Hospital Waste: An Overview on its Management

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In 2007, the UN General Assembly adopted the UN Declaration on the Rights of Indigenous Peoples, which in article 29 proclaims “Indigenous peoples have the right to the conservation and protection of the environment...”
Introduction

- UN human rights council special report 2011 mentions “Improper management of health care waste leads to violation of “Right to life” in terms of deprivation of Right to clean air, water, and environment.”

- There is no convention which covers medical waste management, so categorisation of waste varies from country to country.

- "First, Do No Harm“ stated by Institute for Medicine (IOM) for patient safety should Extend to the Environment.
The management of bio-medical waste ranges from basic issues in developing world to innovation in waste minimization for sustainable future in developed countries.

Due to poor implementation and monitoring of the legislation the issues of environmental protection are not being addressed adequately.
Scientific literature review: Few unpalatable facts

- Household waste exported from the United Kingdom to Brazil for recycling had syringes mixed with it.
- Deaths in Brazil, Algeria, Morocco and Mexico caused by improper disposal of radiotherapy materials.

Source: CMAJ. Dec 13, 2011; 183(18): E1307–E1308. Medical waste-management practices vary across Canada
Scientific literature review: Few unpalatable facts

- Only 23% of Bangladeshi waste workers had received the most basic information about health and safety in medical waste management, and that too from a local NGO. (Patwary, M. A. et al. (2009)).

- No training was given to doctors or other health care personnel in Serbia (Stankovic et al. 2008).

- Medical staff in 6 Nigerian hospitals were unaware of medical waste management regulations and hospital policies (Ndidi et al. 2009).
Scientific literature review:
Few unpalatable facts

- In Tripoli, Libya, a survey of 300 medical waste handlers, working for a local contractor, found that only 7% had received training in waste handling, and 21% were immunised against hepatitis B (Franka et al. 2009).
Scientific literature review: Few unpalatable facts

- Search of the scientific literature on medical waste in low to middle income countries published since 2000 revealed 87 papers.

- Most papers on India (12), followed by 6 (Brazil) with 5 for each for Nigeria and South Africa, and 4 each relating to Iran and Turkey.

- No literature at all was found for many countries; only 6 of the 20 countries of the Americas were represented and only 10 out of the 53 nations of Africa.

United Nations Special Reporter, Calin Georgescu’s concluded that “only a limited number of countries had developed, or is in the process of developing, a national regulatory framework” to handle the mountain of medical waste now being produced by the world’s health facilities.

Source: CMAJ. Dec 13, 2011; 183(18): E1307–E1308. Medical waste-management practices vary across Canada
Aarhus Convention

- The Aarhus Convention is the global model for procedures in environmental regulation.
- It has its roots in the 1992 Rio Declaration and is based on three pillars:
  1) The right to information,
  2) Public participation in decision making and
  3) Access to environmental justice- that is, the right to a healthy environment.
Hazardous and chemical waste conventions


Rotterdam convention (1998): prior informed consent procedure for certain hazardous chemicals and pesticides in international trade.
Bio Medical Waste Management legislation in different countries

**USA:** had Medical waste tracking act introduced for BMW management but expired in 1991. Individual States were given the responsibility to regulate and pass laws concerning the disposal of medical waste after its expiry.

Bio Medical Waste Management legislation in different countries

**Canada**: Relies on umbrella legislation governing all waste material to regulate the handling of medical waste.

**Australia**: National guidelines for waste management

**Europe**: European Legislation for management of hospital waste
India and legislation: National scenario

- The significant economic growth in India lead to industrialization and growth of health sector.


- The Supreme court in India has stated it as a duty of state & individuals to undertake the preservation of the environment. (Rural Litigation Entitlement Kendra v. State of U.P. 1988)
India and legislation: National scenario

- The apex court has stressed upon the ideas of ‘Polluter pays’ & ‘Generator is responsible’. (*Indian Council for Enviro-Legal Action v. Union of India, 1996*)

- Environmental Protection Act 1986 and Bio Medical Waste Management and Handling rules 1998 framed by Government of India with the above stated objectives.

- In spite of the Laws enacted to protect the environment, effect is not visible.
According to Civic Action Group (CAG) report, Government of India 2009, there was poor management, poor awareness and lack of commitment from top management regarding waste management practices.

Source: Reema Kumari, Kirti Srivastava, Anupam Wakhlu, Anshita Singh, Establishing biomedical waste management system in Medical University of India – A successful practical approach Clinical epidemiology and global health, 1(3), 131-136, 2013.
## Annual report by CPCB 2012-13, Govt of India

<table>
<thead>
<tr>
<th>S. No</th>
<th>Annual Report Data</th>
<th>Figures</th>
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<tbody>
<tr>
<td>1</td>
<td>Total no of health care facilities</td>
<td>1,58,276</td>
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<tr>
<td>2</td>
<td>Total no of CBWTF</td>
<td>156</td>
</tr>
<tr>
<td>3</td>
<td>Total no of onsite treating equipment (excluding CBWTF)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No of Incinerators</td>
<td>541</td>
</tr>
<tr>
<td></td>
<td>No of Autoclaves</td>
<td>2,207</td>
</tr>
<tr>
<td></td>
<td>No of Microwaves</td>
<td>127</td>
</tr>
<tr>
<td></td>
<td>No of Hydroclaves</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>No of Shredders</td>
<td>1,751</td>
</tr>
<tr>
<td>4</td>
<td>Total quantity f BMW generated(per kg/day)</td>
<td>4,05,347</td>
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*Statistics of CPCB as on 5.11.13*

**Ministry of Environment and forest notification on the Bio-Medical Waste (Management and Handling) Rules, 1998**
• In India waste management efforts are not directed by a clear cut policy.
• 3R’s of waste hierarchy of reducing, recycling and reusing waste have not been replicated.
• No effective deterrence for non compliance under framed rules.
Hospitals/Private operators are running waste disposal facilities without authorization or segregation practices.

Waste treatment/disposal infrastructure is in inadequate.

Lax and ineffective monitoring to compliance by the authorized agencies.
Compliance to Bio Medical Waste Management- A Study

- The Department of Hospital Administration, PGIMER, Chandigarh studied compliance to the environmental laws by the health care organizations of various states under state pollution control boards/committees in India.

- Actions taken by various state pollution control boards/committees in cases of non compliance were also studied.
Methodology

- Retrospective cross sectional study
- Copies of all notices/ circulars issued by various state pollution control boards to health care facilities for violations under BMW Act was collected by invoking the Right to Information Act 2005
- Period - 1st January 2011 to 30th June 2012.
- Study by collating data from states of Maharashtra, Gujarat, Himachal Pradesh and Chandigarh was done.
Results

Total no of violations = 878

Total no of Health Care Facilities which committed violation in these four states = 509

The number of violations vis-à-vis the different states under the act are similar.

Maximum number of violations recorded were from state of Maharashtra (74.5%) and minimum from Himachal Pradesh (4.5%)

Violations found in urban areas (62.5%) slightly more than in rural areas (32.5%).
Results

75% violations were recorded from private health facilities and 22% from government health facilities.

Out of 509 health facilities 454 (89.1%) had access to Common Waste Treatment Facility (CWTF).

Among these 89.1%, only 22.7% were using CWTF.
Results

Action by the state pollution control boards against violations of this Act was varied in these 4 states.

Show cause notice was issued in 15.3% of cases.

Closure was ordered in very few cases (8 numbers).
Results

Non compliance to BMW rules was seen in 69.5% private health facilities and 20% of govt health facilities.

Non compliance to environmental rules was seen in 7.7% private health facilities and 2.4% of govt health facilities.
Conclusion

More violations seen in private sector, and lack of awareness could be the main reason.

Dismal response to awareness programmes by those running health care facilities and poor implementation of the law by enforcing agencies.

Increased coordination between the regulatory authorities (pollution control boards/committees) and Department of Health required.
BMW Practices in PGIMER
Segregation

- Segregation at the site of generation
- Segregation in color coded containers

General- Black
Soiled infected – Yellow
Plastic – Red
Sharps- Blue
Needle and plastic disposal

Destruction of Needles, nozzles of syringes before they are put into the containers

Disinfection of needles, syringes & plastics in 1% hypochlorite solution
Collection and Transport

- Collection from each ward in colour-coded polybags & colour-coded trolleys

- Transportation to Collection point for Final segregation

- Transportation for final disposal by special vehicle
Final disposal

Infected waste
Plastics
Municipal waste

Incinerator (cat 1, 2, 3)
Disinfection
Mutilation in shredder
Municipal disposal area
A team of 8 dedicated sanitary attendants for BMW.

Supervision by sanitary inspectors and Sanitation Officers

One ANS deputed for supervision of BMW, monitors different areas and conducts audits
Supervision and training in PGIMER

- ANS completes a checklist, and gives a score on waste management in different areas.
- Where the score is less than defined, letters pointing out deficits issued to respective area in charges.
- Training being imparted by ANS by conducting once a week classes for different groups.
### Annual report submitted by PGIMER on 29/1/2014 for 2013.

<table>
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<tr>
<th>S.No</th>
<th>Category</th>
<th>Kgs/day</th>
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<tbody>
<tr>
<td>1</td>
<td>Total quantity of bio medical waste generated</td>
<td>1336.46</td>
</tr>
<tr>
<td>2</td>
<td>Incinerable waste generated</td>
<td>779.06</td>
</tr>
<tr>
<td>3</td>
<td>Non Incinerable waste generated</td>
<td>557.4</td>
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</table>
CASE 1.

In October 2005, the waste transportation vehicle of PGI was found allegedly dumping hazardous waste in municipal committee dumping ground that is meant for dumping general waste only.
MC Chandigarh noticed on 5th October 2005 that some plastic bags containing hazardous BMW were dumped by PGI vehicle at MC dumping site.
Notice issued by MC to PGI on 5th Oct 2005

PGI asked to give undertaking that BMW will not be dumped at the MC dumping ground in future
Notice by CPCC to PGI on 07th Oct 2005

Show-cause within 15 days as to why prosecution should not be initiated against you
This was a violation of Rule 6 (1) which states that Bio-medical waste shall not be mixed with other wastes.

This was also a violation of Rule 4 of BMW (M and H) Rules, 1998 which states that it shall be the duty of every occupier of waste generating institute to take all steps to ensure that BMW is handled in such a manner that there is no adverse effect to human health and environment.
Damage caused due to above violation

1. **Impounding** of waste containing vehicle of PGI by MC

2. **Notices** by MC and CPCC to PGI

3. A **risk of punishment** under section 15 of Environment (Protection) Act, 1986

4. **Adverse publicity** by media affecting reputation of PGI
Immediate actions taken by PGI

For release of vehicle

MC authorities were contacted with a request to release the van of PGI as impounding of van was adversely affecting further waste management in PGI

Undertaking given to MC that every care will be taken to prevent dumping of hazardous BMW of hospital at the MC dumping ground in future

The van was released in the evening of 05th Oct in the interest of public service
An Enquiry was ordered by PGI authorities to ascertain cause of wrong segregation and to suggest remedial actions so that such violation does not happen in future.
Lapse has occurred wherein BMW meant for incineration reached dumping ground of MC showing **wrong segregation**

There is **inadequate/improper supervision** of waste collection, its segregation and disposal particularly from Research Block A and B areas

The acute **shortage of disposal bags** is adding to the problem of waste collection

To prevent such problems occurring in future concerning BMW, more **educational activities** need to be undertaken for all HCWs especially Research Block and Laboratory Staff
Main Causes of Wrong Segregation

1. Inadequate supervision,
2. Shortage of waste bags
3. Lack of awareness / training of some of HCWs

Remedial measures required to address these issues
Remedial measures taken

Addressing inadequate supervision

Written Instructions to Sanitation deptt

- Ensure BMW not dumped at MC ground
- Concerned S.I. to certify that material being dumped has been inspected and verified by him and does not contain any BMW
- Stickers containing name of ward/lab on bags to identify erring ward/lab
- SI will maintain a register that will be checked by S.O. weekly
- Any deficiency noted shall be brought to notice of higher authorities
Addressing inadequate supervision

Written Instructions to Nursing Staff:

To pay utmost attention for proper segregation of BMW at source
Duties/roles well defined for supervisors:

a) DNS/Sister Gr-I/sanitation Officers/Officer Incharge:
Supervision, education and motivation of HCWs

b) Sanitary Inspector (incharge of refuse collection point):

(i) To ensure that only general waste (black bags) are loaded on dumpers for MC ground
(ii) Information about those wards/labs, if any, from where un-segregated waste is sent to refuse collection point should be immediately brought to the notice of authorities
Remedial measures taken

Addressing inadequate supervision

Written request to all HODs

- Resident **doctors** to follow practices of proper BMW management
Remedial measures taken

Addressing inadequate supervision

Liaison officers for research blocks for close supervision
Addressing inadequate supervision

A waste management team

- To closely *supervise* all areas formulating a schedule of visits
- To promptly *report* to higher authorities deficiencies for remedial action
Remedial measures taken

Addressing shortage of supply of waste bags

Request to JMS (P) and Stores officer

- Timely **purchase** and distribution of waste bags
Remedial measures taken

3 Addressing lack of awareness of some of HCWs

- Training classes and workshops for all categories:
  - Doctors
  - Nurses
  - Sanitation staff
Time to Time Meetings held and Instructions Issued for Strict Compliance to BMW Rules
Summary of remedial measures taken

- Written instructions to HCWs defining their duties
- Written instructions to first-line supervisors

A team for daily supervision

Monitoring of practices

Training of HCWs

Supply (bags, needle cutters)

Plan

Do

Check

TQM

Deviation

Authorities

Deming Wheel

Plan

Act

Do

Check
Final outcome

Since it was the first violation of BMW rules noticed and commitment from PGI to improve was given to CPCC, the matter was closed against PGI.
Message/Lesson learnt

Closely supervise BMW management in all areas of hospitals with special emphasis on segregation of waste.

Regularly train all categories of employees for BMW management issues.

Ensure supply of colour-coded waste bags.
Case 2

On segregation of BMW

**Issue**

The Disable Welfare Trust of India (DWTI) run two hospitals in Surat were disposing off the Bio-medical waste in the Surat Municipal Corporation's (SMC’s) door-to-door garbage collection vehicles.

*Times of India, Surat, 4th July 2013*
The Surat Municipal Corporation's (SMC) health and the solid waste department jointly decided to carry out surprise inspection in the city hospitals to check the proper disposal of the bio-medical waste.

During the surprise checking, the hospital was caught red-handed for disposing off the bio-medical waste in the SMC's door-to-door garbage collection vehicles.
It reflects

Poor state of knowledge and attitude on the part of health care workers of the hospital.

Non-compliance to the rules led to

Fine amounting to Rs 12,500.
Lesson learnt

All provisions of BMW (M & H) rules, 1998 should be followed with particular emphasis on segregation and proper disposal of BMW
Punjab Pollution Control Board initiated legal proceedings against a teaching hospital in Ludhiana for violation of BMW (M and H) Rules, 1998

Hospital had not taken mandatory authorization for handling BMW for last 5 years

“Ludhiana Hospital may face legal action”. ...The Tribune dated 30th September 2010
It is mandatory for every health care facility serving more than 1000 patients per month to take authorization from concerned pollution control board for handling BMW...*Section 8 of BMW (M & H) Rules, 1998*
Case 3 ...contd.

**Implications**

- Not taking the mandatory authorization means:
  - Hospital is not authorized to handle BMW generated in its premises
  - Hospital liable to be shut down
  - Punishment under section 15 of Environment (Protection) Act, 1986
Case study 3 ...contd.

Lesson learnt

Authorization should be taken by every healthcare facility serving more than 1000 patients per month.
Case 4
Non-installation of Syringe-destroyers

6 city hospitals in Gurgaon served notice by Haryana Pollution Control Board for non-installation of needle destroyers.

Times of India, 16.09.2010

"Needle destroyers not installed in hospitals"
Non-installation of Syringe-destroyers

Violation

Schedule I of BMW (M & H) Rules, 1998

Mutilation of disposables should be done at source so as to prevent unauthorized re-use...Schedule I of BMW (M & H) Rules, 1998
Case 4 ...contd.

Implications

- Not mutilating used disposables at source means:
  - Violation of provisions of BMW Rules and thus:
  - Punishment under section 15 of Environment (Protection) Act, 1986

Non-installation of Syringe-destroyers
Lesson learnt

All disposables should be **mutilated at source** so as to prevent unauthorized re-use in compliance with schedule I of BMW (M & H) Rules, 1998.
Letter from C&AG to conduct a thematic audit on “Biomedical Waste Management” in PGIMER w.e.f 19/12/13 till 27/12/13

Two members of the audit team conducted the audit

All relevant documentation provided.
Preparation for audit

- Making relevant record ready for inspection
- Allocation of duties among the different branches.
- Deputation of officers among the different branches
- Stay arrangements for the audit team
- Provision of transport facility for moving about
The auditors issued 8 memos while conducting the audits and the relevant information asked vide these memos was provided.

Audit findings at the end of audit on 27/12/13 were released and the reply to observations was sought within 3 days of receipt of the half margin.
Observations raised

- Non availability of effluent treatment plant
- Non availability of autoclave and microwave
- Non maintenance of records
- Satisfactory replies were given to the above mentioned observations.
### Parliamentary questions to PGIMER on BMW Management

<table>
<thead>
<tr>
<th>Parliamentary questions</th>
<th>Total (2011-2013)</th>
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<tbody>
<tr>
<td>Lok sabha, Rajya sabha</td>
<td>07/ 291</td>
</tr>
</tbody>
</table>

**Main focus of parliamentary questions**

- Haphazard disposal of BMW by Doctors/ Hospitals
- BMW Management
- BMW Disposal
- Biomedical waste unit
Innovation in PGIMER

- Sharp blasters – to be installed in high patient turnover areas and ICU’s
- Purchase process of Autoclave cum shredder has been initiated to decrease quantity of waste generated.
- Reducing the use of paper by e-procurement to reduce waste.
Conclusion of Presentation
PGI has an ongoing journey, we are progressing from initial teething problems of implementation and ensuring compliance to purchase of high end equipment for waste minimization.
Every healthcare facility must manage its BMW in such a manner that it has no harmful impact on human health and environment.
Thank you