Impact Evaluation of Health Care Waste Management

For

Rajasthan Health Systems Development Project (RHSDP)

By:

State Institute of Health and Family Welfare, Jaipur

(An ISO 9001: 2008 Certified Institution)

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Prologue

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The byzantine process of Health care is delivered through a set of innately complex structure of Hospitals and Health centers. Equally knotty are the byproducts of the care which if not handled properly can complement the already existing vast infection pool defying the concerted care efforts and making health facilities hostile.

The care process, if follows the universal precautions can help reduce and restrict the treatable infectious waste in the health facility to a minimum of 10-15% at its maximum which can be easily handled through available technology but with dogged determination on part of every one, particularly with reference to segregation.

A standard definition of this by product-Hospital Waste has been simply missing and often for operational purposes & convenience is referred to as material generated in the process of diagnosis, treatment in the hospitals.

The existing Bio-Medical Waste (Handling & Management) Rules 1998, under the Environmental (Protection) Act, 1986; define Bio-Medical Waste as "any waste generated during diagnosis, treatment, or immunization of human beings or animals or during research activities pertaining thereto or in production or testing of biological and including categories mentioned in schedule I of the rules". With 13 Rules, 6 Schedules and 3 formats the legislation has been provided with enough teeth to dig into the deviations in practices at Health Facility levels and Hon'ble Supreme Court taking a strong cognizance of existing practices did prescribe timelines (between December 31,1999- December 31, 2002) for different level to ensure proper treatment and disposal at all facilities.

The State Health Systems Project in Rajasthan with support from World Bank has seriously taken up the issue of Bio Medical Waste treatment & Disposal in all secondary level health facilities by ensuring Hard and Soft contents (Infrastructure, Logistics, Trainings and IEC) infused into the System.

The project, during its early implementation stage had revealed that there is a larger domain of stakeholders, like regulatory mechanism, waste treatment and disposal units functioning under the PPP model, and necessary involvement of local administration and local bodies. Realizing requirement of inputs from these functionaries at the State, District and local levels, it was well thought of by the project to build a network with all these agencies by building lateral interactions and vertical flow of orders and information. To achieve this RHSDP has taken effort in the following manner:

1. Institutional Capacity Building
2. Coordination with other functionaries (like RPCB, CTF services, engaging professional training agencies)

Institutional Capacity Building

Institutional Capacity Building under the project has attempted by through:

1. Transfer of knowledge and
2. Sharing of experience

For the task of intra – departmental capacity building regarding understanding of this legal requirement, an important function of the health system delivery mechanism; awareness workshops (state, zone & district) were conducted in the early stage of the project.

Since inception of RHSDP, the responsibility for all the aspects of Bio Medical Waste Management / Health Care Waste Management were bestowed by the Department of Medical & Health onto the project. These have been addressed with due earnest and project has always stood upon the requirements, whether in terms of mandate of PIP or going beyond to support in terms of soft skills like,
Development of specifications for procurement of items – state level, arranging issue of orders necessary for internal monitoring and Supervision of the HCWM implementation – at zonal / district level & providing inputs for much needed besides authorization process to be taken up and maintained - at hospital / facility level.

During the implementation process, it was evident that, all the experiences earned by project were effectively & regularly shared with the department of Medical & Health. Major contribution of the District Project Coordinators (DPCs) has been in the form of transfer of knowledge and information besides monitoring of the usage of hardware inputs of HCWM. This effective system was drawn upon by the PIU, RHSDP and sensing this requirement early, the TOT workshop conducted for DPCs had been a good strategic move that has helped in effective implementation.

Coordination with Other Stakeholders:

Another major strategy adopted by the project had been regular interactions with stakeholders other than the Department of M&H, i.e. Department of Environment / RPCB, Local Self Government / DLB for institutionalizing CTF services, and District Administration / DHS, apart from Local bodies / Nagar Nigam.

The above indicated major steps were not visualized in candid manner during the project inception, **however, it is now evident that the vigil and on-going innovations taken up at PIU will take the system implementation and integration of stakeholders a long way ahead.**

The project interventions are largely aligned to the underlined principles -

1. **Improve access, &**
2. **Increase Equity**

Keeping these aspects in mind, and after detailed discussions with the officials of RHSDP, it was decided that in the present study, considering the geo-geographical baptization, the districts should be selected as **Desert, Tribal and Plains.**

As per the requirements from World Bank, it was thriftily visualized by the team at RHSDP to have the impact of all the inputs and efforts made by the project, evaluated by an external agency who could point out the achievements and punctuations hitherto, besides making suggestions for the efforts required henceforth.

The independent evaluation, based on the Inception report submitted by State Institute of Health & Family Welfare was awarded to SIHFW with explicitly laid out scope of work and deliverables.

Under the pretext the said study was conceived, planned and executed by SIHFW, Jaipur.

The Study

The Study

The study, broadly focused on the following objectives-

a. Objectives

(i) Assess the implementation of the HCWM, including the short and medium term measures, in the facilities supported by the Rajasthan Health Systems project;

(ii) Assess the progress of implementation and ascertain reasons for failure to implement;

(iii) Undertake a desk review (aides memoire, special studies, guidelines, protocols, standard operating procedures, IEC materials, evaluations and reports) to track the evolution of the HCWM systems in the state;

(iv) Review the implementation of both the hard (civil works and hospital supplies) and soft inputs (training, IEC) and their contribution towards the achievement of the Project Development Objectives (PDOs); vis-a vis implementation in non-project areas

(v) Estimate project funds spending on the implementation of the HCWM Implementation plan in relation to the budgeted amount;

(vi) Elicit views of all stakeholders—(RHSDP, NRHM, DOHFW, Rajasthan Pollution Control Board (RPCB), NGO partners, key facility staff, and CTFs) on the effectiveness of the strategy as implemented by RHSDP;

(vii) Review HCWM practices in outreach camps and mobile medical vans in accordance with set protocols;

(viii) Identify the constraints and bottlenecks in the implementation of HCWM including receiving authorization from the RPCB, as are required under the Bio Medical Rules;

(ix) Review the supervision and monitoring arrangements

b. Approach

In order to accomplish the said objectives and following the scope of work envisaged in the study contract, a process flow was adopted as follows

1. Preparatory work
   - i. Interaction with client organization
   - ii. Procuring documents
   - iii. Identification of consultants
   - iv. Orientation of staff and consultants
   - v. Route and facility mapping
   - vi. Travel itineraries
   - vii. Communication to and with DPC/ CMHO/ Field officers
2. Desk review

3. Protocol development
4. Tabulation plan
5. Data Collection
6. Software development
7. Data entry
8. Data analysis & interpretation
9. Draft report writing

The process terminated into submission of draft report and apropos to the comments from the client organization the draft shall be revised before final report printing and dissemination of the findings.

c. Methodology

Following the broad approach adopted, the activity listing and itinerary was developed along with the study tools.

The study tools used were Structured questionnaire (recording responses and observation), wherein 12 protocols, under four heads, were used, details of which are placed here.

A. Health facility

B. CTF

C. Stake Holders

D. Outreach Camps

Two out reach camps supported by RHSDP were visited to find out factual translation of the RHSDP support at the last point of access. Further, the Common Treatment Facilities are being supported by RHSDP in the form of providing user charges, and therefore visits at 8 operating CTF facilities were planned to determine their physical resources, capacities besides the knowledge and skill sets available with the staff deployed for the identified assignments like transportation, training for undertaking treatment / operation of equipment, disposal practices; as also to identify bottlenecks in providing the services at remotely located facilities

For every **health facility** responses and observations were recorded from/ on:

Respondents

1. PMO/HCWM In-Charge
2. MO
3. Nursing staff
4. Ward Boys/ Sweepers

Observation areas

1. Act & Rules
2. Infection control committee/HSIT and Plan
3. Training,
4. Observation on practices,

5. Frequency of collection,
6. Arrangements made for segregation-Collection, Storage, Transport and Disposal
7. Problems encountered and solutions thereof.
8. On site check of facility by the professional team, with focus on
    1. Segregation practices
    2. Availability of Colour coded Bins and PU liners
    3. Display of HCWM practice protocol, in facility and its sub-units
    4. Availability of personal protective gears for support staff
9. Interaction with support staff to gauge their
    a. Knowledge
    b. Practices
10. Review of records in relation to
    a. Facility Profile
    b. Waste generation (per Day/Month)
    c. Authorization from RPCB
    d. Connectivity to CTF
    e. HCWM Supplies and their usage

For CTF the responses from CTF Administrator, Operator, Waste Collector and transporter were recorded on-

1. Authorization status
2. Capacity
3. Technology Used
4. Average waste load handled
5. Monthly charges received
6. Problems encountered

In addition, the study focused on the following points-

1. The intervention in HCWM areas initiated by RHSDP, like civil work, IEC, Development of protocols and Formats, Authorization of Hospitals under BMW Rules, procurement of items for HCWM and supplies to the institutions, HCWM trainings at Hospital level have been considered as important component of the impact matrix.

2. The qualitative and quantitative aspect of each of the interventions has been assessed at selected facilities and their objective evaluation done.

3. The activities indicated in the project implementation plan (PIP) , measured in terms of achieved efficiency, with special reference to the Project Objective have been considered in the impact evaluation study, and following aspects have been evaluated -

a) Legal Status of Authorization
b) Health facility's connectivity to CTF and regularity of waste collection by CTF
c) Quality and adequacy of trainings
d) Sharps destruction and disposal Practices
e) Information on use of Deep Burial Pits

4. The Desk Review undertaken in the methodology covered -
a) Project Implementation Plan (PIP)
b) Project Agreement Document (PAD) between Bank & RHSDP
c) Aid memories / interim document related to Bank's approval on HCWM practices
d) Health Indicators defined by project/ World Bank
e) Publications on HCWM by RHSDP
f) Reports on interim studies/ evaluation
g) Check list and forms / formats developed by RHSDP

Sample size

Besides the geographical coverage, and in line with the Terms of Reference (ToR), attempt was made to distribute the field data generation activity at all the categories of hospitals and thus following number was identified, in consultation with the team from RHSDP, as representative sample size for the project supported health institutions:

Number of Interviewees from the designated institutions

Facility		Person to be interviewed	Number proposed for interviews
CTF 1. Ajmer 2. Alwar 3. Bikaner 4. Hanumangarh	5. Jaipur 6. Jodhpur 7. Sawaimadhopur 8. Udaipur	Operator Administrator Transporter Waste collector	6 x8 = 48
District Hospital (300 bedded) 1. Beawar, 2. Bharatpur		PMO MO HCWM I/C Nursing staff Ward boys Sweeper	27x2=54
Sub-district hospital (100 bedded) 3. Kishangarh 4. Kotputali 5. Karauli 6. Rajsamand		PMO MO HCWM I/C Nursing staff Ward boys Sweeper	17x4=68
50 bedded hospital (project funded) 1. Nokha 2. Salumber 3. Hindon 4. Mandore	5. Sambhar 6. Amer 7. Bayana 8. Vijaynagar	MO I/C HCWM I/C MO Nursing staff Ward boy Sweeper	10x8=80
30 bedded hospital (project funded) 1. Pisangan 2. Pushkar 3. Dungargarh 4. Gajner 5. Sadulshahar 6. Nagar 7. Kumher 8. Kishangarhbans	9. Gurachandraji 10. Dudu 11. Osiyan 12. Salawas 13. Devgarh 14. Kapren 15. Mavali 16. Mandapiya	MO I/C HCWM I/C MO Nursing staff Ward boy Sweeper	8x16=128
30 bedded hospital (non-project funded) 1. Arai (Ajmer) 2. Deshnok (Bikaner) 3. Rarha (Bharatpur)	4. Dechu (Jodhpur) 5. Paota (Jaipur) 6. Sikandara(Dausa)	MO I/C HCWM I/C MO Nursing staff Ward boy Sweeper	8x6=48
Outreach Camp		Officer in-charge Nursing staff Sweeper	3x2=6
RPCB		Head RPCB	1x7=7
RHSDP		PD-RHSDP Addl. Dir-Quality Addl. Dir-Training Addl. Dir-Procurement Addl. Dir-CAEI Consultant-HCWM	6x1=6
NRHM & DMHS		MD-NRHM Director-PH Director-RCH Addl. Director(HA)	4x1=4

Man power used:

A total of 19 consultants were put on task to accomplish the feat.

Districts & facilities covered:

Desk Review

Desk Review

The following documents were reviewed and the salient features were used to match/support or reject the field findings

1. Project Implementation Plan (PIP)
2. Aid memories / interim document related to Bank's approval on HCWM practices
3. Publications on HCWM by RHSDP
4. Reports on interim studies/ evaluation
5. Check list and forms / formats developed by RHSDP

1. PIP:

PIP for HCWM designed by RHSDP was in conformance to Bio-medical Waste (Management and Handling) Rules 1998 (Second Amendment in 2003), and the key strategies adopted referred to:

a) Waste Management in Hospitals; and

b) Common Treatment Facility (Outside Hospital).

The focus was on Waste Generation minimization and Segregation of the waste following R3 and D3 principles

As per BMW rules the In-charge of the facility (institution) is designated as the occupier and owner of the hospital. Therefore, Principal Medical Officer (PMO) at the District Hospital & In-charges of the PHCs, CHCs, SDH & Dispensaries was made responsible for implementation of HCWM.

The RHSDP planned to support the implementation of the HCWM by giving various inputs like supplies (Bins, Bags, Protective gear as hospital Supplies), Trainings, facilitating authorization, facilitating CTF connectivity and providing funds for CTF hiring charges, construction of Burial Pits and Storage spaces at selected facilities. It was expected that similar support to the health institutions under DM & HS will be made available through NRHM. However, it is recommended that the Departmental efforts converge early and the necessary steps initiated.

At the district level it was planned under PIP that the District Health Society shall undertake monitoring of implementation and the CM&HOs' with the help of Zonal officers will keep track of the requirements and effectiveness – for which necessary mechanism of regular interaction was envisaged at the Directorate.

At the State head quarters the hospital waste management activities were planned to be monitored by the Director- Hospital Administration (HA) & AIDS. He is supported by the Additional Director (Hospital Administration) in the Directorate of Medical & Health Services for HCWM implementation activities.

The other activity, under the PIP itinerary, was Trainings.

HCWM training (first round) was carried out under RHSDP to cover up all 343 secondary level health facilities in 2006-07 and the second planned from 2009-2011. The second round of HCWM training is to be conducted at all primary and secondary level health facilities as per the TOR, approved by the World Bank. This training will be imparted at approximately 406 secondary level (included project supported facilities) and 1500 primary health facilities

Logistics:

For small hospitals like 30 and 50 beds the following colors of the bags and receptacles (bins) will be used in accordance with Schedule II of bio-medical waste management rules.

- Yellow receptacles: Waste Category (1, 2, 3)
- Red receptacles: Waste Category (3 and 6). For waste category 3 a separate bucket will be kept in the laboratory with 1% hypochlorite solutions.
- Blue receptacles: Waste Category (4 and 7) with 1% hypochlorite solution. Needles to be mutilated by needle destroyer before putting them in puncture proof container for 30 minutes.
- Green receptacles: General non-hazardous waste for municipal dump.

The size and number of bins/receptacles were planned to be procured in adequate number for different categories of hospitals to collect the waste in the hospitals.

Items	**300 beds**	**150 beds**	**100 beds**	**50 beds**	**30 beds**
Waste buckets/ baskets	100	70	50	30	30
Bins/ Drums	100	70	50	30	30

Procurement of hospital supplies under RHSDP:

Year of purchase	Name of item	quantity	Cost
Year 1	Plastic bins small size	6060	Rs. 20.76 lacs
	Plastic bags small size	6963	Rs. 40.24 lacs
	Plastic bins big size	1616	Rs.14.84 lacs
	Plastic bags big size	6950	Rs. 13.04 lacs
	Plastic sharp containers	1739	Rs. 7.65 lacs
Total Cost			**Rs. 96.53 lacs**
Year 2	Plastic bins small size	--	--
	Plastic bags small size	--	--
	Plastic bins big size	2560	Rs. 22.84 lacs
	Plastic bags big size	1205000	Rs. 63.17 lacs
	Plastic sharp containers	156	Rs. 1.55 lacs
	Protective rubber apron	3290	Rs. 2.53 lacs
	Protective rubber gloves	3302	Rs. 1.30 lacs
	Face mask	300000	Rs. 6.46 lacs
	Protective rubber boots	3169	Rs. 4.81 lacs
Total Cost			**Rs. 102.66 lacs**
Year 3	Plastic bins small size	6060	Rs. 29.87 lacs
	Plastic bags small size	1105952	Rs. 45.20 lacs
	Plastic bins big size	1616	Rs. 13.58 lacs
	Plastic bags big size	294920	Rs. 15 lacs
	Plastic sharp containers	762	Rs. 7.01 lacs
Total Cost			**Rs. 110.66 lacs**
Year 4	Plastic bins small size	6060	Rs. 26.97 lacs
	Plastic bags small size	1105952	Rs. 39.70 lacs
	Plastic bins big size	1616	Rs. 12.18 lacs
	Plastic bags big size	294920	Rs. 13.48 lacs
	Plastic sharp containers	762	Rs. 63.63 lacs
	Sodium hypochlorite solution	14226 jar of 1 ltr.	Rs. 4.41 lacs
Total Cost			**Rs. 160.37 lacs**
Year 5	Plastic bins small size	12230	Rs. 68.31 lacs
	Plastic bags small size	1972109	Rs. 68.03 lacs
	Plastic bins big size	14226	Rs. 99 lacs
	Plastic bags big size	1764053	Rs. 82.19 lacs
	Plastic sharp containers	1751	Rs. 20.68 lacs
Total Cost			**Rs. 338.21 lacs**

Each bin will be clearly labeled to show the ward name or room where it is kept. Polythene bags placed in bins will be changed with each shift or when they are three-quarters full. **Containers carrying waste will be sealed or tied at the top** whenever the same is being transported within or outside the hospital.

Handling of disposable items:

Disposable like the gloves, syringes, needles, I.V. bottles, catheters etc is being shredded, cut or mutilated. This ensures that the items are not being recycled or reused by rag pickers.

Needles, which are the major portion of sharps is being **mutilated by needle cutter and then put in 1% hypochlorite solution**. The principle of three 'D's will be followed to improve the HCWM as under-

- Distort
- Disinfect
- Destroy

Nursing and other clinical staff will ensure that waste bags are tightly closed or sealed when they are about three-quarters full. Light gauge bags will be closed by tying the neck, but heavier gauge bags probably require a plastic sealing tag of the self-locking type. Bags will not be closed by stapling. Certain categories of waste which may need pretreatment (decontamination /disinfection) at the site of generation such as plastic and sharp material etc, should be removed from the site of generation only after treatment

Waste will not be allowed to accumulate at the point of production. The following instructions will be followed by the ancillary workers in charge of waste collection:

- **Waste will be collected daily** (or as frequently as required) and transported to the designated central storage site.
- **Bags will be removed after they are labeled** with their point of production (ward or department) and contents.
- **The bags or containers will be replaced immediately** with new ones of the same type

A supply of fresh collection bags or containers will be readily available at all locations where waste is produced.

Location of the Containers:

All containers having different colored polythene bags will be located at the point of generation of waste i.e. near operation theatre tables, injection rooms, and laboratories. The color of containers/Plastic bags used for collection of segregated bio medical waste will be identifiable.

Labeling:

All the bags/container must be labeled according to the rules (Schedule III) of Biomedical waste (Management and Handling) (Second Amendment) rules, 2003.

Transportation within the Hospital:

- Within the hospital, waste routes will be designated to avoid the passage of waste through patient care areas (that is **too ambitious a plan for execution on ground** particularly so when the project activities were restricted to infrastructure improvement in terms of renovation and minor repairs).
- **Separate time will be earmarked for transportation of biomedical waste** to reduce chances of its mixing with general waste.
- Dedicated wheeled containers, trolleys or carts will be used to transport the waste bins/ plastic bags to the site of storage treatment.
- Trolleys or carts will be thoroughly cleaned and disinfected in the event of any spillage.
- The wheeled containers will be so designated that the waste can be easily loaded; remains secured during transportation; does not have any sharp edges and is easy to clean and disinfect.

Storage:

According to Bio-Medical Waste (Management and Handling) (Second Amendments) Rules, 2003; storage means holding of biomedical waste for such period of time at the end of which waste is treated and disposed off.

A storage location for hospital waste will be designated inside the establishment. The waste, in bags or containers, will be stored in a separate area, room or building of a size appropriate to the quantities of waste produced and the frequency of collection. Hazardous hospital waste will be stored in a closed room. Unless a refrigerated storage room is available, **storage times for waste (i.e. the delay between production and treatment) will not exceed 48 hours during the cool season and 24 hours during the hot season.**

Biomedical waste will be securely stored to prevent access by rag pickers. The following will be ensured

- The storage area will have an impermeable, hard standing floor with good drainage; it will be easy to clean and disinfect.
- There will be a water supply for cleaning purpose.
- The storage area will afford easy access for staff in charge of handling the waste.
- The store will be locked to prevent access of unauthorized person.
- Easy access for waste collection vehicles is essential.
- There will be good lightning and at least passive ventilation. Sun protection must be there.
- The storage area will be inaccessible for animals, pests and birds.
- The storage area will not be situated in the proximity of fresh food stores or food preparation areas.

A supply of cleaning equipment, protective clothing and waste bags or containers will be located conveniently close to the storage area**.** The storage area will have a weighing machine for the measurement of the waste generated at the facility and proper records will be maintained therein to carry out the waste audit as per Notification of BMW Rules.

The construction of the storage facilities for strengthening the hospital waste management at the hospitals and health care facilities will be undertaken all over the State. The construction of storage facilities will be undertaken along with civil works. The cost of constructing the storage facilities will be included in the cost of civil works.

Transport of Clinical Waste to Treatment/Disposal Unit outside the Hospital:

When the container of the hospital waste is transported from the hospital premises, to any waste treatment facility outside the premises, the container will, apart from the label prescribed in Schedule III, also carry information prescribed in Schedule IV.

The Municipal body of the area will pick-up and transport segregated non bio-medical solid waste generated in hospitals, as well as duly treated bio-medical wastes for disposal at municipal dumpsite in accordance with bio-medical waste management rules June 2003 as is being done in some of the hospitals.

The owner of the common treatment facility in accordance Bio-Medical Waste (Management and Handling), 1998 (Last Amended 2003), will transport the waste from the hospital to the common treatment facility. The containers for transportation must be labeled as given in Schedule III and IV.

End Treatment and Disposal:

The Department of Medical and Health, Government of Rajasthan proposes to set-up Common Treatment Facility (CTF) in the cities/towns with a population of more than 100,000, through PPP.

2. Findings of Aide memoires:

Following a Mid-Term Review (MTR) of the Rajasthan Health Systems Development Project by an International Development Association (IDA) team, which visited different districts and interacted with various cadres from July 30 – August 13, 2007

The mission rated the HCWM as moderately satisfactory for the quality of trainings by consultant firm, and monitoring of these trainings by PMU.

It was agreed that the PMU, NRHM and the Directorate would work closely to ensure coordination of HCWM activities among all health programs, with special reference to Information, Education and Communication (IEC) and training. This will mean that **RHSDP will undertake planning and training for HCWM/IMEP down to the Primary Health Center (PHC) level in all districts**, as well as develop and disseminate appropriate IEC materials. It was agreed that the PMU, NRHM and the Directorate would work closely to ensure coordination of HCWM activities among all health programs, with special reference to Information, Education and Communication (IEC) and training. This will mean that RHSDP will undertake planning and training for HCWM/IMEP down to the Primary Health Center (PHC) level in all districts, as well as develop and disseminate appropriate IEC materials.

The Directorate would ensure adequate supplies/consumables for waste segregation, operational burial and sharp pits, and monitoring of implementation of infection and waste management.

The indication of the World Bank to provide trainings using the Infection Management & Environment Protection (UMEP) guidelines issued by MoHFW / MoE&F, GoI, as also developing & disseminating improved IEC material to trigger better practices have been upheld and attempted by the project. A *hindi* translation of the IMEP is ready for rolling out along-with new set of posters depicting uniform & improved practices of HCWM including all vertically integrated programs viz. NACO, are prepared.

3. Review of Studies conducted:

An Evaluation study was earlier taken up in 2007 by the consultant for Govt. and private facilities. The objectives that the study aimed to address were assessment of authorization status, IEC material availability, assess supplies, trainings, CTF functioning, and HCWM practices.

The rave review of the study was undertaken and some of the observations were taken into consideration.

Out of the 58 Govt. health facilities and 28 private hospitals visited in Rajsamand, Bharatpur, Jodhpur, Dausa, Karauli, Bikaner, Sawai Madhopur, Sirohi and Udaipur districts, it was observed that-

- Human resources are limited in the Govt. health facilities as compared the private.
- There is no ownership in Govt. health facilities as compared the private hospitals.
- There are many responsibilities in Govt. health facilities as compared the private.

Authorization status:

Private health facilities are better than Govt. health facilities. The five main causes for the Govt. health facilities not getting authorization, according to pollution control board are:

1. Money for the default period not deposited (It has now been shorted out).
2. Not having good communication with pollution board as compared to private hospitals.
3. Observations raised were not clarified by the health facilities.
4. Incomplete application forms.
5. No CTF connectivity.

Training & Implementation: -

Govt. health facilities are better than private health facilities. Training was carried out at all Govt. health facilities, but **implementation was not so satisfactory**. Staff was quite causal in HCWM drills.

Hospital supplies: -

Govt. health facilities are better than private hospitals. Hospital supplies and IEC material were available at all govt. hospitals. There is requirement of proper display at prominent places. Hospital supplies and IEC material were not available at private hospitals.

Final disposal- CTF / Deep burial pits:

Govt. hospitals were having CTF connectivity / burial pits for final disposal of BMW except at certain places. Govt. health facilities are better than private health facilities.

HCWM practices: -

HCWM practices were not satisfactory at both, Govt. as well as private. Staff was not following proper instructions and guidelines for reasons: -

1. No personnel supervision by PMO / nodal officer / CHC In-charge.
2. Staff was not much motivated for HCWM practices.
3. Certain percentages were not aware about health care waste management.

Over all, Govt. health facilities follow HCWM practices better than private hospitals.

The recommendations made, however are quite generic, like-

a. Facilities should get authorization.
b. Training.
c. Proper maintenance of burial pits.
d. Municipal waste should not be disposed off in to the burial pits.

e. Revision of contract rates for CTFs

f. Ensuring supplies through DPC.

g. Frequent monitoring from the project headquarters /DPC.

Observations

Observations:

For the selected sample size of 449 persons, 409 personnel could be interviewed for various reasons.

Table 1: Distribution of respondents from the studied facilities/ Institutions

Institutions	No. of facilities/ Organizations	Category of Respondent	Number of persons interviewed
CTF	8	Administrator	8
		Operator	8
		Transporter	13
		Waste collector	15
Health facility	300 bedded (2)	PMO / MO I/C	2
		HCWM I/C	1
		MO	10
		NS	20
		WB	10
		SW	10
	100 bedded (4)	PMO / MO I/C	4
		HCWM I/C	3
		MO	6
		NS	20
		WB	13
		SW	14
	50 bedded (8)	MO I/C	8
		HCWM I/C	5
		MO	8
		NS	27
		WB	15
		SW	18
	30 bedded (16)	MO I/C	16
		HCWM I/C	6
		MO	15
		NS	45
		WB	14
		SW	14
NPF	30 bedded (6)	MO I/C	6
		HCWM I/C	0
		MO	6
		NS	18
		WB	4
		SW	6
Out reach camp	2	MO	2
		NS	2
		SW	2
RPCB	7	Head	7
RHSDP	1	PD-RHSDP	1
		Addl. Dir-Procurement	1
		Addl. Dir-CAEI	1
		Addl. Dir-Training	1
		Consultant-HCWM	1

NRHM	1	Director -PH	1
		Director-RCH	1
		Consultant(RTI/STI)	1

a. Common Treatment Facility:

At each CTF, Administrator, Operator, Transporter and Waste collector present on the day were contacted and based on the structured schedule, their responses were recorded.

Table 2: CTF Profile

CTF	Staff				Vehicles				Frequency Of treatment/ disposal
	No.	Trained	PPE	vaccination	No.	Covered	Compartments in the vehicles	Frequency of Collection	
Ajmer	11	11	Yes	Yes	5	Yes	Yes	24 hours	24 hours
Alwar	6	6	Yes	Yes	4	Yes	Yes	48 hours	24 hours
Bikaner	12	12	Yes	Yes	4	Yes	Yes	12-48 hours	24 hours
Hanumangarh	15	15	Yes	Yes	6	Yes	Yes	24 hours	24 hours
Jaipur	6	6	Yes	Yes	3	Yes	No	48 hours	48 hours
Jodhpur	12	12	Yes	NO	3	Yes	Yes	24 hours	24 hours
S.Madhopur	12	No	Yes	NO	4	Yes	No	24 hours*	24 -48 hours*
Udaipur	14	14	Yes	Yes	4	Yes	NO	48 hours	24 -48 hours

i. CTF Profile

Most of the CTFs, run by the private parties, appears are governed and dictated by profit motives and have no respect for provisions under law, and as such can not be controlled by the project because the regulation and monitoring of CTF falls under RPCB. **Out of the 8 CTFs, 3 of them do not hold a valid authorization** and it abysmally shocking to observe that they are still operating and getting the agreed charges; making a mockery of the Rules. The CTF at Hanumangarh, Sawai Madhopur & Jodhpur are virtually either are operating in defiance to the standards or are non functional.

It is implicitly impossible to make any comment regarding their collection and treatment capacity as the log books, where ever maintained, do not have the quantum mentioned matching with the entries made.

Further the job of CTF is made a little more complex in view of fact that at majority of the places segregated waste is not made available to CTFs which simply means either they have to over stretch themselves or just pass the buck, the evident resultant reveals improper treatment and disposal of waste. Somehow, this is a practice observed across the country, even the incinerator ash of Safdurjang Hospital was found to contain glass bottle, bones and sharps, a few years ago.

Further one of the striking observations is that despite "disposable culture inherent to health care" the **quantity of sharps and plastics found in different color coded bags does not coincide with the figures of normal use** based on the work load reported by the facilities under study themselves. This directly could be interpreted through common market intelligence that there is no control of the health facilities on recycling of used plastic and sharps; picked up from Bio Medical Waste either by people with vested interest from facility itself or the rag pickers, defeating the very purpose of waste management and the kind of soft and hard input that have been barged in by the project.

Connectivity of facilities with CTF (Government & Private hospitals)

S. NO.	CTF	Number of Facilities
1.	Udaipur	160
2.	Jodhpur	82
3.	Ajmer	170
4.	Bikaner	26
5.	Hanumangarh	16
6.	Alwar	28
7.	Jaipur	80
8.	Sawai madhopur	Data not available

83.33% of facilities Project Funded Hospitals were connected with CTF. Facilities not connected with CTF are, Sambhar, Pushkar, Pisangan, Dudu, Osian, Salawas and Gudachandraji. 33.3% of Non project funded facilities (Deshnok, sikandara) were connected to CTF. The funding for this activity at non projhect facilities came from NRHM and RMRS, which shows that if people wish to money is not a constraint and the activity can be appropriated through available funds irrespective of the course.

One of the facilities (Vijayanagar) which was earlier connected to CTF, had some operational problems, like the location of facility is not falling along the main transport route of the CTF operators vehicle, due to lack of number of vehicles required to serve the entire geographical area the operator is

unable to serve the facility regularly and thus faces heated exchange of arguments with hospital staff which is deprived of regular services. The deductions in payments to CTF services are becoming inevitable increasing the dis-satisfaction with CTF operator.

Table 3: Connectivity of study facilities to CTF

	Facility	CTF connectivity	
		Yes	No
DH (2)	Beawar	1	
	Bharatpur	1	
100 bedded (4)	Kishangarh	1	
	Kotputli	1	
	Rajsamand	1	
	Karauli	1	
50 bedded (9)	Vijaynagar	1	
	Bayana	1	
	Nokha	1	
	Amer	1	
	Sambhar	1	
	Mandore	1	
	Salumbar	1	
	Mandapiya	1	
	Hindon	1	
30 bedded (PF) (15)	Pisangan		1
	Pushkar		1
	Kishangarhwas	1	
	Nagar	1	
	Kumher	1	
	Dungargarh	1	
	Gajner	1	
	Sadulshahar	1	
	Dudu	1	
	Osian		1
	Salawas		1
	Kapren	1	
	Gudachandraji		1
	Devgarh	1	
	Mawli	1	
30 bedded (NPF) (6)	Arai		1
	Rarha		1
	Deshnok	1	
	Paota		1
	Dechu		1
	Sikandra	1	
Total (36)		27	9

Collection of waste from health facilities within 24 hours was found in 7 facilities. In remaining project funded facilities waste collection has a latent period of 48 hours.

The project started with only one operating CTF (at Jaipur) in 2004-05, however, by end July 2009, 183 hospitals under the DM&HS were provided membership / connectivity to 10 operational CTF service providers (Kota and Sikar, besides the above mentioned CTF).

iii. **Vaccination of CTF staff**

Staff of all CTFs was vaccinated against hepatitis – B and tetanus except those at Sawai Madhopur. It could not be verified as all the CTF owners reported it verbally and employees endorsed to the same but no testaments to this effect were available.

b. Health Facility:

i. Facility Profile

The facility profile related to bed strength, bed occupancy rate and daily / monthly quantum of waste generated. The appended tables show the profile of 300, 100, 50, 30 bedded (Project funded) and 30 bedded (Non Project funded) facilities.

The bed occupancy rate, a definite measure of efficiency and effectiveness of care, measures and determines the cost of care besides helping in planning of manpower, logistics required and here the waste that is expected to be generated.

Ideally the average length of stay and daily census are essential inputs for calculating bed occupancy. For a 300 bedded unit, the total no of available beds in a year shall be 365 x 300= 109500 and if these beds are occupied for 98650 days, the bed occupancy shall be

Inpatient Days of Care (98,560) / (Bed Days Available 109500) = .900 x 100 = 90.00%.

The reported data from facilities put under study have extremes like 167% and 273% bed occupancy for May 2009, vouching for the earlier statement.

Could be that these facilities are either over burdened and patients are put on floor or patients admitted for plain observation are also put into the numerator; but then all **these are probabilities that can not be further analyzed.**

This is one area where the Medical Officers and Nursing staff needs to be oriented.

Picture showing patients on floor

Table 4: Bed occupancy, IPD & OPD load (Jan-Dec. 2008)

Bed Strength	Facility	IPD patients (Jan 08- Dec 08)	OPD patients (Jan 08- Dec 08)
300	Beawar	28540	243690
	Bharatpur	46521	302462
100	Kishangarh	19377	143271
	Kotputli	23891	247041
	Karauli	42614	262103
	Rajsamand	9862	88133
50	Hindon	15243	144210
	Vijaynagar	5554	74660
	Bayana	17892	127768
	Nokha	6401	75026
	Amer	1016	43033
	Sambhar	3850	68305
	Mandore	1807	83763
	Salumbar	9855	88750
30	Pushkar	1523	26264
	Pisangan	3531	41848
	Kishangarhbans	5133	48972
	Nagar	3938	84603
	Kumher	4642	58916
	Dungargarh	6963	81702
	Sadulshahar	2186	38752
	Gajner	1538	20652
	Dudu	2364	23342
	Osian	1392	28416
	Salawas	472	10530
	Kapren	3472	53300
	Gudachandraji	2432	15837
	Devgarh	8965	52597
	Mavli	1837	18213
	Mandapiya	1661	16115
NPF (30)	Deshnok	624	22195
	Paota	490	11609
	Dechu	456	8328
	Arain	898	14076
	Rarha	610	10756
	Sikandara	2366	24076

Table 5: Percentage of IPD compared to total OPD load:

Bed Strength	Facility	IPD patients (Jan 08- Dec 08)	OPD patients (Jan 08- Dec 08)	OPD: IPD ratio
300	Beawar	28540	243690	11.71
	Bharatpur	46521	302462	15.38
100	Kishangarh	19377	143271	13.5
	Kotputli	23891	247041	9.67
	Karauli	42614	262103	16.25
	Rajsamand	9862	88133	11.18
50	Hindon	15243	144210	10.57
	Vijaynagar	5554	74660	7.43
	Bayana	17892	127768	14.00
	Nokha	6401	75026	8.53
	Amer	1016	43033	2.36
	Sambhar	3850	68305	5.63
	Mandore	1807	83763	2.15
	Salumbar	9855	88750	11.10
30	Pushkar	1523	26264	5.79
	Pisangan	3531	41848	8.43
	Kishangarhbans	5133	48972	10.48
	Nagar	3938	84603	4.65
	Kumher	4642	58916	7.87
	Dungargarh	6963	81702	8.52
	Sadulshahar	2186	38752	5.64
	Gajner	1538	20652	7.44
	Dudu	2364	23342	10.12
	Osian	1392	28416	4.89
	Salawas	472	10530	4.48
	Kapren	3472	53300	6.51
	Gudachandraji	2432	15837	15.35
	Devgarh	8965	52597	17.04
	Mavli	1837	18213	10.08
	Mandapiya	1661	16115	10.30
Non project facility (30)	Deshnok	624	22195	2.81
	Paota	490	11609	4.22
	Dechu	456	8328	5.47
	Arain	898	14076	6.37
	Rarha	610	10756	5.67
	Sikandara	2366	24076	9.82

Normally it is assumed that 10% of the total new OPD load shall require admission to the facility for one or the other reason and stays endorsed here also. The observation that **facility closer to the district has lower admission rate** appears to be justified as people find it convenient to commute to District under an expectation that better facilities shall be available.

Table 6: Quantity of waste generated (Kg)

Bed Strength	Facility	Solid waste (Black bag)		Infectious plastic (Red bag)		Needles and sharps (Blue bag)		Infectious waste (Yellow bag)	
		Daily	Monthly	Daily	Monthly	Daily	Monthly	Daily	Monthly
300	Beawar	51	1416	17	531	9	287	50	1405
	Bharatpur	NA	NA	8	240	5	150	35	1050
100	Kishangarh	NA	NA	7	199	7.5	234	15.5	465
	Kotputli	18	532	2	67	2	53	9	258
	Karauli	NA	NA	5.5	147.7	4.4	342.05	36.1	875.6
	Rajsamand	NA	NA	1.5	156	4	135	12	278
50	Hindon	6	88	6	88	6	88	6	88
	Vijaynagar **	NA	NA	NA	NA	NA	NA	NA	NA
	Bayana	18	540	16	480	10	300	8	240
	Nokha	8	240	2	60	2	60	5	150
	Amer	4	120	3	95	1.5	20	3.5	100
	Sambhar	0.3	6.56	0.3	11.62	0.3	11.77	0.5	17.36
	Mandore	NA	NA	NA	NA	NA	NA	NA	NA
	Salumbar	10	300	1.25	37.5	0.75	22.5	7.5	225
30	Pushkar	NA	NA	NA	NA	NA	NA	NA	NA
	Pisangan	NA	NA	NA	NA	NA	NA	NA	NA
	Kishangarh bans	NA	NA	2	14	1	17	4	46
	Nagar	NA	NA	NA	NA	NA	NA	NA	NA
	Kumher	10	300	7	21	4	120	3	90
	Dungarpur	2	60	4	120	3.5	110	20	600
	Sadulshahar	0.8	23.7	1.2	36.54	0.8	24.57	0.63	19.54
	Gajner	1.6	48	0.43	13	0.53	16	0.96	29
	Dudu	0.5	11.95	0.5	19.4	1	23.75	3.5	50.1
	Osian	NA	NA	NA	NA	NA	NA	NA	NA
	Salawas	NA	NA	NA	NA	NA	NA	NA	NA
	Kapren	NA	NA	NA	NA	NA	NA	NA	NA
	Gudachandraji	NA	NA	NA	NA	NA	NA	NA	NA
	Devgarh	25	750	0.5	15	0.3	9	6	180
	Mavli	1.5	45	2	60	1.5	45	4	120
	Mandapiya	4	120	2	60	NA	NA	3	90
Non project facility (30)	Deshnok	NA	NA	NA	NA	NA	NA	NA	NA
	Paota	NA	NA	NA	NA	NA	NA	NA	NA
	Dechu	NA	NA	NA	NA	NA	NA	NA	NA
	Arain	NA	NA	NA	NA	NA	NA	NA	NA
	Rarha	5	NA	5	NA	0.5	NA	5	NA
	Sikandara	NA	NA	NA	NA	NA	NA	NA	NA

****** Vijaynagar facility till about 6 months back had CTF connectivity, but because of the conflict between CTF operator and the HCWM in-charge, the facility is not getting its waste collected for treatment and disposal. Somehow, the study team had an opportunity to resolve these operational bottlenecks and it was promised that from July-09 the waste collection process would be streamlined.

Table 7: The Average waste generated per day/per month

Bed Strength	Infectious plastic (Red bag)		Needles and sharps (Blue bag)		Anatomical & infectious waste(Yellow bag)	
	Per day	Per month	Per day	Per month	Per day	Per month
300	12.5	385.5	7	218.5	42.5	1227.5
100	4	142.42	4.47	191.01	18.15	469.15
50	4.75	128.68	3.42	83.71	5.08	136.72
30	1.63	29.91	1.05	30.44	3.75	102.05

On an average the waste generated in any of the hospital depends on the quantum and nature of services, besides number of the beds. **The average biomedical waste generation in health care facilities included in the present study, ranged between 0.18 Kg to 0.26 Kg per bed per day.**

A study from Agra (2006), with 10,000 beds and 25,000 kg waste generated per day; pointed out that the private sector generates the least (0.12 Kg/bed/day) whereas tertiary care hospitals (SNMC, Agra) generated **4.59 Kg/bed/day**. The findings from the private hospital in Pudduchery (0.9 Kg/bed/day) and multi specialty hospital (R. Lavanya) in Chennai (2.53Kg/bed/day) confirm the same.

ii. Interaction with Hospital/Facility staff

1. Availability of BMW Rules (PMO/MOI/c)

Out of 30 PMOs/ MOI/c from the project facilities under study 63.3% had copies of BMW rules where as a 16.66% from non project facilities, included in the study had a copy of dossier.

2. HSIT

In order to maintain the aesthetic appeal of health care facilities, it was propounded that Health Systems Improvement Team shall be put in place and shall be responsible for infection control in general and waste management in particular.

The emboldening observation is that of the 30 facilities surveyed, **29 had functional HSIT committees** (except Mandore) and there was a regular interaction between committee members. How effective these interactions have been is examined separately on different parameters.

3. Authorization (PMO/MOI/c)

Authorization status	Project funded Facilities	Non Project Facilities
Obtained initially	30 (30)	1 (6)
Valid as on date	18 (18)	0 (6)
Applied for renewal	12(12)	1 (6)

It appears that simple compliance led to obtaining the authorization from PCB for generation, collection and storage of waste by all the project facilities. As usual, the knee jerk reactions settle very fast in the system and the observations stand as a testament to this, where only 40% of the facilities which initially got the authorization have it valid as on date, while 60% are still waiting for their authorization to be renewed.

The reasons for pending authorizations were however attributable to various reasons from the facilities as also from RPCB.

Mostly **pending authorizations were due to non payment of prescribed fees by the hospital** (as per the notification issued by Dept. of Environment, GoR) or Regional Officers of RPCB not being conveyed that they are empowered to clear applications for Authorization up to 50 bedded facilities at their level. **It is learnt that even this de-centralization of powers for issuing Authorization at RO, RPCB level were facilitated by inter departmental coordination at the Secretary level initiated by RHSDP.**

4. Trainings on HCWM:

Hands -on training was given at facility level at 343 hospitals (DH, SDH and CHC).

A. Project Facilities (supported by RHSDP)

The trainings under HCWM for different cadres have been satisfactory,

Training	PMO/ MO I/C N=30 (%)	MO N=39 (%)	Nursing staff N=112 (%)	Ward boy N=52 (%)	Sweeper N=56 (%)	Total staff N=262 (%)
Trained for HCWM Component	29 (96.66)	29 (74.35)	80 (71.42)	42 (80.76)	46 (82.14)	196 (74.80)

B. Non Project facilities

Training	MO I/C N=6 (%)	MO N=6 (%)	NS N= 18 (%)	WB N=4 (%)	Sweeper N=6 (%)	Total N=40 (%)
Trained for HCWM Component	1 (16.66)	2 (33.33)	0 (0)	1 (25)	1 (16.66)	5 (12.5)

Out of 30 PMO/MO I/C, 96.66% were trained in basics of HCWM except MOI/C Mandore whereas only 16.66% MOI/C were found trained for HCWM in Non Project facilities.

Similarly, 29 (74.35%) out of 39 MOs in PF (Project Facilities) had received training on HCWM against 2 MOs trained at Non Project Facilities. Out of 29 trained MO's, 51.72% reported that they were imparting

regular HCWM trainings to nursing staff/ward boys. Per se**, 84.73% health care personnels were trained on HCWM.**

1. Training of Nursing Staff

Training	Bed Strength					
	300 N=20 (%)	100 N= 20 (%)	50 N=27 (%)	30 N=45 (%)	Project Facilities N=112 (%)	Non Project Facilities N=18 (%)
Received	20 (100.0)	15 (75%)	17 (62.9%)	28	80 (71.4%)	0
Imparting	13 (65)	13 (86.66)	9 (52.94)	20 (71.4%)	55 (68.7%)	0 (0)

2. Training of Ward Boys

Training	Bed strength					
	300 N=10 (%)	**100 N=13 (%)**	**50 N=15 (%)**	**30 N=14 (%)**	**PF (Total) N=52 (%)**	**NPF N=4 (%)**
Training received	8 (80)	12 (92.30)	12 (80)	10 (71.42)	42 (80.76)	1 (25)

3. Training of Sweepers

Training	Bed Strength					
	300 N= 10 (%)	**100 N=14 (%)**	**50 N=18 (%)**	**30 N=14 (%)**	**PF (Total) N=56 (%)**	**NPF N= 6 (%)**
Training regarding waste management	10 (100)	10 (71.42)	13 (72.22)	13 (82.14)	46 (82.14)	1 (16.66)

4. In House trainings

In house training	PMO/MO I/C N=18 (%)	MO N=15 (%)	NS N=37 (%)
Within last 3 months	13	7	29
Last 6 months	1	1	3
Last 12 months	0	0	5
More than a year ago	4	7	0

No In-house trainings on HCWM were conducted in Non Project Facilities. Non project facilities did not have the advantage of getting their staff formally trained through the professional agency engaged for the purpose.

5. Training of Contractual Staff:

Training of Contractual sweepers was done at district hospitals only. However, no evidence could be recorded towards contractual staff being imparted training.

A total of 13178 staff trained in 5 years is an appreciable achievement by any standard

5. Knowledge

1. On Black Bag contents

Information on the type of waste collected in black bags (PMO / MOI/c)

	Project Facility staff			**Non Project Facility staff**		
Staff	PMO/MO I/C N=30 (%)	MO N=39 (%)	NS N=112 (%)	PMO/MO I/C N=6 (%)	MO N=6 (%)	NS N=18 (%)
Correct information about black bag contents	29 (96.66)	37 (94.87)	109 (97.32)	5 (83.33)	4 (66.66)	9 (50)

Out of 112 nursing staff, 109 (97.32%) in PF facilities provided correct information as against 9 (50%) out of 18 nursing staff in NPF facilities. MO I/C Pushkar did not answer this question.

All the PMOs and MOI/C in health facility were subjected to a question regarding their knowledge about the nature of waste generated in a health facility. Virtually all of them were conversant with the kind of waste and enlisted Paper and packaging, Plastic catheters, IV sets, bottles, blood and urine bags, plastic syringes, plastic vials, Needle and sharps, Bandages and swabs, fruit peelings, left over food, milk bags , body fluids and tissues, Plaster casts, Glass-bottles, vials, syringes constituted the bulk of health care waste. It appears that anti tobacco act have sensitized people as 30% of the respondents felt that Cigarettes and Bidi buts are also part of the waste.

2. Type of waste generation in Health Facility

Type of waste	**PMO/MO I/C N=30**
Paper and packaging	30
Plastic catheters, IV sets, bottles, blood and urine bags,	30
plastic syringes, plastic vials	30
Needle and sharps	30
Bandages and swabs	28
Fruit peelings, left over food, milk bags	29
Body fluids and tissues	30
Plaster casts	30
Glass-bottles, vials, syringes	30
Cigarettes/ biddy buts	14
Flowers	13
Metal cans	14

3. Color Coding and nature of waste

Type of waste	Non infectious waste (Black)	Infectious waste (Yellow)	Infectious plastic (Red)	Sharps (Blue)
Project facilities				
PMO/MOI/c N=30(%)	29 (96.7)	28 (93.3)	28 (93.3)	29 (96.7)
MO N-39(%)	38 (97.4)	37(94.8)	35(89.7)	35 (89.7)
NS N=112 (%)	110 (98.2)	105 (93.7)	107 (95.5)	110 (98.2)
WB N= 52 (%)	48 (92.3)	43 (82.7)	50 (96.1)	51 (98)
Sweeper N= 56 (%)	51 (91.1)	50 (89.2)	49(87.5)	53 (94.6)
Non project facilities				
MOI/c N= 6 (%)	3 (50.0)	3 (50.0)	3 (50.0)	3 (50.0)
MO N= 6 (%)	4 (66.7)	2 (33.3)	2(33.3)	4 (66.7)
NS N= 18 (%)	7 (38.9)	7(38.9)	6 (33.3)	7 (38.9)
WB N= 4 (%)	1(25.0)	1 (25.0)	1 (25.0)	1 (25.0)
Sweeper N= 6 (%)	3 (50.0)	3 (50.0)	3 (50.0)	3 (50.0)

*****Responses do not sum up to 100% on account of multiple responses

4. Treatment and disposal of waste

The MOs know about requirement of treatment of bio medical waste viz. disinfection of mutilated plastics. However, the observations are that practices are not in conformance to the knowledge at over 50% hospitals surveyed.

The reasons for not practicing are many, including

1. Non availability of disinfectant (RHSDP supplied Sodium Hypochlorite only once during entire project period)
2. Shortage of staff
3. Poor motivation level of staff
4. Rag pickers in the campus

The assessment of knowledge was made through various questions asked to each category of staff, viz. PMOs, MOs, Nursing and Para Medical Staff. Though the staff was aware about categories of biomedical waste, many aspects like waste categories, segregation, disinfection, treatment and disposal were not

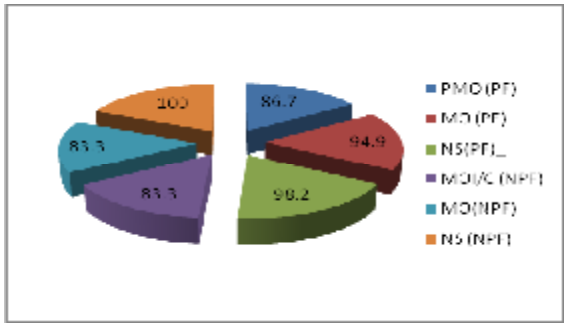
clear to them particularly, with regard to treatment techniques, disposal methods for drugs and medicines and disposal of laboratory samples.

The level of practices of nursing staff about the waste segregation was rather poor. There efforts made to imbibe the guidelines provided by the project by MO In-charges & Doctors were not upto the mark, it is felt that this aspect was not taken by Doctors as their job responsibility. Thus, the practices as hospitals were not in unison with the consolidated guidelines printed and provided at each facility of RHSDP. During interaction with RHSDP officials it was pointed out that that another set of IEC material has already approved by WB (fresh posters, with IMEP booklets translated in Hindi) & is now being issued to enable HCWM protocols to be better understood in pictorial form.

6. Practices

Another important aspect considered for the study was whether infection prevention and universal precautions were being observed by the MOs and staff deployed at the hospitals. Under consideration were the areas like Hand washing, tying & labeling of bags as also frequency of changing of waste collection bags, collection of bags from wards, Sharps disposal, Brooming, Laundry of aprons, record keeping, Infrastructure (civil works for HCWM), CTF connectivity.

1. Hand washing Practices



One of the important components of universal precaution in order to contain Hospital Acquired Infections (HAI) is frequent washing of hands by health care providers after each procedure/ intervention. As expected, virtually all the respondents affirmatively said “yes” to the question as to whether they wash hands after each procedure. Somehow this cannot be verified as the study was not a “time motion study”.

Tying and labeling of color coded waste bags

Staff	Project Facilities			Non Project Facilities		
	PMO/MO I/C N= 30	MO N= 39	NS N= 112	PMO/MO I/C N= 6	MO N= 6	NS N= 18
Bags tied & labeled	28	36	108	2	3	8

Although majority of respondents in Project facilities said that the bags were being tied & labeled, somehow, the observation fails to vouch for that as **none of the bags at any of the facility was found labeled according to provisions of Bio Medical Waste Management & Handling Rules.**

The general interpretation was that, that the pre printed labels carrying bio medical hazard symbol were being assumed as compliance towards the requirement of labeling.

(Photo- Colour coded bins at Lab. at Rajsamand)

2. Frequency of changing bags in bins

Duration	PF			NPF		
	PMO/MO I/C N= 30 (%)	MO N= 39 (%)	NS N= 112 (%)	PMO/MO I/C N= 6 (%)	MO N= 6 (%)	NS N= 18 (%)
12 hrs	5 (16.7)	4 (10.2)	30 (26.8)			3 (16.7)
24 hrs	25 (83.3)	7 (17.9)	62 (55.4)	3 (50.0)	2 (33.3)	2 (11.1)
When ⅔filled		3 (7.6)	16 (14.2)			6 (33.3)

*percentages do not sum up to 100% as the non responses have not been included in the table.

Ideally the color coded waste bags from the bins are to be tied, labeled after the bags are ⅔ filled and transported to common storage area within the facility with in 24 hours. When the care providers were subjected to the question regarding their knowledge about the frequency of changing bags, majority felt embarrassed in responding. Of the 39 Medical officers around **only 24% had the idea as to when the bags are to be changed, 14.28% of Nursing Staff had the knowledge that the bags are to be changed when ⅔ filled** and another 55.35% responded that they ask for change of bags after 24 hours even if not ⅔ filled. **These probably can addressed and little more prudently through regular trainings.**

3. Frequency of waste collection from wards

Duration	Project Facilities			Non Project Facilities		
	PMO N= 30 (%)	MO N= 39 (%)	NS N=112 (%)	PMO N= 6 (%)	MO N= 6 (%)	NS N=18 (%)
Once in a day	24(80.0)	27(69.2)	56(50.0)	3(50.0)	3 (50.0)	10(55.5)
Twice in a day	6(20.0)	11(28.2)	46(41.0)	1(16.7)	2(33.3)	8(44.4)
Thrice in a day	0(0.0)	0(0.0)	7(6.2)	0(0.0)	0(0.0)	0(0.0)
Once in 2 days	0(0.0)	1(2.5)	0(0.0)	1(16.7)	1(16.7)	0(0.0)

*percentages do not sum up to 100% as the non responses have not been included in the table.

Ideally the waste collection frequency and frequency of changing bags (24 hrs or 2/3 volume of the bags) should have matched.
In order to examine the correlation, a question was put to providers regarding frequency of waste collection from wards in district hospitals.

From the observations recorded, it appears that either the PMO/MO and nursing staff are not conversant with frequency of waste collection and the time when bags are to be changed or simply have tried to cover up the ignorance by maintaining silence which gets reflected in the fact that **80% of the PMOs said that waste was collected once in a day in contradiction to their own statement regarding frequency of change of bags, where 83% said after 24 hours.**

The nursing staff also confirmed to almost same kind of responses. This once again could be interpreted as the obdurate indifference or ignorance about the two practices. Once again this calls for strengthening of the training component.

4. Use of Protective gears by staff collecting waste

Staff	PF			NPF		
	PMO/MOI/C N=30 (%)	MO N=39 (%)	NS N=112 (%)	PMO/MO I/C N=6 (%)	MO N=6 (%)	NS N=18 (%)
Use of protective gears	25(83.3)	33(84.6)	95(84.8)	3(50)	2 (33.3)	2 (11.1)

On being questioned whether the staff responsible for collecting and carrying the waste to storage area in the facility use personal protective gears, almost 80% of all the PMOs/ MOI/C and Medical officers had a positive nod.
This was further triangulated with explicit details from another group of respondents (ward boys, nursing staff and sweepers).Somehow, on the day of visit the entire set of response stood shattered.

5. Needle stick injury

Needle stick injuries	Project facilities			Non Project facilities		
	NS N=112 (%)	WB N=52 (%)	Sweeper N=56 (%)	NS N=18 (%)	WB N=4 (%)	Sweeper N=6 (%)
Ever met with a needle stick injury	37 (33.0)	10 (19.2)	18 (32.1)	3 (16.7)	3 (75)	2 (33.3)
Did you report	6 (5.4)	1 (1.9)	8 (14.3)	-	-	-

Procedures and interventions across all health facility make the health care providers prone to needle stick injuries in view of the nature of interventional procedures. But then universal precautions time and again ask to be observed by every one in rank and file as a ritual. Somehow, as a routine this is the most neglected area under the cover of "philosophy of the convenience" where indiscriminate throwing and re-sheathing practices make them a little more vulnerable.

The problem gets compounded in view of the improper segregation and utter disregard for destroying/ distorting and cutting the needles.

The BMW Rules have made specific provisions for the safety of waste collectors where by puncture proof containers and bags for sharps along with provision of rubber gloves has been made. Still the accidents can happen, with best of the practices followed, and are to be reported timely in Form III under Biomedical waste management Rules.

Opinion on this neglected area were sought from the Medical officers and PMOs, who opined that they are aware of the **needle stick injury events but none of them confirmed that such accidents are reported by any one in writing**. **The same was also confirmed by RPCB officials. 30.8% Nursing Staff, 23% Ward boys and 32% sweepers admitted having received needle stick injury at some point in time.**

6. Practices of treating/ disposing the sharps by Nursing Staff

Practices of Nursing staff	Bed complement wise distribution of facilities					
	300 N= 20 (%)	100 N= 20 (%)	50 N= 27 (%)	30 N= 45 (%)	Total PF N= 112 (%)	Total NPF N= 18(%)
Cutting of needles	20 (100.0)	18 (90.0)	21 (77.8)	39 (86.7)	98 (87.5)	15 (83.3)
Syringe Hub cutting	18 (90.0)	17 (85.0)	21 (77.8)	35 (77.8)	91 (81.2)	11 (73.3)
Chemical disinfection before disposal in blue bag	18 (90.0)	18 (90.0)	14 (51.8)	33 (73.3)	83 (74.1)	3 (16.7)
Using Puncture proof container	5 (25.0)	12 (60.0)	7 (26.0)	14 (40.0)	38 (34.0)	0 (0.0)

*percentages do not sum up to 100% as the non responses have not been included in the table.

Following the D3 principle of waste Management, even before the sharps are collected and transported a few basic procedures are to the ensured at the level of nursing staff like cutting of needle and syringe hubs, disinfection and collection in puncture proof bags.

Though the practices were not observed and the responses are based on questions posed to nursing staff

at facilities of different levels. Almost 87.5% of nursing staff reported that they do cut the needles and another 81% use the hub cutters for distorting syringes.

Somehow the **deposition of needle in puncture proof container / blue bin is a practice that the nursing staff from the project facilities do not follow**, only 34% responding affirmatively here. at the places where these containers are said to have been in use, the containers were purchased locally. The depositing of needles in a puncture proof container (PPTC) is a part of practice and will happen almost in a reflex action once of the nurse administering injection. Thus, to be quickly able to relate to the PPTC, it is important to have a uniform PPTCs provided in a facility as also across the state. In the absence of such uniformity, the practices are varying and naturally therefore away from scientifically correct and acceptable norms. Present practices of use of local PPTCs / bins & bags arrangements need strengthening in terms of unified procurement and also improvement in regular monitoring by doctors.

7. Laundry of aprons

Another tool for observing universal precautions is the use of aprons by health care providers as a personal protective measure. Besides the use it is expected that these protective gears would be confined to the hospital premises and shall be timely laundered at the facility itself.

Somehow the burlesque observation is that **73% of PMOs almost 50% of MOs, and 81% of the Nursing staff do carry the aprons and infection pool along with it to their respective homes**. 38% of the MOs preferred to maintain silence. System should make sufficient attempts to ensure that the aprons are kept at the facility and laundered there only.

10. Log book maintenance

	Project Facilities		Non Project Facilities	
	PMO/MO I/C N=30 (%)	NS N=112 (%)	PMO/MO I/C N=6 (%)	NS N=18 (%)
Log book maintenance	20 (66.7)	73 (65.2)	0 (0.0)	3 (16.7)

66.7% of PMO/MO I/C reported maintenance of waste generation/ disposal log books. However, unit specific records for waste generation were not maintained and corroborates with absence of labeling on waste bags which makes it difficult to identify the place of origin of waste.

11. Segregation practices

Normally 10-15% of the Health facility waste is infectious that needs to be treated and disposed off safely. But this requires a concerted effort towards expedient segregation which in turn needs a lot of concern, awareness and repeated sensitization.

PMO/MOI/C at 93.3% of project funded facility reported that segregation practices were being followed at their facilities.

Consultant observing segregation at Devgarh

6.7% of Facility In-charges (at Pushkar, Salawas) were honest enough to confess that segregation is not practiced at their facilities.

Only 33.3% Non Project Funded Facility In-charges reported that segregation practices were being followed at their facilities (Deshnok, Sikandara). The problem could be for logistics (bins/bags), orientation or failure to understand the need and problem magnitude.

The general observation of study team members is that **segregation practices were not up to the mark at majority of the facilities but for district hospital. This concern was also voiced by CTF administrators.**

2. Hospital Supplies & their utilization

In view of logistics support, RHSDP did procure and supply bins and bags to all the facilities which were replenished based on demand. **The other option was that local purchases can be made for consumables like bags.**

An attempt was made to verify the supplied quantity and the stock at hand to assess whether the supplies are being put to use or simply dumped in the stores, the issue of which has left to the discretion of “conservative” store keepers.

At District Hospital Bharatpur, 60 color coded bins (15 each of yellow, blue, red and black) were supplied during 2008-09. These bins were complemented by 10800 bags (2700 of each color).

At District Hospital Beawar, 168 color coded bins (40 each of yellow, blue, red and 48 black) were supplied during 2008-09. These bins were complemented by 63248 bags of different colors supplied during the same period. The stock verification showed that 47794 bags (75.5%) of the supply have been

consumed. Somehow this verification could not be made for Bharatpur as the records were not made available.

At place the amount utilized and amount purchase matches leaving no balance with the store which can be questioned then as to how come they are still using the bags and bins.

This could be explained that the utilized amount is based on probably referring to "issued" which is now under use. Somehow this was not cross questioned and so the explanation is a plain assumption.

iii. General Observations:

1. Rag pickers

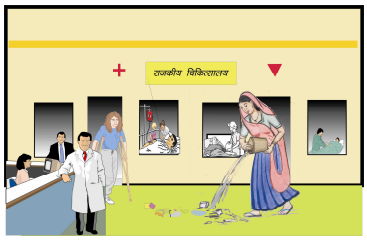
Bed Strength	Bed compliment based distribution of Project Funded Facilities				Non Project Funded Facilities
	300 N=2 (%)	100 N=4 (%)	50 N=8 (%)	30 N=16 (%)	N=6 (%)
Rag pickers seen in facilities	1 (50.0)	1 (25.0)	2 (25.0)	4 (25.0)	2 (33.3)
Name of Facility	Beawar	Rajsamand	Salumbar Vijayanagar	Dudu, Devgarh, Mavli, Mandapiya	Arain, Paota

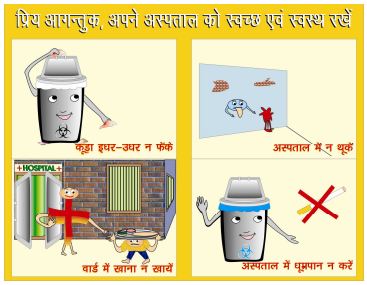
26.7 % of project facilities reported the perennial presence of rag pickers in their hospital premises while 33.3 % non project facilities are also facing the same problem**. However, rag pickers were not observed by the study team at the time of visit**, but for Beawar; as they operate either early or late evenings.
It was reported to us by PMO and MOI/C of the respective facilities.

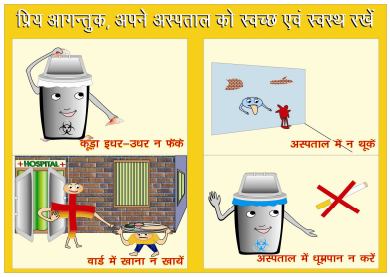
2. Display of HCWM IEC material

It was observed by the study team that on-site IEC materials on HCWM provided by PMU were available at facilities and prominently displayed at the place of use (on the wall above each located color coded bin) and were of considerable practical usefulness for health staff. IEC under HCWM was taken up by RHSDP in a big way.

The text may not be the appropriate media reflecting the efforts on IEC, therefore a glimpse at these Pictures may be a little more assuring







Good deal of picturesque messages towards importance of cleanliness at hospitals, segregation, handling, treatment & disposal of Bio Medical Waste were seen at majority of facilities, pasted/ displayed at strategic points.

3. On site availability of bins/bags

Proper availability of bins/bags at respective places (Emergency, labor room, OT, OPD, Laboratory, dressing Room, Injection room, ward, Blood bank) in facilities was observed and it was found that at both the district hospitals (300 bedded, Bharatpur and Beawar), bags and bins were in use at all the places.

For other facilities (100, 50 and 30 bedded) the presence at designated places ranged from 22%-88%. 22.2% of Non Project facilities, (precisely Deshnok) had bins/bags at respective places.

c. **Out Reach Camp:**

Both the "Out Reach Camps" were visited during the study period at Charwad & Surata (Dungarpur)

The Camp teams consisted of MO I/C, MOs (3), Nursing staff (12) & Laboratory staff (1)

Services provided at camp included:

- Examination of patients
- Diagnostic work
- Injection/ vaccination of patients and
- Minor operation (at Surata)

Some Observations at Outreach camp sites

1. Bins, bags, needle cutter were found in the camp,
2. **No Puncture proof translucent container was found**,
3. **Protective gears were neither provided nor used**,
4. **IEC materials were not displayed**,
5. Sodium hypochlorite freshly prepared solution was not being used
6. **No BMW records were found**,
7. **50% said that Sputum samples are thrown in bins without treatment**,
8. Municipal waste thrown on site
9. Segregated BMW is taken away to facility,
10. **Hand washing practices are partially followed.**

Meaning thereby that "Health camp checklist" and support provided by RHSDP for HCWM is not paid any heed while organizing outreach camps.

d. Rajasthan Pollution Control Board (RPCB):

Officials from regional offices of RPCB were interviewed in order to have their understanding on various aspects of biomedical waste management, like, authorization, legal obligations, fee structure and trainings.

1. Fee Structure

The team checked from all regional offices about fee structure.

All RPCB offices cited the following Fee structure & the rules under which the charges are made

S. No.	Applicant	Amount in Rs. Per Annum
1.	Clinic, Pathological Laboratories and blood Banks.	1000/-
2.	Veterinary Institutions, Dispensaries and Animal Houses.	1000/-
3.	Hospitals, Nursing Homes and Health Care Establishments	1000/- up to 4 beds and additional Rs. 100/- per bed per annum from fifth bed onwards.
4.	Operator of the facility of Bio-Medical Waste (excluding Transportation)	1000/-
5.	Transporter of Bio-Medical Waste	7,500/-

2. Knowledge of Staff:

	Jaipur	Alwar	Bhilwara	Kota	Udaipur	Bikaner	Jodhpur	Total	%
Awareness about BMW	Yes	Yes	Yes	Yes	Yes	Yes	Yes	7	100
Waste Categories	Yes	Yes	No	Yes	Yes	No	Yes	5	71.42
Schedules (6)	Yes	Yes	No	No	No	No	Yes	3	42.85
Rules (13)	Yes	No	No	No	No	No	No	1	14.28
Forms (3)	Yes	Yes	Yes	No	Yes	no	No	4	57.14
Training on BMW	Yes	No	No	No	Yes	Yes	Yes	3	42.85
Copy of rules provided	NO	No	NO	No	Yes	Yes	Yes	3	42.85
Inspections									
CTF	Yes	Yes	Yes	Yes	Yes	Yes	Yes	7	100
Health Facility	Yes	Yes	No	Yes	Yes	No	Yes	5	71.42

Notices to defaulting CTF operators are being issued by RPCB, however there are lapses in necessary on going monitoring.

Only 42.85% informed that they have had training in Bio Medical Waste management. **No report of needle stick injury was found at any Regional Office of RPCB**.

Notices had been served under The Bio Medical Waste Management & Handling Rules at Kota (mostly to private hospitals) and Bhilwara (Dist. Hospital).

For example M.G.Bhilwara was inspected by RPCB on 6.02.09 and authorization was cancelled due to following reasons:

1. Improper segregation
2. Needle cutter/syringe cutter not in use
3. Intact needles and intact plastic bottles were found in bins
4. Improper disinfection practices
5. Authorization taken for 315 beds, against the actual bed strength of 385

It is recommended that RPCB officials should be responsible for vigilant monitoring. The RPCB staff needs orientation on hospital working, IEC, training on various dimensions of HCWM. Further, their own inter-departmental coordination need be strengthened in terms of:-

1. Effective communication of authorizing powers and procedures (upto 50beds through RO; i.e., 51 and above be referred to HO).
2. Practice of deep burial permitted as per rules for towns below 5.0 lac population.
3. Monitoring of CTF services in a close manner; if felt necessary in collaboration with DMHS/ RHSDP.

Interaction with State Authorities

Interaction with State Authorities:

A. RHSDP

Most of the respondents stated that Implementation of comprehensive HCWM plan as stated in PIP has been done by RHSDP including sensitization of stake holders through workshops, HCWM trainings, civil work for burial pits and storage spaces, facilitation of authorization, funds for CTF, awareness through IEC material workshops, trainings, and procurement of hospital supplies. All agreed that there were some gaps in implementation especially with regard to segregation practices.

In a major innovation, RHSDP decided to provide hands on training to the total staff of facilities right at their doorstep. The move paid rich dividends and was highly appreciated by World Bank & M & H. Total of 13178 personnel were trained in two phases of trainings at 343 facilities.

RHSDP has completed its supplies consisting of Bins, Bags, Hypochlorite solution/bleaching powder, IEC material (posters, flexi sheets, videos, CDs), Protective gears (apron, gloves, mask, eye shield, boots), Wheel barrow/trolley, Training material, Formats , records & labels, Standard operating procedures guidelines, except needle cutter/hub cutter and labels.

Burial pits and storage facility had been provided.

They had trained all the staff at 343 facilities including 2147 doctors, 6096 nursing staff and 3441 ward boy/sweepers.

As per respondents no authorization charges are being paid by RHSDP. Initial authorization in respect of all 343 health facilities had been obtained. 107 authorizations have been renewed. Almost all due renewals have been applied and pending with RPCB for reasons like fee and membership issues.

172 facilities are connected to CTF remaining 171 are yet to be connected, this is line with recommended practice under The Bio Medical Waste Management & Handling Rules, 2003 (Amended).

Various gaps found during monitoring include areas of segregation, low respect to usage of protective gear, non availability of hospital supplies at wards, no CTF connectivity at rural hospitals

Actions taken to rectify the gaps include more frequent monitoring and follow up in DPC meeting, segregation practices and other implementable HCWM activities are addressed in HSIT training and district level training, observation of HCWM practices during field visit to the facilities, meeting RPCB and CTF operators.
Ownership of Directorate (Hospital Administration) to monitor the HCWM implementation through CM & HOs and Block CMOs, PMOs and in-charge Hospital.

Linkages with NRHM, RPCB and CTF operators are maintained.

Scope of further expansion of activities includes extension of HCWM activities to NRHM supported facilities. Experience earned by RHSDP in different fields is being shared with NRHM & DMHS for implementation, henceforth.

1. Civil Works

Burial pits

The Rules provide for disposal of Bio Medical Waste using deep burial pits – at locations with population less than 5.00 Lacs; and thus most of the 50 & 30 bedded CHCs can legally use this system of final disposal. Anticipating that development of CTFs in state will take time, the deep burial pits were constructed in the early stage of the project – which has proved to be a wise decision.

There were deep burial pits constructed at 314 facilities out of 343. At 26 locations the waste storage spaces were constructed. All these construction works were undertaken on priority as per directions of Project Director for legal compliance. These works were executed through DPCs (as there was no Civil Engineering wing with RHSDP in the first year of the project) and were completed in the first year of the project. The total expenditure on the construction activities pertaining to HCWM was 192 Lacs against budgetary provision of ~ 300 Lacs.

The design, drawings, bill of quantities and estimates were provided by Architect and Consultant-HCWM, based upon the MHSDP works for HCWM.

Facilities	Project Funded Facilities N=30 (%)	Non Project Facilities N=6 (%)
Burial Pit present	23 (76.7)	2 (33.3)
Location of burial pit		
1. Within campus but near the hospital building	17 (73.9)	2 (33.3)
2. Within campus but away from the hospital building	6 (26.0)	0 (0.0)
3. Outside the hospital campus	0 (0.0)	0 (0.0)
Is the burial pit covered	19 (82.6)	2 (33.3)
Is the burial elevated	21 (91.3)	2 (33.3)
Is the burial pit fenced	20 (86.9)	2 (33.3)

Under the Project, all the burial pits dug were with lids elevated above ground and fenced as also provided with shed. The dimensions of pits at + 100 bedded facilities large –2x2x3 meters and at CHCs Small-1.5x1.5x2 meters). Of the 23 facilities where burial pits were located, 91.3% had it elevated from the surroundings and 86.9% of the pits were adequately fenced.

The situation in non-project facilities needs a lot of effort. Just 16.7% non project facilities were having a sharp disposal pit.

It is suggested that besides sustaining and improving the efforts in project facility, the DM&HS should now start focusing on other (non project funded) facilities towards BMW system implementation too. The rich experience earned and the success rate achieved by the project endeavor may be taken further by the Directorate and aligned procurement specifications, practices be pursued. Project is likely to take up trainings at all facilities under the extension period, which will spread uniform messages across the state.

Storage room

66.7% project facility had a designated storage room within the facility premise for collecting waste and only authorized staff had access to this storage room. Storage spaces constructed under RHSDP were at 8 DHs (namely Beawar, Alwar, Banswada, Bharatpur, Bhilwara, Ganganager, Pali & Sikar) and 18 Facilities Udaipur (50, 30 bedded).

1. Facilities at Storage Room

Ventilation N=20 (%)	Water and drainage N=20 (%)	Power supply N=20 (%)	Weighing machine N=20 (%)	Exhaust fan N=20 (%)	Demarcated area N=20 (%)
18 (90.0)	13 (65.0)	9 (45.0)	18 (90.0)	3 (15.0)	12 (60.0)

The BMW rules have made certain provisions mandatory for the waste collection and storage rooms. Of the 30 project funded facilities **only 66.7 % had designated storage area** for keeping waste before collecting by CTF personnel.

90 % of storage rooms were having ventilation, only 15 % had exhaust fan & 60 % had demarcated area for color coded bags. Some of the storage rooms though constructed under project, viz. at Kotputli, are not provided with access and consequently, is put to many other uses but for bio medical waste storage.

2. Procurement & Supplies (support from RHSDP)

With detailed specifications drawn for each item, procurement cell followed National shopping method prescribed by The World Bank and completed procurement and supplies to all 343 project supported facilities.

Procurement of equipment (weighing machine, needle & syringe destroyer, plastic shredder) needed for implementation of HCWM at each institution was prescribed in the PIP of RHSDP. Procurement of consumables and equipment is now streamlined and centralized at RHSDP. Procurement is done in line

with the World Bank procurement norms bulk per annum and delivery is made directly at each location. The quality of supplies is ensured by assigning Pre dispatch inspection to an independent agency, who draws samples from the manufacturers premises before dispatch and gets them tested from authorized laboratories. The quantities procured are based on lists provided by each facility, which are then compiled by the PIU. In case of defects, the feedback mechanism is based on complaints from individual facilities, and samples are sent for testing at CIPET (Central Institute for Plastics Engineering and Technology) at Chennai.

Punctuations in procurement

1. Plastic shredders (40 units) tendered out, technical specifications not met at the time of supply, bid scraped.
2. Complaints about the Biodegradable waste collection bags, addressed following a complaint redressal mechanism. The quality of procurements was established and re-established through tests conducted at independent / government laboratories

The supplies from PIU, RHSDP were demand driven in nature and had inherent limitations on account of:

i. The timely demands not raised by facility in-charges / DPCs
ii. The irrational demands raised
iii. No demand for disinfectant (Sodium Hypochlorite), also the PIU failed to anticipate demands and make timely supplies.
iv. MO in-charges found it difficult to secure and store the Sodium Hypochlorite solution (procured for 1 year, at a time – as per World Bank procedure), which was made an administrative issue.
v. The approval of specifications as also the bid documents / procurement plan

Procurement of consumables and equipment is now streamlined and centralized at RHSDP. Procurement is done in bulk per annum and delivery is made directly at each location. The quantities procured are based on demand given by each facility, compiled by DPC and packaged / tendered by PIU, RHSDP for initiating the procurement process. It has been observed during interaction with PIU (EPMC cell) that the approval of specifications as also the bid documents / procurement plan from the World Bank took long time which resulted into delays in supplies at some occasions.

Head of Expenses	Allocation (as per PIP) [Revised] Million INR	Estimated Expenditure Million INR	Remarks
Civil Works	30.00 one time activity	19.20	Construction of Deep Burial Pits at 316 facilities and BMW Storages at 26 facilities
Procurement	5.7 [11.0]per year	10.0 per year	Hospital Supplies, like Bags, Bins, Disinfectant, Protective Gear, etc.
Trainings	15.17	15.3	Hands on trainings at all 343 facilities, covering medical officers & entire staff
Workshops	2.0	0.55	State & District Level sensitization workshops; Midterm state level workshop
IEC	3.0	0.60	Development, printing and dissemination of Posters, Guidelines, Formats, SOPs, etc.
CTF hiring charges	Total 1.50 [@ Rs. 1000/- per bed r year, for all CTF connected facilities]	Avg. Annual expenditure ~ 0.50	Provision was initially made only for 47 facilities – considering only one functional CTF at Jaipur

3. Trainings

For capacity building of the Staff at the project facilities, Training was considered to be the crucial instrument for change so that concerns could be translated into action and hospital waste management plan put on the ground.

Initial Training Plan-

Category	Load	Days	Batches	Location	Subject	Implementation Plan
Training of Trainers	64	6	2	IIHMR	Human Resource Management, Planning, Legal aspects, Technology assessment, Infection control,	Year 1
Director/Deputy Director/Joint Director	26	6	1	Jaipur/IIHMR	Human Resource Management, Planning, Legal aspects, Technology assessment, Infection control,	Year 1
Chief Medical & Health Officer	32	6	2	Jaipur/IIHMR	Human Resource Management, Planning, Legal aspects, Technology assessment, Infection control, Monitoring	Year 1
Principal Medical Officer/ Medical Officer Incharge	343	6	14	Jaipur/IIHMR	Human Resource Management, Planning, Legal aspects, Technology assessment, Infection control, Monitoring, Waste to energy recycling, Disposal	Year 1
Senior Medical	371	6	7	Jaipur/IIHMR	Human Resource Management,	Year 1 & 2

Officer/ Medical Officer					Planning, Legal aspects, Technology assessment, Infection control, Monitoring, Waste to energy recycling, Disposal	
Staff Nurse/ ANM	464	6	19	District Training Center	Sharp Management, Hospital infection, Protection of waste handlers, Collection, Transportation, Disposal	Year 1 to 4
Laboratory Technician and Blood bank Technician	464	6	19	District Training Center	Sharp Management, Hospital infection, Protection of waste handlers, Collection, Transportation, Disposal	Year 1 to 4
Wardboys/Class IV workers of House keeping, Laundry and Mortuary, Safai karamcharies	560	2	23	Hospitals	Deep burial, Confined burning, Hospital infection and protection of health workers	Year 1 to 4
Municipal Corporation Health Officer	20	6	1	Jaipur/IIHMR	Planning and Monitoring, Hospital infection and protection of waste handlers	Year 1
NGO representative	64	3	2	Hospitals	Rationale of hospital waste management, Hospital infection & Risk involved to waste handlers and community.	Year 1 to 4

The trainings, in consonance to R3-D3 approach converged on segregation, collection, transport and treatment, employee's responsibility, employer's role in waste management program and standard operative procedures for waste management. Trainings as per PIP were initially planned to be conducted for different personnel at selected training institutes and after defining training load and training days for different categories of personnel.

Training Areas:

The planned trainings covered areas like Attitudinal change – concept of clean and unclean practices, Waste – classification, Hazards of waste, Regulatory Framework, Segregation of waste, Management of Sharps, Collection of waste, Transportation of waste within the health care setting, Hand washing, Management of Plastic, Management of liquid waste, Use of Disinfectants, Personal safety, Management of Linen/Care in laundry and Record Keeping.

Training methodology:

On site hands on training, redesigned under PIP, through a hired agency at all 343 hospitals / CHCs', in the later half of second year of the Project, synchronized with the completion of civil works (Deep Burial Pits and Storage spaces for CTF connected facilities), procurement of all hospital supplies & IEC material.

Status of Health Care Waste Management Training:

Phase	Number of Trainees					
	Doctors	Nursing Staff	Para Medical	Class IV	Others	Total
Phase- 1 (2006-07) (covering + 100 bedded institutions) Completed at 40/343 facilities	1008	2273	397	1732	296	5706
Phase- II (2006-07) covering 30 & 50 bedded CHCs) Trainings completed at 303 facilities	1139	2437	989	1709	1198	7472
Total	2147	4710	1386	3441	1494	13178

To address the qualitative issues, besides sensitization and re-orientation, second round of HCWM trainings (Phase II) has started in July 2009. Wherein, the initial non project facilities have also been encompassed covering all 406 secondary level institutions (CHCs, SDH & DH) and 1500 PHCs' supported by NRHM. **Probably this is the only state where convergence between a project and a mission has successfully rolled out** for scripting the future strategies well in advance.

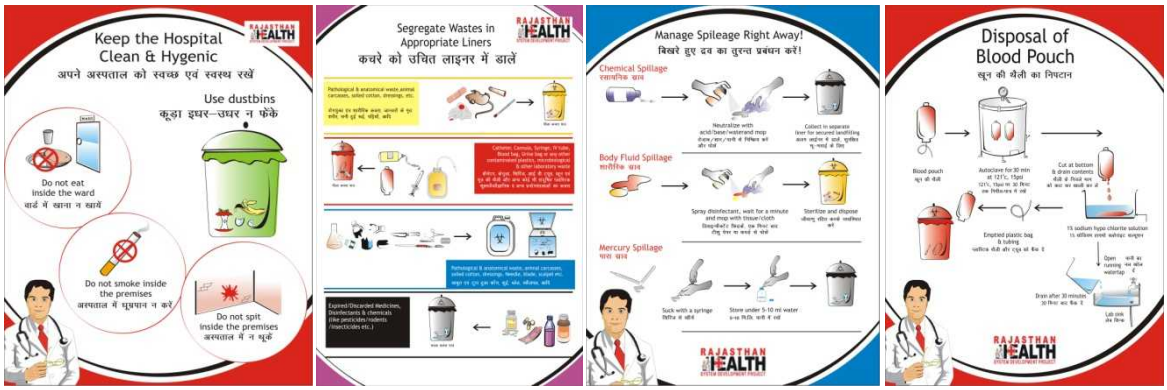
4. Design & Development of IEC at PIU, RHSDP

Initially, IEC material was procured for all 343 facilities and disseminated right in first year. Training kits including audio visual presentations (in 2 CDs) were also supplied. Development of IEC was then initiated within the project. Audio Visual film on HCWM practices was developed. Additionally color coded flexi sheets were printed and provided by the project to all facilities to serve as on spot reminder towards segregation requirements.

The Infection Management and Environment Plan (IMEP) guidelines of the MOHFW were translated in Hindi. These guidelines will be disseminated and utilized for imparting training to healthcare facilities and workers. New IEC materials (posters, flexi-sheets) have been developed taking into account IMEP guidelines. These are proposed to be distributed to all RHSDP facilities and remaining non project facilities (totaling now to 406) and 1500 PHCs' that are supported by NRHM.

IEC that supports practices - display at Osiyan

Following inputs were provided by PIU, RHSDP towards fresh set of posters for IEC approved by the World Bank.



5. Support for Health Camps (access and equity issues)

Health camps are organized in distant areas to increase access to and equity in health care service delivery with particular focus to underserved marginalized populace. During medical camps bio-medical waste is produced apparently, which has to be segregated and stored correctly, to avoid transmission of infection which calls for observance of precautions in collection, segregation, treatment & disposal of Bio Medical Waste, including practices like-.

- Multiple use instruments should be sterilized or disinfected after every use.
- Ensure that disposable items are destroyed under supervision after use.
- Hand washing practice before and after each procedure should be ensured.
- Ensure sharps & needles, not to be handled with bare hands.
- Poster indicating the Dos and Don'ts of Bio Medical Waste Management be displayed

RHSDP has prepared a pre camp check list with guidance of the World Bank to enable MO I/Cs to manage Bio Medical Waste that will generated during all out reach camps.

6. Facilitation of processes across stakeholders like RPCB (Authorization) & CTF service providers (PPP)

RHSDP has engineered the integration of Health Care Waste Management (HCWM) across all health programs in the state that includes resolving the strategic and policy issues related to Common Waste Treatment Facilities (CTF), by organizing high-level tripartite discussions with departments of Local Self-Government and Environment. As a result many, convoluted issues stand ironed out with reference to CTF operations. The project has been instrumental in addressing to the de-centralization of the Authorization process and certain coordination problems with RPCB, of which few are enumerated below:

- The issue of Authorization by RPCB under the BMW Act will not be linked with CTF membership/connectivity in areas where CTFs connectivity is not presently available.
- Issue of authorization will not be withheld on account of earlier dues of fees (since 2002) from the Govt. Hospitals.
- Regional offices will expedite authorization
- CTFs asked to provide connectivity and service to Govt. health institutions on priority basis
- The issue of CTF user fees has been resolved.

Best of efforts can fail, but give it a try; the project believed in, still some of the recalcitrance continues in order to cover up ignorance, indifference and impassivity.

7. Monitoring & Supervision

RHSDP has developed check lists for BMW implementation. It is expected that hospitals shall use the check list in order to see whether all requirements under the law are being followed or not with reference to categorization of waste, treatment and disposal besides planning for resources.

HCWM implementation discussed as an agenda in HSITs. Monitoring in HSIC meetings by CM & HO (Chairperson HSIC).

Supervision by the Hospital in-charges, PMOs.

Monitoring by CM&HOs, Officials designated at the state, Zone and district level for monitoring during their field visits.

Core committee has been constituted for monitoring with the Director - Hospital Administration at the State level.

It if felt necessary to have few components monitored through District Health Society e.g. quality of CTF services, solid non infectious waste collection and disposal through local bodies, issues pertaining to Regional Office, RPCB. Orders have been issued to the Collectors of all Districts to form committees for monitoring the collection of waste and disposal practices by the CTFs and monitoring this activity as an agenda in the District Health Societies.

Maintenance of records

According to the bio medical waste (management and handling) (second amendments) rules, 2003, every authorized person i.e. hospital superintendent/principal medical officer will maintain records related to the generation , collection, reception, storage, transportation, treatment, disposal and/ or any form of handling of bio medical waste in accordance with this rules and any guidelines issued. All records will be subject to inspection and verification by the prescribed authority at any time.

There are various guidelines, formats and protocols of HCWM developed by RHSDP, all these are published in a HCWM booklet published by the project, in line with the provision of PIP. The formats for recording observations of BMW generation, disinfection process, segregation & weighing, disposal etc. etc. are not being followed in the field. Simpler formats have been devised by Hospitals locally

As observed from the facilities, by and large, as a ritual, hospitals, if at all, simply record total number of bags and approximate weight in a register. Generally, no systematic records are available with the hospitals on the HCWM subject, and at a few locations only registers are available as part objective evidence of HCWM implementation at the hospitals.

- Accident reporting

According to the bio medical waste (management and handling) (second amendments) rules, 2003, when any accident involving BMW occurs at any facility where bio medical waste is handled or during transportation of such waste, the authorized person will report the accident in Form III to the prescribed authority. Action will immediately be taken to treat the emergency. And, if there is any spillage during transport than action will be taken to contain it as required.

There were however, no recorded evidences available with any of the hospitals.

- Reporting of needle stick injury / injury due to sharp

Since the chance of occurrence of a needle stick injury in health facility is high, it is essential to keep track of these and take remedial measures to prevent staff at hospital from infections like Hepatitis B and HIV, etc. There were however, no recorded evidences available with any of the hospitals, and the observations made in the present study also vouch for that.

Challenges

1. Coordination between stake holders.
2. Inadequate supervision and enforcement of facilities at CTF operations by Rajasthan Pollution Control Board (RPCB).
3. Improving Monitoring mechanism – as if PMO or MO In-charges are not strictly monitoring the implementation & practices
4. The attrition rate amongst contractual helpers
5. Poor sharp management
6. Camp protocols not followed
7. CTF connectivity in distant areas is lacking
8. Monitoring of CTF under DHS / RMRS needed

Addressing the challenges

1. RHSDP has played a key role going beyond the mandate of PIP, in helping to resolve the strategic and policy issues related to Common Waste Treatment Facilities (CTF), through discussions with departments of Local Self-Government and Dept. of Environment.
   The other areas where Project can contribute could be deciding on alternatives for disposal of BMW in remote areas, facilitating monitoring of CTF by Pollution Control Boards, involving DM &HS on technical issues, IEC and M&E.
2. Reorientation of HCWM practices to district officials for change of perceptions and conducting regular monitoring and changing the mindset of individuals.
3. Repeated Hands on training through re-orientations need to be imparted at facility level. HCWM system has a large human interfacing in the implementation process; thud putting knowledge into practice followed by sustaining practices to improve quality is a big challenge. Interaction, counseling and education are best steps to bring about ownership & sustainability of such processes.
4. Issuance of procedural directives by PHS, PD, RHSDP, for strict implementation of HCWM plans
5. Availability of HCWM related supplies (Bins/ Bags, Protective gear, Disinfectant, Trolleys)
6. Addressing the HCWM related issues by developing IEC material/ audio-visual film
7. Monitoring the CTF facilities by DPCs and District Health Societies is already in place to assess their capacities in terms of infrastructure and knowledge with respect to BMW collection, transportation, treatment & disposal in a scientific manner with responsible care waste treatment personnel at site.

B. NRHM

All the respondents agreed that they had plans for HCWM activities and knew the various steps taken by RHSDP in this regard. They are coordinating with RHSDP in all activities. Besides bins and bags NRHM has supplied needle cutter/hub cutter, wheel barrow and trolley to health facilities. To Review and monitor HCWM related issues & provide trainings HSIT committee has been constituted. These committees hold their monthly meetings regularly.

Summary & Conclusion

Summary & Conclusion:

The independent evaluation, based on the RFP and Inception report submitted by State Institute of Health & Family Welfare was awarded to SIHFW with explicitly laid out scope of work and deliverables.

The study tools used were Structured questionnaire (recording responses and observation), wherein 12 protocols, under four heads, were used, details of which are placed here.

A. Health facility
B. CTF
C. Stake Holders
D. Outreach Camps

8 CTFs, 2 District Hospitals, 4SDH, 8-50bedded hospitals, 16- 30bedded facilities and another 6 30 bedded non project facilities besides 2 outreach camps, interaction with officials at Head office of RPCB, interaction with staff at 7 regional offices of RPCB, authorities at RHSDP and officials of NRHM was included for the scope of work for the present study. The forte and fortitude of the study was based on assessment of health facilities on various facets of biomedical waste management, interaction with staff at CTF and other stake holders and observations of outreach camps. Besides, using the instrument of structured questionnaire, observation, physical verification and the desk review of PIP, aide memoire and studies; was the approach adopted. The study was undertaken in eight districts.

Some of the arresting findings from the genre are reproduced for comprehending the present observations-

a. Common Treatment Facility (CTF)

Authorization of CTF, availability of technology, provision of personal protective equipment for CTF staff, adequate number of vehicles with proper enclosed design & compartments; collection and treatment of collected waste in 48 hours are some of the limiting factors at CTFs. Some of the common problems encountered by CTFs included being asked to collect waste from more than 150 kms. (Bhilwara), being asked to lift municipal waste, improper segregation i.e. not in line with BMW rules, at times un-mutilated needles are observed, and minimal red and blue bag waste quantity.

Out of the project funded facilities visited 83% (25 out of 30) were connected with CTF. Regular collection of waste from these facilities within the mandatory period of 24hours was found only in five facilities.

CTF staff is said to have been vaccinated but for non availability of records this cannot be attested.

b. Civil works

The impact of Civil Works pertaining to HCWM was visible in terms of availability and the usage of acceptable disposal point in the absence of CTF Regular connectivity as also as stand bye arrangement

besides connectivity to CTF at the project supported facilities. On the other hand, the non project supported facilities did not have Deep Burial Pits (one out of the 6 non project facility reportedly having a deep burial pit). The system implementation would not be complete without these civil works, and therefore, these structures become part of the legal requirements – in particular where the hospital is not connected with CTF services.

The BMW rules have made certain provisions mandatory for the waste collection and storage rooms. Out Of the 25 CTF connected project funded facilities **only (20) 80% had designated storage area** for keeping waste before collecting by CTF personnel.

90 % of storage rooms were having ventilation, only 15 % had exhaust fan & 60 % had demarcated area for color coded bags.

c. Health Facilities

Awareness of BMW Act & Rules and their availability at facility was satisfactory. Health Systems Improvement Team (HSIT) was functional in all project facilities, but for one, and they had regular interactions. Adamantly designed IEC material was found at most of the facilities. Barring their mishandling & errors in the from of display at a few hospitals the IEC was satisfactory.

d. Quantum of waste (generation per bed per day)

The approximate total waste generated in the hospital is 1.57 kg in 30 bedded hospitals, 2.06 kg in 50 bedded hospitals, 2.18 kg in 100 bedded hospitals, 3.44 kg in 150 bedded hospitals and 1.92 kg in 300 bedded hospitals in the state. The **largest amount of waste was generated in the 150 bedded** hospitals However, the Bio medical Waste quantities assessed at surveyed facilities indicate a quantum of 0.18 to 0.26 per kg per bed per day, this low quantum is attributed to pilferage of metal & plastic wastes.

It would be pertinent to note that the waste segregation practices, although not adopted in toto, have lead to considerable reduction in the Bio-medical waste quantities during project period across the state at the project supported facilities.

The supplies of color coded bins and bags were matched with the requirements in both the district hospitals and were found in use also at designated places within the facility. Similarly, the supplies had also reached every year to all the project supported (343) facilities which has triggered implementation.

e. Authorization:

Initially authorization was obtained by all Project funded facilities. But only 60% of them had the valid authorization on the date of visit while another 40% who have deposited the prescribed fee are waiting for renewal. It is learned that the decentralized powers for issuing authorization at regional office level have been facilitated by RHSDP.

f. Training:

The training status of the different cadres on HCWM components, with a range of 70% to 80%, still leaves a sizable backlog. Further, on an average 50% to 70% of the nursing staff is involved into in house trainings. Since the cleaning at majority of the hospitals is outsourced, training of the contractual staff though becomes imperative, cannot be certified but for records.

g. Knowledge

Knowledge on color coding and the kind of waste associated with a particular color is excellent in project facilities (97%) as compared to non project facilities (50% to 80%).

The staff at project supported facilities had a fair understanding of the different kinds of waste that are generated in the facility in process of care.

RHSDP has been advocating use of black bags for general waste (not in line with BMW rules & IMEP guidelines) and blue bags for sharps (Unsafe due to the higher chances of ripping). These two items, however, are being replaced with green bag and PPTC respectively.

h. Practices:

The practices do not match the knowledge for various reasons including non availability of disinfectant, shortage of staff, poor motivation and presence of rag pickers in the campus. The worst hit area on account of practices not matching up with knowledge is waste segregation.

Practices were judged based on simple questions (the present study was not a time-motion study) in relation to hand washing, tying and labeling of bags, frequency of changing color coded bags, sharp disposal, brooming and apron laundry.

Hand washing practices are universal to Project and non project facilities, color coded collection bags are tied but not labeled. The waste is collected within 24hours; use of personal protective gear by staff is reported to be observed by close to 80% of the staff. Somehow the same set of response stood shattered on the day of visit. Staff is aware of needle stick injuries but none of them confirmed reporting of these accidents to anybody though 30.8% of the nursing staff 23% of the ward boys and 32% of the sweepers admitted might have met with such accidents at some point in time. The non reporting of these accidents was also confirmed by the RPCB officials.

73% of PMOs almost 50% of MOs, and 81% of the Nursing staff do carry the aprons and infection pool along with it to their respective homes.

Deposition of needle in puncture proof container is a practice that the nursing staff from the project facilities does not follow, only 34% responding affirmatively.

As a universal practice, both the Project as well as non project facilities is broomed regularly followed by wet mopping. The practice is simply a result of failure to correlate the relation between bacterial air concentration and hospital acquired infections.

The segregated waste was stored at a certain place prior to removal from the hospitals. The data reveals that in 300 and 150 bedded hospitals; almost **all the waste was stored within the hospital campus**.

Rag pickers were reported to be operating at 8 hospitals out of 30 project facilities. However, the study team could not locate them at the time of visit. On being questioned on segregation, only 6.7% of the facility in-charges did confess that segregation is not practiced. The segregation practices by and large were not up to the mark but for district hospitals and this was observed by the team.

i. Transport of Bio Medical Waste to Treatment/Disposal Unit outside the Hospital

During the present study, it was observed that bags containing BMW meant for transportation to CTF were not labeled. In accordance Bio-Medical Waste (Management and Handling) (Second Amendments) Rules, 2000, CTF operator has to transport the waste from the hospital to the common treatment facility.

j. IEC

The IEC material was seen displayed at strategic points.

k. Outreach Camps

The observations from outreach camps are- puncture proof translucent containers absent, protective gears not used, IEC material not displayed, body fluid and sputum samples thrown indiscriminately along with municipal waste; meaning thereby that the health camp check list is not paid any heed.

l. RPCB

A commendable effort of coordination of PIU, RHSDP with RPCB officials need be taken note of as following milestones are achieved.

1. De-centralization process of issue of Authorization at Regional Office level for hospitals upto 50 bed strength.

2. Issuing first time authorization to all 343 project supported facilities within project period

A few RPCB officials were not conversant with categories, schedules, rules and forms related to BMW rules.

Recommendations

Recommendations:

Drawing the context from the field observations, desk review and the opinions evolved during interaction with the officials from RHSDP/NRHM a set of recommendations are put here for consideration:

1. CTF Services

a. CTF should be asked to maintain facility based records and the same should be ma de available to designated authority on a monthly basis. Failure on this account should incite interdiction. Record of vaccination of staff will also be maintained.

b. CTF authorization should be strictly monitored by RPCB with provision of austere mulct.

c. The charges and the coverage by one CTF should be re casted based on the waste load, capacity and financial viability.

d. Waste collection from the facility should be ensured within 24hours, failure on part of CTF on this account again should be subjected to penal provisions.

e. Better outreach and increased responsible discharge of duties is expected from CTF service providers.

2. Trainings

a. Frequent in-house refresher trainings should be taken up on a quarterly basis as much of the knowledge has not been translated into practice.

b. Hands on training should cover all categories with focus on nursing staff and helpers (sweepers) and address to R_3 D_3. Training on Segregation needs to be emphasized with practical demonstration, particularly with reference to sharps

c. Improper segregation practices are increasing load of Bio Medical Waste and thus, put additional burden of cost of treatment..

d. Trainings at non project facilities also should start at the earliest as the staff is vulnerable to transfers between Project and non project facilities.

A suggestion is to depute the Non Project facilities staff to a nearby CHC for undertaking trainings as, this staff (posted at NPF) may in future be transferred to some other facility having HCWM system in place and will not be able to comprehend and cope up with the color coding approach for waste segregation

e. Sensitization of contractual staff (Safai Karmcharis/Ward boys) is very m,uch needed for a successful implementation besides an inbuilt clause (in the cleaning service outsourcing MoU) that the staff trained in BMW implementation shall not be replaced before one year.

3. Procurement of Hospital Supplies

a. Procurement and supply of consumables should match the quantum of waste and timing of the supplies to reach facilities be synchronized. Under utilization of hospital supplies for HCWM can lead to spread of HAI infections and occupational hazards.

b. Constants like, shortage of consumables (soap, mask, cap, boot, bags, and disinfectants) should be addressed on priority. Non availability of disinfectant needs careful monitoring.

c. PMO/In-Charge (HCWM) should be delegated responsibility for local purchase of consumables (decentralization will ensures smooth operations).

4. Civil Works for HCWM

a. Designated storage rooms with mandatory requirements to be erected in all facilities present without storage rooms.

b. Maintenance and up keep of Deep Burial Pits be ensured as final disposal option, in the wake of disturbance / interruption in the CTF services.

c. For disposal of treated sharps, sharp pits to be taken up on priority at non project facilities, i.e. the remaining secondary level institutions.

5. Improvement of Practices

a. The daily practices like segregation, disposal of sharps, Use of personal protective gears amongst waste collectors and sweepers need to be closely monitored by a staff that is preferably not involved in the clinical work (Hospital Administrator, Matron / Designated staff only responsible for only housekeeping).

b. Washing of Aprons at hospital itself need be instituted to reduce hazards to family members of health service delivery workers.

c. Municipal waste is effectively and separately collected and disposed off daily so that the cumbersome task of segregation of waste does not become an exercise at the end of each day.

d. A consorted effort for initiating record keeping and its maintenance is necessary at hospital.

e. Brooming is replaced by vacuum cleaning and/or moping to improve the indoor / work place air quality.

f. Financing and resource allocation for HCWM implementation is to be integrated with the main state budget head. DH&HS need to act and carve out budgetary provision for this component with a holistic approach, for legal compliance.

g. Practices at outreach camps needs monitoring using approved protocol & check list

h. IEC material provided (flexi sheets, charts & posters) may be better used for internal trainings, improvement of practices.