BIO-MEDICAL WASTE MANAGEMENT BULLETIN

A Success Story

King George's Medical University, Lucknow.

Volume 1 October 2012

BACKGROUND

"The quality of a man's life is in direct proportion to his commitment to excellence, regardless of his chosen field of endeavor" **-Vince Lombardi Jr**

King George's Medical University (KGMU) has been a frontrunner among medical education institutions in the country since its inception in 1911 and is committed to dissemination and advancement of knowledge in the field of biomedical sciences. Being a centre of excellence in tertiary level health care in the state, KGMU is also committed to improving public environmental health. With this goal, KGMU initiated activities to manage the waste generated within its premises and hence constituted a Bio-Medical Waste Management (BMWM) Committee in the year 2009. In the year 2010, KGMU was chosen as a **Model Health Care Facility** for implementation of UP sub-component of the Indian component of the project titled *"Demonstrating and Promoting best Techniques and Practices for Reducing Health Care Waste to Avoid Environmental Release of Dioxins and Mercury"*. The objective of this project was to develop systems and provide policy framework for waste management in the University. The task of implementation of the activities under the project was assigned to the BMWM Committee chaired by CMS Dr. S.N. Shankhwar. Dr. Kirti Srivastava was appointed the Member Secretary of the Committee. The Project Steering Committee (PSC) was constituted with the Registrar, CMS, Medical Superintendent Prof N. S. Verma, Member Secretary, Dr. Archana Kumar, Dr. Anupam Wakhlu and Dr. Reema Kumari as its members. To coordinate BMWM activities in the various departments of the University, Nodal Officers were nominated from all the departments. The BMWM Committee along with the Nodal Officers have been working tirelessly to improve the waste management scenario, in order to make **the endeavor a huge success.**

The BMWM Organization at KGMU

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INTRODUCTION

Improper management of biomedical waste from hospitals, clinics, and other healthcare facilities poses occupational and public health risks to patients, health workers, waste handlers, haulers as well as the community at large.

Mandate:

The Govt. of India felt the need to regulate bio-medical waste generated in healthcare facilities throughout India and hence notified the Bio-Medical Waste (Management and Handling) Rules on 20th July, 1998. Subsequently amendments were introduced in the year 2000 and 2003.

Hazards due to mismanagement of bio-medical waste:

The health sector's mandate is to prevent and cure disease. Yet the delivery of healthcare services often inadvertently contributes to creation rather than alleviation of disease. Hospitals generate significant negative environmental health impacts through the natural resources and products they consume as well as through the waste they generate. Hospitals also pose serious occupation-related risks to the staff and to the patients. Risk of infection by direct contact with sick people, needle and medical equipment punctures thus transmitting blood-borne diseases and the ingress of outdoor pollutants make management of hospital environment a necessity.

PROJECT INITIATION

In 2006, a project on injection safety was initiated at KGMU with the support of International Clinical Epidemiology Network (INCLEN). Training on safe injection practices and knowledge regarding importance of bio-medical waste management was imparted to those giving injections. This project led to initiatives for bio-medical waste management at KGMU and thereby receiving support for such initiatives in the form of UNDP-GEF-MoEF* project on healthcare waste management. The project aimed to develop KGMU as a model of good BMWM and mercury management among various healthcare facilities, which would serve as a role model for learning and dissemination of knowledge with regards BMWM practices for other facilities in UP and the surrounding regions.

The process of implementation of the UNDP-GEF-MoEF project on healthcare waste management (HCWM) has involved:

1) Baseline assessment
2) Identification and appointment of Nodal Officers
3) Orientation and Training Programmes
4) Academics and Research activities
5) Development of Infrastructure and Procedure
6) Monitoring and Evaluation

1. BASELINE ASSESSMENT

A baseline assessment was carried out in KGMU in May 2010 to collect information on the status of the existing waste management and infection control practices and for identifying good practices and techniques along with the potential problems that would be addressed during project implementation. The results of the baseline assessment also helped to define goals and milestones of the project in order to gauge progress and evaluate the performance of the model facility component of the project. The salient findings of the baseline assessment have been: Waste segregation in the hospital was primitive and no segregation was being practiced. Overall, inappropriate waste segregation was attributed to non-availability of infrastructure. KGMU had outsourced its waste collection, treatment and disposal to a private common treatment facility whos's services were terminated later on as the institute was not satisfied with their services. Inadequate training and awareness among the staff and apathy of staff towards waste management. Staff/ nodal officer were committed but due to lack of adequate funds, the status of BMWM practices were not up to the mark.

2. IDENTIFICATION OF NODAL OFFICERS

As a first step towards successful implementation of project activities, nodal officers have been designated in each department of KGMU. These nodal officers coordinated the activities during the baseline assessment in the hospital and assisted the UNDP team. Monitoring and evaluation is another primary responsibility of Nodal Officers.

* United Nation Development Fund--Global Environment Facility-- Ministry of Environment & Forest

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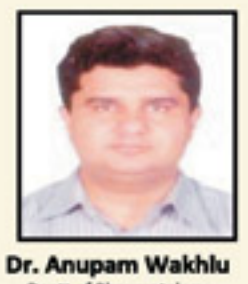

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3. ORIENTATION & TRAINING PROGRAMMES

a) Training of Trainers (ToT):

Training programmes have been conducted for the identified nodal officers for transforming them as Master Trainers on BMWM of KGMU. These master trainers took extensive sessions of departmental trainings and within the short span of 18 months of project implementation, **2212** healthcare professionals and personnels have been trained in the University. The process of training is ongoing.

We are now trying to explore opportunities to engage the expertise of these Master Trainers for the training of personnel from other healthcare institutions.

b) Training Programme on Mercury phase out:

Training programmes have been organized for the staff on hazards of mercury, mercury spill management and for promoting use of mercury- free devices.

During Inauguration of CHCWM
Dean & Head Prof. J.V. Singh, IGNOU-Regional Director
Dr. Amit Chaturwedi, Dr. Reema Kumari

4. ACADEMICS & RESEARCH ACTIVITIES

a) Certificate Course in Health Care Waste Management (CHCWM):

The project has the provision for enrolling interested candidates for the six months CHCWM programme conducted by IGNOU*. An IGNOU study centre for the CHCWM course has been established in the university and the course has been successfully running since December 2010 and three batches have successfully completed the course. The designated KGMU officials for the program are:
study centre code 27187

Program Incharge: Dr. Reema Kumari, Associate Professor,
Dept of Community Medicine & Public Health.

Academic Counselors:	Dr. Kirti Srivastava	Department of Radiotherapy
	Dr. B.P. Singh	Department of Prosthodontics
	Dr. R. K. Deewan	Department of Anatomy
	Dr. R. K. Kalyan	Department of Microbiology

* Indira Gandhi National Open University

Prof J.V. Singh, Dr. Amit Chaturwedi, Prof. Narsing Verma

Participants during session

Field Visit at Synergy Waste Management system, Barabanki during IGNOU, CHCWM course.

b) **PhD Enrollment:** Ms. Ashita Singh has been enrolled for a doctoral thesis on BMWM under the guidance of Prof. Ashish Wakhlu. Dr. Kirti Srivastava, Member Secretary, BMWM Cell has been instrumental in providing onsite guidance required for the doctoral research.

c) **Pubications:**

- **Hospital Waste Management:** Reema Kumari, Kirti Srivastava, Anupam Wakhlu. Journal of Physiology,vol.XI, 2012.
- **Current Biomedical waste management practice and cross infection control procedures by dentist in India:** B.P. Singh, S.A. Khan, N. Agarwal, International Dental Journal 2012 62 (3) 111-116
- **Assessment of the knowledge, attitude and Practices regarding Biomedical Waste Management amongst the Medical and Paramedical Staff in Tertiary Health Care Centre:** Rekha Sachan, ML Patel ,Anuradha Nischal Int. J Scientific & Res Publication 2012.
- **Establishing Healthcare Waste Management in Medical University of India- A Successful Approach:** Reema Kumari, Kirti Srivastava, Anupam Wakhlu, Anshita Singh. Clinical Epidemiology & Global Health (submitted)
- **From policy table to bin-side: An urgent need to address Bio-Medical waste management in India:** Kirti Srivastava, Anupam Wakhlu, Reema Kumari, Anshita Singh. International Journal of Waste Management.(submitted)
- **Impact of Training session on Health Care Waste Management among Doctors & Nurses-An Analysis,** Reema Kumari, Kirti Srivastava, Anshita Singh. Indian Journal of Occupational & Environmental medicine (submitted)

d) **Workshops Organized During the Programme:**

- **TOTs:** Orientation Programme for Academic Counselors of Certificate in Health Care Waste Management (CHCWM) by Dr. A.K. Agarwal, Professor, School of Health Sciences, IGNOU and Dr. Megha Rathi, National Technical Adviser, UNDP-GEF Project.
- **Mercury:** Workshop on **"Mercury Phase Out In Health Care Sector"** was organized at Convention Center, CSMMU U.P. Lucknow by Toxics Link & IGNOU. Dr. Peter Orris,Dr. M. Subba Rao, Dr. A.K. Agarwal were the key expert in the workshop.
- **Refresher course:** A refresher course for all the nodal officers, participants of TOT program and those who have completed IGNOU course (CHCWM) by Dr. A.K. Agarwal, Professor, School of Health Sciences, IGNOU and Dr. Megha Rathi

5. DEVELOPMENT OF INFRASTRUCTURE AND PROCEDURE

A BMWM Cell has been established at KGMU which is the point of coordination of various activities being undertaken for improving the waste management situation in the Institute. The BMWM Cell is furnished with all the necessary facilities such as computer, internet, printer, scanner etc. The BMWM Cell also manages the records pertaining to various waste management procedures and policies adopted in the hospital. Specialized infrastructure has also been developed under the project which is detailed as:

a) **Infrastructure for waste segregation:** Colour-coded bins and posters guiding the colour coding schemes have been provided at all points of waste generation.

Bins

Placement of bins & Posters in each department

Nodal Officers along with the Waste Management team identified the location and placement of bins &posters in each department.

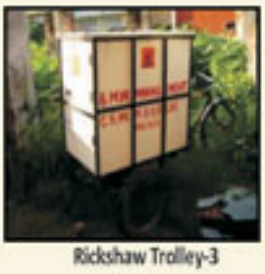
b) **Waste collection and transportation:** Nursing trolleys and ward collection trolleys have been specially designed and fabricated for collection and transportation of waste within the wards. For transportation of waste from departments and till the Central Collection and Treatment Site (CCTS), Rickshaw Trolleys were procured.

Procedure Trolley

Nursing Trolley

Ward Collection Trolley-1

Ward Collection Trolley-2


Rickshaw Trolley-3

Seven routes have been identified for collection and transportation of waste from all the departments of KGMU. The timings and frequency of waste collection from the wards have been adopted in consultation with the respective nursing staff so as to assure minimum intervention while the ward staffs are performing their duties.

Step -1: Weighing of bags

Step -2: Bags in Collection Trolley

Step -3: Recording by Supervisor

Step -4: Weight recording by staff

Step -5: Record verified by sister

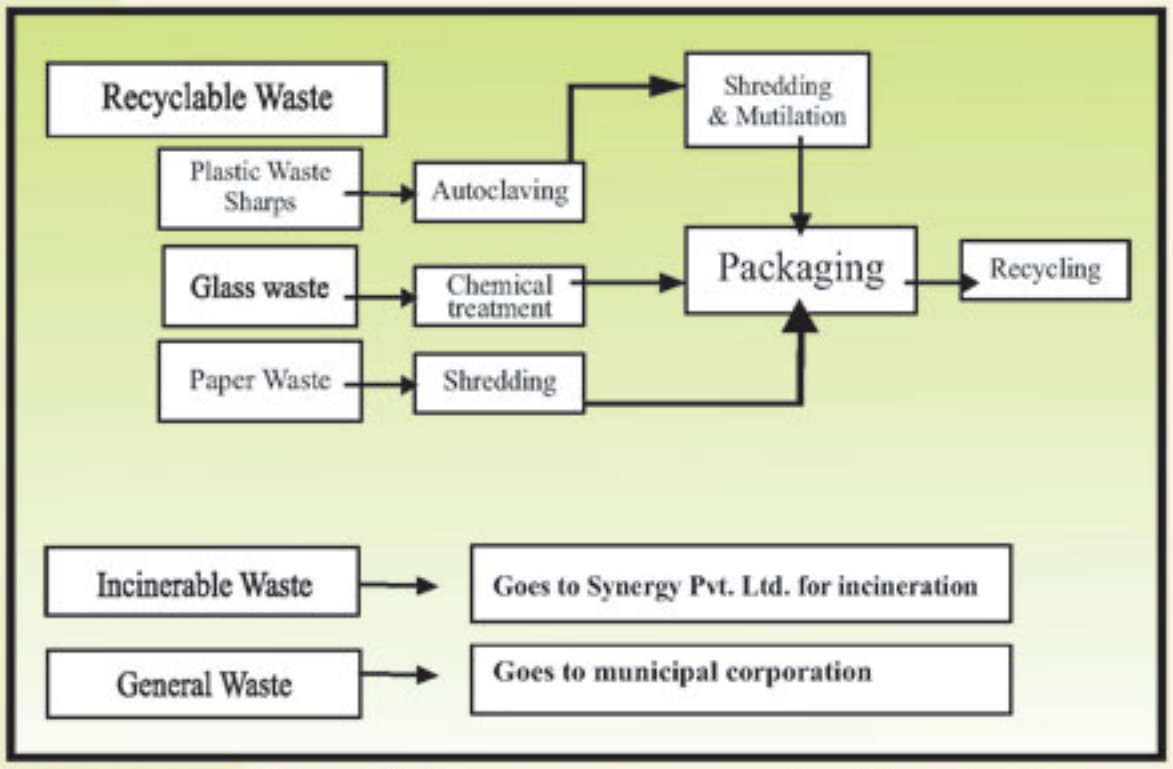
Step -6: From ward trolley to rickshaw trolley

c) **WasteTracking and online waste recording system :**
For the purpose of waste tracking and to avoid pilferage, *waste tracking system* was setup. Under this system. booklets were provided to all the departments of the University. This has to be verified and countersigned by the nodal officer of the respective department and report sent every month to the BMWM cell. Currently, site-specific labeling is being carried out for the bags. A bar-coded tracking system for waste management is under development.

d) **Waste handling, treatment and terminal disposal:** A Central Collection and Treatment Site (CCTS) has been established behind the Department of Pulmonary Medicine for interim storage and terminal disposal of bio-medical waste.

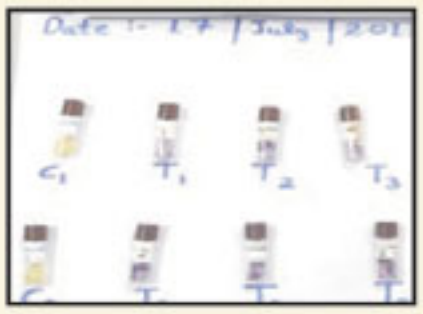
Facilities at CCTS:

- **Infected Waste :** The infected plastic is autoclaved and subsequently segregated into different categories and then shredded. The shredded waste is sent for recycling. The autoclaves installed at the CCTS are standardized once in a week as per CDC-2004 guidelines with biological indicators



Autoclave

Plastic Shredders



Biological Testing of Autoclave by International Expert

Treatment & Disposal process of infectious plastic waste

- **Glass Waste :** Glass collected separately from the wards is subjected to chemical treatment with 10% hypochlorite solution and the disinfected bottles are sold to recyclers.

Treatment of Glass Bottle

- **Paper Waste:** Paper waste is also collected separately and then shredded and packed at CCTS & finally sold for recycling.

- **E-Waste:** Provision for collection of E-Waste like all electronic items such as mobiles, damaged computer parts etc. has been made at CCTS. Electric waste generated is disposed off appropriately.

- **Incinerable Waste:** All highly infectious incinerable waste is weighed at CCTS and is then sent to Synergy Waste Management, the identified Centralized Biomedical Waste Treatment Facility (CBWTF).

Paper Shredder

Transportation of Incinerable waste to Synergy

e) **Occupational Health and Safety:**
Providing personal safety to those working for the waste management system is also identified as a primary responsibility of the institution. Personal protective gears are provided to the waste collection team to ensure their safety. The vaccination of the staff involved is also undertaken from time to time.

f) **Needle-Stick Injury Reporting:**

In the healthcare service setup, the most common occupational hazard is needle stick injury which possess threat of transmission of diseases like Hepatitis B and C, HIV etc. The magnitude of the problem is unappreciated due to under reporting, so that effective steps to minimize needle stick injuries are not initiated by healthcare facilities in earnest. Since the establishment of BMWM Cell, we have started keeping a record of all the needle stick injuries occurring in the hospital. Streamlining of the prophylaxis procedures for Hepatitis B and HIV are being initiated. Needle stick injuries may be reported directly to the respective nodal officers or to the CCTS.

g) **Phasing out of Mercury:**

One of the goals of the project is to demonstrate and promote proper management of mercury and the use of non-mercury alternatives. With this objective, a survey by using the **Jerome device**, an indoor air analyzer was done to assess level of mercury in ambient air inside the KGMU. The survey readings showed that level of mercury was varying in the hospital depending on the ventilation and proper air circulation in the rooms and the amount of mercury being used there.

An inventory of mercury equipments like thermometers and sphygmomanometers being used at KGMU has been formed and a strategy has been devised to phase out these mercury based equipments with non-mercury ones. Mercury-free equipments are being procured and will gradually replace the conventional ones.

Mercury BP apparatus & Thermometer

Non-Mercury BP apparatus & Thermometer

h) Infection Control:

Information has been collected on the status of infection control practices in KGMU. On the basis of the findings, the Infection Control Committee, which was constituted in April 2010, was reactivated, and Dr. Prashant Gupta, Assistant Professor, Dept. of Microbiology has been nominated as Member Secretary Infection Control Committee (ICC). The committee sought suggestions and recommendations on improving the occupational safety and infection control practices in the University. The committee is also in the process of formulating infection control and antibiotic policy.

i) Development of policies, procedures and IEC Material:

To standardize the healthcare waste management system at KGMU, a rigorous documentation is being undertaken. Standard Operating Procedures (SOPs) for various healthcare waste management practices being adopted at KGMU are being drafted. Operations Manual for CCTS and Infection Control Policy are also being drafted. Health Care Waste Management Policy and Guidelines have been adopted and circulated throughout KGMU. Various IEC (Information, Education and Communication material) materials like attendant Card, hoardings and pamphlets have been developed and distributed. Bedside stickers have been designed to emphasize the use of black bins only by the patient and their attendants. Pamphlets have been designed for patient/attendants to create awareness about BMWM practices in the university.

Hoarding

Bed side sticker

Pamphlet

j) Rewards and Accolades:

"Motivation is the art of getting people to do what you want them to do, because they want to do it.". The thought behind this inspirational quote has motivated us to devise strategies to inspire people and reward those who are motivating others. We have incentivised the entire process of waste segregation and collection and reward all those who are doing an exemplary job in the University. Additionally, the departments where waste segregation has improved considerably have been offered exclusive complimentary ward cleaning by the partner agency who is collecting waste from the various workstations.

Awards

Trauma Center Casualty

Medicine Ward- 5

Medicine Ward- 2

Medicine Ward- 6

Ward cleaning done by collection agency

6. MONITORING & EVALUATION

Supervisory and monitoring rounds are being taken very enthusiastically by the Nodal officers along with BMWM team regularly during monitoring rounds. Assessment was done as per a standardized format for evaluation.

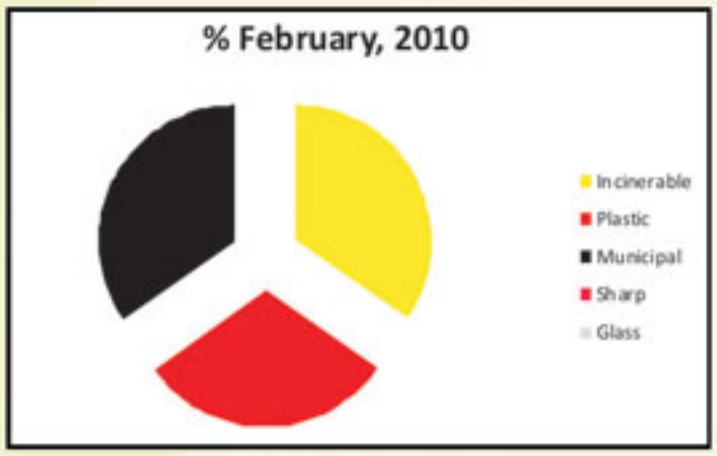
Monitoring Round at CTVS

Before and After: A Success Story

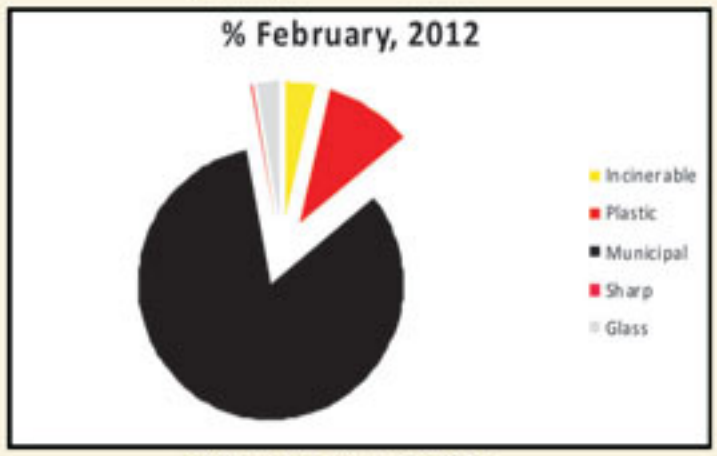
The success achieved in the last 18 months of project implementation are exemplified by the following:

1) **Decrease quantum of infected waste generated :**

Category wise waste generated KGMU UP, Lucknow
(Comparison between February 2010 and February 2012)



Yellow Waste: 24,075 kg
Red Waste : 22,676 kg
Black Waste : 23,736 kg



Yellow Waste : 2510 kg
Red Waste : 7454 kg
Sharp Waste : 1734 kg
Glass Waste : 1964 kg
Black Waste : 58,314 kg

2) Better segregation:

Before

After

4. International acclaim:

United Nations Development Programme
GEF Global Healthcare Waste Project

gef

7 September 2012

The Global Project Team of the United Nations Development Programme-supported Global Healthcare Waste Project, funded by the Global Environmental Facility in cooperation with the World Health Organization and Health Care Without Harm, recognizes Chhatrapati Shahuji Maharaj Medical University, Lucknow, Uttar Pradesh, for its commitment and dedication to excellence in environmentally sound healthcare waste management. As noted in the World Health Organization's core principles on healthcare waste management:

"The safe and sustainable management of health-care waste is a public health imperative and a responsibility of all. Improper management of health-care waste poses a significant risk to patients, health-care workers, the community and the environment. This problem can be solved. The right investment of resources and commitment will result in a substantive reduction of disease burden and corresponding savings in health expenditures."

Through the leadership of Vice Chancellor Prof. D.K. Gupta, Dean Prof. J.V. Singh, Registrar Mr. Rakesh Kumar, CMS Dr. S.N. Shankhwar, Member Secretary Waste Management cell and others, CSMMU has achieved significant improvements in its system of healthcare waste management. We believe that CSMMU's hard work in implementing best practices and technologies for healthcare waste management will enhance infection control and prevention and will have a lasting impact on the health of the public, healthcare workers and the environment.

The Global Project Team considers CSMMU as one of the global project's model hospitals, a model that other hospitals can learn from, not only for India but also the South Asian region. We greatly appreciate the efforts of the administration and staff for their important contribution to the work of promoting good healthcare waste management.

Jorge Emmanuel, PhD, DES, CHMM, PE, REP
Chief Technical Advisor
UNDP GEF Healthcare Waste Project

Ashley Iwanaga, MPH
Global Project Coordinator
UNDP GEF Healthcare Waste Project

FUTURE PLANS

The issues which are of primary concern to the KGMU requiring emergent attention are:

1) Establishing training and resource centre on healthcare waste management and infection control
2) Complete replacement of Mercury devices
3) Improving sanitary system at KGMU; Setting up of Effluent Treatment Plant (ETP)
4) Chemical management & expired drugs management
5) Adoption of antibiotic policy
6) Establishing Central Sterile and Supplies Department (CSSD)
7) Other environmental initiatives (bio-composting plant, rain water harvesting, employing solar energy etc)

International and national experts and advisors:

The University was visited by various experts from time to time to assess the progress of the project and to make recommendations.

1) **Dr. Jorge Emmanuel,** visited the University on 16 July 2010. He is Chief Technical Advisor to United Nations Development Programme, GEF Global Healthcare Waste Project.

2) **Dr. Peter Orris,** visited the university on 24-25 March 2011, He is Professor & Chief of Service , Occupational and Environmental Medicine, University of Ilinois at Chicago Medical Center.

3) **Dr. Edward Krisiunas,** President WNWN* International, Inc. visited the university on 18-20 April 2012.

4) **Dr. Glenn McRae,** Health Care Waste Management Consultant, United Nations Development Program, GEF Global Healthcare Waste Project visited on 14-16 June 2012

5) **Prof- A. K. Agrawal,** SOHS IGNOU, New Delhi, Dr. Megha Rathi and Shubhangi Wankhede of UNDP have also visited the University from time to time , assessed the progress of the programme and gave critical suggestions for improvement of the same.

* Waste Not, Want Not

ACKNOWLEDGEMENT

We are thankful to Honorable Vice-Chancellor for his farsightedness with regard to implementation of BMWM and having provided us unstinted support towards the same.

Our Registrar also needs a special mention in whole heartedly supporting the endeavor with his suggestions, guidance and facilitation of the entire process.

Our thanks to the Finance Officer for having considered our budgetary requirments sympathetically.

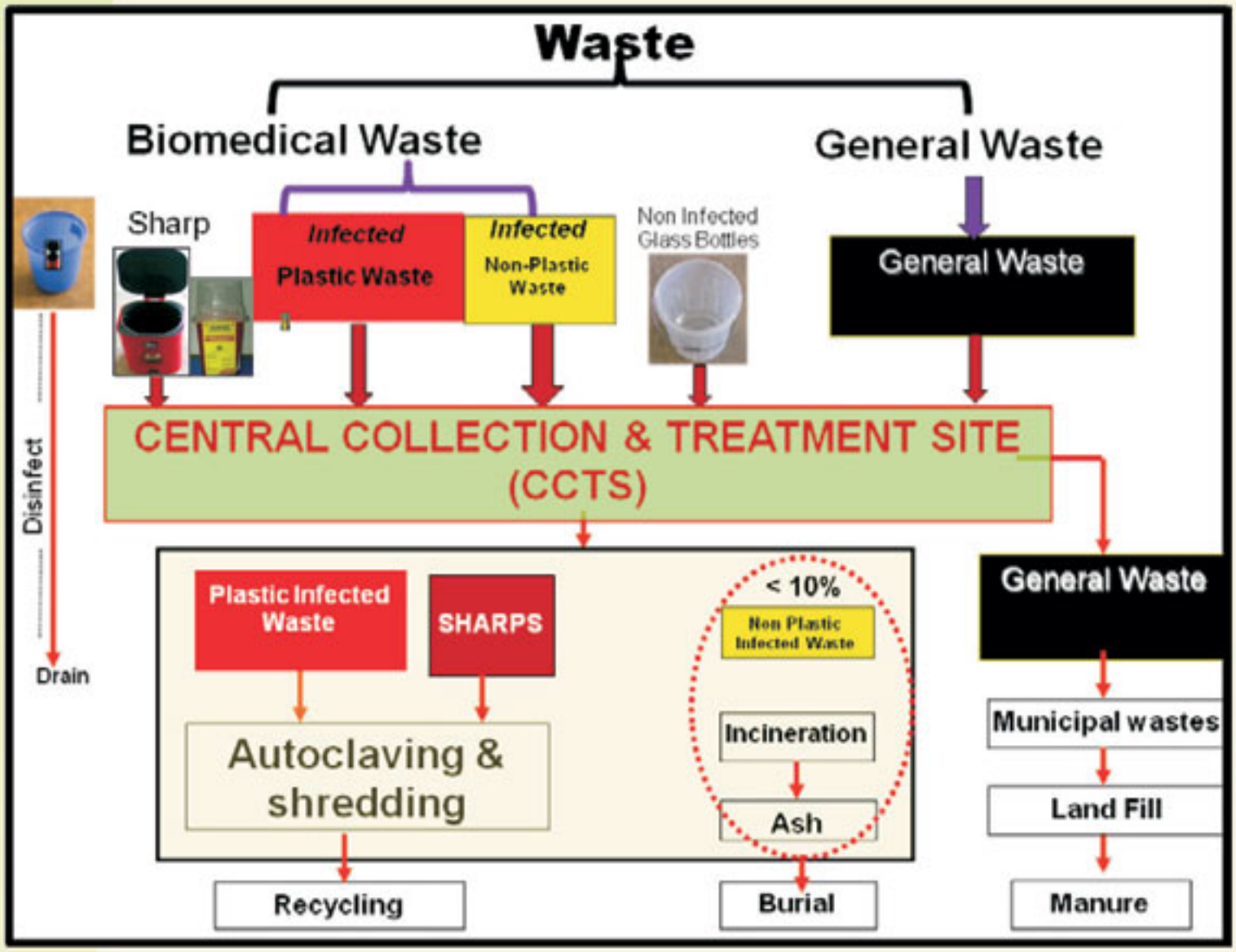
The Dean, Prof J V Singh has been very encouraging. All the Superintendants including Prof. S N Shankhwar, Prof. N S Verma, Prof. J D Rawat and faculty members have been very supportive in their suggestions and in establishing BMWM in the University. The Head of Departments need to be specially thanked for having spared their nodal officers and members of the working committee. The vision of the senior Matrons and staff nurses is commendable in having identified lacunae with regards BMWM that have existed in the University for a long-time and having suggested remedial measures.

As part of this collective initiative (GEF-UNDP-MoEF-IGNOU), we are extremely grateful to Dr Jorge Emmanuel, Ms Ashley Iwanaja, Dr Ed Krisiunas, Dr Glenn McRae, Dr Peter Orris, Mr Jack Weinberg (GEF) from the Global Project Team, Dr M. Subba Rao, Director, MoEF and Ms Shubhangi Wankhede, Dr Megha Rathi, Mr Sunil Arora from United Nations Development Programme. Prof. A K Agarwal, Dr Amit Chaturvedi and Dr Ashwani Kumar from Indira Gandhi National Open University (IGNOU) for providing us timely financial and logistic inputs, encouragement and critical comments.

The PRO's, Sanitary Inspectors, social workers and entire Bio Medical Waste Management staff along with the contractual collecting staff headed by Mr Santosh Singh, Awadh Enterprises and Mr Mohd. Bilal Khan, Star Enterprises need a big round of applause for having left no stone unturned in establishing the ideal process of BMWM and spreading the good word. Mr Ram Prakash and Mr Ashutosh need special mention for being the working backbone of the Bio Medical Waste Management staff team and virtually being our eyes, ears and hands.

Biomedical Waste Management Staff

Flow chart for Waste Management at KGMU



"The success of implementation of any project depends on the perseverance and dedication of the people involved. We want to express our gratitude to all those who have supported us in this endeavor"