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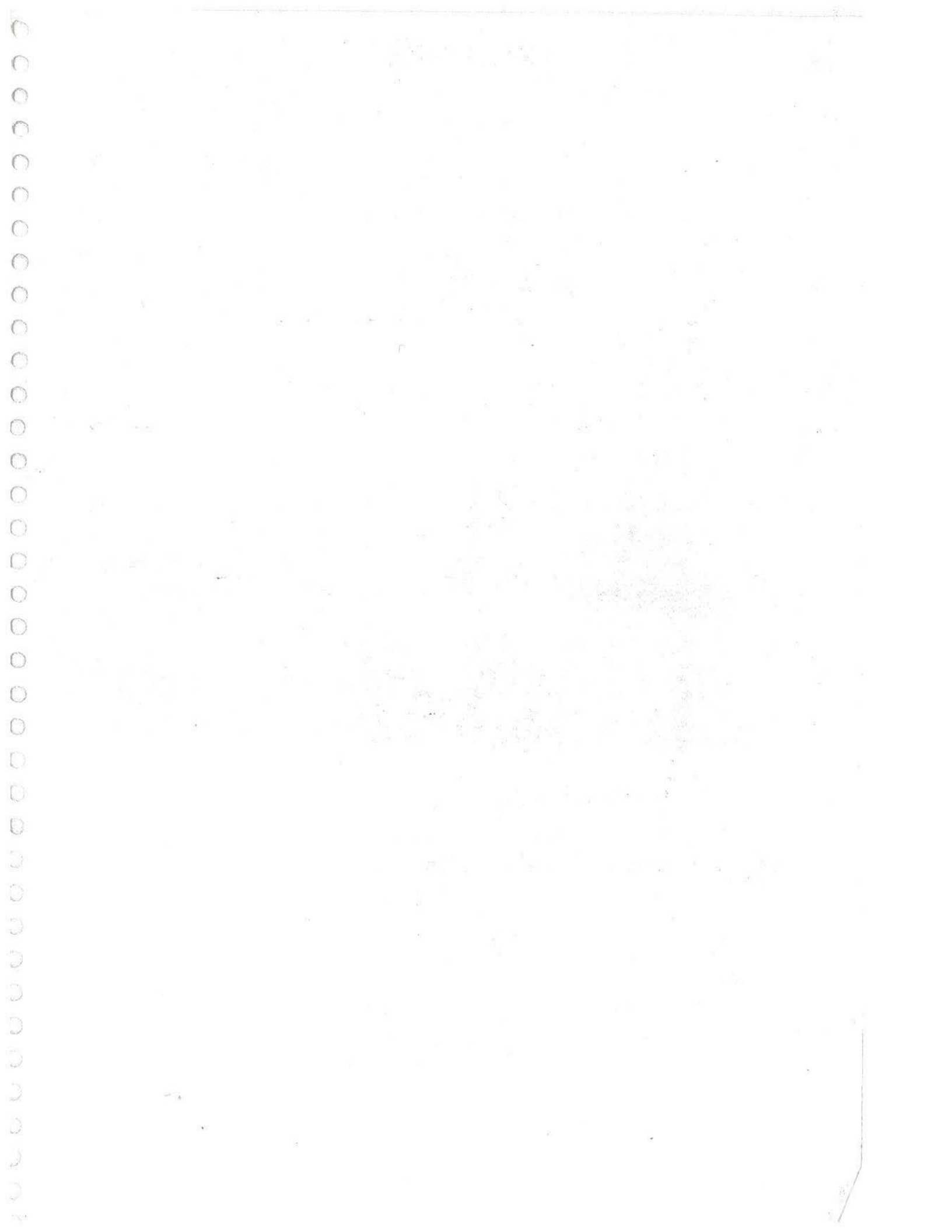
# JOURNAL OF THE INDIAN SOCIETY OF HOSPITAL WASTE MANAGEMEN



## Highlights

- President's Page
- Editorial
- Original Papers
- Agenda
- Concern
- Report

INHS Asvini  
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# JOURNAL OF THE

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## Indian Society of Hospital Waste Management

**Volume - 4 Issue - 1**  
**April 2005**

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# JOURNAL OF THE INDIAN SOCIETY OF HOSPITAL WASTE MANAGEMENT

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**PRESIDENT'S PAGE**

Lt Gen JR Bhardwaj, PVSM, AVSM, VSM, PHS  
President: ISHWM  
DGAFMS, Ministry of Defence, Government of India

Dear Friends,

The Indian Society of Hospital Waste Management is in its fifth year of service to the country. It has been my proud personal privilege to have been associated with this multi-disciplinary Society which has been formed with aims and objectives to create a clean environment which is not polluted by the hospital waste especially the infected and hazardous waste generated within the hospital/healthcare facilities premises. I recall so far three major achievements of the Society:

- Defense forces who took the initiative by conducting the first workshop on Hospital Waste Management under the aegis of World Health Organization (WHO) and Ministry of Health & Family Planning, Government of India, joining and collaborating with the civilian groups to address an important public health problem
- Proactivity in joining hands with International agencies and leading Universities like IGNOU
- Taking leadership to establish regional chapters of the Indian Society of Hospital Waste Management

While these achievements are by no means small, I see greater potential in the Society and in their members.

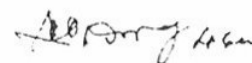
I visualize a greater need for deeper research to be taken up to address this burning problem. Management of plastics, glass, sharps still remains a great challenge. The system of health care waste management has lacunae in two important health care systems of the country – Primary Health Care System and Practitioners: Family

practitioners of modern medicine, Unani, Ayurveda, Homeopathy, Siddha, etc. Thirdly, Biomedical Waste Management is less understood in Veterinary settings and research Institutes. There is need for collaboration between Medical Colleges, Universities and Pollution Control Boards to undertake these basic and field oriented research. I request all the members of Indian Society of Hospital Waste Management to make a difference by undertaking research in the above areas and sharing their findings in the next issue of the Journal.

There is also a need for participation by Social Scientists, specialists in all behavioural sciences, technologists and technocrats to join hands as your experience over the years has convinced us that the issue is principally an issue of attitude and behavior. Need for innovative technologies were obviously felt during the period at grassroots levels and special areas. Members of the profession should assume leadership roles and should be proactive and reactive and not merely responsive. I am confident that the Society and its members would rise to the occasion and contribute to the emerging realities and challenges.

I wish the members all the very best when this fourth issue of the Journal is being released on 5<sup>th</sup> Annual Conference of Indian Society of Hospital Waste Management at Indian Naval Hospital Ship Asvini at Mumbai.

Jai Hind



(J R Bhardwaj)

Lt Gen  
DGAFMS & President ISHWM

**EDITOR'S NOTE****Dr. D Gopinath**Executive Editor - ISHWM, New Delhi  
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We are pleased to release the fourth issue of the Journal of Indian Society of Hospital Waste Management. While it is gratifying to note the improvement in the level of awareness countrywide, there is long path to tread considering the magnitude of the problem.

Systems, which were initiated, are in the evolutionary process and at the same time, many health care facilities are yet to initiate the process. Even in those systems, which are already evolving, liquid waste management still remains a Grey area.

Capacity building at all levels still remains a crucial issue, which needs to be addressed with vision, sincerity and commitment. With health tourism becoming a reality, there is an urgent need to address the area of hospital waste management if we intend to survive in this competitive market society.

Occupational Health and Safety issues still remain a major area of concern.

The first Biannual Conference of the Society was held in Bangalore on 4<sup>th</sup> and 5<sup>th</sup> November 2004. It was gratifying to observe that the participation was overwhelming and there is a reason to believe that the issue has attracted attention seriously, especially in public health systems. Another landmark in the area is the launching of certificate course in Health Care Waste Management by Indira Gandhi National

Open University to cater to the needs of the Country and the region in collaboration with World Health Organization. I am sure, this will go a long way in capacity building.

The current issue contains very useful introspections. Apart from the report of biannual conference, Key note address by Dr A K Agarwal, Director, School of Health Sciences, IGNOU on Day I - preconference workshop and Key note address by Mr. Yellappa Reddy, Former Secretary, Environment, Ecology and Forests, Government of India are an enlightenment to all of us. Two undergraduate students of Medicine from M S Ramaiah Medical College and Bangalore Medical College provide a review of Health Care Waste Management Scene and Practice study in a large health care setting respectively. Other interesting articles include research studies in STI clinic settings by Dr.Srikrishna et al and Plantation health service settings by Dr.Pritesh et al.

While requesting criticism from all the readers for the research articles, we also invite contributions from all of you for the next issue. The journal is yours and only your contribution will make difference in it. Please ensure that research articles, review articles, book reviews, conceptual and advocacy papers, list of useful publications are welcome. Kindly reach them by December 2005 for publication in next issue.

Warm regards and best wishes

**ARTICLE****Management of Health Care Waste – Risks and Principles**

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Safe Management of Health Care Waste is the process to ensure proper hospital hygiene and safety of health care workers and communities. Towards achieving this two underlying critical aspects need to be understood. The following paragraphs provide an overview of the risks and the underlying principles of safe management of health care waste.

**RISKS ASSOCIATED WITH HEALTH CARE WASTE**

The characters of the Health Care Waste that make it a health risk are, for it contains infectious agents, toxic chemicals, sharps, which renders it as highly infectious, flammable, genotoxic, cytotoxic, and radioactive. Hence, the risks from the Health Care Waste are not only from the pathogens but also from the chemical and pharmaceutical properties of the wastes components. Nevertheless, while considering the risks from the Health Care Waste, dosage, quality, vectors and inherent properties of each of the components must be considered separately. The risks from the Health Care Waste are to: (a) staff, including medical, paramedical, and house – maintenance personnel at the Health Care Institution; (b) patients and their attendees, and visitors to the Institution; (c) workers in waste handling facilities like Common Bio-Medical Waste

treatment Facility, recycling plants, laundry, transportation, landfills etc.; (d) scavengers and rag-pickers; and (e) public.

**1. RISK FROM INFECTIOUS AND PATHOLOGICAL WASTES:**

The pathogens in the Waste can enter the body by absorption through puncture or abrasion or opening or cut in the skin, absorption through the mucous membranes; inhalation, and ingestion [6]. However, except for the highly infectious wastes, concentration of the indicator microorganisms in other types of Health Care Waste is generally no higher than that found in the domestic wastes [3]. Table 1 gives the *Infections that have the potential to spread through the infectious Health Care Waste* [3]

**2. RISK FROM SHARPS:**

Sharps can cause puncture or cuts, which can further be infected by concentrated culture of pathogens. Thus, the dual risk of injury and disease transmission makes the Sharps very hazardous. Another potential risk is, the sources of generation are diverse and persons at risk to exposure of Sharps are of varied job categories. Many authorities like Center for Disease Control and Prevention issue guidelines for managing Needle Stick Injuries [7, 8].

### 3. RISK FROM PHARMACEUTICAL AND CHEMICAL WASTES:

The health risk from these categories of the Health Care Waste can be either due to acute or chronic exposure. The most commonly documented injury is burns from the corrosive, flammable and reactive properties of the chemicals like disinfectants, which are often used in large quantities in health care settings. Intoxication from the absorption of the pharmaceutical wastes through skin and mucous membrane increases the risk of teratogenicity. Further, risks from highly reactive secondary products, air suspension particulate matter, and wide spread contamination of the health care environment should also be considered, in view of epidemiological studies having found excess fetal malformations and

miscarriages, hepatitis, and cancer in operating room personnel. [9]

### 4. RISK TO THE COMMUNITY HEALTH AND ENVIRONMENT:

Urbanization, which is often unplanned and rapid, is associated with health hazards like substandard housing, crowding, air pollution, insufficient or contaminated drinking water, inadequate sanitation and solid waste disposal services, vector-borne diseases, industrial waste, increased-motor vehicle traffic, and stress associated with poverty, unemployment, and environmental degradation [10]

The Health Care Waste, whose sources are the Health Care Settings, which incidentally are being

**Table 1**  
**Health Care waste; Infections and their mode of transmission**

Transmission Vehicles	Pathology	Examples Of Associated Pathogens
Faeces and/or vomiting	Gastroenteric infections	Enterobacteria, e.g. Salmonella, Shigella spp. Vibrio cholerae, Helminths
Inhaled secretions, saliva	Respiratory infections	Mycobacter tubercul., Measles virus, Strept. Pneumoniae
Eye secretions	Ocular infection	Herpes virus
Genital secretions	Genital infections	Neisseria gonorrhoeae
Pus	Skin infections	Streptococcus spp.
Skin secretions	Anthrax	Bacillus anthracis
Cerebrospinal fluid	Meningitis	Neisseria meningitides
Blood, sexual secretion	AIDS	Human immunodeficiency virus (HIV)
All bloody products & secretions	Haemorrhagic fevers	Junin, Lhassa, Ebola and Marburg viruses
Blood	Septicaemia	Staphylococcus spp.
Blood	Bacteraemia	Coagulase-negative staphylococci, Staphylococcus aureus, Enterobacter, Enterococcus
Blood	Candidaemia	Candida albicans
Faeces	Hepatitis A	Hepatitis A virus
Blood and body fluids	Hepatitis B & C	Hepatitis B and C viruses

Source: (3)



mushroomed in the urban areas, further increases this strain on community health and environment.

The risk from the Health Care Waste to the community and environment includes intentional and unintentional exposure. Intentional exposure is from the reuse of the disposable materials, resulting in transmission of HIV, HBV, HCV, and also certain infection, spread through media or caused by more resilient agents. Unintentional exposure is through inadequately disposed waste, resulting in the possible pollution of the air, water, and soil [11]. It also includes the use of strong disinfectants, and chemicals, having a strong impact on environment.

## 5. RISK DURING FINAL TREATMENT AND DISPOSAL:

The commonly employed technologies for the treatment of the Health Care Waste are: Landfills, Incinerators, Autoclaving, Microwaving, Hydroclaving, Wastewater treatments, disinfection, shredding. The treated Health Care Waste are further disposed to secure or municipal Landfills, sewer or dumped as such in Nature. Ironically, the Health Care Waste can be made to take a more risky shortcut to be mixed directly with the Municipal Wastes.

Medical incinerators are major source of Dioxins [polychlorinated dibenzodioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs)], which accumulate in the food chain, and through food supply and human milk have an effect on reproduction, development, immune system function, and carcinogenesis. Polyvinyl chloride (PVC) plastic in the Health Care Waste is the source of the dioxins and Health professionals have a responsibility to reduce the contamination of the segregated incinerable Wastes with PVC plastics [12]. In addition, the Medical Waste Incineration has high content of high metals emission (mercury, lead, arsenic, cadmium, nickel, manganese etc.), which can be minimized by phasing out the use of heavy metals like Mercury in Instruments. Evidences show significant increased risk of Adult and Childhood cancers around 3 km – 7 km of Municipal and Medical Incineration sites. [13, 14]

Every year, worldwide, of total 12 000 million injections, 8-16 million hepatitis B, 2.3 to 4.7 million hepatitis C and 80 000 to 160 000 HIV

infections are estimated to occur from re-use of syringe needles without sterilization. The risk could be avoided by proper disposal of used syringes. [13] Thus, solution is simple, but for it to be a reality needs much of background logistics to be worked out.

The liquid wastes are either: (1) treated by disinfection, or (2) treated in Waste Effluent plant, or (3) drained without any treatment to the public sewers. There are evidences to show that the Liquid Wastes contain significant culture of pathogens to cause infection. In a cholera outbreak in Daghestan, the hospital wastewater was implicated as one of the sources of epidemic. Evidence show increased single and multiple antibiotic resistant bacterial species in Hospital sewers. This development of resistant microbes has great clinical, pharmacological, economical and social importance. [15, 16]

## PRINCIPLES IN SAFE MANAGEMENT OF HEALTH CARE WASTE [2 – 4]

The following concepts and principles constitute the core for management of health care waste:

### POLLUTER PAYS PRINCIPLE:

It is the legal and financial liability of the producer of the Waste to ensure safe and environmentally sound disposal of the Waste generated.

### PRECAUTIONARY PRINCIPLE:

When risk from a particular activity is unknown, then the risk is assumed as significant, and safety and health protection measures should be designed accordingly. This principle is particularly important in view of current epidemiological studies *not conclusively* establishing the risk attributes of the Health Care Waste to the staff in the Health care settings, Health Care Waste treatment facility, and transport personnel, or the public, except for the risks from the Waste Needle Sharps to cause infections.

### DUTY OF CARE PRINCIPLE:

The person handling or managing hazardous substances or related equipment is ethically responsible for applying the utmost care.

### WASTE REDUCTION, RECYCLING AND REUSE PRINCIPLE:

The principle of the 3R's includes activities such as segregation at source, color-coding, storage within and outside the health care setting, collection, and transportation.

### ENVIRONMENTALLY SOUND TREATMENT AND DISPOSAL OF WASTE PRINCIPLE:

The principle is to adopt: (a) safer, eco-friendly treatments which can minimize / eliminate the harmful effects of Health Care Waste; and (b) disposal techniques which considers both short-term and long-term effects of introduction of treated or untreated or mixture of both kinds of Health Care Waste, to the community and environment.

### PROXIMITY PRINCIPLE:

As much technically and environmentally possible, the treatment and disposal of the Waste should be nearer to the point of generation of the Waste.

The above principles are generally considered when notifying legislations and implementing Health Care Waste Management Plans. These vary from region to region. Accordingly, the practices and extent of segregation, containment, storage, transport and disposal of the Health Care Waste are different in different regions.

### REFERENCES

1. The Ministry of Environment and Forests. Government of India. The Bio-Medical Waste (Management and Handling) Rules. Gazette of India. 1998 Jul 20: Extraordinary Part II Section 3(ii).
2. Environmental and occupational health office, Department of Health, Republic of the Philippines. Health care waste management manual; 2000.
3. Pruss A, Giroult E, Rushbrook P, editors. Safe management of wastes from health-care activities. Hong Kong: World Health Organization; 1999.
4. Pruthvish S, Gopinath D, Jayachandra Rao M, Girish N, Bineesha P, Shivaram C. Information and learning units for safe management of health care waste. Health Care Waste Management Cell, *MSRMC*; 2000.
5. Pruthvish S, Gopinath D, Jayachandra Rao M, Girish N, Bineesha P, Shivaram C. Health care waste management - an exploration. Health Care Waste Management Cell, *MSRMC*; 1997.
6. Pruss A, Townend WK, Teacher's guide -Management of wastes from health care activities. World Health Organization; 1998.
7. Updated U.S. Public Health Service Guidelines for the Management of Occupational Exposures to HBV, HCV, and HIV and Recommendations for Post exposure Prophylaxis. *MMWR* 2001; 50 (RR-11):1-52.
8. CDC and the Healthcare Infection Control Practices Advisory Committee. Guidelines for environmental infection control in health-care facilities. *MMWR* 2005; 52 (No. RR-10): 1-42.
9. Bennett PN, Brown MJ. Clinical Pharmacology. 9th ed. Spain: Churchill Livingstone; 2003.
10. Moore M, Gould P, Keary BS. Global urbanization and impact on health. *Int J Hyg Environ Health*. 2003 Aug; 206(4-5): 269-78.
11. World Health Organization. Policy analysis - management of health-care wastes; 2000 Apr.
12. Thornton J, McCally M, Orris P, Weinberg J. Hospitals and plastics. Dioxin prevention and medical waste incinerators. *Public Health Rep*. 1996 Jul-Aug; 111(4): 299-313.
13. World Health Organization. Wastes from health-care activities. 2000 Oct: Fact Sheet: N 253.
14. Knox E. Childhood cancers, birthplaces, incinerators and landfill sites. *Int J Epidemiol*. 2000 Jun; 29(3): 391-7.
15. Reinthaler FF, Posch J, Feierl G, Wust G, Haas D, Ruckebauer G, Mascher F, Marth E. Antibiotic resistance of *E. coli* in sewage and sludge. *Water Res*. 2003 Apr; 37(8):1685-90.
16. Tsai CT, Lai JS, Lin ST. Quantification of pathogenic microorganisms in the sludge from treated hospital wastewater. *J Appl Microbiol*. 1998 Jul; 85(1): 171-6.

**ARTICLE****Occupational Health and Safety measures in some select health care institutions of Bangalore city**

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**Abstract**

Safe Management of Health Care Waste (SMHCW) is a burning issue and implications of its mismanagement on human and environmental health is well known. In the midst of many attempts to address the various issues concerning SMHCW, the core issue of occupational safety of health care personnel is not adequately addressed. The objectives of the current study were to document the existence of stated institutional policies towards promotion of Occupational safety and Safe management of health care waste in select Health Care Institutions (HCI's) and use of Personal Protective Equipment (PPE) by health care personnel during minor procedures. The study was undertaken in 88 HCI's of various types in administrative limits of Bangalore Municipal Corporation. Information for stated objectives was collected from the head of institution or the designated person in charge. Information regarding use of PPE was collected by direct observation of the health care worker and by interaction and discussion. A field-tested observation checklist was used to document practices. The key results were: Only one of the institutions had waste management policy and only 2 of the 88 institutions had Infection Control Committee. 56 HCI's had obtained authorization, however other requisites of BMW (m & h) Rules 1998, such as injury reporting and recording were almost non-existent. Aspects of Occupational health like use of PPE namely gown was practiced by doctors in only 1/3<sup>rd</sup> of HCI's and only about 50% of the Nursing staff wore gloves during minor procedures. The practice of using gown or glove among laboratory technicians was very low.

**Conclusions**

Use of PPE by health care workers in most instances is not an issue of availability. Like with other aspects of health care waste management such as segregation at source and containment, it is an issue of attitude and behaviour. In this context, having institutional policy(s) that address comprehensively the multifarious concerns of SMHCW including occupational health and safety becomes essential.

**Background**

The following study is the result of the explorations made as a part of the larger study undertaken at Health Care Waste Management Cell, M S Ramaiah Medical College, Bangalore. Many other aspects of the study results were shared at various forums addressing concerns for safe management of health care waste including

the ISHWM conferences.

**Introduction**

Safe Management of Health Care Waste (SMHCW) is a burning issue and the implications of its mismanagement cannot be overstated<sup>1,2,3</sup>. Many of the concerns with respect to SMHCW such as segregation at source, use of color coded

containers, common waste treatment facilities and treatment technologies are being discussed and an effort towards solutions is visible in many places. However, in the midst of all this, the core issue and one of the objectives of SMHCW namely Occupational safety and Personal Protective Equipment (PPE) gets diluted. The role of institutional policies that address these concerns is paramount<sup>14</sup>.

### Objectives

1. To document the existence of stated institutional policies towards promotion of Occupational safety and Safe management of health care waste in select health care institutions
2. To document the use of Personal Protective Equipment by health care personnel during minor procedures.

### Materials

#### Place and Duration of the study:

This study was undertaken in Health Care Institutions (HCI's) falling under the administrative limits of the Bangalore Mahanagara Palike (BMP) during the period June 1999 and September 2000. In all a total of 88 Health care institutions were studied.

The types and number of institutions studied included:

Type of Health Care setting	Practices documented in
Government Hospitals	6
Private Hospitals	3
Large nursing homes (Bed strength > 35]	14
Small to medium size nursing homes [Bed strength < 35]	16
Maternity homes	16
Urban health care settings and General Practitioner clinics	19
Clinical diagnostics laboratories and Blood banks	14

The sample was a purposive sample and effort was made to include most types of health care settings for documenting practices.

### Methods of collection of Data

1. Initial interaction and discussion was held with
  - Providers: Management and Employees
  - Implementers: City Corporation
  - General Community: Non-governmental Organizations.
2. Observation check-list was used to documenting existence of institutional policies, occupational safety/use of personal protective equipment. For collecting information on policies and authorization from pollution control boards, heads of institution or persons in charge of waste management identified by head of institution were interviewed.
3. Documentation of practices with respect practice of Occupational safety measure/use of personal protective equipments was made by direct observation of health care personnel during procedures. Data was also collected by enquiry and interaction/discussion.

Categories of health care personnel and their strength in the study institutions is given below

Type of HCI's	Total n=88(%)
Doctors n (%)	1350 (27.64)
Nurses n (%)	1410 (28.86)
Lab Techs n (%)	315 (6.45)
X-ray techs n (%)	94 (1.92)
HK Staff n (%)	1336 (27.35)
Others n (%)	380 (7.78)
<b>Total n (%)</b>	<b>4885 (100.0)</b>

Figures in parenthesis indicate % tage; n= Number of HCIs; No.=Number; Techs=Technicians; HK=House Keeping

## Results and discussion

As seen in Table 1, only 2 (3.60%) institutions had an infection control committee and 6 (8.80%) institutions had a waste management committee. 2 (3.60%) institutions had a Disinfection policy. It was observed that none of the study institutions had an Occupational safety policy.

Adrian Coad et.al has noted that having a designated Committee in the HCIs as a separate entity or as a part of the hospital infection control committee would be helpful in overseeing the day to day activities concerning waste management<sup>3</sup>. Similar views have been expressed by Pruss et al<sup>1</sup>.

**Table 1:**  
**Presence of institutional Policies in the study institutions**

HCIs	Total n=88
ICC	2(3.60)
WMC	6(8.80)
WMP	1(1.13)
HIV-ICP	1(1.13)
WSMP	1(1.13)
DIS-P	2(3.60)

Figures in parenthesis indicate percentage, NP= Not present; ICC=Infection control committee; WMC=Waste management committee; WMP=Waste management policy; HIV-ICP=HIV-infection control policy; WSMP=Waste sharp management policy; DIS-P=Disinfection policy

It was observed in many study institutions that the mere designation of a person in charge for waste management was considered sufficient and equivalent to that of a waste management committee. However, none of the health care institutions studied had a stated occupational health safety policy, which if present could have had an impact on this important front.

Table 2 shows that 56 (63.6) of the study institutions i.e mostly institutions with in-patient care facilities had obtained authorization from the

prescribed authority for implementation of Bio Medical Waste (Management & Handling) Rules 1998<sup>5</sup>.

**Table 2: Select Institutional Initiatives**

HCIs	Totaln=88
Authorization	56(63.6)
Illness recording	1(1.1)
Reporting Illness	1(1.1)
Waste Monitoring	4(4.5)
Training	33(18.23)

Note: figures in parenthesis indicate percentages:

Training towards SMHCW was reported in 33 (18.23) of the HCIs. However, only one of the institutions had a system for Reporting and Recording illness. It should be noted that the reported training in most of the institutions was mere instructions for segregation, color-coding to be followed and other aspects. During the course of the interactions with various health care personal including Doctors, there was an opinion that there should be a formal Training for the personnel regarding waste management. Training in waste management is an important factor that plays a great role in SMHCW<sup>6,7</sup>.

Recording and reporting of injuries is mandatory according to the BMW (Management & Handling) Rules 1998<sup>5</sup>. This aspect could be related to none of the study institutions having a stated Occupational safety, and only one institution having HIV/AIDS infection control policy, as was discussed earlier. The importance of having a system of waste documentation and injury recording is very essential in the overall context of SMHCW<sup>8,9</sup>. To illustrate Injury Reporting and recording would serve as a sensitive indicator for the prevailing occupational safety aspects from both provision and utilization of PPE by health care personnel. Annual incidence of needle stick injuries in USA is estimated at about 0.8 million, with an estimated reporting rate of 40% to 80%<sup>8,9</sup>.

Not all of the study HCIs had applied for authorization. This could be because of the requirement of the rules for the HCIs to have

**ARTICLE****Hospital Waste Management In Davangere, Karnataka**

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**ABSTRACT**

All the 182 allopathic health care setups of Davangere City were included in the study. The heads of the setups were visited and then they were interrogated to obtain the data. Among 182 health care setups 3 were teaching hospitals, 29 were private nursing homes, 120 were general practitioners clinic, 30 were dental setups. The quantity of the waste generated varied from 7gms to 1.4kg/patient/day. Large quantity of waste was produced by nursing homes and less by dental setups. Major type of the waste is contributed by general waste followed by human anatomical waste (361gm/patient/day). The liquid waste was disposed directly into the underground sewage system without pre-treatment. Appropriate management of syringes was observed only in teaching hospitals. Disfigurement of waste sharps was practiced in 53% of the setups. 70% were disposing waste sharps into the public dustbin. 44% healthcare setups were selling recyclable items without pre-treatment and disfigurement. Majority of the setups (80%) were disposing soiled waste into the municipal dustbin, except in one private nursing home where incineration was done. 58% of healthcare setups were disposing human anatomical waste into the public dustbin. Except in one (3%) setup all were transporting the waste in unsafe manner. Personal protective measures and occupational safety measures were lacking in all the health care setups. All the teaching hospitals and nursing home authorities opined the need of common incinerator for city. Dentists and general practitioners expressed the need of setting up of common private organization for disposal of hospital waste. Lack of common setup for disposal, cost factor, disposal of anatomical waste, non co-operation from the patients attenders, non co-operation from the staff, were the problems were the problems faced by the heads of the health care setups in the management of waste. Complete mismanagement of hospital waste was observed in healthcare setups of Davangere City.

**Keywords:** Hospital Waste Management, Urban Area, Health Care Setups, Disposal of Hospital Wastes.

**INTRODUCTION**

Hospitals generate large volumes of waste as a by product of various preventive, diagnostic, therapeutic services. It is estimated that 0.5 to 1 Kg of waste per bed per day is produced by taluka hospitals<sup>1</sup>. The mismanagement of hospital waste poses risk to the people and to the environment<sup>2,3</sup>. The hazards of hospital waste can not be solved with a burn or bury attitude, it is a time to act now. Since Davangere is a District head quarter and so many nursing homes and clinics are coming up that too in residential areas, to know the situation of healthcare waste management in the city, this study was taken up.

**OBJECTIVES**

- ♦ To study the procedures adopted in the management of hospital wastes in all the hospitals.

- ♦ To know the difficulties encountered in the collection, storage, transportation and disposal of hospital waste in the city.

**MATERIALS AND METHODS**

All the 182 allopathic health care setups of

**Table 1 :**  
**Health Care Setups Studied**

Type of health care setups	No. of the healthcare setups
Teaching Hospitals	3
Government = 2; Private = 1	
Private nursing homes	29
General practitioners clinics	120
Dental college teaching hospitals	2
Dental clinics	28
<b>Total</b>	<b>182</b>

**Table 2 :**  
**Quantity and Type of Hospital Waste produced**

Healthcare setups	WASTE CATEGORY (Waste represented in gram per patient per day)							
	Syringes	Waste sharps	Intact glass ware	Soiled waste	HAW	Recyclable waste	General waste	Waste Wt. in kgs/ patient / day
General practitioners clinics	6(50%)	4(33%)	0.9(7.5%)	1.69 (2%)	NA	NA	0.9 (7.5%)	0.012
Pvt. Nursing homes	160(11%)	100(7%)	47(3%)	159 (11%)	334 (23%)	42(3%)	600 (41%)	1.442
Teaching hospitals	49(5%)	11(1.5%)	16(2%)	48 (6.3%)	19 (2.5%)	35(5%)	580 (76%)	0.758
Dental setups	3.2(4%)	1(1.3%)	4(5%)	17.5 (23%)	8 (10.4%)	13(43%)	9.9 (13%)	0.007

Davangere City were studied during the period January 2000 - December 2000. The purpose of the study was explained and cooperation was sought from the heads of the individual institution prior to the interview.

## RESULTS

Total number of beds available were reported to be 2732 and total bed occupancy was 1770 (64%). Average O.P. strength/day was 66.38.

Infection control committee was present in the 3% of health care setup and waste management committee in 3% of setups. Except the 3 teaching hospitals, no other health care setups had these committees. Table 2 shows that large quantity of waste is produced by nursing homes less by dental setups. Maximum type of the waste is produced by general waste namely viz remains of food coconut shell followed by human anatomical waste (361 gm/ pt./day). The quantity of waste sharps produced by private nursing homes was 7% which was higher than in M.S.R.M.C Study where the percentage of sharps was 0.1%<sup>1</sup>. General waste according to many authors is estimated to contribute about 60-85% to the total waste<sup>5</sup>. The character and quantity of the waste varied widely in different setups. This diversity was also been observed in Delhi<sup>6</sup>.

Table 3a and 3b gives the overall picture of

management of waste in the different setups. All the setups were disposing the liquid waste into the underground sewage system. Disinfection of the liquid waste was not practiced in any of the healthcare setups. Management of the liquid waste not appropriate in all the setups.

Segregation was practiced in 59% health care setups, disinfection was done only in 5% and important component like disfigurement was practiced only in 14% setups. Appropriate containment of this item was practiced only in 4% setups. Final disposal option was selling this hazardous item for recycling in 47% setups. Appropriate management of the syringes was observed only in teaching hospitals.

Recapping of needles which is not recommended was practiced in 57% of the health care setups. Disfigurement was done in 53% of the setups, 70% were disposing into the public dustbin. Appropriate containment of this item was observed in all the teaching hospitals.

44% health care setups were selling the recyclables without any pre treatment and disfigurement. Disinfection and disfigurement of this item was not practiced in any of the setups.

Disinfection of soiled waste was not practiced in any of the healthcare setups. Majority (80%) were disposing by dumping into the municipal

**Table 3a:  
Aspects of waste management in different setups**

Healthcare setups	GP clinic (n= 120)		Pvt. Nursing home (n= 29)		Teaching hospital (n = 3)		Dental setup (n=30)		Total (n=182)	
Liquid waste disposal into sewage	120	100%	29	100%	3	100%	30	100%	182	100%
<b>MANAGEMENT OF SYRINGE WASTE</b>										
Segregation	87	73%	16	55%	3	100%	2	7%	108	59%
Disinfection	6	5%	0		3	100%	0		9	5%
Disfigurement	14	12%	7	24%	3	100%	2	7%	26	14%
Colour coding	0		4	14%	3	100%	0		7	4%
<b>Disposal options</b>										
Burning	27	23%	3	10%	0		4	14%	34	18.5%
Incineration	0		1	3%	0		0		1	0.5%
Municipality bin	24	20%	12	41%	0		26	87%	62	34%
Sold	69	58%	13	45%	3	100%	0		85	47%
<b>WASTE SHARPS MANAGEMENT</b>										
Segregation	87	72%	11	38%	3	100%	10	33%	41	61%
Disinfection	1	0.8%	0		3	100%	0		4	2%
Colour coding	0		4	14%	3	100%	2	7%	9	5%
Recapping	99	83%	2	7%	2	75%	0		103	57%
Disfigurement	88	73%	2	7%	0		6	21%	8	4%
<b>Disposal options</b>										
Burning	27	23%	4	14%	3	100%	4	14%	38	21%
Burial	0		0		0		0		0	
Corporation bin	93	78%	24	83%	0		6	21%	143	79%
Incineration	0		1	4%	0		0		1	0.50%
<b>MANAGEMENT OF RECYCLABLES</b>										
Segregation	NA		20	69%	3	100%	2	7%	25	40%
Disinfection	NA		0		0		0		0	
Disfigurement	NA		0		0		0		0	
Colour coding	NA		4	14%	3	100%	2	7%	9	15%
<b>Disposal Options Used</b>										
Sold	NA		22	76%	3	100%	2	7%	27	44%
Corporation bin	NA		7	24%	0		0		7	11%
<b>SOILED WASTE MANAGEMENT</b>										
Segregation	75	63%	10	34%	3	100%	2	7%	90	49%
Disinfection	0		0		0		0		0	
Colour coding	0		4	14%	3	100%	2	7%	9	5%
<b>Disposal options used</b>										
Burning	27	23%	3	10%	3	100%	2	7%	35	19.5%
Burial	0		0		0		0		0	
Incineration	0		1	3%	0		0		1	0.5%
Corporation bin	93	78%	25	86%	0		28	93%	146	80%



**Table 3b:**  
**Aspects of waste management in different setups**

Healthcare setups	GP clinic (n= 120)		Pvt. Nursing home (n= 29)		Teaching hospital (n = 3)		Dental setup (n=30)		Total (n= 182)	
<b>MANAGEMENT OF HUMAN ANATOMICAL WASTE</b>										
Segregation	NA		14	48%	3	100%	2	7%	19	31%
Dis-infection	NA		0		0		0		0	
Colour coding	NA		4	14%	3	100%	0		7	11%
<b>Disposal Options Used</b>										
Burning	NA		3	10%	0		4	14%	7	11%
Incineration	NA		1	3%	0		0		1	5%
Burial	NA		5	17%	3	100%	0		18	29%
Corporation bin	NA		10	34%	0		26	87%	36	58%
<b>FINAL DISPOSAL OPTIONS</b>										
Burning	39	33%	7	28%	2	67%	2	7%	50	27%
Incineration	0		2	7%	1	33%	0		3	2%
Burial	0		8	28%	3	100%	3	10%	14	8%
Municipality bin	81	80%	24	56%	3	100%	15	50%	142	78%
<b>CONTAINERS</b>										
Number studied	277		228		260		164		929	55%
Plastic container	213	77%	228	100%	260	100%	164	100%	865	93%
Card board container	64	33%	0		0		0		64	7%
Lid Present	167	60%	17	7%	260	100%	164	100%	608	65%
Absent	110	0%	211	93%	0		0		321	35%
<b>Frequency of emptying</b>										
Daily or twice daily	81	66%	29	100%	3	100%	30	100%	143	78%
Once a week	16	7%	0		0		0		16	9%
Twice a week	7	6%	0		0		0		7	4%
Thrice a week	16	11%	0		0		0		16	9%
<b>Transportation of waste</b>										
Manual	120	100%	29	100%	2	67%	30	100%	181	97%
By Trolley	0		0		1	33%	0		1	3%
<b>Containers used</b>										
Bucket	56	47%	14	49%	0		0		70	38%
Dust bin	0		5	17%	0		10	80%	13	7%
Polythene bag	50	42%	10	34%	2	66%	20	20%	82	45%
Card board box	14	11%	0		0		0		14	8%
<b>Use of Personal Protective Device</b>										
Apron	3	25%	0		1	33%	0		4	2%
Gloves	15	13%	15	52%	3	100%	2	20%	36	20%
Mask	0		0		0		0		0	
Foot wear	66	55%	27	38%	3	100%	30	100%	126	69%
<b>Immunisation taken</b>										
T.T	114	90%	29	100%	3	100%	30	100%	176	97%
Hepatitis. B	3	3.00%	10	34%	3	100%	2	20%	18	10%

dustbin except in one private nursing home, where incineration was practiced.

Pre treatment of the human anatomical waste was not practiced in any of the healthcare setups. 58% of the health care setups were disposing this waste into the public dust bin.

The final disposal options used in majority (78%) of the health care setup was dumping to municipal bin, this included even the teaching hospitals. Incinerators were present in three setups and one was in use and that too was not as per the standards mandated by BMW rules.

Except in one (3%) setup all were transporting the waste in unsafe manner. 45% setups were using polythene bag as container for carrying the waste during transportation. Maximum use of polythene bag was observed in teaching hospitals (66%).

Plastic containers (93%) were used in majority of the setups while cardboard boxes (7%) were

used as a container in general practitioners clinics. (35%) of the containers were without lid. The containers in all the teaching hospitals had lid (100%). Practice of emptying containers daily was observed in majority (74%) of setups. Weekly or by weekly emptying of containers was practiced in general practitioners clinics. The maximum practice (67%) of emptying containers twice daily was observed only in teaching hospitals.

Use of protective devices by waste handlers like footwear, gloves, aprons was observed in 69%, 20%, 2% setups respectively. Similar practices were reported from America<sup>7</sup>. This table shows that though immunization against observed tetanus was observed in 97% of the setups, only 10% of the setups immunized their staff against hepatitis B. Immunization of their staff against both hepatitis B and tetanus was observed in all the teaching hospitals.

Table 4 shows that all the teaching hospitals and nursing home authorities opined the need of

**Table 4 :**  
**Opinions by the Head of the setups regarding Safe Management of Hospital Waste.**

Healthcare Setups	A	B	C	D
General practitioners clinics (120)	39(33%)	42(35%)	45(38%)	54(45%)
Pvt. Nursing homes (29)	15(52%)	9(31%)	12(41%)	10(34%)
Teaching hospitals (3)	3(100%)	1(33%)	1(33%)	1(33%)
Dental setups (30)	4(13%)	4(13%)	1(3%)	24(80%)
Total (182)	61(34%)	57(31%)	59(32%)	99(54%)

A - Common incinerator for city; B - Different incinerator for different zones of city. C - Entrusting the responsibility to municipality; D - Private organization on rental basis.

**Table 5:**  
**Problems encountered in the management of Hospital Waste**

Healthcare Setups	I	II	III	IV	V	VI	VII
General practitioners clinics (120)	25(21%)	0	50(42%)	70(38%)	0	0	30(25%)
Pvt. Nursing homes (29)	15(52%)	5(17%)	0	20(69%)	0	0	2(76%)
Teaching hospitals (3)	3(100%)	0	0	0	2(66%)	2(67%)	0
Dental setups (30)	10(33%)	0	0	20(62%)	0	0	0

I - Cost factor ; II - Disposal of anatomical waste; III- Disposal of waste sharps ; IV - Lack of common setup for transportation and disposal; V - Non co-operation from the patients attenders; VI - Non co-operation from the staff;

common incinerator for city. Dentists and general practitioners expressed the need of setting up of common private organization for disposal of hospital waste.

Table 5 shows that cost factor (100%, 52%) was the major problem faced by teaching hospitals and private nursing homes respectively. Disposal of waste sharps (42%) lack of common setup for transportation and disposal 69%, non-cooperation from the patient's attenders (66%), non cooperation from the staff (67%) were the problems expressed by general practitioners, heads of private nursing homes, superintendents of teaching hospitals respectively.

### Conclusion

Our observation reveals over all mismanagement of hospital waste in the city, though there were some attempts to follow the BMW rules. Our observation also reveals that, the mismanagement of the hospital waste can be minimized by, setting up of common private organization for the management of hospital waste in the city. The mismanagement of hospital waste resulting in different health hazards has been well established<sup>8,9</sup>. This alarming situation warrants for the urgent need of inculcating knowledge and skills, regarding management of hospital waste among all the personnel involved in health care setups.

### REFERENCES

1. Karnataka Health Systems Development Project. Management of Hospital Waste in Secondary Level Hospitals in Karnataka. Bangalore; May 2001.
2. Pruss A, Giroult E, Rushbrok P. Safe Management of Wastes from Health-Care activities. World Health Organization, Geneva; 1999.
3. Health care waste management cell. M.S. Ramaiah Medical College, Bangalore, Health care waste management - An exploration; 1997.
4. Tata Energy Research Institute. Bangalore. Biomedical waste management, Indian Scenario; 1999.
5. Sulabh International Institute of Health Hygiene. New Delhi. Hospital Waste Management - An Integrated Approach, Nath S; 1998.
6. SRISHTI, New Delhi, Managing Hospital Waste, A Guide for Health Care Facilities, Megha Kela. Ravi Agarwal, Nazareth; 1998.
7. Akduman D, Use of personal protective equipment and operating room behaviors in four surgical subspecialties. *Infection Control Hospital Epidemiology*; 20: 110-114; 1999.
8. Kishore, Joshi. Hospital Waste Management in India. *Indian Journal of Occupational and Environment Medicine*, Vol.3, No.2, April-June 1999.
9. Chitra Nagaraj, Study of Health Status of the Pourakarmikas working under the Bangalore Mahanagara Palike (Thesis). Bangalore, Rajiv Gandhi University of Health Sciences; 2000.

**ARTICLE**

## Hospital Waste Management Practices at Victoria and Vani Vilas Hospitals, Bangalore City

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### ABSTRACT

Only 10 – 25% of hospital waste produced is hazardous and carries a variety of health risks, if not disposed properly. The target group affected is vast starting from doctors to waste handlers. The current study was undertaken to study the current practices of hospital waste management at Victoria and Vani Vilas Hospitals, Bangalore. It was a cross sectional study undertaken during the period August & September 2004. A pre tested observation check list and a pre tested questionnaire was used in four selected departments – Surgery, Obstetrics & Gynaecology, Microbiology and Pathology to observe the processing of waste. The questionnaire was administered to all the health care personnel in these locations to know their knowledge and attitude regarding safe hospital waste management.

Most (91%) of Health Care Personnel were not trained, showing their poor level of knowledge regarding colour code used for different categories and their method of disposal. Few (23%) were not aware of precautions for prevention of HIV/AIDS. Majority (55%) were not using protective devices provided to them showing lack of attitude. From the observation made we could see that basic facilities like colour buckets, bags, needle burners were missing in few locations and in most of the locations waste produced is not being properly processed in the next stage, showing that none of them could ensure for safe waste management without break in the series. It was thus concluded that There is a need for improvement, which can be started from the basic level of periodic training of health care personnel by strengthening their knowledge and attitudes and there by improving the waste management practices along with strengthening of infrastructure for the same purpose.

### INTRODUCTION

“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 biologicals and including categories mentioned in schedule I of Bio-Medical Waste Management and Handling) Rules, 1998 of India like human anatomical waste, micro biology and biotechnology wastes, waste sharps, discarded medicine and cytotoxic drugs, soiled waste, solid waste, liquid waste, incineration ash, chemical waste. Between 75-90% of the waste produced by the health-care providers is non-risk or “general” health-care waste. The remaining 10-25% is regarded as hazardous and may create a variety of health risks <sup>1</sup>.

The indiscriminate and unregulated dumping of hospital waste exposes the most underprivileged and informal sector like ragpickers and municipal corporation waste handlers to injury and infection.<sup>2</sup> Hospital waste also has direct impact on spreading of infectious diseases like tetanus, hepatitis and AIDS. Chitra et.al. have reported the prevalence of Hepatitis infection in Bangalore Mahanagara Palike (BMP) waste handlers at 5%.<sup>3</sup>

Victoria Hospital with an average out patient strength of 3,43,242 per year and an inpatient strength of 19,086 per year is a 764 bedded multi-speciality hospital and Vanivilas Hospital for both women and children has an average outpatient number of 58,601 per year and inpatients of 6,968 per year has 536 beds, both are tertiary care government teaching institutions attached to

Bangalore Medical College and also is a referral center. Since no study on waste management practices have been done in these institutions present study was under taken to assess the current situation in hospital waste management.

## OBJECTIVE

To study waste management practices at Victoria and Vanivilas hospitals, Bangalore.

## MATERIALS AND METHODS

Four departments were selected for the study. Pathology, microbiology and surgery in Victoria Hospital and Obstetrics & Gynaecology in Vanivilas Hospital as they produced maximum infective wastes.<sup>4</sup> Cytology section of pathology department, bacteriology section of microbiology, major O.T, minor O.T & kamaraj ward of surgery department and minor O.T labour room, post operative wards of OBG department are the eight locations where study was done. The prior permission was taken from the superintendents of respective hospitals and from the Principal of Bangalore Medical College.

The data collection was done between 24-08-2004 & 15-09-2004. A pretested observation checklist was used to collect the data. Four to six waste containers were randomly selected and observed at the above said points of generation of waste with regard to segregation, containment efforts, transport and treatment / final disposal of various categories of waste. The locations were regularly visited for five to seven days, concerned health care personnel were enquired about facilities available for waste treatment, the various stages of waste management practice in the same location for different categories of wastes like lab waste, incinerable waste, waste sharps, food waste, plastics and paper which ever was generated at that location, same was thoroughly observed and was filed in the observation checklist.

The purpose of the study was explained to all the participants (Nurses, Technicians & Waste handlers) and a pretested and semi structured questionnaire was administered to them to find out their knowledge and attitude regarding hospital waste management. But to few, who were illiterate we explained the questions in their mother tongue and got the questionnaire filled.

## RESULTS

1. A total of 35 health care personnel interviewed; 48% of health care personnel interviewed were nurses.
2. Among the health care personnel interviewed only a small percentage (9%) was trained, remaining (91%) were not trained even once.
3. Majority (83%) of health care personnel interviewed felt that segregation should be done.
4. Fifty one percent of the interviewed health care personnel were vaccinated against Tetanus & Hepatitis B.
5. Among all interviewed 77% were aware of universal precautions for prevention of AIDS/ HIV.
6. Majority of health care personnel (55%) did not use boots while handling hospital waste where as 40% did not use gloves because of various reasons (emergency, no time to wear gloves, inconvenience, fed up of using gloves very often).

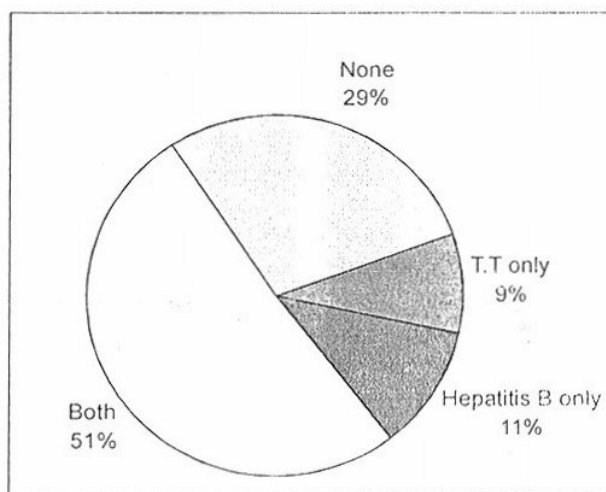


Chart-5: Vaccination status of health care personnel.

7. In surgery department all the required facilities like segregation, containment, autoclaving and needle cutter were available.
8. In OBG department most of the facilities were missing there by dampening the process

**Table-1:**  
**Availability of facilities for waste processing**

Facilities of waste processing	Surgery (Total locations observed n=3)	Microbiology n=1	Pathology n=1	Obstetrics & Gynaecology n=3
Segregation	3	1	1	1
Containment	3	1	1	Nil
Incineration	Nil	Nil	Nil	Nil
Autoclaving	3	1	1	3
Microwaving	Nil	Nil	Nil	Nil
Needle cutter	3	1	1	Nil
Deep burial	Nil	Nil	Nil	Nil
Others	Nil	1	Nil	Nil

**Table-2:**  
**Availability of Colour Coded Buckets**

Colour of bucket	Availability
White	100%
Blue	87%
Red	75%
yellow	63%

of waste management.

9. In microbiology and pathology departments all the basic facilities were available and is up to mark.
10. Most of the containers (64%) had lids but containment efforts are incomplete with lids being absent in 36% of them.
11. Most of the location (6-7) had all colour bins

**Table-3:**  
**Frequency of disposal of different categories of waste**

(n= No. Of Locations producing that category of waste)	(Frequency of disposal)		
	Daily	Once a week	Once a month
Surgery remains (n=4)	4	-	-
Gloves & Plastics (n=8)	5	3	-
Sharps (n=8)	2	3	3
Bandage & Clothing (n=8)	6	2	-
Paper Wastes (n=8)	6	2	-

but few locations without specified colour bins will defeat the purpose of waste management.

12. Black colour inner lining plastic bags were

used for all types of waste in most of the locations, which is not a correct practice as this may lead to confusion in final disposal method.

13. All surgery remains were disposed daily. Majority of other wastes were also disposed daily. But disposal of sharps was variable with few locations disposing it once a month, which is not favorable.

## DISCUSSION

In the whole study only a few (9 %) were trained regarding Hospital Waste Management, which reflects a poor level of knowledge among health care Personnel. Still 83% of them felt that hospital waste should be segregated, which is in accordance with the study done by Ramakrishna. B. Goud et.al (2002) (84.5%)<sup>6</sup>. The knowledge of the Health care Personnel about the correct colour code for various categories of waste and its final method of disposal is very poor.

All the respondents were not vaccinated and only 77% of them were aware of universal precautions for prevention of HIV/AIDS. In our study, we have found that 62% are vaccinated against hepatitis, where as the study in 2001 by Health Care Waste Management cell, M S Ramaiah Medical College shows that only 32% were vaccinated<sup>7</sup>, which shows the raising awareness among the health care personnel which can be still improved by training and retraining programs.

Majority 55.5% did not wear boots and other protective clothing like gloves although they were provided with it because of various reasons.

Since from the point of generation to the final disposal there are fluctuations in the graph. In the previous study it was found that most of the

institutions were able to achieve segregation, disinfection, disfigurement, containment in differing degrees for different types of wastes but transportation, colour coding and final disposal gave away the system which is same case in our study in Victoria Hospital but Vanivilas hospital is giving away at the level of disinfection it self.

Most of containers 64% had lids but with (36%) of them having no lids containment efforts are unsatisfactory. In the study done by Ramakrishna B Goud et al (2000) it is shown that in bedded health care institutions 65% of the containers were not having lids but present study shows that 64% of the containers are having lids showing a marked improvement in containment efforts which can be still improved<sup>2</sup>.

## LIMITATIONS OF THE STUDY

All the departments under the hospital couldn't be included in the study because of time limit. Study design being a cross sectional one. the waste management practices were observed for a short period of time which may not reflect a complete picture of the current practices

## RECOMMENDATIONS

1. Periodic training should be given to all the health care providers from doctors to waste handlers.
2. Infrastructures for handling hospital waste should be strengthened by supplying the protective devices to all and colour-coded bins to all departments.

TABLE 4:  
Processing of different categories of waste

Category of waste	Location producing waste (n)	Segregation	Disinfection	Disfigurement	Containment	Transportation	Colour code	Final proper disposal
Incinerable waste	7	6	-	-	5	5	5	5
Waste sharps	8	7	5	5	7	7	7	5
Lab waste	2	2	-	-	2	2	2	2
Food waste	2	1	-	-	1	1	1	1
Paper & plastics	7	5	-	-	5	5	5	5

**ARTICLE****Setting Up Waste Management Systems in KHPT Clinics in Karnataka**

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**Abstract**

Karnataka has a serious and growing HIV epidemic with an estimated prevalence of HIV infection in the adult population of 1.52%<sup>1</sup>. This means that there are approximately 500,000 persons living with HIV/AIDS (PLWHAs) in the state. To respond to this Karnataka State AIDS Prevention Society (KSAPS) and the University of Manitoba (UOM) have established a partnership to design and implement an intervention project in Karnataka called "Sankalp" under the Karnataka Health Promotion Trust (KHPT). The goal of the KHPT project is to reduce the transmission of HIV and Sexually Transmitted Infections (STI) in the Indian state of Karnataka. It is the endeavor of KHPT to achieve this goal by expanding and improving the quantity and quality of STI treatment services for vulnerable populations in the state. The target is to set up at least one clinic at all taluka headquarters in Karnataka within selected districts and to provide technical and material support and supervision to ensure that services are delivered appropriately. An effort has been made to safely manage the health care waste that would be generated in these clinics. This paper mainly discusses the practical issues involved in setting up these systems (including segregation, containment, treatment on site and disposal) and also the practice of universal precautions. Few of the protocols developed for the purpose are also discussed. The discussions also included the results of SWOT analysis of the process and systems established.

**Keywords:** STI Clinics; Waste Management Systems.

**Introduction**

In India there are an estimated 5.1 million PLWHAs, with an overall prevalence of 0.9 – 1.4%<sup>1</sup> in adult population. Karnataka has a serious and growing HIV epidemic, with an estimated prevalence of 1.52%<sup>1</sup>. This means that there are an approximate 500,000 PLWHAs. Karnataka is considered to have a high-risk generalized epidemic<sup>2</sup>.

In Karnataka, AVAHAN's (a project funded by Bill and Melinda Gates Foundation) efforts are led by the project SANKALP. This 5-year project is implemented by the Karnataka Health Promotion

Trust (KHPT), a partnership between University of Manitoba (Canada) and Karnataka State AIDS Prevention Society (Government of Karnataka). KHPT builds on the effective collaboration between KSAPS and UOM fostered by India Canada Collaborative HIV/AIDS Project (ICHAP) funded by Canadian International Development Agency (CIDA). KHPT integrates the Gates funded project with the state's HIV/AIDS Program. The goal of the project is to reduce the transmission of STI's and HIV in the Indian State of Karnataka.

Key strategies for expanding the access to prevention and treatment of STI in Karnataka



include:

- Setting up Program Linked Clinics in each of the taluka headquarters, which have high volumes of sex work.
- Fixed Day Fixed Time Clinics in selected hot-spot locations.
- Setting up a network of Referral Doctors for treatment of STI.
- Holding STI camps in areas where health care facilities are not available / accessible (remote / rural areas).

Safe Management of Health Care Waste (SMHCW) becomes one of the important aspects in all these health care delivery models. Improper management of Health Care Waste (HCW) poses risks to health care workers, the municipal corporation workers and the informal waste handlers like rag pickers<sup>3</sup>. These risks are mainly avoidable health risks<sup>4</sup>. Conceptualization of better systems is easy, but to establish these systems and protocols, ensuring that things are in place and functioning appropriately calls for commitment and responsibility from all categories of staff involved in the health care delivery system. Management of wastes is a classic example of team effort wherein people of different skills and awareness levels are involved in various capacities. The systems for safe management of wastes in STI Clinics is a unique experience since it is a combination of specialized health care with principles of primary health care approach. These STI clinics also generate a considerable amount of waste sharps. Waste sharps are the most hazardous of all the categories of HCW, in that they have the potential to cause a visible injury along with deadly blood borne infections like Hepatitis B and C and HIV.<sup>8</sup> This risk becomes even greater in the context of those working in STI Clinics. In the Indian context however, the magnitude of these risks are not well documented.<sup>9</sup>

This article discusses the practical issues involved in setting up systems for SMHCW in various settings as mentioned earlier.

### Aim

To develop objective oriented systems for Safe Management of Health Care Waste comprising

aspects of Occupational Health and Safety in all Health Care Delivery Systems of KHPT (Program Linked Clinics, Referral doctors and other modalities).

### Objectives

1. To identify and categorize the types of wastes generated in health care modalities of KHPT.
2. To institute waste management systems based on the categories and quantities of wastes generated for their safe management.

### Activities undertaken

1. STI Clinics in various districts including the out reach centers are the settings where an effort to institute systems for SMHCW were made.
2. Initially a free listing of all kinds of wastes that was being generated in KHPT clinics (and could be generated in future) was listed out and the approximate quantities were noted.
3. Discussions were held with the staff regarding how they were handling (segregating, collecting and disposing) wastes; the problems they faced and their perceptions regarding the risk.
4. A site visit was done to observe and confirm the information received.
5. Quantification was done in select places in order to estimate the plan for the equipment to be procured for waste management.
6. After this a copy of Bio Medical Waste (Management and Handling) Rules 1998<sup>5</sup> was kept in each of these clinics for information and reference.
7. Education, training and hands on experience was given to project staff regarding basics of Health Care Waste Management and Universal precautions to be followed.
8. The Universal Precautions<sup>6,7</sup> to be followed while handling the wastes were made both in English and local language (Kannada mainly) for all categories of personnel. It was pasted in a prominent place for all to follow.

9. The following materials were procured and provided for waste management:

- a. Color-coded plastic containers<sup>5</sup> – 4 different colored (Yellow, Red, White and Black) footpad operated covered bins were procured in each of the areas. (Green colored bin was used for domestic wastes)
- b. In places where these 4 colored bins were not available ribbons of the respective colors were procured and tied round white colored bins (color coding).
- c. Polyethylene liners were also provided.
- d. Personal Protective Equipment (PPE) like disposable gloves, masks and gowns for handling wastes were provided for addressing issues of occupational safety.
- e. Labeling: Labels were printed and pasted above the bins for easy understanding of all Health Care Personnel (HCP) involved in handling these wastes.
- f. Stickers with the Bio Hazard logo were procured and affixed.
- g. Labeling with Tags / Stickers / Ribbons was done as and when needed. This was mainly done in order to facilitate for "Waste Tracking".
- h. A Chart wherein details of "Which Waste to be put in Which Colour Bin" was prepared and pasted on the wall just above the place where the bins were kept.

10. **Disinfection:** A concentrated solution of bleaching powder and other disinfectants like freshly prepared Sodium hypochlorite solution and Glutaraldehyde has been provided.

### Challenges encountered and measures taken to address them

- Procuring different coloured bins at taluka places was at times difficult. Alternatively 4 different coloured ribbons or polythene covers for the purpose of colour-coding was employed.

- **Attitudes of Health Care Personnel** – "Old Habits Die Hard"; initially many a times it was found that health care personnel mostly doctors were not interested in using the bins kept for segregation of wastes. They felt that "it is small quantities of waste generated so let us dump everything into one bin". In spite of training them on these issues, even simple things were not followed initially at some places. It definitely took time to inculcate a change in behavior regarding this matter.

- **Non Governmental Organization (NGO) Staff:** many of the collaborating NGO's in the project were new to the health field, so they had to be educated, oriented and trained regarding importance of Bio Medical Wastes and why they had to be safely disposed / managed.

- **Risk Perception:** many of the staff at the grass root level were ignorant of the risks involved in not following the Universal Precautions; risks involved in improper or unsafe methods of waste management. So repeated orientation, training and demonstration and experience sharing was given to staff at all levels, to create an awareness and risk perception among them.

- **Dilution of the message / importance of the message:** At the city and district levels most of the things were followed meticulously but moving down to taluka levels, many things were not followed properly. The reasons for this could be many – the levels of understanding of the risk; availability and accessibility of facilities also play an important role. For e.g. non-availability of agencies which collect and manage/dispose wastes at many taluka levels. Indigenous methods such as burning the wastes or deep burial were attempted as alternatives in the interim period.

- **Finding an external agency like CWTF operators,** which collects, transports, treats and disposes the waste was a problem. The help of consultant doctors / nursing homes / hospitals in the local area was sought. Common treatment facilities are evolving slowly in the state.

## SWOT Analysis<sup>12</sup>

### Strengths:

- A clear understanding, commitment, cooperation and support especially among the staff in the project.
- Availability of finances could be considered as one of the strengths. The emphasis of the project is delivery of quality care that is freely accessible to those most in need of it. However, there is adequate attention paid to ensure the setting up of good systems using minimal resources and at low cost.
- Bio-Medical Waste (Management and Handling) Rules, 1998, which has made it compulsory for all health care establishments to manage wastes in a safe manner.

### Weakness:

- Difficulties in places where there are no agencies for the final treatment and disposal of waste.
- Staff Turnover: As in any other sectors, staff turnover is an issue here as well, which also is effected by stigma towards STI / HIV and AIDS. So finding and training new staff becomes a problem.

### Opportunities:

- The project is in its initial stage and since it has been started to look at setting up these systems now itself, there is definitely enough time and scope for lots of improvement.
- Availability of technical support from KHPT staff as well as from outside sources such as the members of the Health Care Waste Management Cell.

### Threats:

- Attitudes of some of the staff at various levels.
- Levels of Risk Perception.
- Myths and Misconceptions.

### Conclusion

This has been an attempt to develop scientifically sound and practically feasible systems

at low cost utilizing the locally available resources. It is endeavoured to develop objective oriented systems of safe management of HCW especially in view of many of the project activities being centered in underserved areas. The efforts would also address issues of occupational health and safety of HCP. It is hoped that these systems would evolve into meaningful and objective oriented systems that would serve as Model Systems for SMHCW at a Primary Health Care level. There has been a constant learning from experience and attempts at improvement of these systems. Some protocols and systems are in place and rest of the protocols would be finalized once more is learnt through experience and feedback.

### Acknowledgements

Dr. Pruthvish S, Director and Members of Health Care Waste Management Cell, Department of Community Medicine, M S Ramaiah Medical College, Bangalore.

### References

1. Report on HIV Sentinel Surveillance, Karnataka: A report published jointly by Karnataka State AIDS Prevention Society (KSAPS) and India Canada Collaborative HIV / AIDS Project (ICHAP); 2003.
2. Overview of Estimation of HIV/AIDS Epidemics: A report published by UNAIDS, June 2003.
3. Adrian C, Jurg C. How are we managing our healthcare waste? By, SKAT, Swiss Center for Development Cooperation in Technology and Management, Vadianstrasse 42, CH - 9000 St. Gallen, Switzerland: 1999.
4. Health Care Waste Management - an Exploration. A Report published by the Department of Community Medicine, M S Ramaiah Medical College, Bangalore, India: 1997.
5. Bio Medical Waste (Management and Handling) Rules, 1998; Ministry of Forests and Environment, Government of India: 1998 July.
6. CDC. Update: Universal precautions for prevention of transmission of HIV, Hepatitis B virus and other blood borne pathogens in health care settings. MMWR 1988; 37: 377 - 388.
7. CDC. Guidelines for prevention of transmission of HIV and HBV to health care and public - safety workers. MMWR 1989; 38 (S - 6): 1-36.
8. Safe Management of Wastes for Health Care Activities, 1999, WHO. Available at URL: [http://www.who.int/docstore/water\\_sanitation\\_health/wastemanag](http://www.who.int/docstore/water_sanitation_health/wastemanag)
9. Wg Cdr J N Srivastava. Injuries due to sharps in hospitals. Journal of ISHWM 2002 Apr; 1(1): 14 - 21.

10. Ramakrishna G B, Gopinath D, Dayanand M, Murthy NSN, Girish N. In-house Waste Containment efforts in select Health Care Institutions of Bangalore City. Journal of ISHWM 2003 Apr; 2(1): 24 – 27.
11. Ramakrishna G B. Determinants for Safe Management of Health Care Waste. Annexure 1:

#### Annexure No 1:

#### Free Listing of Wastes generated in the STI Clinics

1. General waste: including paper, tablet/capsule covers and syringe wrappers.
2. Instruments: **Disposable Tongue Depressors** and Speculums.
3. Disposable Gloves; Cotton swabs and gauze pieces; needles, syringes and lancets.
4. Bottles – glass and plastic: irrigation saline, hydrogen peroxide, betadine lotion, disinfectants like savlon, syrups etc.
5. Broken ampoules / intact empty vials;
6. Liquid wastes with disinfectants;
7. Vaginal swabs and cervical swabs;
8. Vacutainers.
9. Condoms male (and also female), which are used for demonstration purpose;
10. Expired / outdated medicines;
11. Urine samples;
12. Blood samples;
13. **Leucocyte Esterase Dipstix (LED) urine strips;**
14. Pregnancy test kits;
15. **RPR (Rapid Plasma Reagin) test kits;**
16. Reagents;
17. IV fluid bottles and IV drip sets;
18. Stains – Gram's stain for vaginal and cervical specimens;
19. Glass slides and cover slips used for microscope.

Note: The wastes mentioned in bold are unique to the STI Clinic Setup

Instrument for Data Collection; p 104. A dissertation submitted to Rajiv Gandhi University of Health Sciences, Bangalore, 2001.

12. James M. SWOT Analysis – Understanding Strengths, Weaknesses, Opportunities and Threats. Available at URL: <http://www.mindtools.com/pages/article/jm.htm>

#### Annexure No. 2:

#### List of Universal Precautions: Do's and Don'ts followed in the STI Clinics

##### Do's:

1. Please do wear gloves if there is a risk of contact with blood and body fluids.
2. Please do wear eyeglasses or goggles, mask and / or gown if there is a risk of splashing of blood or body fluids.
3. Please do wash hands with soap and water before and after patient contact and on removal of gloves.
4. Please do wash hands immediately after exposure to blood & / or body fluids.
5. Please cover cuts, abrasions with waterproof dressings.
6. Please do follow color-coding for collection and segregation of waste.
7. Please dispose wastes on a regular basis.

##### Don'ts:

1. Please do not pass sharp instruments hand to hand.
2. Please do not guide needle with fingers.
3. Please do not re-sheath needles.
4. Avoid direct transfer of instruments, use a tray.

**Annexure No. 3:**  
**Colour Coded Bins and Different Categories of Wastes**

Colour Code	Yellow	Red	Blue / White (Translucent)	Black
<b>Wastes</b>	Blood and Body Fluids Bandages. Vaginal Swabs. Cervical Swabs. Blood and Urine Samples.	Disposable Plastics. Disposable Syringes Rubber / Latex gloves. Vacutainers	Reusable Sharps like some Needles, Scalpels, Surgical instruments; Vacutainer needles.	Chemical waste All Hazardous Wastes; LED Urine Strips. Pregnancy Test Kits.
	Cotton Swabs / Gauze soiled with Blood / Body Fluids. Extremely soiled Linen	Condoms both male and female. Tubings. Catheters. IV Fluid bottles and IV Drip Set	Waste Sharps like Disposable Needles, Broken Glass (Ampoules and Vials), Blades, Glass Slides & Cover Slips used for Microscope.	Discarded Medicines; Ash RPR Test Kits. Reagents - Gram's Stain etc.

**Annexure No. 4:**  
**A Format for Waste Management Register**

Date of Collection	Place	Type of Waste	Quantity	Date & Time of Disposal to CTF*	Signature of Staff	Sign / Thumb impression of Receiver/ Helper

**ARTICLE****Assessment of Waste Management Systems in Plantation Health Care Centers in Karnataka**

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**ABSTRACT**

This study looks into the health care waste management systems in plantation health care centres in Karnataka. It is a descriptive study, covering 30 coffee/ tea plantations in Chikmagalur, Hassan and Kodagu districts in South Karnataka, having 24 health care centers, by employing a field tested 'Observation checklist.

**RESULTS**

In all the estates there were attempts at 'managing' health care waste. However, the core practices of waste segregation, the colour-coding scheme and other components were not uniform. Though the efforts towards containing waste were obvious, the equipment for the purpose was not appropriate. Of the 24 health care centres that were assessed, none of the centres had a written waste management policy nor did they have a waste management committee. The health care providers of 13(54%) centres were trained in health care waste management. None of the centres had the system of documenting quantity of waste types generated, nor was there a system of safe transportation to the site of disposal. Segregation of waste was practiced in 7(29%) centres. The mechanisms for waste containment were also found to be variable and deficient from estate to estate. The treatment of waste before transportation or disposal was limited only to waste sharps (needles). Even this critical practice was satisfactory in 21% of the centres. With respect to disposal methods, majority of the centres were either burying or burning the waste.

**INTRODUCTION**

As per the provisions of the Plantations Labour Act, 1951, every plantation is required to have a medical facility maintained for its workers<sup>1</sup>. Most plantations, as per this requirement, have either a first aid station or a dispensary or a small hospital on the estate catering to the health needs of their workers. This is dependant on the size of the population resident or working at the plantation. Coffee plantations, where the population is small are normally equipped with first aid stations. These stations are usually manned by a qualified Auxiliary Nurse Midwife/ Pharmacist and have a doctor periodically visiting the facility as per the provisions of the Act. The health care facilities that we visited have on an average 400 patients per month, all these being managed on an out patient basis, as they do not have facilities for admission and intervention. All cases needing admission are referred. Some of the procedures being performed include injections,

minor dressings and minor surgical procedures. Though these health facilities cater mainly to the needs of outpatients, they generate a range of waste types that include sharps, pathological and anatomical wastes, plastics and contaminated dressing material.

During a routine 'Health and Welfare Audit' of a group of coffee/ tea plantations in South Karnataka by the Department of Community Health, St. John's Medical College, Bangalore, a special effort was made to look into the biomedical waste management practices in the health facilities of these plantations. The quantum of waste generated, though small, it has the potential to cause visible injury (due to sharps) and infections such as HIV and Infective Hepatitis, if improperly disposed<sup>2</sup>. Improper disposal could also result in environmental pollution- air pollution due to toxic fumes, dioxins in the food chain and incineration effluent<sup>3</sup>. The placenta from home deliveries was being buried in shallow pits. It was

realized that proper management of all the wastes (segregation, containment, treatment, transportation and final) disposal is urgently required<sup>4</sup>. Thus this study was undertaken to study the health care waste management systems in plantation health care centres in the state of Karnataka.

## OBJECTIVES

1. To assess the current health care waste management in the plantations.
2. To suggest improvisation in the existing systems for waste management.

## MATERIALS AND METHODS

The study was done in August – September 2004, in selected coffee/ tea plantations in Chikamagalur, Hassan and Kodagu districts in South Karnataka, by a team of doctors from the Department of Community Health, St.Johns Medical College, Bangalore. For the purpose of the study, the Observation Checklist developed and tested by the Health Care Waste Management Cell, Bangalore<sup>5</sup> was used. The waste management practices looked into included the existence of a biomedical waste management committee and waste management policy, whether training was imparted in waste management, and the aspects of segregation, containment, treatment and disposal of the health care waste generated.

## RESULTS

In all, the audit team visited thirty estates having twenty-four health care facilities. A waste management committee had not been formed and there was no written policy on waste management at any of the plantations. None of the systems followed were uniform, as in, they varied from center to center. The health care providers (Pharmacists/ANM's) at these plantations expressed the need for a uniform Health Care Waste Management Policy to be developed and implemented. As a result, there was no system of documenting quantity of waste types generated and occurrences of injuries or accidents during handling of the waste at any of the centres. However, training in waste handling and management had been imparted around one year back (June 2003) to the health care providers of 13 centres (all the plantations located at Coorg) by

the Center for Environmental Education Local Branch office. Though there were visible efforts at waste management at these centres, yet the systems in place were lacking completeness. In other centres, the lack of knowledge and know how was evident during discussions with the health care providers. There was a definite need for training at these centres. The key observations made were:

1. Segregation of wastes was being correctly done at 7 (29.16%) of the centres. An attempt to segregate the waste, resulting in incomplete/ partial segregation of waste was being done at 8(33.33%) of the centers.
2. Though in all the centres, the waste was being contained in puncture proof containers, mainly waste paper baskets or buckets, with or without lids, appropriate containment procedure was being followed in only 5 (20.83%) of the centres.
3. In the 5 centres with appropriate containment, training had been imparted. The inappropriate containment in the other 8 centres where training had been imparted reflects a lack of clear cut understanding regarding segregation and containment.
4. Treatment of waste before disposal was being done only for needles and at 11(45.83%) of the centres. Among these, it was being correctly done at 5(20.83%) of the centres. In all these centres, the needles were being contained in puncture proof cans (Jerry cans).
5. The transportation of the waste from source of generation to the site of disposal was in plastic carry bags. The site of disposal was around 100 meters from the centres. In instances where it was carried over a long distance, 2 estates used a jeep to transport the waste to the disposal site at nearby Primary Health Centres.
6. The method of waste disposal was different from centre to centre. Burning of the waste, including plastics, in shallow pits dug close to the health centres, was observed in 5 (21%) of the centres. Burial of the waste, including plastics, was being done in 10 (42%) of the centres. In 7(29%) of the centres, plastic waste

was being buried and incinerable waste such as infected dressings were being burnt in an incinerator like equipment located at one of these 7 centres.

7. In 2 (8%) centres the waste was being segregated (not at the point of generation) and this waste was being sent to the nearby Primary Health Centre for disposal. The method of disposal of this waste at the Primary Health Centre could not be looked into.
8. In all the centres, the expired date drugs were being collected and sent back to the source from where they were being procured. However we could not look further into the method of disposal of these drugs.
9. Home deliveries had taken place at 18(75%) of such plantations where details of these home deliveries could be obtained. In all these plantations, the placenta was being buried in pits dug near the houses. However in 3(12.5%) of these plantations, an alternate method of disposal of the placenta was by throwing it into the toilet pit.

### Conclusion

The segregation of plastics and glass waste and of needles at the point of generation is essential<sup>6</sup>. It is also essential that contaminated waste be segregated appropriately from non contaminated general waste<sup>4</sup>. It is recommended that uniform systems of colour coding be developed and covered puncture proof containers be used for safe containment of waste generated<sup>7</sup>. Proper treatment of contaminated waste and sharps needs to be undertaken before they are disposed<sup>8,9</sup>. It is recommended that bleach solution or any other suitable disinfectant be used for this purpose<sup>10</sup>. There is a need for safe transportation of these wastes from the point of their generation to the place of final disposal, to avoid injury and infection to waste handlers and others. Plastics should not be burnt or buried. Segregated plastics could be disinfected and recycled<sup>3</sup>. Guidelines for proper disposal of waste generated by health care centres may be obtained by referencing the Bio Medical waste (management and handling) rules, 1998.

### RECOMMENDATIONS

- Organizational policy on Health Care Waste Management needs to be developed at these estates taking into account local needs.
- The policy should include adequate training of health care personnel and universal precautions.
- Efforts towards evolving suitable systems of waste management are needed on the part of all concerned <sup>11</sup>.
- Periodic appraisals of the systems implemented may be done during subsequent Health and Welfare Audits.

### OVERVIEW OF THE FINDINGS IN THE STUDY

Number of health care settings assessed	24
1. Training to health care providers in managing health care waste	13 (54%)
2. Segregation of waste	15 (63%)
3. Appropriate Segregation	07 (29%)
4. Containment of waste	24 (33%)
5. Appropriate Containment	05 (21%)
6. Treatment of waste before disposal	11 (46%)
7. Appropriate treatment	05 (21%)
8. Burning of waste as method of disposal	05 (21%)
9. Burial of waste as method of disposal	10 (42%)
10. Burning of incinerable waste and burial of non incinerable waste as a method of disposal	07 (29%)
11. Home deliveries	18 (75%)
Disposal of home delivery anatomical wastes by burial	18 (75%)
Disposal of home delivery anatomical wastes into toilet pit	03 (13%)



## REFERENCES

1. The Plantations Labour Act, 1951: Provisions to health, Section 10.
2. Chopra G S, Guptha P K. Health Care Medical Wastes – A Hotbed of Infection. *Journal of ISHWM*. 2004 Apr; 3 (1): 41-45.
3. Pandey A K. Plastic medical waste and its management. *Journal of ISHWM*. 2004 Apr; 3 (1): 33-37.
4. Bio-Medical waste (management & handling) rules, 1998: Rule 6.
5. Ramakrishna GB. Determinants for safe management of health care waste. A dissertation submitted to the Rajiv Gandhi University of Health Sciences, Bangalore, 2001.
6. Singh Z, Dutta J, Dudeja P. Plastic Waste Management. *Journal of ISHWM*. 2004 Apr; 3 (1): 26-29.
7. Pruss A, Giroult E, Rushbrook P. Safe Management of Wastes from Health Care Activities. World Health Organisation, Geneva, 1999.
8. Singh R. Concern. *Journal of ISHWM*. 2004 Apr; 3 (1): 51-52.
9. Bio-Medical waste (management & handling) rules. 1998: Rule 5, Schedule I & II
10. Rashmi J R, Ramakrishna GB, Dominic M. Naveen R, Deepthi K, Deepa R. Developing a system for safe management of Health Care Waste at a Primary Care Center. *Journal of ISHWM*. 2004 Apr; 3 (1): 21-25.
11. Ramakrishna GB, Girish N. Methodology for Training Personnel for Instituting Systems for Safe Management of Health Care Waste. *Journal of ISHWM*. 2004 Apr; 3 (1): 55-56.

**AGENDA****HEALTH CARE WASTE MANAGEMENT:  
overcoming bottlenecks and *efforts at capacity building***Agarwal A K<sup>1</sup>

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**The U N weekly newsletter, 26 June – 2 July, 2004 reported:**

Used syringes and disposable medical equipment, weighing more than 300 quintals were seized and three persons were arrested in this connection in Nangloi, New Delhi this evening. The material had been collected from several hospitals and was to be sold. The syringes, nozzles and surgical equipment had been cleaned and neatly packed into 200 gunny bags, which were stored in two plots. The accused said that every 15-20 days, truckloads of this material would be sent to buyers.

*(as reported by a leading news agency – January, 2003).*

Unsafe management of medical waste poses a series of life threatening risks – for all health personnel and patients intramuros, and also to the general public, extramuros. Most major hospitals may have disposal facilities but small private hospitals may not because of cost involved. Consequently, used plastic syringes and transfusion pipes reach rag pickers who siphon them off to scrap dealers. These scrap dealers get them recycled back into the market, without disinfecting. It is estimated globally that more than 21 million HBV, 2.3 million HCV and 260,000 HIV infections occur due to reuse of syringes thus posing a grave danger to the community. The health care workers are also at high risk due to exposure of Bio-Medical waste as a single needle stick injury carries a risk of transmitting 30%, 1.8% and 0.3% of HBV, HCV and HIV respectively. (WHO Policy Paper on Safe Health Care Waste Management, Aug 2004). It is because of this high risk that through the Basel Convention, the United Nations have officially classified health care waste to be the second most hazardous waste, after radioactive waste.

Realizing the problem due to unsafe injections, AD syringes were introduced for immunization

programmes globally. AD syringe ensures that the injections will not be reused but at the same time increase the volume of hospital waste. To tackle this immense waste (around 200 million injections annually, Source: Draft CPCB guidelines on Immunization Waste Management) generated at about 5.5 lakhs sites located in urban and rural areas need to be disposed off according to the laid down bio-medical waste rules. The main bottleneck to sound health care waste management programme is the lack of awareness and appropriate skills, insufficient resource allocation and lack of adequate equipment. Proper management of hospital waste would result in reduced hospital-acquired infection, a notable reduction of health hazards posed by infectious sharps and a lesser adverse impact on the environment.

Impact of improper waste management is global issue and is not restricted by boundaries or regions. According to WHO estimates, the SEAR countries together, produce some 350,000, tons of health care waste per year, close to 1000 tons a day (based on 1 kg/bed/day). As it is not segregated at source, all of it is to be considered hazardous despite the fact that only 10-20% is infectious in nature.

In India bio-medical waste generated from 0.6 million beds is about 600 MT. (This does not include the generation of waste from a very large

<sup>1</sup> The text of this article is based on the key note address delivered during the inauguration of the pre-conference workshop during the conduct of the first biannual conference of the ISHWM at Bangalore Nov 2004.

number of unregistered nursing homes and the practicing quacks and PHC's and SC's and outreach sites). To find solution to the problem, Bio-Medical Waste (Management and Handling) Rules were promulgated in the year 1998. The implementation so far, is far from satisfactory. Awareness and will to implement is also low.

Looking for solutions to the problem of health care waste, the health care facilities and other agencies involved in waste management were quick to bang on technological solutions. Incinerators have been widely used by these health care facilities to burn the waste. The problems associated with the incinerators are now well known to all of us and have emerged as a major health and environmental hazard. Thus, alternative solutions/options for health care waste management have now evolved. Cost effective, environment friendly technologies need to be adapted. One of the feasible and realistic option for large cities and towns is to establish common bio-medical waste treatment facility for management and treatment of health care waste facility.

Presently the focus is not only on finding environment friendly technological solution but towards a holistic approach for managing health care waste. Focus is now on an integrated waste management system that will cover all health care facilities (urban & rural), different categories of health care workers, patients and the community. Initiatives have been taken by different stake holders towards the integrated solutions.

WHO has been very instrumental globally and regionally to provide long term solutions to the problem of health care waste management. In its policy paper on safe health care waste management, (2004) WHO highlights on:

1. Problem posed by reuse of syringes
2. Hazards associated with burn technologies
3. Occupational safety issues

In view of the challenge presented by health-care waste and its management, WHO activities are oriented towards the following guiding principles:

1. Preventing the health risks associated with

exposure to health-care waste for both health workers and the public by promoting environmentally sound management policies for health-care waste;

2. Supporting global efforts to reduce the amount of noxious emissions released into the atmosphere to reduce disease and defer the onset of global change;
3. Supporting the Stockholm Convention on Persistent Organic Pollutants (POPs);
4. Supporting the Basel Convention on hazardous and other waste; and
5. Reducing the exposure to toxic pollutants associated with the combustion process through the promotion of appropriate practices for high temperature incineration.

WHO proposes to work in collaboration with countries through the following strategies:

#### Short-term

- Production of all syringe components made of the same plastic to facilitate recycling;
- Selection of PVC-free medical devices;
- Identification and development of recycling options wherever possible (e.g.: for plastic, glass, etc.); and
- Research and promotion on new technology or alternative to small-scale incineration;

Until countries in transition and developing countries have access to health-care waste management options that are safer to the environment and health, incineration may be an acceptable response when used appropriately.

Key elements of appropriate operation of incinerators include effective waste reduction and waste segregation, placing incinerators away from populated areas, satisfactory engineered design, construction following appropriate dimensional plans, proper operation, periodic maintenance, and staff training and management.

#### Medium-term

- Further efforts to reduce the number of unnecessary injections to reduce the amount

of hazardous health-care waste that needs to be treated;

- Research into the health effect of chronic exposure to low levels of dioxin and furan; and risk assessment to compare the health risks associated with:

- (1) Incineration; and
- (2) Exposure to health-care waste.

### Long-term

- Effective, scaled-up promotion of non-incineration technologies for the final disposal of health-care waste to prevent the disease burden from: (a) unsafe health-care waste management; and (b) exposure to dioxins and furans;
- Support to countries in developing a national guidance manual for sound management of health-care waste;
- Support to countries in the development and implementation of a national plan, policies and legislation on health-care waste;
- Promotion of the principles of environmentally sound management of health-care waste as set out in the Basel Convention; and
- Support to allocate human and financial resources to safely manage health-care waste in countries

In India WHO has taken up the following activities:

- ✓ Established 11 projects for model health care waste management systems in hospitals with more than 500 beds like Air Force Hospital, Bangalore.
- ✓ Organized many workshops in collaboration with different agencies
- ✓ Developing, training and awareness material on health care waste management
- ✓ Projects on immunization waste management

Efforts made by NGO's and some of the professional bodies like the Indian Society of Hospital Waste Management (ISHWM) have been

very proactive in this field. As in other developing countries, in India also there is no single agency handling the subject of Bio-medical Waste. There is a multi sectoral approach with Ministry of Environment & Forest (MOEF), Ministry of Health and Family Welfare (MOHFW), Central Pollution Control Board (CPCB), State Pollution Control Board (SPCB), municipal authorities, NGO's, individuals and health care institutions involved in proper management of the waste. It is therefore necessary that along with providing adequate manpower and infrastructure to train and educate various categories of health professionals like doctors, nurses, ANM's, waste handlers, patients and community about health care waste management with a view to meet the statutory and legal requirements across the country.

### Problems

Training is one of the weakest links. There are more than a million rag pickers who do not use any protection. Recycling of syringes and the plastics used in the medical management is a thriving business of millions of rupees. Needle stick injury is a common occurrence not only amongst the ragpickers but also amongst the health care workers—highest incidence being amongst the paramedical staff. Training material targeting different categories of health care workers, providing necessary information on proper waste management and emphasizing occupational safety need to be developed.

This workshop focusing on waste handlers, who are least equipped with the knowledge and skills, but are at "High Risk" assumes greater relevance in the above scenario. IGNOU, in this direction is soon launching a 6-month certificate programme on health care waste management.

### IGNOU's Certificate Programme in Health Care Waste Management

The School of Health Sciences, Indira Gandhi National Open University (IGNOU), in active collaboration with the Indian Society of Hospital Waste Management (ISHWM), New Delhi and WHO, SEARO, is developing a Certificate Programme in Health Care Waste Management for health functionaries in South East Asian Countries.

The methodology includes a number of

important activities namely, constituting a core group, prepare an elaborate framework and syllabus of the course programme, identifying course writers and multi-media experts, conduct bibliography search of existing health care waste management institutes, resources or awareness material in South East Asia Region, conduct five national workshops in identified countries, finalize the objectives and detailed structure of the programme, organize orientation training workshops for the course writers in distance mode of education, assign course writing works to the experts, audio/video production, develop manual for the practical training of the academic counsellors and also develop evaluation and impact assessment guidelines.

### Expected Outcomes

The 6-month Certificate Programme in Health Care Waste Management along with the self-instructional materials and video cassettes will be developed for implementation through distance education in all the countries under the SEARO region of WHO. The programme shall be launched in SEAR countries: India, Bangladesh, Bhutan, DPR Korea, East Timor, Maldives, Myanmar, Nepal, Sri Lanka. The programme would be undertaken with the help of existing IGNOU network and through WHO, SEARO and WHO regional offices in the respective countries. The target groups would include health professionals, paramedical staff, NGO workers, hospital administrators, sanitary inspectors, nursing home administrators etc.

### Programme Highlights

This is a six months programme of 14 credits i.e. from January to June or July to December. During this programme learner shall be attached to a study centre for a period of six days. Out of the contact period of 6 days, 2 days would be used for practical demonstration of health care waste management system in a health care facility. The rest 4 days would be utilized for theory and project counselling.

A project also needs to be taken up as a mandatory requirement for successful completion of this programme. After successful completion of

term end examination in the theory and examination of the project report, a certificate will be awarded.

This programme offers the flexibility of completing it in minimum duration of six months and a maximum duration of two years. After a period of two years, the learners shall have to re-register.

### Present Status of the programme

- The university has prepared the detailed syllabus of the programme, identified the course writers and editors for writing and editing the course. The manuscripts of all the units have been received by the university, and have been sent to the editors for further editing and are in the process of printing.
- Detailed programme and project guides have also been prepared by the university, which will be given to each student at the time of admission, to introduce them to the course.
- *Core group has been constituted, which meets from time to time to discuss the present status of the programme.*
- *To spread awareness, obtain a regional perspective of each country and introduce the course, workshops were organized in Bangladesh, Nepal and Indonesia with the active participation of WHO, Ministry of Health, Local NGO's and leading hospitals in each country.*

To conclude I would like to say that to have a sound waste management system it is very important to provide on going training awareness programmes for all health care workers. The course material for this programme is in final stages of completion. The programme will be launched in 2005. Around 15-20 hospitals with modest health care waste management facilities and experts are being identified as study centres, across the country for implementation of this programme. As regards other South East Asian Countries, the arrangements for theory and practical counselling in select hospitals are being finalized along with country officers of WHO.

## CERTIFICATE COURSE IN HEALTH CARE WASTE MANAGEMENT

The Certificate in Health Care Waste Management consists of 2 courses and 10 leads to 10 credits. Each course consist of 4 booklets / blocks and each block consists of 2 to 4 units.

### COURSE I: IMPACT OF WASTE ON ENVIRONMENT AND HEALTH (4 credits)

<b>Block I</b>	<b>Understanding Our Environment</b>
Unit 1	Introduction to Environment
Unit 2	Environmental Pollutants
Unit 3	Interrelation ship of Environment and Health
Unit 4	Waste Management
<b>Block II</b>	<b>Health Care Waste and its Management –I</b>
Unit 1	Definition, Types and Categories of Waste
Unit 2	Principles of Health Care Waste Management
Unit 3	Handling Health Care Waste
<b>Block III</b>	<b>Health Care Waste and its Management –II</b>
Unit 1	Impact of Health Care Waste on Environment
Unit 2	Impact of Health Care Waste on Human Health
Unit 3	Survey Methodology, Workers Safety and Precautions
<b>Block IV</b>	<b>Current Status and Legislation in South East Asian Countries</b>
Unit 1	Rules and Legislation
Unit 2	Regulatory Mechanism
Unit 3	Current Status in India, Thailand, Indonesia, Sri Lanka & Bangladesh
Unit 4	Current Status in Bhutan, DPR Korea, Timor Leste, Maldives, Myanmar & Nepal

### COURSE II: HEALTH CARE WASTE MANAGEMENT – CONCEPT, CAPACITY BUILDING AND METHODOLOGIES (6 credits)

<b>Block I</b>	<b>Practical Aspects of Health Care Waste Management</b>
Unit 1	Managerial and Administrative Aspects
Unit 2	Integrated Infection Control Management
Unit 3	Disinfection and Transportation
Unit 4	Capacity Building, Training and Monitoring
<b>Block II</b>	<b>Systems and Technologies in Health Care Waste Management</b>
Unit 1	System Options
Unit 2	Disposal of HCW - Burn Technologies (Including Video)
Unit 3	Disposal of HCW - Non-Burn Technologies (Including Video)
Unit 4	Emerging Concepts and Possibilities
<b>Block III</b>	<b>Recent Reports on HCWM &amp; Case Studies</b>
Unit 1	Significant Case Studies
Unit 2	Management of Waste from Immunization
Unit 3	Injection Safety
Unit 4	Emerging Issues
<b>Block IV</b>	<b>Training Manual for Waste Handlers</b>
Unit 1	Teachers Guide
Unit 2	Training Manual for Waste Handlers of Health Care Settings
	<b>PROJECT (4 credits)</b>

**AGENDA****INDIAN SOCIETY OF HOSPITAL WASTE MANAGEMENT**

First Biannual Conference  
4<sup>th</sup> and 5<sup>th</sup> November 2004, Bangalore

**BANGALORE DECLARATION**

Draft 1<sup>st</sup> Nov 2004

We the members of ISHWM, representatives of Governmental, Nongovernmental and voluntary organizations and other concerned citizens who have assembled here in Bangalore for the first Biannual conference on Safe management of health care waste on the 4<sup>th</sup> and 5<sup>th</sup> of November 2004:

**Recognise that:**

- a. Waste from any health care setting needs to be handled with utmost precaution
- b. Improper management of this waste leads to health hazards to the members of the community and the environment
- c. Feasible and cost-effective practices and systems have been demonstrated for both within and outside the institution for safe management of the waste generated.
- d. The existing policies and legislation have resulted in modifying behaviours and practices towards better management of health care waste
- e. There continues to exist a gap between existing and desirable optimum appropriate practices both within and outside the health care settings

**Reaffirm and adopt the principles of**

- a. Polluters pays
- b. Waste minimization and hazard reduction
- c. Segregation of waste
- d. Environmentally sound practices
- e. Utmost patient safety

**Commit and dedicate ourselves to**

- a. Instituting better waste management practices in all types of health care settings
- b. Provide critical feedback to ensure better performance of the individual systems and sub-systems
- c. Facilitate for networking for concerns and issues and for capacity building of the personnel both within and outside institutions generating bio-medical waste

**Undertake to**

- a. Adopt the model institutional policy for safe management of Health care waste
- b. Draft the model citizens charter for health care waste management
- c. Influence and advocate with policy makers, implementers and all those working with health care waste towards its safe management

We solemnly pledge to strive for better health of all people in a better world

(Draft Declaration being shared with all readers for comments and suggestions and adoption by the ISHWM general body)

**CONCERN****Responsibility for Safe Management of Health Care Waste**

Yellappa Reddy A N

*Editors Note: Mr A N Yellappa Reddy is a noted environmentalist in the country. He was formerly the Secretary to Government of Karnataka in the department of Environment, Ecology and Forests. Mr ANY Reddy is a founder member of Health Care Waste Management Cell, Dept of Community Medicine, M S Ramaiah Medical College, Bangalore, India.*

The discovery of antibiotics ushered in a new era. This era was characterized by the thought that there was a pill for every ill. By the 18<sup>th</sup> century the germ theory of disease had gained ground. Subsequent research in Microbiology revealed that these microorganisms had the ability to transform much ahead of any new technology, which could destroy them. The result was that microbes began to defy the "highly potent antibiotics". These resistant strains found a readily available route to spread faster - improperly managed waste streams in the health care institutions. The cost of treating such diseases is higher and is increasing day by day. Prevention is definitely cheaper than treating the disease. Unfortunately being the most neglected tenet in existing health care, this is resulting in a perfect niche for biological bombs in the human habitat. As health care professionals, if we fail or delay in stopping this process, we will face acute embarrassment.

In the history of medicine, much before the advent of antibiotics or the discovery of the microbe, our forefathers and predecessors aided the sick and the suffering with their unique systems of practice of care and cure. The essential principles of practice of the art of medicine in these yester years relied mainly on code of ethics: individual and community practices for leading a better life were enunciated. Manu dharma shastra and treatise of Charaka and Sushruta have listed these codes of practice. Basic hygiene and

sanitation was considered the key health intervention. This probably sustained human kind for centuries: the relevance of these principles in modern day stands unquestioned and remains unchanged. However, manipulation of the human environment for more comfort and luxury along with newer lifestyles is posing a much bigger challenge in health care today.

There is indisputable evidence to show that although we have fought and won many battles against the microbes, the war on germs continues. Are innovative inventions, discoveries and practices an eternal answer or the panacea for emerging challenges and issues? Many antibiotics of use, are becoming museum specimens at an unimaginable pace. These concerns and issues justify the demand to commit for health promotion and prevention, which are the only cost effective and cost beneficial interventions, amidst the dwindling resources the world over. In this very context, the impact of mismanagement of health care waste is to a large extent avoidable. The moot question is - should we pay a price for an outcome, which is preventable?

The issue of mismanagement of health care waste is no more in the professional and medical domain, it has become an agenda which is in the public domain. The professional community has to take the responsibility and make a commitment on both moral and ethical grounds. In essence we have to be socially accountable. It is time that all stakeholders wake up and act responsibly before being branded as bio-terrorists.

India is emerging as an important health



destination as part of free market economies. We cannot shy away from this emerging reality but must commit ourselves to quality, credibility, responsibility and accountability in delivery of health. The emerging health insurance industry in India is looking seriously at quality and credibility of the health care providers and their institutions. If we are not able to meet this essential requirement, we may loose out.

In addition, currently, protection and preservation of our environment is a key issue. The assaults and willful damage to the delicate ecological balance have thrown open irrefutable evidences of dangers not only to the human species, but to all living creatures in this world. Although technological innovations promise to limit and reverse the damage already caused, we are all too aware that available remediation systems are highly technology intensive, cost intensive and resource intensive and are beyond the reach of two thirds of humanity. This justifies our recommitment in the merit of protecting and preserving the delicate balance between the human and the environment. From an ecological perspective health is seen as a delicate balance between man his environment while disease is a disturbance of this delicate equilibrium.

The magnitude of the problem facing us in this arena is mind boggling and staggering. How are we prepared to face this challenge? The sero-prevalence of HIV among the high-risk groups - which is the only available/ reliable data in the country, has jumped from 7% (1993) to nearly 30% by the beginning of the present millennium and the increase is four fold in less than 10 years. By any parameter, this jump is alarming and is of an utmost concern. There are evidences in recorded history of medicine where infectious and parasitic diseases have wiped out human habitation, retarding human development process and growth. The threat of the emerging epidemic of HIV/AIDS and its devastating effect on human societies and national economies have already become evident: India is sitting on volcano of HIV/AIDS which is likely to erupt in the next 5-10 years. Although behavioural issues are chiefly responsible, the contribution of negligence of certain elementary and desirable practices of health care is contributing to this problem in its own way. There is no justification in saying that reduction of this part of the burden cannot be

achieved within the ambit of current available knowledge and technology.

The guidelines of universal precautions which were enunciated at the beginning of the HIV/AIDS epidemic is being observed more in breach than in practice in most health care settings. I am convinced that if health care providers take the necessary steps and precautions in the area of health care waste management with a view to protect their own health, the health of their colleagues and also persons visiting these facilities then they would have to a large extent fulfilled what is expected of them.

Waste management endeavors in health care settings undoubtedly also helps in team building; it improves interpersonal communication at different levels in the institution, be it a clinic, corporate hospital or even in a public health facility. Waste management effort acts as a conveyor belt on which other institutional initiatives can be on loaded. House keeping, Infection control initiatives and waste management endeavors are supplementary and complimentary. They are mutually inclusive and not exclusive. The outcomes also need to be seen through collateral benefits that the institution is bound to harness.

A facet of waste management which is yet to receive due attention is the problem of management of liquid waste. The least the health care institutions can do is to decontaminate the liquid waste before disposal, although, statutory obligation requires the establishment of effluent treatment technologies.

Health care waste is not only infectious but also potentially hazardous. An index waste in this regard is heavy metals like mercury. The impact of mercury has been recorded in the history of medicine and all of us are familiar with the disease of Minamata Bay. Man made disasters such as the thalidomide disaster, Chernobyl disaster, Bhopal gas tragedy can create health emergencies equal to and at times more devastating than the natural disasters like droughts, floods and famines. They destabilize national social fabric and their economies in the global village.

Perhaps the only one category of waste which has by and large received due attention is radioactive waste; probably because of separate

regulations under which it is governed. These are monitored by a competent agency such as Bhabha Atomic Research Centre, with the guidance of committed scientist under a competent authority.

India being a welfare state has a constitutional obligation to protect and promote the health of its citizens. And health as a fundamental right of

every citizen is enshrined in our constitution. It is the duty and the obligation of every concerned stakeholder specially so the health care providers and other related sectors to contribute to make the great vision a reality.

“JAI HIND”

**LETTERS TO THE EDITOR****“Effort: Effect and Impact”**

All Health Care providers irrespective of their designations have a fundamental duty in the management of biomedical waste. The infective nature of Biomedical waste and when mismanaged, its enormous effect on the environment as well as personnel working in these institutions is indeed grave. We need to make all efforts to render it non infective and thus minimize its spread. It is the bounden duty of all health care providers. In this context, the Health Care Waste Management Committee of MSRamaiah Group of Hospitals comprising of administrators, representatives of various departments, nursing superintendent and public relations officer started meeting and with the collective wisdom evolved various strategies for safe waste management.

The effort was spearheaded by the enthusiastic pioneers from the department of community medicine who undertook the inspections, gave suggestions and supervised the implementation. The onus was on training for segregation at source and safe handling. Towards this end, Standard Operating Protocols were evolved and training of personnel at grassroots was done on an intensive and extensive basis. Simplified charts in pictorial forms with colour codes for various kinds of waste were displayed at

all locations of generation of waste inculcating the attitude of self protection which ultimately meant safe practices and protection of environment was done with zeal. Ensuring attitudinal change and continuous monitoring with checklists to document the same became well established and accepted.

During the various deliberations, there was a revitalization and formation of a new Infection control committee very rightly headed by Dr. Indumathi, our Microbiologist. A further offshoot is the recognition of the need for a committee to monitor blood transfusions and safe disposal.

Developing a highly motivated workforce by training in safe practices, implementing the recommendations of Health Care Waste Management Cell and monitoring of practices with continued improvements would work to a “safer protected biohazard free environment”. Kudos to everyone involved for their commitment towards a sacred cause.

**Dr Saraswathi G Rao**  
Prof and Head of Pathology  
MS Ramaiah Medical College  
Bangalore, Karnataka, India

**DIALOGUE****Hospital waste management: the 'colour'ful issues?****Machado L**

Asst Prof

Department of Community Medicine, A J Institute of Medical Sciences, Mangalore

Health Care Waste Management has entered a new phase, the phase of awareness. Only a few years ago it was an unknown and uncharted area. Today it is a serious issue with various stakeholders and also entrepreneurs. Many lessons have been learned and many mistakes corrected. Procedures have been laid down and many have been updated. The time is now ripe for the consolidation of all the gains made so far. This article focuses on shedding light on some of the practical problems and questions faced in the implementation of HCWM. It does not provide all the answers but definitely raises a lot of questions. From the standpoint of a town like Mangalore with a large number of private nursing homes, where final disposal facilities are yet to materialize and where systems are in place in only a few health care institutions, it is a scenario that requires the introduction of simple and straightforward guidelines for implementation of HCW.

A J Hospital and Research Centre, the 400 bed multi-speciality hospital has a system of waste segregation and containment in place and also an effluent treatment plant for handling of liquid waste. Having realised the importance of safe management of health care waste, Infection control committee and it's attendant teams are functioning well. Dedicated waste handlers have been allocated. Regular training programmes on HCWM are being conducted. A J Hospital has adopted the Colour coded system at all levels for HCW as per the Bio-medical waste management rules. The following paragraphs highlights some issues, more as a dialogue from experience from implementing a system and also from interaction with colleagues and friends.

The important area of segregation is not as easy to implement as it appears or is as made out to be. Periodic surveillance and regular questioning on segregation by senior staff during

their daily or weekly rounds of the hospital has had the effect of keeping the staff aware of the importance of HCWM.

A closer scrutiny reveals many areas of confusion. Some of them are listed below:

**Red:** Disinfected container/plastic bag Cat. 3, Cat. 6, Cat.7.

Questions arises as to:

1. Where should the disfiguring be done?
2. Who is responsible and what instrument is to be used?
3. Are there guidelines as to how to perform this procedure safely?
4. In the case of specialty equipment such as cardiac filters how should an institution go about disposal?

**Yellow :**Plastic bag (non chlorinated) Cat. 1, Cat. 2, and Cat. 3, Cat. 6

It may be noted that cat 3 & 6 appear also in the red category. When one talks of using ties what type and how must they be tied? The usual practice has been to tie up the bag opening itself into a knot before transporting. The danger is that if done when more than ¾ full there is definitely a risk of spillage.

**Blue/White:** Translucent Plastic bag/puncture proof Container

**Cat. 4, Cat. 7** Is it that there is an overlapping of category 7. A commonly encountered problem is whether the container is blue or white? This confuses the first time implementer and what must be remembered is that the colour is blue and the container must be puncture proof. In most hospitals this category is

contained in jerry cans which happen mostly to be white.

### Destroyer Vs Hand over

While most large hospitals have acquired needle destroyers many of the nursing homes do not have them or even if they do, they have reached a point of un-serviceability. This brings to the fore whether a needle destroyer is worth its investment? The suggested methodology for handling of syringes does not require the use of a needle destroyer. It however, raises the issue of Syringe disfigurement –

1. Where should it be done?
2. Should one crush it or cut it?
3. If one is crushing it where and what danger do splinters hold?

**Black:** Plastic bag Cat. 5 and Cat. 9 and Cat. 10. but is mistakenly used for General Waste

### Pharmacy waste

Expired drugs disposal: there are no guideline as to how exactly this is to be done. Must the drugs be removed from their blisters before disposal? What personal protection is required for this procedure?

### CARDBOARD BOX

The cardboard box has many uses and one of them is in containing all the disfigured syringes. A problem here is that in the event a syringe is not properly disinfected and lands in this box it is near impossible to spot. A key question is should this box have a lining?

Method of final disposal need to be suggested. The recent advances in use of plastics in road laying could be a possible panacea for this problem, however more research and definite findings need to be made in this area.

**GREEN:** Food waste and wet waste

While the BMW rules refer only to general waste, it must be remembered that even general waste from a hospital comes under the umbrella of Hospital Waste. In a perfect segregation system there would be no chance of mixing of BMW with

this category. This is a utopian thought and the reality is totally different.

A question arises is what about the General waste that is produced and what colour should it be given.

Many may say that it should obviously be green, but a common error is the use of black for general waste.

**WHITE:** non infected dry waste

Though the systems for recycling in India are far from being in place, however, it would do no harm to be clairvoyant. It is essential for health care institutions to incorporate an ideology of concern for the environment and prepare for the future. It in addition is a good marketing tool.

For some of the questions that have been raised the reader will be tempted to say " the answer is obvious or simple". The reality of these situations are different, while some have had experience and awareness in the area of Health Care Waste, others look for guidance to establish systems. Health Care institutions have a desire to establish systems but are held back possibly due to :

1. The thought that the law, however written, would not be enforced to the extent written.
2. A notion that costs of such a system and training time are too great.
3. After all it's only waste.
4. Lack of information.
5. Confusion (cf: overlapping of some categories in the BMW rules).
6. Final disposal facilities not being available:

**The immediate need is to make the whole implementation programme startup to be more user friendly.** This guide should be instrumental in converting many who are hesitant. The benefits of a efficient and effective waste management system are many and these need to be highlighted including the reduction of nosocomial infections and the interdepartmental coordination as experienced in M S Ramaiah Hospital and Command Hospital, Bangalore.

**Acknowledgements are due to:**

- The management of A J Hospital and A J Institute of Medical Science who have been proactive in supporting and ensuring progress in safe management of Hospital Waste.
- the unstinting support of Dr Manohar Rao, Associate Dean, AJIMS.
- Experiences in the Health Care Waste Management Cell and the ever-present Oracles - Dr C Shivram, Dr D Gopinath, Dr S Pruthvish and Dr N Girish.

**REPORT****Report on the First Biannual Conference of Indian Society of Hospital Waste Management was held on 4th and 5th November 2004 in Bangalore.**

This was jointly organized by Health Care Waste Management Cell, Dept. of Community Medicine, M S Ramaiah Medical College and Command Hospital (Air Force), Bangalore.

**PRE-CONFERENCE WORKSHOP  
ON DAY 1**

It was inaugurated by Sri AN Yellappa Reddy, Former Secretary to Government of Karnataka, Department of Environment, Ecology and Forests, with Dr. A C Ashok, Registrar, and Academics – MS Ramaiah Medical College being the presiding Officer. Surgeon Rear Admiral P Sivadas, Addl. DGFMS and Vice President, ISHWM enlightened the participants with Objectives, mission, vision and goals of ISHWM. Dr H Sudarshan, Director-Vigilance and formerly Chairman, Task Force on Health on health and family welfare, Government of Karnataka participated. Dr. A K Agarwal, Director, School of Health Sciences, Indira Gandhi National Open University, New Delhi delivering the Key note address highlighted the need for capacity building for health care waste management and also provided details of planned Certificate course in Health Care Waste Management being undertaken in collaboration with Regional office for the South east Asia of WHO. The "Information and Learning Units" for Safe management of health care waste developed by Health Care Waste Management Cell with the support of Government of Karnataka was handed over to Surg RAdm P Sivadas, for use and further field testing across the country. In all 225 Doctors, Nurses, Administrators and other health personnel from District Hospitals under Karnataka Health Systems Development Project, Private Health Care Settings, NGOs, participated in the programme. Participants from other states included Enviro Vigil from Mumbai, IGNOU from Delhi, Uttar Pradesh Health Systems Development Project, BD syringes, Mumbai.

**PRE-LUNCH SESSIONS:**

Wg Cdr Ahutosh Sharma, CHAF, Bangalore

made a presentation on Trainer's guide and Dr Pruthvish, Associate Professor of Community Medicine, MSRMC made a presentation on the Waste handler's manual developed by Health Care Waste Management Cell, and Command hospital (currently under review by IGNOU and WHO). Dr N Girish and Dr Raju, Deputy Director, KHSDP provided tips and guidelines for field-testing the Waste handler's Manual.

The panel discussion on Immunization waste, radioactive waste, Liquid waste was chaired by Surgeon Rear Admiral P Sivadas and co-chaired by Dr. Madhusudan, Scientist from Central Pollution Control Board. The panelists included Dr. N Girish, Assistant Professor of Epidemiology, NIMHANS, Dr A K Sabhapathy from Krishna Hospital, Cochin, Dr. MAR Iyengar, Scientist (Rtd) from BARC, Mumbai.

**POST-LUNCH SESSIONS:**

The participants after briefing visited M S Ramaiah Hospitals and Command Hospital (Air Force) Bangalore in smaller groups. After studying the systems in place by observation and after interaction with the concerned personnel, they undertook SWOT analysis of waste management system. Senior faculty of Nurses and Doctors from Waste Management Committees of the respective hospitals were the key facilitators for this activity. Dr M Dayananda, Associate Prof, Dept of Community Medicine and Dr Riyaz Basha, Lecturer, Community Medicine, BMC coordinated visits to Command hospital, Plastic asphalt road and M S Ramaiah group of hospitals respectively. The participants interacted with resource persons from waste management committee of MSR group of hospitals namely Dr Saraswathi Rao, Dr Indumathi, Dr Harshad Shah, Brigadier Shantha (NS), Mrs Mary kutty (Deputy NS) and team.

Dr M Dayananda and Dr Riyaz Basha facilitated a meeting of CTF operators on 4/11/04.

Dr Shekhar from Shimoga presented his experiences as well as outcome of this meeting in the panel on day 2. An attempt was made by Dr Riyaz Basha prior to the conference to contact state pollution control board and all CTF operators of Karnataka State. Excepting CTFs of Belgaum and Hubli-Dharwad rest of the CTFs participated in the event.

## DAY II

Due to space constraints all participants were not able to visit the CTF. Hence, Dr Riyaz Basha and Dr Hemanth T facilitated visit to Ramky Mediincin Ltd on 5/11/04. Day 2 started with presentation and discussion of field visits made previous day. Wing Commander Franklin from St. John's Medical College and Hospital, chaired this interactive and resourceful session. Wing Commander Ashutosh Sharma was the co-chair person.

Dr K N Sharma, Executive Director, (Health Sciences), Gokula Education Foundation inaugurated the deliberations of the first biannual conference of the Indian Society of Hospital waste management at Urban Health Training and Research Centre, Vyalikaval, Bangalore. The **Protocol for waste management in Primary Health Centres**, developed by Health Care Waste Management Cell, was released for field-testing by AVM Dr Ranjith Kumar, PMO, HQ Training Command, (AF) Bangalore. Dr K N Sharma also released **Abstract Booklet** containing the abstract of the papers that was presented at the conference. Welcoming the gathering, Dr S Kumar, Principal, MSRMC and Dean, MSRMTM recalled the seminal contribution of Dr C Shivaram, former Principal of M S Ramaiah Medical College for conceptualizing the need and also providing a framework for systematic effort towards safe management of health care waste not only in the parent Institution but also the State and the country at large.

Dr D Gopinath, Professor of Community Medicine and Chairperson of the Organizing Committee of the Conference explained the activities of Health Care Waste Management Cell and Indian Society of Hospital Waste Management. In his Presidential remarks Surgeon

Rear Admiral P Sivadas lauded the organizers for organizing the deliberations and called for organization of the Regional Chapter of Indian Society of Hospital Waste Management at Bangalore. Mr. AN Yellappa Reddy, Former Secretary, Environment, Ecology and Forests delivered the keynote address. **He cautioned that the agenda of health care waste management has gone beyond the health system and if proper, appropriate and urgent action is not taken, doctors, nurses and all other health care personnel will be named as bioterrorists.** There is an urgent need for an enhanced responsible attitude and behavior and sustained action across the state and the country.

Need for better management of mercury in Health Care Settings was presented by Dr Leonard Machado, Assistant Professor of Community Medicine of A J Shetty Medical College, Mangalore. This was followed by the presentation on the Malleshwarm health care waste management pilot project (1998 – 2001). Dr Girish, Dr Gopinath and Dr Pruthvish made presentations with Mr. A N Yellappa Reddy, chairing the session. **The Pilot project which was supported by the Urban waste Expertise Programme of Netherlands had evolved practical systems for – segregation at source, containment and transportation in a staggered collection mode. Building alliances for common treatment facilities, the project activities was able to usher an attitudinal change and found it to be a critical requirements for any health care waste management system.** In this context, the efforts needed in District Hospitals and Primary Health Centers across the state was discussed.

The panel discussion that followed the presentation focused on the **need to establish common treatment facilities and the requirement to strengthen standards of existing facilities.** Panelists included Dr B J Mahendra, Associate Professor of Community Medicine, KIMS, Bangalore, Dr Madhusudan, Scientist from CPCB, Dr K B Shekhar representing Cooperative Common treatment facilities in Shimoga and Mr Nagaraj, Representing Ramky Mediincin Pvt Ltd, Bangalore. Prof. M K Ramesh from National Law School of India chaired the session which was moderated by Dr N Girish.



An exclusive session for free papers was held. 13 papers from Medical colleges, NGOs, CTFs were presented. The deliberation was chaired jointly by Air Commodore M K Mishra and Dr K Jayanth Kumar, Professor and Head of Community Medicine, MSRMC. Dr M Dayananda, Dr V Narendranath, Dy. Medical Director, MSRMH, Dr M Jayachandra Rao, formerly Chief Health Officer Bangalore Mahanagara Palike and Wing Commander Ashuthosh Sharma coordinated this session.

The programme concluded with valedictory address by Surgeon Rear Admiral P Sivadas giving a call for need to establishing Regional Chapter of ISHWM in Karnataka. Dr Raju, Deputy Director, KHSDP, who spoke on the occasion assured action in all District Hospitals and Primary Health Centres of the State and expressed that there is lot of scope and potential to place the agenda of health care waste management in forthcoming HNP project and assured that the same will be taken up. Draft Bangalore Declaration on Health Care Waste Management was circulated among all participants inviting their comments and suggestions. The same will be taken up for declaration in Annual Conference during April 2005. Dr Lalitha, Lecturer in Community medicine, MSRMC helped the participants to work towards finding solutions for grey areas like – management of mercury, effluent management, management of radioactive waste, etc.

#### Proposed follow-up action:

- Sharing the Report and Proceedings with participants, Rajiv Gandhi University of Health Sciences, Government of Karnataka
- Dept of Environment and Dept. of Health and Family Welfare, WHO and UNICEF.
- Working closely with KHSDP and Government of Karnataka – Health and Environment Departments to field test Waste handler's manual in all 27 District Hospitals and PHC protocol in select PHCs.

- Work closely with RGUHS and Health Varsities of the country to strengthen Health Science Curricula with respect to Health Care Waste Management.
- Work towards forming a Regional Chapter of ISHWM.
- Collaborate with IGNOU for initiating certificate course in Health Care waste Management for 13 Countries of South East Asia Region in Collaboration with WHO-SEARO.

#### The organizing committee acknowledge with gratitude the support of the following:

- a. President and Executive committee of the Indian Society of Hospital Waste Management, New Delhi
- b. Vice Chancellor, Registrar (Academic) and Registrar (Evaluation), Rajiv Gandhi University of Health Sciences, Bangalore
- c. Gokula Education Foundation, Bangalore and its health educational institutions – Medical College, Hospitals and Nursing College.
- d. School of Health Sciences, Indira Gandhi National Open University, New Delhi
- e. Dept. of Health and Family Welfare, Government of Karnataka, Bangalore
- f. Dept. of Environment, Ecology and Forest, Government of Karnataka, Bangalore
- g. Anand Institute of Laboratory Medicine, Bangalore
- h. Mallige Medical Centre, Bangalore
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- k. AS Kamath Group of Hotels, Bangalore
- l. Insulin BD group, Mumbai

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## INDIAN SOCIETY OF HOSPITAL WASTE MANAGEMENT

(Founded – 2000, registration under the Societies Registration Act XXI of 1860, Reg No. 36939 of 2000)  
 Rome No. 126, AIR Hqs. West Block-VI, RK Puram, New Delhi – 110 066.

The Government of India published a Gazette notification on 20 July 1998 making all persons who generate, collect, receive, store, transport, treat, dispose or handle medical waste in any form responsible for handling the medical waste without and adverse effect to human health and the environment. Consequent to the publication of above Gazette Notification on Bio-Medical Waste Management. It is mandatory for all hospitals and health institutions to implement the rules.

Since Hospital Waste Management is a perpetual problem, it was felt that there should be an all India Organization/Society comprising of experts/specialists from various disciplines involved in Hospital Waste Management. This Society should provide conceptual guidance and oversee scientific research for further development.

With this important aspect in mind. The Registrar of Society at Delhi was approached for registration of the 'Indian Society of Hospital Waste Management (ISHWM)' and the Society came into existence on 10<sup>th</sup> April 2000 and registered under Societies registration Act XXI of 1860 with Registration Number 36939.

The aims and objectives of the Society are as follows :

- (a) To promote and advance the knowledge in Environmental Protection with special reference to Hospital Waste Management/ It also envisages promotion and improvement in public health, Protection to the environment, hospital and individual through the practice and education in the subjects dealing with the said subject.
  - (b) The subject of Environmental Protection and Hospital Waste Management involves multidisciplinary approach and involves active participation by specialists of various disciplines such as pathology, Microbiology, Hospital Administration, Preventive & Social Medicine. Therefore, it will function to bring together specialists from various disciplines under a roof with a common goal a personal and environmental protection.
  - (c) To propagate education and inculcate awareness in hospital as well as general population.
  - (d) To advance research in various fields connected with Environmental Protection and Hospital Waste Management.
  - (e) To function as an interface with Industries involved in designation/manufacture of bio-medical waste disposal equipment/appliances for R&D development India.
- To fulfill the and further the above objectives, the Society shall
- (a) Hold periodically meetings, seminars workshops, training courses and annual conference of the members of the Society.
  - (b) Conduct workshops, training courses etc. separately for the benefit of the beneficiaries such as general public, hospital waste handlers, patient & their relatives.
  - (c) Publish and circulate an journal on Hospital Waste Management and Environmental protection.
  - (d) Maintain a Library at the location of the permanent office as an when established.
  - (e) Generate funds from all possible sources. The funds so generated will be utilized for advance in the knowledge of disposal of waste and environmental protection. Scholarships and Awards for outstanding contributions will be judged on merit by a special board of officers nominated from time to time.
  - (f) Propose to the Government the laws and regulations in respect of disposal of waste from the hospitals and environmental protection.
  - (g) Create and assist State-wise branches to propagate the objectives all over the country in a methodical and systematic manner.

### EMBLEM & LOGO

The Emblem of the Society has been aptly designed to convey the message of environmental

protection by confining hazardous hospital waste. The Concept of the Emblem is :-

Hospital Waste Management uses four colours – namely – Green, Black, Yellow and Red (coding colours) used for bags to collect and dispose off hospital waste.

Hands : The two figures over the top and bottom denote the hands in light brown outlined with black to denote the hands, which stand for the control and management of waste.

Syringe : The syringe has been used as a symbol to represent hospital waste due to its extensive use in clinical practice.

Biohazard : Hospital waste is a serious

biohazard; hence the universally accepted logo for biohazard appears in the backdrop.

Tree & the Blue background : denote the eco friendliness, which is very important while disposing of hazardous waste.

Summary : the Logo depicts the hospital waste (syringe), which is a biohazard to the community being efficiently managed (by hands) in an environmental friendly (tree and blue background) manner.

ISHWM : Indian Society of Hospital Waste Management.

Please visit our website : [medwasteind.or](http://medwasteind.or) for details including memberships forms

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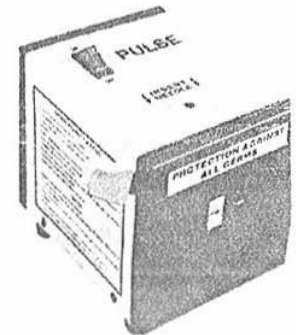
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