

The Containment measures to overcome a Challenge of Bio-Medical Waste Management in CLEVB



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Introduction

Biomedical waste (BMW): is any kind of waste containing infectious materials. It may also include waste associated with the generation of biomedical waste that visually appears to be of medical or laboratory origin (e.g., packaging, and vaccine vials, etc.), as well research laboratory waste containing biomolecules or organisms that are restricted from environmental release.

The Central laboratory for evaluation of veterinary biologics (CLEVB): is a main Egyptian Facility authorized to evaluate the veterinary biologics and vaccines for different animal species of several origins and ISO 17025 certified. So there are many challenges facing CLEVB during evaluation of vaccines either in laboratory partition or animal facilities. Biomedical waste management is the main challenge facing the safety of the work.

The aim of this study

Identify any gaps that may appear in the systems of biomedical waste disposal and dealing with it. Biomedical waste must be properly managed and disposed off to protect the environment, general public and workers, especially healthcare and sanitation workers who are at risk of exposure to biomedical waste as an occupational hazard.

Methods:

A) Application of Risk assessment with special Considered Factors

- Characteristics of the used LAB. biological agents
- What activities will be carried out in the lab to detect types of BMW?
- Employees working with the biological agents.
- How will the BMW be handled in the laboratory and transfer?
- Application of Gap analytical Study on the two levels (CLEVB Biomedical Waste Disposal manner and Management & Activates)
- Evaluation of the Biorisk Assessment

1. According to CLEVB Biomedical Waste Disposal Management & Activates. Table & Fig.1.

2. According to CLEVB Biomedical Waste Disposal manner Table & Fig.2.

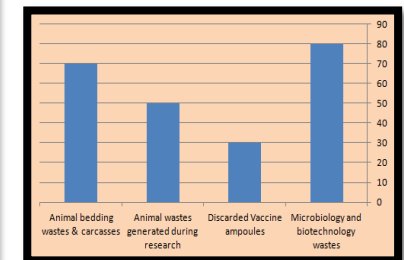
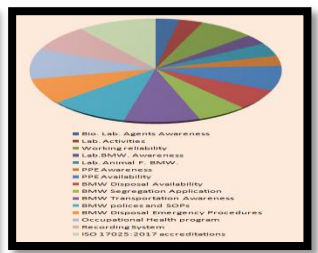
- Application of SWAT analysis

SWOT analysis*



Gap Analysis & Biorisk Assessment of BMW Disposal (in relation to CLEVB Biorisk Management & Activates)

#	Item of Risk Assessment	Percent of completion	Comments
1	What do they know about the characteristics of the biological Lab. Agents? - Pathogenicity, virulence, mode of transmission, infectious dose, stability in the environment, susceptibility to disinfection, treatment available	30%	Variable Bio. Lab. Agents Awareness Associated with the level of education and job description (highly specialized or Lab. Technician or worker)
2	What are the activities carried out in the lab?	Lab. Activities 50%	Working reliability 70%
3	What are the reliability of who working with the biological agent - Are they trained and experienced?	Lab. Activities 50%	Administrative Control
4	What do they know about the Biomedical Waste of Laboratory Facility?	Lab. BMW Awareness 30%	Specific for workers in the disposal of biomedical waste, level of training and job description
5	What do they know about the Biomedical Waste of Laboratory animals Facility?	Lab. Animal F. BMW Awareness 40%	
6	What do they know about the using of Personal Protective Equipment against Biomedical Wastes?	PPE Awareness 30%	
7	What is the availability of Personal Protective Equipment against Biomedical Wastes?	PPE Availability 75%	
8	What is the availability of different methods for disposal of the Biomedical Wastes?	BMW Disposal Availability 60%	
9	What is about the Segregation of Biomedical Wastes?	BMW Segregation Application 60%	
10	What is about Biomedical Wastes Transportation Tools?	BMW Transportation Awareness 90%	
11	What is about the availability of Biomedical Waste disposal Policies and SOPs?	BMW pols and SOPs 90%	
12	What is about the availability of Biomedical Waste disposal Emergency Procedures? (guidelines for types of accidents that might occur response to biological wastes?)	BMW Disposal Emergency Procedures 70%	Administrative Control
13	What is about the availability Occupational Health program for all employees working with Biomedical Wastes?	Occupational Health program 30%	
14	What is about the availability of Biomedical Waste Recording System?	Recording System 80%	Specific for workers in the disposal of biomedical waste, level of training and job description
15	Are the rules of the Biomedical Wastes disposal in line with criteria of ISO 17025:2017 accreditation?	ISO 17025:2017 accreditation 100%	Administrative Control



Gap analysis and Biorisk Assessment (in relation to CLEVB Biomedical Waste Disposal manner)

LAB Facility Biomedical Wastes	CLEVB		Animal Facility Biomedical Wastes	
	Microbiology and biotechnology wastes	Discarded Vaccine ampoules	Animal wastes generated during experiments	Animal bedding wastes & carcasses
Biomedical waste management	Characteristics: Solids, liquids, Tissue, Agents, Infectious	Characteristics: Mostly vials that may be infectious	Characteristics: waste of animals used in experiments (infected)	Characteristics: Experimental animal carcasses, Infected
Categories and Types	Animal: Moderate Use of PPE: 90% Segregation: 90%	Animal: Moderate Use of PPE: 50% Segregation: 10%	Animal: High Use of PPE: 30% Segregation: Not needed	Animal: High Use of PPE: 30% Segregation: Not needed
Collecting Package	Acc. to BMW type	Collecting Package	Plastic bag, Leak proof	Direct to Storage with Chemical treatment
Storage	In a proper place and should not exceed for 4-10 hrs	Storage	In a proper place and should not exceed for 4-10 hrs	Storage
Transportation Tools	trolleys	Transportation Tools	trolleys	No
Processing and Treatment	Acc. to the segregated types	Disinfection, Autoclaving or Dry Heat	Disinfection, Autoclaving or Dry Heat	Chemical
Chemists	90%	Chemist	90%	Chemist
Recording	100%	Recording	100%	Recording
Biorisk Evaluation and Assessment	High	Biorisk Evaluation and Assessment	Moderate	Moderate
Source of Risk	Highly infectious	Source of Risk	May be infectious	Source of Risk
Cap Analysis indicator	Lack of Awareness and Training Needs	Cap Analysis indicator	Lack of Awareness and Training Needs	Cap Analysis indicator
	80%		30%	50%

All the results were highly oriented towards the gap in performance of the human element. The defects were not due to the lack of resources, but it was conducting to the requiring of more training and attention to human resources. Therefore, the following program was launched.

B) Experimental Implementation of multidisciplinary plan (TPEB):

- 1-Training
- 2-Protection: (application and doing) Work Practices, decontamination and personnel protection
- 3-Establish: Confirm the application of all components of training and protection through creation and verification of different Policies and SOPs for
- 4-Behaviour

Outcome and Results:

From the experimental application of this multidisciplinary plan (TPEB) and by reviewing of the records, there were more awareness and care during disposal of biomedical wastes and also a clear improvement in the level of safety and dealing with different agents due to the follow-up while avoiding blame.

Conclusion:

A) As a result of conducting this study, the Central Laboratory for Evaluation of Veterinary Biologics (CLEVB) has the possibility to

- 1- Identify any gaps that may appear in the systems of biomedical Waste Disposal and dealing with it.
- 2- Apply multidisciplinary plan (TPEB) to solve problems and maintain the safety and Occupational Health of researchers and the work force inside whole facilities of the Laboratory.
- 3 - Realize of the concepts, symbols and SOPs of the international standard that were not known and how to deal with different types of laboratory Wastes and also Chemicals.
- 4 - Upgrading BSL-2 to BSL-3 of some CLEVB units without huge funds or economic losses.
- 5 - Modify the behavior of the workforce and increase the awareness to the management of emergency cases and dealing with the using of first aid kits.
- 6 - Merging between the safe biomedical waste disposal using different measures and the criteria of ISO 17025:2017 and increased the possibility of auditing, review and evaluation the performance.

B) Through this study there is an opportunity to circulate a unified standard measures for biomedical and chemical wastes disposal in whole countries of Middle East and North Africa (MENA) Similar to the global standard applied regulations of different organizations like OSHA, GHS, and It can be called

Middle East and North Africa plan for Chemical and Biomedical Wastes management, Abbreviated to (MENA - CBMW)

REFERENCES:

1. <https://extranet.thcrrc.org/EN/sections/ehs/hamm/chap6/section8.html>
2. U.S. Congress, Office of Technology Assessment, Finding the Rx for Managing Medical Wastes, OTA-O-459 (Washington, DC: U.S. Government Printing Office, September 1990)
3. Canadian Biosafety Hand Book 2nd ed.
4. CEN Workshop Agreement CWA 15793:2011 Laboratory biorisk management
5. CEN Workshop Agreement CWA 16393:2012 Laboratory biorisk management – Guidelines for the implementation of CWA15793:2011
6. WHO Laboratory Biosafety Manual
7. WHO Laboratory Biosecurity Guidance
8. Laboratory Biosafety and Biosecurity Risk Assessment Technical Guidance Document