage of different types of linen such as bedspreads, hospital workers' OT coat, pediatrics mattress, tablecloths, *etc*. The shortage ranged between seven (29 *per cent*) and 13 (54 *per cent*) against the requirement of 24 different types of linen during 2018-19. Further, seven (29 *per cent*) to 12 (50 *per cent*) types of linen were not at all available in the test checked hospitals during 2018-19. The data is given in **Table-52** and **Table-53** below:

Table-52: Shortage in linen items during 2018-19

	DHs		JHs		DFHs	
	Almora	Haridwar	Chamoli	Udham Singh Nagar	Almora	Haridwar
Shortage in types of linen (out of 24 types of linen required))	9	10	13	11	7	11
Types of linen not available at all (out of 24 types of linen required)	12	9	7	8	10	7

Source: Information collected from test checked hospitals.

Table-53: Linen items not available during 2018-19

DH Almora	Bedspreads, Over-shoe pairs, Patients Pyjama (for female) Shirt, Paediatric Mattress, Leggings, Mortuary sheet, Mackintosh sheet, Apron for cook, Towel, perennial sheets for OT, Hospital workers' OT coat, Tablecloth and Mats.
DH Haridwar	Bedspreads, Leggings, Mats, Mortuary sheet, Abdominal sheets for OT, Mackintosh sheet, Apron for cook, Apron and Tablecloth.
JH Udham Singh Nagar	Bedspreads, Over-shoe pairs, Paediatric Mattress, Leggings, Mortuary sheet, Apron for cook, Hospital workers' OT coat and Mackintosh sheet.
JH Chamoli	Paediatric Mattress, Leggings, Hospital workers' OT coat, Mortuary sheet, Apron for cook, Mats and Tablecloth.
DFH Almora	Bedspreads, Towels, Doctor's overcoat, Leggings, Mats, Mortuary sheet, Tablecloth, Over-shoes pairs. Apron for cook and Mackintosh sheet.
DFH Haridwar	Bedspreads, Leggings, Mortuary sheet, Mats, Apron for cook, Uniform Apron and Tablecloth.

Source: Information collected from the test checked DHs/JHs/DFHs.

[2] Abdominal sheets for OT, Bed sheets, Bedspreads, Blankets (Red and Blue), Doctor's overcoats, Draw sheets, Hospital workers' OT coats, Leggings, Mackintosh sheets, Mats (nylon), Mattresses (Foam) for adults, Mortuary sheets, Over-shoe pairs, paediatric mattresses, Patient's coats (Female), Patient's Pyjamas Shirts (Male), Patna towels, Perennial sheets for OT, Pillows, Pillows cover, Apron for cook, Curtain cloth windows and doors, Uniform/Apron and Table cloth.

On the other hand, it was observed that except in JH Chamoli, the bed sheets[3] were in excess by 59 *per cent* to 101 *per cent* and blankets were in excess by 60 *per cent* to 714 *per cent* in test checked hospitals, indicating that hospitals were procuring bed sheets and blankets in excess while there was shortage of other types of linen items.

6.2.2 Issue of clean linen items

As per the IPHS, laundry facility should be available in the hospitals to provide well washed and infection free linen to patients. Audit scrutiny revealed that daily collection of soiled linen and daily delivery of cleaned linen was not done in test checked hospitals during the period 2014-19. It was further noticed that:

- Bed sheets were not changed on daily basis in any of the test checked hospitals. Further, during physical inspection of wards in the test checked hospitals it was stated by the occupants of the wards that the bed sheets and pillow covers, *etc.* required to be changed on daily basis were changed in two to three days. The patients were thus not provided hygienic and clean bed linen in these hospitals, putting them at risk of further infection.
- Date wise and patient wise records were not kept by test checked hospitals for linen issued to the patients.
- Covered trolleys were not available to carry the linen from wards to laundry in DFH Almora and in DH Haridwar whereas the available covered trolley was not put into use by DFH Haridwar. Non-availability/non-use of covered trolleys increased chances of spread of infection in the two hospitals.

In the Exit Conference, the Government accepted the facts and stated that clear directions would be issued to the hospitals to ensure availability of required items and effective compliance of prescribed norms.

6.2.3 Other shortcomings noticed in washing and storage of linen

As per Kayakalp guidelines, during the process of drying of the linen it is to be ensured that the linen is kept off the ground and away from dust exposure. It was noticed during physical inspection that:

- In two[4] out of six test checked hospitals, the linen was being dried on the surface of ground as depicted in ***Photograph-9*** alongside.

Photographs-9: JH Udham Singh Nagar

[3] Calculated on MNH tool kit guidelines (number of beds x 3).
[4] DH Almora and JH Udham Singh Nagar.

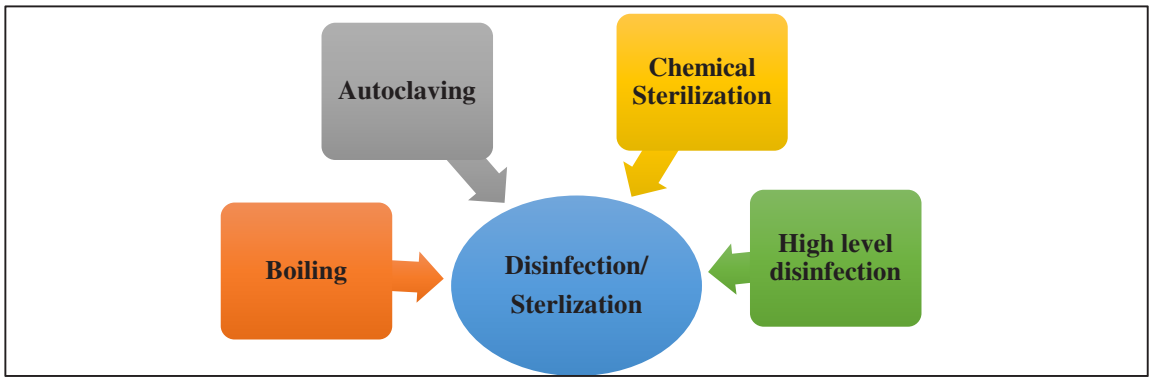
- Washed clothes were not ironed by the contractor in two[5] test checked hospitals.
- There was no proper place to store linen in DFH Almora and JH Udham Singh Nagar in wards.

The facts were accepted by the authorities and it was further stated that necessary instructions would be issued for regular issue of bed sheets and other items.

6.3 Disinfection and Sterilisation

Sterilisation helps to prevent the build-up of bacteria, viruses, *etc*. on the medical tools and reduces the chances of spread of infection in patients undergoing treatment. As per Hospital Infection Control Guidelines of the Indian Council of Medical Research (ICMR), disinfection and sterilisation help prevent the build-up of bacteria/Virus. *etc*. on the medical tools, linen and consumables, and reduce the chances of spread of infection in patients and staff of hospitals. NHM Assessor's Guidebook recommends boiling, autoclaving, high level disinfection (HLD) and chemical sterilisation process for disinfection/sterilisation in the district hospitals.

Figure-4: Various methods of disinfection and sterilisation



Generally, critical instruments/equipment (those surgical instruments penetrating skin or mucous membrane) should undergo sterilisation before and after use; semi-critical instruments/equipment (those in contact with intact mucous membrane without penetration like endotracheal tubes) should undergo high level disinfection before use and intermediate level disinfection after use. Availability of the different methods of disinfection and sterilisation in the test checked hospitals is in the **Table-54** given below:

Table-54: Availability of disinfection and sterilisation procedures (2018-19)

Hospital	Boiling	Chemical Sterilisation	Autoclaving	High level disinfection (HLD)
DH Almora	Yes	Yes	Yes	No
DH Haridwar	Yes	Yes	Yes	No
JH Udham Singh Nagar	Yes	Yes	Yes	Yes
JH Chamoli	Yes	Yes	Yes	Yes
DFH Almora	Yes	No	Yes	No
DFH Haridwar	Yes	Yes	Yes	No

Source: Information collected from test checked hospitals.

[5] DFH Almora and JH Chamoli.

6.3.1 Boiling, Autoclaving and Chemical Sterilisation

Boiling for 10-15 minutes kills bacteria but not viruses and spores are used for sterilisation of syringes, needles, bowls, trays and metallic instruments. On the other hand, autoclaving at 15 lbs pressure for 45 minutes at 121°C kills even spores and viruses[6] is used for blunt metallic instruments; rubber and glass articles; linen and bandages; and non-absorbable suture material. Chemical sterilisation involves immersion in a sterilising chemical liquid for 15 minutes and is used for sharp metallic instruments.

Audit observed that sterilisation through boiling was available in all the test checked hospitals.

Positive feature

Autoclaving was available in all the test checked hospitals. Besides, chemical sterilisation method was available in all the test checked hospitals except DFH Almora.

6.3.2 High Level Disinfection

High Level Disinfection (HLD) is the process of complete elimination of all micro-organisms in or on a device, with the exception of small numbers of bacterial spores.

HLD is used for disinfecting semi-critical devices that come into contact with intact mucous membranes but do not ordinarily penetrate sterile tissue such as endoscopes, laryngoscope blades and respiratory therapy equipment, HLD process was needed to be available in every hospital.

HLD method for disinfection was not used by four out of six test checked hospitals. In the test checked hospitals, autoclaving was, therefore, the chief method of sterilisation.

Positive feature

High Level Disinfection method was available in JH Chamoli and Udham Singh Nagar.

6.3.3 Records of Sterilisation using autoclave

Audit observed the following discrepancies in maintenance of records of sterilisation using autoclaves in three[7] hospitals where this aspect was test checked as given in **Table-55** below:

Table-55: Availability of records of sterilisation using autoclave

Name of the record	Availability of records (out of three hospitals test checked)					Impact of non-maintenance of records
	2014-15	2015-16	2016-17	2017-18	2018-19	
Register of date of Sterilisation	3	3	3	3	3	-
Register of date of return of equipment after sterilisation	3	3	3	3	3	
Records of number of instruments received per pack	0	0	0	0	0	Weakness in monitoring of requisite equipment.
Records of number of instruments sterilised per pack	0	0	0	0	0	As above

Source: Information collected from the test checked hospitals.

[6] As per the provisions laid down in Manual of Laboratory Techniques, National Institute of Communicable Diseases, Directorate General of Health Services, Government of India.

[7] DH and DFH Haridwar and JH Chamoli.

Non-maintenance of the requisite records indicated weakness in monitoring of sterilised equipment. Also, the periodicity of the sterilisation of the equipment could not be ascertained in audit.

6.4 Cleaning services

6.4.1 Housekeeping

The test checked hospitals except DH Almora and DFH Almora[8] outsourced their housekeeping functions to external agencies. It was noticed that Kayakalp checklists were followed by the housekeeping agencies. The following shortcomings were noticed.

Photograph-10: DH Haridwar

- Kayakalp guidelines envisage usage of dust control mops instead of brooms prior to wet mop. However, in all the test checked hospitals, it was found that normal brooms were used by the cleaning staff as seen in the ***Photograph-10*** alongside.

- The Municipal Solid Waste (MSW) generated by hospitals should be segregated into bio-degradable, non-degradable and domestic hazardous wastes as per MSW guidelines 2016 and stored properly in the suitable bins. Further, the used sanitary waste like diapers, sanitary pads, *etc*. are required to be wrapped securely in the pouches and are to be placed in the bin meant for dry waste/non bio-degradable waste.

However, it was found that in two[9] out of six test checked hospitals, the procedure as laid down in MSW guidelines 2016 for disposal of MSW wastes were not being followed. The generated waste was not being segregated and stored properly as is evident from the ***Photographs-11*** and ***12*** given below:

Photographs-11: Waste dumped in front of hospital premise of DH Haridwar

Photographs-12: Waste dumped at Ambulance station, JH Udham Singh Nagar

[8] Contractual Staff and Regular staff.
[9] JH Udham Singh Nagar & DH Haridwar.

- Stray animals were seen moving around the dumped MSW waste in DH Haridwar while bio-degradable waste[10] was being burnt in JH Udham Singh Nagar and JH Chamoli in violation of MSW guidelines as is evident from the ***Photographs-13*** and ***14*** given below:

Photographs-13: Stray animals moving around MSW at DH Haridwar

Photographs-14: Biodegradable waste burnt in JH Chamoli

- During physical inspection, it was noticed that in JH Udham Singh Nagar pathology toilet was in non-usable condition. Further, cleanliness in few areas of JH Udham Singh Nagar and DH Haridwar premise was also not ensured as evident from the ***Photographs-15*** and ***16*** given below:

Photograph-15: Toilet in non-usable condition in JH Udham Singh Nagar

Photographs-16: Area of hospital premise of JH Udham Singh Nagar

During the Exit Conference, the Government accepted the facts and stated that clear directions would be issued to the hospitals for effective compliance of prescribed norms.

6.4.2 Air and surface samples for microbiological survey

NHM Assessor's Guidebook prescribes that the health care facility must have a system to take air and surface samples for microbiological survey to check for infections. Kayakalp guidelines prescribe that routine environmental surface and air sampling should be done in all OTs. If results are not satisfactory, investigation should be done and appropriate corrective actions are needed to be taken.

[10] Tree leaves.

It was noticed that only DFH Haridwar had conducted (July 2016) air sampling in OTs. However, three out of four test checked hospitals had done microbiology surface swab tests in few wings[11] of the hospital. The results of the tests are detailed in the **Table-56** below:

Table-56: Microbiological test results

Tests conducted	DFH	JHs		DH
	Haridwar	Udham Singh Nagar	Chamoli[12]	Haridwar
Pathology laboratory	**Growth**	**Positive**		No test done
Labour room	**Growth**	Negative	**Positive**	
Orthopaedic OT		**Positive**		
General OT	**Growth**		**Positive**	
Minor OT			**Positive**	
NBSU		Negative	**Positive**	
NICU	**Growth**			

Source: Test-reports of hospitals.

The results were, therefore, adverse for Pathology laboratory and Orthopaedic OT in JH Udham Singh Nagar; Labour room, Minor OT, General OT and NBSU in JH Chamoli; and Labour room, General OT, NICU and Pathology laboratory at DFH Haridwar. Apart from this, no reports of any surface/air/hand swab tests were prepared in the test checked hospitals during 2014-19. Audit could not, therefore, derive assurance regarding cleanliness of surfaces/hands of hospital staff in the sampled hospitals.

During the Exit Conference, the Government accepted the facts and stated that clear directions would be issued to the hospitals for effective compliance of prescribed norms.

6.4.3 Fumigation of OT

International Infection Control Guidelines including Centre for Disease control (CDC) do not advocate fumigation[13] practice in OT as all the modern critical parameters required for OT disinfection are in place with a well-equipped Heat Ventilation Air Conditioning[14] (HVAC) system. The HVAC system maintains indoor air temperature and humidity, controls odours, removes contaminated air and minimises the risk of transmission of airborne micro-organisms. The Kayakalp guidelines further state that without HVAC system the quality of air in the OT cannot be guaranteed and, therefore, after fogging, air sampling is to be taken and records of the same are to be kept.

---

[11] DFH Haridwar**-** General OT (July 2016); NICU (August 2016); Labour room, General OT, NICU and Pathology Laboratory (July2018); General OT and Labour room (August 2019); JH Udham Singh Nagar- Pathology Laboratory; Labour room; NBSU &Orthopaedic OT (September 2018).

[12] Two microbiology tests carried by the hospital: General OT (July 2019) and Labour room; OT and NBSU (August 2019).

[13] Fumigation: It is the process by which we can sterilize the enclosed area by spraying chemical usually in gaseous form which will kill or destroy microbes present in the air.

[14] An HVAC system with modern AHU helps to maintain positive air pressure in OT and maintain 15-20 air changes/hour. Use of HEPA filters (to remove particles of size of > 0.3 mm), laminar air flow and UV radiations further helps in maintaining asepsis and infection control.

Examination of records of the test checked hospitals revealed that four test checked hospitals[15] were using fumigation practice while others were using Carbolization[16] disinfection system. None of the hospitals had installed HVAC facility in the OT. Further, records of air samples taken after fogging were not maintained by the hospitals.

6.4.4 Microbiological surveillance report at the instance of audit

NHM Assessor's Guidebook prescribes that the facility must have a system to take air and surface samples for microbiological survey to check for infections. As microbiological survey checks were not conducted regularly by the test checked hospitals as discussed in the ***paragraph 6.4.2***, at the request of audit, four test checked hospitals[17] conducted air and surface swab test in General OT, Eye OT, Labour room, General ward and Pathology laboratory besides hand swab test of nurse and doctor. Reports of these tests revealed that:

- Pathology laboratory (Surface Swab) and General ward (Surface Swab) in JH Udham Singh Nagar had positive results.
- Microbiological surveillance report of Labour room (labour table 1; labour table 2; labour table 3; and suction machine) in DFH Haridwar was unacceptable and sterilisation was termed unsatisfactory.
- Microbiological surveillance report of Eye and General OT in DH Haridwar was reported acceptable but Sterilisation was termed unsatisfactory.
- Microbiological surveillance report of Labour room (labour table and labour rack) of JH Chamoli was reported of having growth in culture in Gram-positive bacteria and Gram Negative Cocco bacillus (GNCB).

In addition to above, it was found that in two[18] out of 6 test checked hospitals, the wards were having moisture[19] and growth of ***Aerobic Spore Bearer staphylococcus aureus*** was detected in the microbiological surveillance report. The authorities stated that necessary action would be taken in this regard.

6.5 Bio-Medical Waste Management

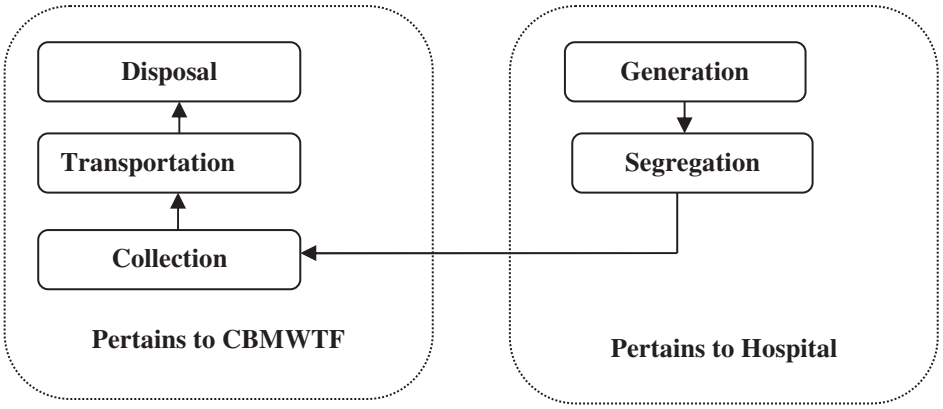
Bio-medical waste (BM waste) is generated during procedures related to diagnosis, treatment and immunisation in the hospitals and its management is an integral part of infection control within the hospital premises. Government of India framed Bio-Medical

---

15 DH Almora, DFH Haridwar, JH Chamoli and DH Haridwar.
16 Carbolization: It is a process of cleaning equipment articles with antiseptic solution.
17 JH Udham Singh Nagar, DH Haridwar, JH Chamoli & DFH Haridwar.
18 DH Haridwar and JH Udham Singh Nagar.
19 Seepage and Moisture in wall was due to discarded material kept on the roof by DH Haridwar. Neither auction of discarded material nor annual maintenance/repairs were done by the DHs/JHs/DFHs.

Waste (Management and Handling) Rules, 1998 under Environment (Protection) Act, 1986, which were superseded by Bio-Medical Waste Management Rules, 2016 (BMW Rules). The BMW Rules, *inter alia,* stipulate the procedures for collection, handling, transportation, disposal and monitoring of the BM waste.

Figure-5: Stages of bio-medical waste management[20]



6.5.1 Generation of bio-medical waste

6.5.1.1 Authorisation for generating bio-medical waste and annual reporting

The BMW Rules require hospitals generating BM waste to obtain authorisation from the State Environment Protection and Pollution Control Board (SEPPCB).

The status of authorisation from SEPPCB is depicted in the **Table-57** given below:

Table-57: Status of Authorisation from SEPPCB

	DH		JHs		DFH	
	Almora	**Haridwar**	**Udham Singh Nagar**	**Chamoli**	**Almora**	**Haridwar**
Authorisation received up-to	March 2017	March 2013	March 2014	September 2018	March 2014	Information not available

Source: Information collected from test checked DHs/JHs/DFHs.

As can be seen from above, none of the hospitals had valid authorisation from the SEPPCB as on 31 March 2019. In five out of six test checked hospitals, the reasons regarding non-renewal of authorisation were not available. In case of DH Haridwar, the SEPPCB stated that the district hospital was not following the BMW Rules and, therefore, no authorisation was granted. Further, the hospital was also penalised (September 2019) for non-adherence to rules.

6.5.1.2 Segregation of bio-medical waste

The BMW Rules require hospitals to segregate and store different categories of BM waste in separate coloured bins at the source of generation for their collection by the Common Bio-Medical Waste Treatment Facilitator (CBMWTF).

[20] CBMWTF-Common Bio-Medical Waste Treatment Facilitator.

Audit observed that the segregation of BM waste in separate coloured bins was done in all the test checked hospitals and disposal by three hospitals was done through CBMWTF whereas three hospitals[21] were using tank for disposal[22]. Further, in respect of liquid chemical waste generated in the hospitals, BMW Rules mandate segregation of the waste at source and its pre-treatment or neutralisation prior to mixing with other effluent generated from hospital. It was observed that in none of the test checked hospitals, an Effluent Treatment Plant (ETP) was established for pre-treatment of BM waste, resulting in drainage of the BM waste directly in the sewerage system, which was not only hazardous to the public health but also violated the BMW Rules. It was noticed that the demand for establishment of ETP had been made by only four out of six test checked hospitals[23].

6.5.1.3 Duties of the occupier

As per guidelines of BMW of 2016, in order to ensure occupational safety of all its health care workers and others involved in handling of biomedical waste, the occupier has to provide appropriate and adequate personal protective equipment[24]; conduct health check-up; ensure protection against diseases that are likely to be transmitted by handling of bio-medical waste; and establish a barcode system for bags or containers containing bio-medical waste that are to be sent out of the premises. Scrutiny of records disclosed the following shortcomings:

- Protective gears/equipment were not provided and used by the bio-medical waste handlers during work.
- Records relating to health check-ups done at the time of induction and at least once in a year for all its health care workers and others involved in handling of bio-medical waste, were not maintained except in DFH Haridwar, JH Chamoli and DH Almora where the procedure was followed partially.
- Immunisation of all its health care workers and others, involved in handling of bio-medical waste was not ensured by test checked hospitals.
- No barcode system[25], for bags or containers containing bio-medical waste that were to be sent out of the premises, was ensured in any of the test checked hospitals.

---

21 DH Almora, JH Chamoli and DFH Almora.

22 BMW guidelines 2016 envisage that the disposal by deep burial is permitted only in rural or remote areas where there is no access to common bio-medical waste treatment facility. This has to be carried out with prior approval from the prescribed authority and as per the Standards specified in Schedule-III. The renewal of authorisation for disposal of BMW was not granted by the SEPPCB to these hospitals.

23 JH Udham Singh Nagar (December 2019) and JH Chamoli (March 2020) had not placed the demand for the establishment of ETP.

24 Gum boots, masks, aprons gloves and head gear.

25 To be ensured within one year from the date of the notification (2016).

- There were no records except in DFH Haridwar and JH Udham Singh Nagar to show that Waste Management Committee meetings were regularly held to review the performance of the waste disposal.
- For disposal of bio-medical waste, chlorinated bags[26] were to be phased out within two years from the date of notification of the BMW Rules 2016 but these bags were still being used by DFH Haridwar and DH Haridwar for disposal of bio-medical waste.

During the Exit Conference, the Government accepted the facts and stated that clear directions would be issued to the hospitals for effective compliance of prescribed norms.

To sum up, *the test checked hospitals, air and surface samples were not regularly taken for microbiological survey to check for infections. Cleaning and laundry services, despite outsourcing, were not of a satisfactory level in most of the hospitals. Similarly, bio-medical waste management was inadequate. None of the test checked hospitals had authorisation from the SEPPCB as on 31 March 2019 for generating bio-medical waste. Protective gears/equipment were not provided and used by the bio-medical waste handlers during work. Thus test checked hospitals lacked an overall environment of infection control.*

[26] Incineration of chlorinated polyvinyl chloride has negative environmental consequences as there is a chance that dioxins, which are carcinogenic in nature, might be released.