ORIGINAL ARTICLE

Situational analysis of Bio-medical waste management of Tertiary care centre and Common Bio-medical Waste Treatment Facility of South Gujarat

Mali Ankur¹*, Damor Rahul², Kosambiya Jayeshbhai³

¹Resident Doctor, ²Assistant Professor, ³I/C Professor and Head, Department of Community Medicine, Government Medical College Surat

ABSTRACT

BACKGROUND INCLUDING OBJECTIVES: A legislative framework for Bio-medical waste management was generated a decade ago; but still there is a gap at local level in management. So, this study was planned to document existing resources, system capacity and practice relating to Bio-medical Waste Management (BMW) in New Civil Hospital, Surat (NCHS) and Common Bio-medical Waste Treatment Facility (CBWTF) of Surat.

METHODOLOGY: Study was cross sectional survey, with direct observation of BMW management system. There were 31 items, spread over system capacity (7), resources (8) and process (16). These items were weighted by no compliance (0), partial compliance (5) and full compliance (10). Health facility was assigned into one of three categories (red, yellow, green) based on mean score. CBWTF was assessed by guidelines of Central Pollution Control Board and SWOT analysis.

OBSERVATIONS & DISCUSSION: Mean score for system capacity, resources and process was 8.33, 9.84, and 7.41. So, mean score for NCHS is 8.5 (green category >7.5). There is still a gap in process; the main reason for it is partial compliance for segregation, management of sharp, and non-availability of clean and labelled trolley for in house transport. SWOT analysis for CBWTF: 1) Strengths: maintain standards of incinerators and autoclaves, timely collect waste from health care facilities & transport vehicle were tracked by GPS, Water recycled from Effluent Treatment Plan was used for gardening, washing vehicles etc. 2) Weakness: it covers >150 km of area, Stack monitoring system was there but it was not working, CBWTF is in residential area. 3) Opportunity: New distribution channels 4) Threat: New Govt. regulations. CONCLUSIONS & RECOMMENDATIONS: Segregation process should be strengthened. There is requirement of another CBWTF in Surat city.

Key words: Situational analysis, Bio-medical waste management, BMW scoring system, Common Bio-medical Treatment Facility, SWOT analysis

INTRODUCTION

Situational analysis means “A systematic collection and evaluation of past and present economic, political, social, and technological data aimed at 1) identification of internal and external forces that may influence the organization’s performance and choice of strategies and 2) assessment of organization’s current and future strengths, weakness, opportunities and threats”¹. Bio Medical Waste means “Any waste, which is generated during the diagnosis, treatment or immunization of human beings or animals or in research activities pertaining thereto or in the production or testing of biological including categories mentioned in Schedule I of Bio-medical Waste (Handling and Management) Rules, 1998”². Expansion of health care facilities as well as the recent trend of using disposables has led to an unprecedented burden of health care related waste. Since the last three decades, unregulated handling of biomedical waste is emerging as a serious threat to human health and safety, and many researchers have documented this as a priority area³,4,5. It has been reported that in UK, during the period of 1996 to 2004, 2140 people got occupational exposures to blood borne viruses. It has been found that 21% of the injuries occurred during the disposal process. As per study in Mexico City, out of 69 interviewed waste handlers, 34%(13)
reported needle stick injuries during the first 12 months and 96% had seen needles and syringes in waste. The concern over HIV, HBV, HCV and other blood borne infections has led to an increased professional and environmental activism towards this issue. The hepatitis outbreak in Modasa, Gujarat (India) 2009, pointed towards the core issue of poor biomedical waste management in the country. At the global level, 18 to 64 per cent of healthcare institutions are reported to have unsatisfactory Bio-Medical Waste Management (BMWM) facilities; predictors include lack of awareness, insufficient resources and poor disposal mechanisms. India was one of the first countries to implement BMWM rules. The Ministry of Environment and Forests notified the “Bio-medical Waste Management and Handling Rules”, in July 1998 (later amended in 2003 and 2011) under the Environment Protection Act, 1986. Surat city is of total 326.515 sq. km area. Population is 44, 61,026 as per census 2011. Due to wide area of Surat city it is difficult to dispose bio-medical waste of the city separately. So SMC has decided a single window strategy for disposal of bio-medical waste management; BOOT (Built Own Operate Transfer) contract was awarded to ENVISION ENVIRO ENGINEERS PVT. LTD. at Bhatar from 01/01/2003 and on its expiry in the year 2010 it is extended further for period of 14 years.

OBJECTIVES
1. To document the available scientific data regarding biomedical waste management like existing resources, system capacity and practice relating to BMW management in New Civil Hospital, Surat.

MATERIAL AND METHODS
• Study Setting: Injection room, Immunization room, Treatment & Procedure room, Dressing room, General wards & Labour room from different departments like Paediatrics, Internal Medicine, General Surgery, and Obstetrics & Gynaecology of New Civil Hospital, Surat and Common Bio-Medical Waste Treatment Facility (ENVISION Pvt. Ltd) of Surat. Study was carried out during November’2014.
• Study Design: Observational Cross sectional study.
• Assessment Tool: Observation checklist based on the National Accreditation Board Standard for Hospitals and healthcare providers (NABH 2011) in India to assess the BMWM system and actual practices through direct observation. The checklist included issues of system capacity, resources and processes covered under nine domains with related questions. There were 31 items spread over system capacity (7); resources (8); and process (16). Thus, differential weightage was given by way of variable number of items under the three major domains. For Common Bio-medical Waste Treatment Facility; checklist for performance evaluation (Annexure-V) from Central Pollution Control Board was used.
• Frame work for analysis:
  • Health facility score: The questions were clustered around three major domains (system capacity, resources and processes) which were further categorized into nine sub-domains or items, each with 1 to 4 questions. These nine sub-domains of BMW management included: one domain for systems capacity; four domains each under resources and processes namely segregation of BMW; management of sharps; in-house transport of BMW and for storage and record keeping. Systems capacity assessed availability of guidelines, charts, designated official and provision of protection for health providers. Each question was separately assigned scores as full compliance (10 points), partial compliance (5 points) and no compliance or absence of the particular component (0 points). Domain score was calculated as average scores of included
questions. The average scores of domains were used to determine the overall score for health facility.

- **Grading of Bio-Medical Waste Management System**:

<table>
<thead>
<tr>
<th>Median BMWM scores</th>
<th>Interpretation</th>
<th>Colour code</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;2.5</td>
<td>No credible BMW management system in place</td>
<td>Red</td>
</tr>
<tr>
<td>≥2.5 - &lt;5.0</td>
<td>System present but needs major improvement</td>
<td>Yellow</td>
</tr>
<tr>
<td>≥5.0 - &lt;7.5</td>
<td>System requires some additional efforts</td>
<td>Yellow</td>
</tr>
<tr>
<td>≥7.5</td>
<td>Good system in place for BMWM</td>
<td>Green</td>
</tr>
</tbody>
</table>

- Operational analysis (SWOT analysis) of BMWM is done for both New Civil Hospital and Common Bio-medical Waste Treatment Facility (CBWTF) of Surat city.

### Observations and Discussion

#### Mean Score for Different Domains

<table>
<thead>
<tr>
<th>Domain</th>
<th>Mean Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>System Capacity</td>
<td>8.33</td>
</tr>
<tr>
<td>Resources</td>
<td>9.84</td>
</tr>
<tr>
<td>Process in Hospital</td>
<td>7.41</td>
</tr>
</tbody>
</table>

- Mean score for system capacity was 8.33 out of 10. Low score was because of training of some employee related to Bio-Medical Waste disposal were not done & most of employee were not immunized against disease likely to be transmitted by handling of bio-medical waste. Compliance for rest of system capacity like guidelines/charts for BMW were available, their location was appropriate, specific person was assigned for regular supervision for proper management BMW, there was designated waste route in NCHS & timely provide personal protective equipment like hand gloves, cap, mask etc.

- Mean score for resources was 9.84 out of 10. Reason for High score was timely supply of materials for like containers, needle cutter, trolley for in-house transportation, maintenance of log-book at source.

- Mean score for process in hospital was 7.41 out of 10. Low score as compared to system capacity & resources was because of improper segregation of sharp waste & plastic and non-availability of clean and labelled trolley for in-house transport, Infectious waste was improperly segregated and mixture of material contained in blue or red and yellow coloured bags found in few wards of hospital.

- Over all 350-450 kg BMW is generated in hospital/day. Over all mean score for NCHS were 8.5 that are more than 7.5. It indicates good system in place for BMW (green category).

CBWTF is located in residential area. It covers around 6000 Health Care Facilities (HCF)& 15000 beds from Palej to Bhilad. There were 30 labelled vehicles for collecting BMW. There was an incinerator, autoclave, and shredder & ETP. Stack monitoring system was there but it was not working. Venturi scrubber was there to prevent air pollution. Capacity of incinerator was 200kg/hour & for autoclave 125 kg/cycle.

### REFERENCES


Strengths
1) System capacity & resources were in place of BMW management like charts/guidelines, PPEs; nodal officer is designated for supervision, availability of appropriate containers with colour bags, yellow puncture proof container, functional needle cutter & maintenance of log-book at source and storage site in NCHS.
2) Availability of 30 labelled vehicles for transportation of waste & timely collection waste from HCFs & vehicles were tracked by GPS.
3) Maintenance of operating standards of incinerator and autoclave.
4) ETP was present to recycle water used in incinerator plan.
5) Incineration ash was sent to BEIL for final disposal & autoclaved and shredded waste to

Weaknesses
1) Training of contract employee was not done regarding BMW management.
2) Immunization of some employee was not done against disease that is likely to be transmitted by handling BMW.
3) Segregation of BMW was still a problem in wards mainly for management of sharps and plastic.
4) Non-availability of clean, close & labelled trolley for in-house transport of BMW.
5) Stack monitoring system is there for Combustion Unit, but it was not working.

Opportunities
1) Increasing number of Health Care Facilities & expanding area of Surat city.
2) Strict & existing law for enrolment of each HCF in CBWTF.

Challenges
1) CBWTF is situated near residential area; there may be chance of opposition by people.
2) Poor compliance from local regulatory body (Surat Municipal Corporation).

Internal Factors

External Factors