

Planning for Health Care Waste Management

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ABSTRACT

Using the author's extensive experience in four projectsⁱ on Health Care Waste Management conducted in South Africa, and neighbouring countries, this paper deals with the inherent challenges facing management within health care facilities in dealing with health care waste. In all the projects, the results have been successful at the conclusion of the work. Segregation at source was a primary concern and the technical aspects of the HCWM System were addressed. There was also an intensive focus of training.

Two questions arise:

What has the focus for HCWM been over the last decade?

Have the interventions on HCWM in the health facilities been sustainable?

The paper discusses these two questions and outlines where the critical shifts in thinking should be for more sustainable improvements in HCWM in the Health Care Facilities. Specific reference is made to the work conducted in the National Department of Health Infrastructure Unit Support Systems (IUSS) Project (2012-2013) implemented by the CSIR.

1. INTRODUCTION

Whenever health care waste is discussed with people outside of the industry, the first thing that comes to mind is the illegal dumping of syringes and body parts. The media quite rightly are quick to focus on these events and we are all familiar with the reports where the only change is the location and size of the event, the most memorable one being the huge dumping of health care risk waste in the brick works in the Free State.

So, what is Health Care Waste (HCW)? Health Care Waste is broken into two main categories viz. the non-hazardous health care general waste (HCGW) and the hazardous component – health care risk waste (HCRW) which includes infectious waste, anatomical waste, sharps, pathological / laboratory waste, pharmaceutical waste, radioactive waste and cytotoxic waste. Other types of hazardous waste generated in a health care facility are similar to any other industry such as mercury, silver, asbestos, fluorescent tubes, chemicals, oils and solvents etc. The types of waste generated in the execution of health services are therefore very broad and require an integrated waste management approach to deal effectively with it. Effective segregation at source is key to good health care waste management, as the different types of waste generated require different methods of treatment to render the hazardous components (pathogens) safe for disposal. The hierarchy of waste management that represents avoidance, reduce, reuse and recycle to minimise the quantities of waste going for final treatment and disposal is also key to good health care waste management.

2. WHERE HAS THE FOCUS BEEN OVER THE PAST DECADE?

The changes that have taken place have been initiated from the 'end-of-pipe' management with the quest for cleaning treatment of the health care risk waste. These changes have been driven by the Environmental departments and started in 1998 with the introduction of the National Environmental Management Act 107 (NEMA). Both the public health facilities and the private companies took the decision to close down the ineffective and air polluting small on-site incineration plants and to contract out the treatment and final disposal of HCRW. The impacts of this decision were far-reaching and the service provider industry began to grow exponentially. Together with growth so too the inherent risks of transporting the HCRW off-site to larger and hopefully better controlled and run treatment facilities were brought sharply into focus. During the following decade the National Environmental Department continued to keep up the pressure and in 2008 the long awaited National Environmental Management: Waste Act 59 (NEM:WA) came into being, followed now more recently by the draft HCWM Regulations in 2011 to and the draft National Standards for Validation of Treatment Efficacy and Operation of a non-combustion Technology for Treatment of HCRW in 2012. Other

significant legislation is the National Environment Management: Air Quality Act No 39 of 2004 and the framework in 2007. Running parallel to the promulgation of legislation, the Green Scorpions, embedded in the Department of Environment, have been flexing their muscles to some degree to stamp out illegal dumping, illegal storage and unlicensed treatment and disposal.

While waiting for guidance from National Government on how best to manage HCW, a plethora of provincial legislation at Provincial and Local Government level made an appearance (also mainly driven by the environmental sections) causing some confusion and challenges for the service providers who were crossing provincial lines in fulfilling their contractual obligations.

Naturally the cost of managing HCW at health care facility level began to increase. When compared to the negligible cost of burning of the waste on-site and in some instances disposing of the residue into on-site pits this increase was inevitable. NEMA sought to deal with the environmental issues of these practices. The transporting of the waste is the most costly step and carries perhaps the higher risk, especially with exposure to the workers and the general public. How to containerise the waste to prevent exposure to the pathogens when transported off-site, how to transport safely and how to prevent exposure to the workers at the treatment plants started to make a significant impact on the norms and standards for the management of health care waste at the health care facility level. The end-of-pipe activities was having a ripple effect backwards through the cradle to grave process.

Over the past decade, several initiatives have been carried out within the health care facilities to address the risks experienced in handling the HCRW off-site.

The projects carried out for an improvement in HCWM at health care facilities are as follows:

- “Sustainable Health Care Waste Management in Gauteng” (2000 – 2003);
- “National Solid Waste Management Strategy for Swaziland – Mbabane Hospital”(2000 – 2001);
- “National Waste Management Strategy Implementation Pilot Project Design, Implementation and Capacity Building” (2005 – 2006)
- “Health Care Waste Management: Technical Assistance Project” in Lesotho” (2009 – 2013)

2.1 Sustainable Health Care Waste Management in Gauteng (2000 – 2003)

This project was the first of its kind in South Africa and was funded by the Denmark Government (DANCED) and anchored in the Gauteng Environmental Department (GDACE). This project arguably has had the greatest impact on the way in which HCW is managed not only in Gauteng, but in the other provinces as well.

Significant outputs of this project are the HCWM Information System and the promulgation of the Waste Information Regulations 2004 and the Gauteng HCWM Regulations 2004, both written under Section 20 of the Environmental Conservation 73 Of 1989. The tender specifications written for the Gauteng DoH has had far reaching impact on tender specifications for Gauteng and other provinces. The preparation of Guidelines for HCWM and the 5-day Training are also worth a mention.

The system introduced in the pilot project run at Leratong Hospital and at Itereleng Clinic had far reaching implications on the whole HCWM Industry with the introduction of reusable containers, weighing of waste and an improvement in the off-site transport of waste to the off-site incinerators.

2.2 National Solid Waste Management Strategy for Swaziland (2000-2001)

A pilot project for an improved HCWM System in Mbabane Hospital was a small part of the overall project to develop and implement an integrated waste management system....ⁱⁱ It was also funded by DANCED and implemented by the Ministry of Environment, Lesotho.

The objective of this pilot was to plan, develop and implement a technical and financially feasible HCWM System in the Mbabane Hospitalⁱⁱⁱ. The main focus of this project was to introduce segregation at source and transport to the on-site incinerator. Training was also an important component.

2.3 The National Waste Management Strategy implementation Pilot Project Design, Implementation and Capacity Building in a rural area (2005 - 2006)

This project was multi-faceted. There was a HCW component and a pilot project implemented at a hospital and a group of clinics in the Zeerust (Ramothere Moiloa Sub-district.) The main objective was to address the need of the less densely populated and more remote rural areas^{iv} as needing a different approach from those catered for in the Gauteng demonstration project for the urban areas where long distances, small quantities of waste, limited infrastructure and limited resources play a significant role.

The results of this pilot were successful to the extent that a new system was introduced and the HCRW was transported from the clinics in a 4 x 4 bakkie and a specially designed trailer to a storage area at the Lehurutshe Hospital that acted as a transfer station for the Sub-district. An independent service provider was contracted to collect the HCRW from the transfer storage area for transport to their incineration plant in Gauteng.

2.4 Health Care Waste Management: Technical Assistant Project (HCWM:TA) in Lesotho (2009 – 2013)

This HCWM-TA assignment is part of the Health Sector Project of the Compact between the Millennium Challenge Corporation (MCC) and the Government of Lesotho (GOL) that was represented by Millennium Challenge Account-Lesotho whose main aim was to provide assistance to help facilitate poverty reduction through economic growth in Lesotho. The Ministry of Health (MOH) was implementing entity. This was a groundbreaking project from the development of a policy and strategy, regulations, standards, guidelines and a pilot implementation in three districts. The promulgation of the regulations and the development of the standards will have far reaching implications for Lesotho.

3. SUMMARY OF RESULTS CHALLENGES AND LESSONS LEARNED FROM THE PILOTS?

With only a few minor exceptions, the results from these projects and the lessons learned are remarkably similar. These have been divided into three main categories as follows:

3.1 Segregation at source:

Segregation at source was a key focus for all the projects and this required the need to have containers at the generation point to facilitate the separation of the waste with a minimum of risk. At source, the types of containers can vary considerably, as long as the training and awareness is centred on the types of containers used and the colour coding. The key factors affecting good segregation were found to be:

- Insufficient containers / liners at point of generation (Several reasons cited centering mainly around the budgeting/ purchasing and distribution of the containers or liners.)
- Inconsistent colour coding used (Also found to be a purchasing and distribution problem)
- Incorrect types and sizes of containers supplied. (Also a purchasing and distribution problem)
- Incorrect placing of equipment and containers (If not fixed, they are moved)
- Poor inter-relations between departments (Procurement / Nursing / Cleaning and collection)
- Poor job performance particularly with non-adherence to colour coding. (Sometimes training need; mostly found to be poor people management skills, poor supervision and enforcement.)

3.2 Storage

Storage facilities at all the pilots posed a major problem. The storage areas for new containers prior to distribution to the generation points was insufficient and the distribution systems in three of the pilots had to be introduced and monitored to ensure a timely supply of containers where they were required. The Interim storage areas were limited, mainly being shared with the sluice room or another storage area. Except for Leratong Hospital in the Gauteng Project, the central storage areas had to be built under the ambit of the project and system were introduced for the recording and traceability of the waste collected.

3.3 Capacity Building and Enforcement

In all the projects, it was necessary to have a champion. In the Gauteng Project, the Health Care Waste Officer was introduced. The terms of reference for this individual mainly focused on regular inspections and enforcement of the system. The ward supervisor also played an important role. It was found that some wards ran smoothly and the system function well, yet there were challenges in other wards. In these wards

the key problem was found to be that the day-to-day enforcement / supervision was lacking. Senior management involvement through the health and safety committee structures was also very beneficial to ensure that standards were upheld.

4. HAVE THE INTERVENTIONS ON HCWM IN HEALTH FACILITIES BEEN SUSTAINABLE?

The Health Care Waste Industry has experienced significant changes over the past decade or so. The legislation from the environmental sector has paved the way for more stringent enforcement for the handling, storage, treatment and disposal of the HCRW component. These end-of-pipe requirements have forced the health facilities to change the way in which they segregate and containerize the HCW at source. The tender requirements have become more stringent and the Service Providers are required to take greater responsibility for the supply of legally compliant containers and for the training of health facility staff. There are however, still many challenges that lay ahead.

All these changes are positive. Why then are the changes in the health facilities less evident? The progress here has been slow. The legislation has mainly been driven at national level by the environmental departments with the national department of health being less evident in the drive for better HCWM standards.

5. IS A CRITICAL SHIFT IN THINKING IS REQUIRED?

Frequently training is put forward as the panacea for all ills and it is believed will resolve the problems. It has been the experience from the projects that, although training is required, without the support of equipment, space, and enforcement, the system will fail. If training is provided, but when the learners get back to their places of work the equipment or containers are not provided or the colour coding is different, the training exercise has been wasted. Perhaps it is not the problem, but our response to the problem that's the problem? The saying "if we always do what we have always done, we will always get what we have always got"^v perhaps has some significance.

A small, but critical shift in thinking by the Department of Health and the Health Facility Management is required. However, there is a small light at the end of the tunnel, and the kudos for this must be given to the Infrastructure Section of the National Department of Health for their foresight. A project called the DoH Infrastructure Unit Support Systems (IUSS) Project, implemented by the CSIR has been running since 2011. Extensive work has been done on designing hospitals around the norms and standards for the delivery of health services, rather than trying to retrofit the hospital and clinic infrastructure to fit the norms and standards. HCW has been included in this planning which is definitely a significant and critical shift in thinking.

Let us look more closely at some of the critical impacts that infrastructure planning and budgeting has on the success of the HCWM System

5.1 The impact of procurement on the success of the HCWM System

Poor budgeting and procurement practices and a lack of understanding of the importance of buying the right equipment have significant impacts throughout the 7 steps of the cradle-to-grave process and this coupled with the lack of well planned infrastructure can negatively influence the success of the HCWM System. The impacts of poor procurement practices in the 7 steps are shown in Table 1 below.

6. INFRASTRUCTURE PLANNING

The Department of Health Infrastructure Unit Support Systems (IUSS) Project (2012-2013)^{vi} implemented by the CSIR is a real positive step forward to address these critical areas when designing new hospitals and clinics. However, they can also be used in older health facilities that are upgrading or extending. Through the use of tables, diagrams and charts that are available from these documents, infrastructure changes can be made that will positively influence the success of the norms and standards for HCWM within the health facilities. This is particularly true where inadequate storage space is a major issue for the health facilities in implementing and sustaining a HCWM System. A summary of the infrastructure requirements is shown in Table 2 below.

Table 1: The impacts of poor procurement practices on the 7 steps of the cradle-to-grave process

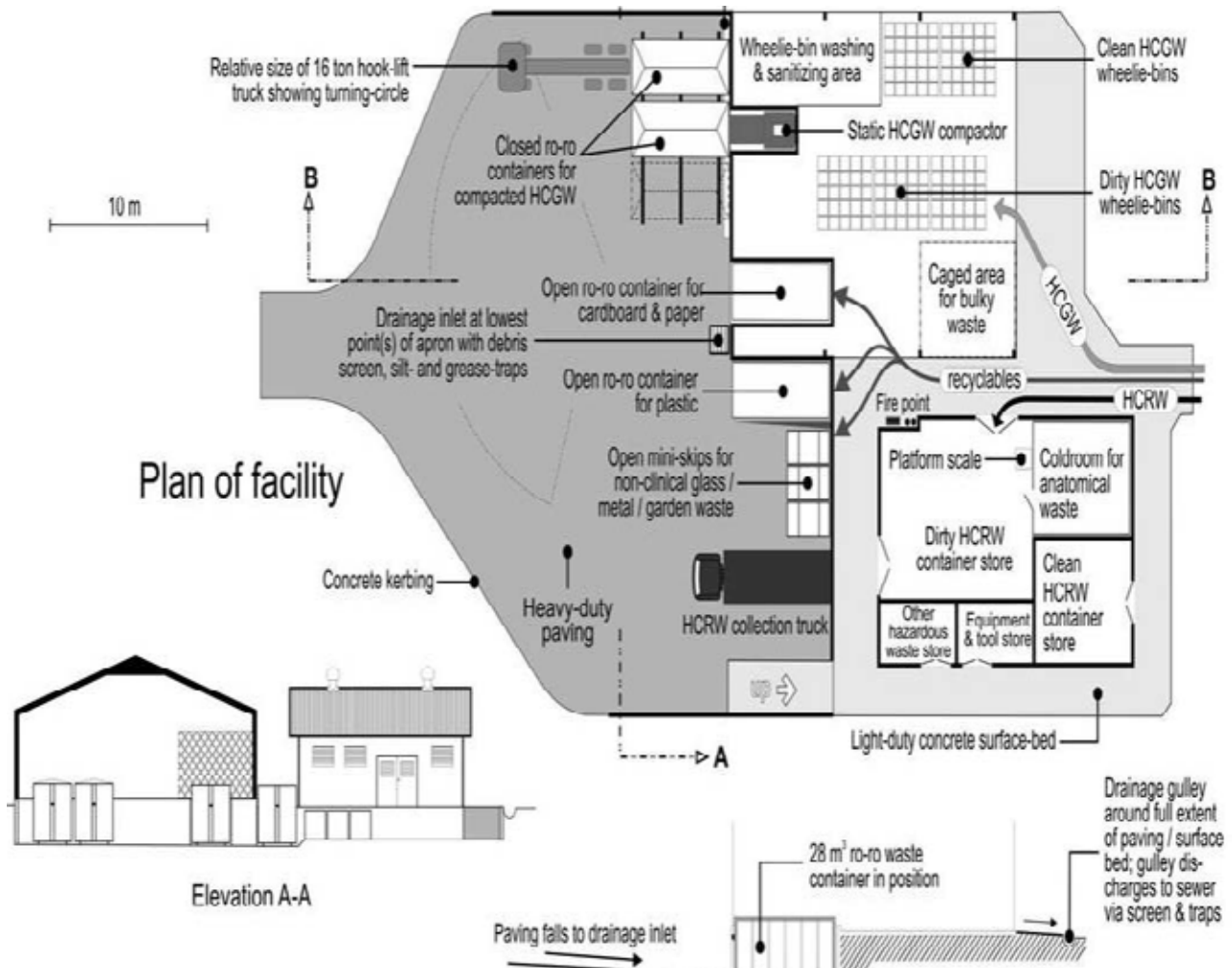
Step No	Steps of the cradle-to-grave process	Impact of poor procurement and distribution
	Procurement	Insufficient planning at the dispatch area to accommodate the different sizes, types and quantities of clean containers results in more frequent ordering cycles and shortages with incorrect segregation as a consequence.
1	Generation	Incorrect containers and colour coding supplied at infrequent intervals results in shortages.
2	Segregation	Incorrect sizes and types of containers provided resulting in incorrect placement standards at generation. Fixing to the walls of brackets are affected when different sizes and types of containers are procured.
3	Interim Storage	Build-up of HCRW within the wards. Exposure to patients and visitors. Infection control principles compromised.
4	Internal transport	Inadequate trolleys to transport the segregated containers results in exposure to workers and the general public.
5	Central Storage	Inadequate central storage areas result in the accumulation of HCRW in different areas of the health facility. More frequent collections are required. Possible exposure to patients and visitors and infection control principles compromised if waste is not removed from the wards when full. Injury to staff and transporters.
6	External transport	The size and types of the external transport vehicles are determined by the sizes, types and quantities of containers
7	Treatment & disposal	The treatment facility would need to adjust to the types of containers (whether single use or reusable)

Table 2: The infrastructure requirements for health care waste management

Storage Area	Infrastructure requirements
Dispatch Store	Infrastructure planning for the size of the dispatch store to accommodate the quantities of disposable / consumable containers and liners will alleviate some of the pressures experienced in these departments. Better planning is required to prevent shortages of these critical items. The size of the area is determined by the quantities of waste generated that determines the quantities of containers needed and the size of the area required for the types and sizes of the containers when nested. Storage space should be sufficient to accommodate 2-3 months supply of consumable items. Storage space should also be provided for a quantity of reusable containers that may be required to replace missing or damaged containers or in emergency situations. Access for the delivery vehicle should also be provided that gives a good turning circle. The store must also have sufficient ventilation, good lighting, protection from the elements, and be secure to prevent theft of containers.
Interim Store	Interim stores are temporary storage areas at the ward / generation level and should be large enough to accommodate 2 – 3 days accumulation of HCGW and HCRW to cater for weekends or when the internal collection does not happen. Must be able to contain the number and sizes of the different types of containers used for the HCWM System. Space in the maternity wards should also be provided for refrigeration for the placentas if stored for longer than 24 hours. Space provided for the storage of pathological waste in the laboratories and for pharmaceutical waste in the pharmacies.
Internal transport	HCGW AND HCRW should be transported separately and larger facilities can have different routes/lifts for the collection of waste. Routes and lifts must be large enough to allow for the size of the containers / wheelie bins with sufficient turning circles. Ramps and slopes provided instead of steps. Provision may also be required for motorized transportation in the larger hospitals.
Central Store	The central storage needs are determined by the quantities of waste generated, the types and sizes of the containers used and the frequency of collection. Space must be provided for both HCGW and HCRW. The separation of the clean and dirty areas is also desirable. The clean area is for the returned reusable containers and the dirty area is for the full containers awaiting collection by the service provider. It would be ideal to have the central storage area able to accommodate the full spectrum of waste that includes a recycling area. In the larger hospitals a compactor for HCGW reduces the quantities of waste required to be stored. Provision should also be made for the other hazardous items such as grease, fluorescent tubes etc. In some instances cleaning of the containers not leaving the site are not always carried out properly as access to adequate water supply and drainage not supplied. Figure 1 below gives an example of the ideal central storage area for a large hospital.

The documents from the IUSS Project can be obtained on the web site www.iuss@csir.co.za. Contact person Peta De Jager e-mail pdejager@csir.co.za

Figure 1: An example of a well-planned central storage area in a large hospital^{vii}



7. CONCLUSION

Although some successes are recorded for improved HCWM standards, there are still many challenges that lie ahead. There is no single solution to what ails the industry and it is only with the coordinated efforts of all stakeholders coupled with the desire and ability to think and work smarter that changes will be sustainable.

ⁱ “Sustainable Health Care Waste Management in Gauteng” (2000 – 2003);
 “National Solid Waste Management Strategy for Swaziland – Mbabane Hospital”(2000 – 2001);
 “National Waste Management Strategy Implementation Pilot Project Design, Implementation and Capacity Building” (2005 – 2006)
 “Health Care Waste Management in Lesotho (2009 - 2013

ⁱⁱ National Solid Waste Management Strategy for Swaziland fifth draft Volume I & II
ⁱⁱⁱ National Solid Waste Management Strategy, Project document FLK 001001, undated)
^{iv} National Waste Management Strategy Implementation Project Document June 2004
^v Henry Ford
^{vi} IUSS Health Facility Guide: Infrastructure Design for Waste Management in Healthcare Facilities, dated 1 October 2012 by Infrastructure Unit Support Systems (IUSS) Project (2012-2013); Abridged version dd 4 October 2013
^{vii} IUSS Health Facility Guide: Infrastructure Design for Waste Management in Healthcare Facilities, dated 1 October 2012 by Infrastructure Unit Support Systems (IUSS) Project (2012-2013);