**Introduction**

In 1860 Florence Nightingale made an important connection between improvements in healthcare systems and recovery of patients, to the need for clean water, fresh air and sanitary conditions (Melamed, 2003, Bledryzycki 2005). Since then, it has been one of the doctrines of modern healthcare that management of the ambient environment assists in both prevention of illness and promotion of healing. Daschner (1997), clearly indicates that healthcare requirements and environmental impacts are very much intertwined. Attracting significant attention over the past few decades has been that of management of wastes generated from hospitals.

Yet despite this, the healthcare sector (and government agencies), has been reticent in developing and implementing appropriate programs to actually improve its environmental performance. This is regardless of organisations such as the World Health Organization indicating that effective biohazardous waste management is an important and necessary component of any environmental protection program/strategy (WHO 1998). This is due to their conclusion that hospital waste is special, having a higher potential of infection and injury (eg., sharps injury), than any other type of waste. Therefore, it should be handled with sound and safe methods wherever generated to avoid negative public health, environment and economic consequences.

For this paper, the term “biohazardous waste” has been used in this submission to cover items such as “medical waste” and “clinical waste” but acknowledges that the scope is broader and includes wastes with similar characteristics that are increasingly being generated outside of healthcare activities.

**Sources**

Biohazardous waste is generated from the following types of facilities/activities; hospitals; nursing homes; doctors; dentists; veterinarians; pathologists; body piercing facilities; emergency services; home healthcare; sharps and clinical and related waste from commercial buildings and workplaces (eg, first aid waste); sharps from public areas; needle exchange programs; universities; blood banks; mortuary; crime/trauma scene remediation and other similar practices. It also includes commercial practices/activities that manage what would be considered biohazardous waste. An example would be a commercial cleanup of abandoned rental properties.

These sources have increased significantly both as modes of healthcare delivery have changed and as issues associated with a broader range of activities are understood in regards to exposure to blood and other body fluids. Generators of biohazardous waste are no longer viewed as purely restricted to health and related activities.
Management of biohazardous waste is problematic in that:

- There is lack of clarity in defining it
- There is often poor segregation at the point of generation
- It is a heterogeneous waste in that it contains a broad mix of hazardous substances
- There are legal responsibilities in regards to managing all aspects of the waste from “point of generation” through to treatment and final disposal
- Waste management education is generally poorly conducted
- Biohazardous waste managers are often not adequately resourced to implement innovative waste management programs
- It is a costly waste stream to manage
- Community perception of the wastes is primarily based on fear of contracting disease

Carvalho (2002), undertook a preliminary risk assessment of the management of health-care waste. This was an important process as it did not only examine the issue of the inherent risks associated with the waste, but how these risks could be realised through current management processes. This study identified aspects of waste segregation, containerisation, internal collection systems and storage of the waste that could result in adverse consequences. Such conclusions were also supported by Awad (2004) and Poenkae (1996) who indicated that these issues could be resolved by direction and guidance by those agencies responsible for management of biohazardous waste.

The debate about what should and should not be classified as clinical waste (and why), is not new. Authors in the late 1970’s to early 1990’s (Norris 1978, Doyle 1985, Hedrick 1988, Byrns 1992, Lumsdon 1993), were arguing that the rationale for defining clinical waste in the United States of America was flawed – this being the country where legislation for managing clinical waste was believed to have been initiated. It was being argued that there were little microbiological rationales for defining such wastes. That is, based on a couple of studies (Trost 1985a and 1985b), that themselves were limited in their scope, yet regulators took a conservative view of what should be classified as biohazardous waste. Not an approach based on a full understanding of the literature and risk assessment that addressed all management aspects.

Currently in Australia, each State/Territory jurisdictions has in place regulations that deal with the management of hazardous wastes and biohazardous waste. However, in particular with biohazardous waste, each of the States/Territories has developed different definitions and management approaches for this waste stream. This has provided difficulties for all stakeholders (from generators, transporters and treatment facility operators), to implement strategies for the safe and cost-effective management of this waste.

An example of the issues within Australia resulting from the diverse number of definitions is with healthcare providers that have shifted from predominantly single jurisdiction operation, to providing services across State/Territory boundaries. Due to the differing definitions and
management approaches, they need to develop separate waste management strategies, staff training programs and quality assurance programs for facilities in each jurisdiction.

Apart from the definitional issues, is the lack of capacity to remain current with issues posed by evolving types and sources of biohazardous waste. Three key management issues are:
- home healthcare waste
- biohazardous waste resulting from pandemics
- pharmaceutical waste disposed of to sewer
Regulators must recognise these issues and implement strategies to manage them effectively.

Governments and industry associations have identified biohazardous waste management within the healthcare sector as a potential problem area for patients, staff, visitors, the wider community and the environment. The way in which biohazardous waste is treated and disposed of is also recognised as being a possible environmental and/or OHS risk through unsafe handling practices and limitations associated with available treatment technologies.

It is also important to note that of the three national publications relating to management of biohazardous waste, two publications, the National Health & Medical Research Council document has been rescinded and the Australian Standard is soon to be discontinued. Apart from the Code of Practice (described below), this leaves no publication or guidance material that is not State based.

In 1990, a seminal report on the management of clinical and related waste to the United States Congress (USAOTA 1990), stated that “The amount of medical waste generated by in-home health care and hospice care is under appreciated – and is expected to increase, because treating individuals in those settings is becoming more and more common”. It is acknowledged that there has been and will continue to be, an increase in patients receiving home healthcare. For example, patients undergoing home dialysis have increased from approximately 800 in Australia in 2005, to approximately 2,900 in 2007. It has also been predicted that there will be an 8% increase in home dialysis patients each year.

Clinical and related wastes generated by home healthcare providers pose the same risk of disease and injury as do similar wastes generated in healthcare (or related), facilities. Given that these wastes can end up in the domestic waste or recycling stream they pose a hazard to waste handlers, landfill staff and staff employed at Material Recovery Facilities. This latter issue was raised in 1994 in a report to the Californian Waste Management Board (CIWMB 1994).

The issue of management of pharmaceutical waste is causing some concern. Previous management methods have only recently come under scrutiny as researchers start to analyse impacts from disposal of pharmaceuticals to sewer and landfills (Bound 2005, Kim 2007, Musson 2009, Kotchen 2009). As an example, the issue of antibiotic resistance in the flora of sewage
treatment plants was raised by Guardabassi (1998). The Stockholm County Council (Stockholm 2005), have determined that reduction of pharmaceutical residues in ground, air and water environments is one of their five most important environmental issues. Reasons for this decision are not just the known human and environmental consequences, but also because there is little understanding of the impacts of residual pharmaceuticals.

A summary review of publications relating to management of Avian Flu published by various Commonwealth Government agencies has shown that waste management does not feature in regards to specific detail. As an example, the Commonwealth Department of Health and Ageing publication “Australian Management Plan for Pandemic Influenza - June 2005”, provides careful guidance on the procedures that healthcare practitioners should adopt to protect themselves from potential contact with the Avian Flu virus. These professional are advised to ensure “appropriate handling of waste”, and to treat all wastes as infectious waste. However, in this publication, instructions are to deposit wastes (including PPE), generated during these procedures into the general waste stream.

This approach is analogous to saying that while in a healthcare facility we must treat these materials as potentially infectious, but outside, there is no risk. Simply depositing the materials into a waste container in itself does not reduce the potential hazards to the wider community and specifically waste handlers.

In America, there is also recognition that specialist biohazardous waste companies do and will have a role in managing wastes resulting from an Avian Flu epidemic. In fact the USA National Strategy publication states that there should be development of coordination mechanisms across American industries to assist in management of all aspects of an Influenza outbreak.

Cleaning up the Mess
Ultimately, the objective of managing any waste appropriately is to ensure that pollution of air, land and water does not occur and that the life, health, welfare and well-being of people, flora and fauna are preserved and not exposed to unnecessary physical, biological or chemical hazards and any consequential risks (Aquino 1999).

According to the Victorian Hazardous Waste Consultative Committee (HWCC 2000), “the extent of the risk involved in the management of hazardous wastes depends on a number of interrelated factors, including the likelihood of human or other living organism’s exposure, and of the volume and potential hazard of the waste”.

This statement is in accord with the precautionary principle (Sattler 2002). This principle requires decision makers to act in a conservative manner when there is dispute over scientific conclusions in relation to, in this instance, appropriate biohazardous waste management strategies.
Yet despite this recognition, governments and their agencies have demonstrated a continuing, till now, lack of impetus to actually work co-operatively to develop appropriate management strategies and guidelines for all stakeholders. Even in 2003, a scoping study by the Commonwealth Government established to determine the relevance of uniform approaches across all jurisdictions did not identify this as an issue warranting attention. This was despite continual lobbying by stakeholders for such an approach.

Recognising that there was an issue that needed resolution and to assist all stakeholders achieve improved biohazardous waste management, in 1994, the Australian and New Zealand Clinical Waste Management Industry Group (ANZCWMIG) was formed. Now called the Biohazard Waste Industry Group of Australia and New Zealand (BWI), it represents the majority of organisations and individuals involved in the management, transport and treatment of biohazardous wastes across Australia. The primary aim of BWI is:

"To achieve consistency of industry practice through uniform guidelines on classification, handling, transportation, treatment and disposal of clinical and related waste in Australia and New Zealand. In achieving this, the waste generators, transporters, disposal and treatment facilities, along with the regulators of this industry, have a focused understanding of, and commitment to, the best practice required to ensure cost effective, safe and environmentally sound management of clinical and related wastes."

The main issues identified by the group were the diversity of standards, policies and legislative requirements emanating from each State jurisdiction. Across Australia for example, there was no consistency in the title or resulting definitions used to refer to what were essentially the same wastes.

Development of the 6th edition of the Code of Practice provided an opportune time for BWI to consider what should be an appropriate definition for management of this waste stream – remembering that there is a plethora of legislative definitions in Australia with no nationally agreed definition. It was also an appropriate time to ensure all generators of biohazardous waste were considered in relation to risks associated with wastes they generate or manage.

Subsequently, BWI agreed on the following definition:

*Biohazardous waste arises from, but is not limited to, medical, nursing, home healthcare, dental, veterinary, laboratory, pharmaceutical, teaching, podiatry, tattooing, body piercing, brothels, emergency services, blood banks, mortuary, crime/trauma scene remediation and other similar practices and/or any activity prescribed by a relevant regulatory authority. It also includes commercial practices/activities that manage what would be considered biohazardous waste as described below.*

*Types of biohazardous waste include:*
  a. Human blood or body fluids, other than urine or faeces (except from hospital/nursing home patients); or
b. Human tissue; or

c. Sharp discarded objects or devices capable of cutting or penetrating the skin (“sharps”), or the container in which they are packaged; or

d. A diagnostic specimen; or

e. A laboratory culture; or

f. Tissue, carcasses or other waste arising from animals used for laboratory investigation or for medical or veterinary research other than psychological testing; or

g. Materials or equipment containing, or reasonably suspected of containing human blood or body fluids other than urine or faeces (unless there is visible blood and/or faecal waste is from hospital/nursing home patients); or

h. Faecal contaminated materials from hospital patients or nursing home residents (or similar), but excluding nappies from newborn or infant patients; or

i. Sanitary waste except from a domestic premise unless the generator is known to have, or suspected of having a communicable disease

j. Waste from patients known to have, or suspected of having a communicable disease; or

k. Waste derived from a prescribed activity.

Note: Faecal waste disposed of via an approved sewage system is not classified as a biohazardous waste.

As a consequence of the co-operative manner in which the Code of Practice has been developed, the outcomes for the biohazardous waste management industry have been extremely positive. Government agencies such as the Victorian, Western Australian and South Australian Environment Agencies as well as NSW WorkCover have adopted the Code. In addition, The Australian Council of Healthcare Standards, the peak healthcare organisation that accredits healthcare facilities advocate the use of the Code to their auditors as the benchmark for determining if healthcare facilities are managing wastes correctly.

Of importance is the fact that the Code of Practice addresses issues that government agencies were reluctant to deal with. The issue of clinical waste generated by nursing/medical professionals in domestic premises is increasing due to the trend to send patients home earlier. As a consequence wastes that would have been managed as clinical and related wastes were, and still are finding their way into the domestic waste stream. As a Group, this was recognised and appropriate advice is provided in the Code of Practice.

Specific issues basic to the development of the Code of Practice that had to be agreed upon by members of the Group were:
What constituted clinical and related wastes – what definition was appropriate;
What was appropriate storage requirements – remembering that some members of the
groups serviced remote locations and that generators of clinical and related wastes were
also diverse (e.g., from a small GP practice to the large metropolitan teaching hospitals);
What would be deemed appropriate transport requirements; and
Issues in relation to treatment of clinical and related wastes and subsequent disposal of
residues.

Industrial relations and community issues also had to be considered. It was also extremely
important that to ensure a workable Code of Practice, that extensive consultation with waste
generators and other related organisations were conducted. In that respect, representatives from
nursing associations, hospital, infection control and other professional organisations provided
valuable input into the development of the Code of Practice.

The Code of Practice had to address the many different type and sized clinical and related waste
generating facilities. Early on in the development of the Code of Practice, it was recognised that
a performance based approach would work, whereas a prescriptive approach would be largely
ignored due to it being impractical and unsustainable.

The processes for the development (and subsequent review), of the Code of Practice involved
careful debate of the issues that included consideration of individual members businesses. In
addition, consultation with a broad range of industry associations, relevant professional
associations, government agencies and other stakeholders, was an integral part of the process. At
the conclusion of the consultation process, a Code of Practice was developed that represented best
practice for the containerisation, storage, transport and treatment of clinical and related wastes.

Of importance, is the fact that the Code of Practice is forward thinking in addressing clinical and
related waste management issues – often issues that government agencies were reluctant to deal
with. As a Group, this was recognised and appropriate advice is provided in the Code of Practice.

As a consequence of the co-operative manner in which the Code of Practice has been developed,
the outcomes for the biohazardous waste management industry have been extremely positive. In
addition, the Group is now seen as the peak industry group for this specialised waste
management, and has been invited to sit on a variety of Standards Australia and Commonwealth
government committees.

As previously stated, the myriad of definitions used by regulatory and other government agencies
throughout Australia is of continuing concern to BWI. However, due to our continuing lobbying
and provision of expert advice, BWI has successfully lobbied the Commonwealth government to
include the need to a consistent definition in the process for developing the National Waste
Policy. Hopefully then, more effective management of this stream will result.
References


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