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Environmental Legislation and the Management of Medical Waste

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Abstract: Throughout the developing world many hospitals—both public and private—are struggling to cope with the size and quantity of hazardous medical waste generated by the provision of health care services and procedures. Left unchecked, this situation has the potential to cause injuries and spread disease. Moreover, the indiscriminate dumping of waste material in front of hospitals combined with its improper transport and disposal by waste-management firms can result in it being transferred to municipal waste sites. Such practices expose citizens to a series of immediate and longer-term public health threats. In light of recent international and regional efforts to regulate medical-waste management, this paper critically analyzes the legal and regulatory framework recently implemented by Saudi Arabia.

Keywords: Environmental Management, Legislation, Waste, Hazardous, Saudi Arabia, Australia

1. Introduction

The problem of proper disposal of medical waste plagues public and private hospitals in Saudi Arabia. The volume of medical waste, and the particular threat to public safety and the environment, require proper disposal management practices. Injury, death and environmental contamination are all ‘live’ issues due to the inappropriate disposal of medical waste. Threats of such wastes range from dumping waste indiscriminately in front of hospitals to improper transport and disposal by waste-management firms. An important call for the elimination of the problem emphasizes the use of advanced technology and modern equipment, however these systems are negligible if the will, expertise or personnel to enforce waste-management regulations are absent.

This paper conducts a critical analysis of the legal and regulatory efforts made by Saudi Arabia in light of international and regional efforts to regulate medical-waste management. Following on from this, it examines how the Saudi Government has implemented its obligations. It also, briefly compares both the regulatory and enforcements systems operating in South Australia and Saudi Arabia to reveal differences in political will, public input, and the size and expertise of enforcement bureaucracies. As a consequence, the South Australian framework is seen to be unsuitable for the purposes of modelling in Saudi Arabia. Alternative recommendations in the form of economic mechanisms are proposed.

2. Background

Medical waste is defined as all waste generated directly in the care and treatment of patients. Medical waste presents particular hazards to human health and the environment as a result of its contact with bodily fluids, chemicals and even nuclear radiation (Manzurul *et al.* 2008). The Saudi Arabian healthcare industry is growing significantly as the population grows and ages, leading to a significant increase in the generation of medical waste (MoMRA, 2009). Contact with medical waste exposes people to diseases, bacteria, toxins and other threats to health and well-being. Due to the public health and safety risks associated with medical waste, it is often singled out for specific waste-management procedures in industrial nations in order to prevent disposal in public landfill systems.

The varying nature of medical waste typically requires specific disposal and handling practices under advanced management systems (Manzurul *et al.* 2008). For example, syringes are typically disposed in containers at the site. These containers prevent contamination of healthcare workers and others in the medical setting. In addition, these containers become part of the medical waste flow system itself as they are retained for disposal. Transfer and transport of medical waste typically involves public or private-sector agencies, and the final disposal either occurs at incineration sites or at dumping sites, depending on the nature of the waste. Before dumping, medical waste must be treated through advanced systems, including microwave and autoclave technologies. Only after such treatments, may their disposal in solid-waste landfills be permitted (Al-Shallash and Shereif 2007). In the case of radioactive waste, disposal requires even more advanced systems and infrastructures (Manzurul *et al.* 2008).

In addition to healthcare providers, research laboratories and other facilities, medical operations generate what is considered medical waste. Typically, these are subject to medical-waste regulations in industrial countries and an increasing number of developing countries. However, not all waste generated at healthcare providers and other medical facilities are categorized as medical waste. In fact, 80 per cent of the waste generated by healthcare providers and medical operators is categorized as general waste, which can be disposed of through traditional means (Al-Shallash and Shereif 2007).

Obviously, proper storage methods are paramount to avoid cross-contamination of medical waste with general waste. In addition to safety issues, healthcare providers are motivated by cost to distinguish between medical waste and general waste, since the management of medical waste can incur costs of up to three times of those associated with the management and disposal of general waste (Al-Shallash and Shereif 2007). Typically, healthcare workers are trained to identify proper storage and handling needs on-site, with disposal containers marked accordingly.

Management of medical waste thus involves several distinct phases: on-site handling, on-site storage, transfer and transport, treatment, and disposal. The law typically requires procedures for each of these phases, depending on the type of waste, and healthcare providers are responsible for enacting and enforcing proper management processes. In addition, private firms are typically responsible for waste-management transfer, transport and disposal to off-site systems.

3. International and regional regulations of medical waste

In 1989, *The Basel Convention on Controlling Transboundary Movements of Hazardous Waste and their Disposal* was adopted by the United Nations, and Saudi Arabia was a signatory (The Basel Convention, 1989). The goal of the *Convention* was to prevent the proliferation of the waste trade, which generally involved the transport of waste from industrial and developing countries to less-developed countries for disposal (Tiemann 1998). At the time, many of the Gulf States signed on to the Convention and/or agreed to similar controls on the transfer and transport of medical waste (The Basel Convention, 1989). The problem of transport of medical waste across national borders occurred as strong public-safety and environmental regulations in industrial countries placed greater cost demands on healthcare providers and waste-management operators, encouraging them to enter deals with less-developed countries with more lenient regulations to accept their medical waste. The waste trade, which included other hazardous materials, was considered an unethical trade that exposed poorer peoples of less-developed countries to contaminants generated by the wealthier peoples of the industrialized world. Similar concerns motivated the Gulf Cooperating Council, a regional body of Gulf States, to enact regulations on waste management, prohibiting its transport across national boundaries (Al-Shallash and Shereif 2007).

Despite the intent of the Basel Convention, significant public-safety and environmental problems persist across the globe (Tiemann 1998). In 2009, hundreds of people in India were found to have contracted Hepatitis B as a result of black-market operators obtaining, then on-selling, used syringes to drug users and illicit healthcare operators. A subsequent study by the Indian government found that 30 per cent of injections in the healthcare industry were conducted with used syringes. Several scholars have now identified how improper waste-management practices in the developing world have resulted in specific health and environmental threats being realized (Harhay *et al.* 2009).

These same scholars have also begun to recognize the intertwined nature of training and regulations in solving the problem of improper medical-waste management (Harhay *et al.* 2009). This concept is described as a bottom-up, top-down approach. Training of healthcare workers and operators represents the bottom-up solution to the problem, while the law represents the top-down solution. Both approaches are seen as necessary to ensure the proper management of medical waste, as failures at both levels have been identified as the cause of exposure to the public and the environment from medical waste (Lars *et al.* 2000).

4. Medical-waste practices and regulations in Saudi Arabia

The Kingdom of Saudi Arabia is estimated to generate approximately 50,000 tons of medical waste each year. This waste is generated by nearly 2,000 medical centres operating across the Kingdom. Moreover, the number of medical centres and hospitals is growing each year, with 79 hospitals under construction in 2009 alone (MoMRA 2009).

In response to the growing challenges posed by increased medical waste, the Kingdom established its first regulations on the disposal of medical waste in 1998. According to the Kingdom, these regulations 'require the most advanced medical waste disposal methods,' and the Kingdom solicits bids from the private sector to provide waste-management services to healthcare providers (MoMRA 2009). The increase in medical waste is the result of

increasing modernization and the expansion of the Saudi Arabian healthcare industry. The average generation of waste per patient in Saudi Arabia is 1.3 kilograms per day, which is equivalent to the per patient waste generation for developing countries and is expected to increase in coming decades (Al-Shallash and Shereif 2007).

Under the *General Environmental Law and Rules for Implementation*, Saudi Arabia has defined *medical waste* as:

‘substances which have been discarded or neglected and which cannot be put to good or beneficial direct use. Hazardous waste is a type of waste with characteristics that render them hazardous to man’s health and to the environment. They can be toxic, highly reactive, flammable, explosive, corrosive, infections or radioactive in nature. The issue of hazardous waste pollution has become significant, receiving great attention from national and international organizations concerned with the protection of the environment due to havoc and health and environmental risks that such wastes can cause in the event of improper discharge into the environment’ (PME 1997, Preface).

Until the regulations of 1998, medical waste was generally viewed to be municipal, and its disposal occurred through municipal waste-management systems. As a result medical waste typically ended up in public or municipal landfill (Al-Shallash and Shereif 2007). In other treatment processes, some healthcare providers engaged in on-site or in-house incineration, subjecting local and surrounding populations to potential contamination from air pollution. The initial threat from medical waste in Saudi Arabia was thus considered to be one of air pollutants. In response, the Presidency of Meteorology and Environment issued a directive in 1997, to shut down all on-site treatment systems at healthcare providers, and healthcare providers were required by 1998 to enter contracts with private firms that would transfer and transport medical waste to off-site disposal systems. Issued by the Kingdom, these regulations were the basis of stricter controls endorsed by the Gulf countries in 1999 (as evidenced by the guidelines for medical-waste management issued by the Gulf Cooperation Council) (Al-Shallash and Shereif 2007). Under the 1998 regulations, the Kingdom’s Ministry of Municipalities and Rural Affairs partnered with the Presidency of Meteorology and Environment and the Ministry of Health to regulate medical-waste management (PME 2001).

Obviously, the first consideration in waste-management storage procedures on-site is to avoid contamination of general waste with medical waste. Similar to the systems instituted among healthcare providers in the industrial world, Saudi Arabian healthcare providers designate containers for specific types of waste, including general waste, medical waste, and sharp waste (syringes). However, Saudi Arabian healthcare providers are strongly motivated by cost considerations to streamline their waste management procedures (Al-Shallash and Shereif 2007).

As a result of cost considerations, many Saudi Arabian healthcare providers have instituted waste segregation programs that have seriously diminished the amount of medical waste they must manage. At the Dhahran Health Center, a waste-segregation program operated by the Saudi Arabian Oil Company resulted in a 65 per cent reduction in infectious waste. In addition to cost savings, the Presidency of Meteorology and Environment estimated a significant reduction of incineration, from daily to just three times a week (Al-Shallash and

Shereif 2007). Thus, proper waste-management of medical waste can result in cost savings, health benefits and environmental benefits.

Scholars have also documented problems in medical waste management by healthcare providers. One study of waste-management awareness among workers at King Fahd Hospital found ‘a lack of awareness, ignorance of policy and procedure on the handling of healthcare waste among healthcare staff’ (Al-Shallash and Shereif 2007). These problems were considered significant enough that the Ministry of Health and Presidency of Meteorology and Environment supported additional legislation that took effect in December 1999 and required all private medical facilities to implement a waste management system, specifically requiring the services of a private contract authorized by the Presidency of Meteorology and Environment (PME 2001).

One of the motivations for updating the medical-waste management regulatory system was the fact that most of Saudi Arabia’s landfills had reached capacity, and environmental contamination was considered widespread (Al-Shallash and Shereif 2007). The contribution of medical waste to Saudi Arabian landfills was considered a significant threat to public health and the environment. The guidelines of 1998 were codified in the law that took effect in December 1999. The law applies only to private medical facilities, but it is believed that public medical facilities follow similar procedures (PME 2001). The law included the following requirements:

- Medical-waste treatment plants must be provided on-site by generators of medical waste, OR
- Generators of medical waste must contract for medical-waste management services.
- In either case, the Presidency of Meteorology and Environment had to approve these waste-management practices.

As a result of concern around the failure of in-house or on-site treatment facilities to properly safeguard the public and the environment, new regulations were issued in February 2001 requiring the closure of all on-site treatment plants and the ‘contracting-out’ of medical waste transport and disposal (PME 2001).

Saudi Arabian regulations for medical-waste management rely heavily on the expertise and responsibility of private waste-management firms. There were an estimated seven such firms engaged in medical-waste management in 2009, and the Kingdom was attempting to encourage growth in the waste-management industry to lower the costs of waste-management for healthcare operators and improve the overall expertise of waste-management practices. The Kingdom is closely aligned with both the healthcare and waste-management industries to cultivate improved waste-management technologies and practices (MOMRA 2009).

Nevertheless, media reports from a variety of sources, mostly English-language Saudi Arabian newspapers and websites, document problems with medical-waste throughout the Kingdom. In August 2011, *Arab News* reported a complaint filed by a Saudi Arabian mother whose son returned to the family home with used syringes and other medical waste (2011). A health official from the local jurisdiction blamed the improper disposal of medical waste on the private firm contracted for waste-management service. Despite this claim, no action was taken against the firm. In May 2011, *The Saudi Gazette* published photographs of medical waste disposed in flash-flood control channels near the city of Najran (2011).

5. Medical-waste management in South Australia

South Australia's regulatory system for medical waste management and disposal generally correlates to those instituted in North America and Western Europe. *The Environment Protection Act 1993* and *The Environment Protection (Waste to Resources) Policy 2010* provide both the operating framework and specific regulations for medical-waste management. Initially, all medical waste was required to be incinerated and could not be disposed of in repositories reserved for general waste. However, as new technologies emerged to treat medical waste, such as microwave and autoclave, regulations were amended to allow non-incineration treatment processes. All treatment and disposal sites—be they incineration or otherwise—must be licensed by the Environment Protection Authority, and all waste-management firms are required to be licensed. There are also strict regulations on healthcare providers and other generators of medical waste related to handling and on-site storage. The law includes civil and criminal penalties for improper waste-management practices (EPA, 2013).

6. Proposed legal mechanisms to improve medical-waste management in the Kingdom

Scholars have recognized the previous failure of Saudi environmental and public-health laws to achieve desired ends due to a lack of enforcement and the will of policymakers and regulators. Indeed, the history and current status of Saudi environmental law reflects an inconsistency between the law and its enforcement. The cause of this inconsistency is identified as a combination of meagre political will, a lack of expertise and a lack of personnel. In response to this failure, legal scholars have recommended new legal mechanisms designed to overcome the twin challenges of expertise and personnel. Under these proposals, Saudi Arabia, and other Arab countries with similar lack of expertise and personnel in the regulatory regime, could enact economic mechanisms in the law, including pricing, charges, taxes, and financial incentives (Saqqar 2004).

Pricing involves economic mechanisms to increase the price of products and services related to waste-management, thus encouraging more effective and efficient practices that diminish impacts on the environment and public health. In the context of medical-waste management, pricing could take various forms. Tariffs could be exacted on medical materials that can be recycled or more efficiently used, resulting in less medical waste in the waste stream. Costs for disposal of treated medical waste into municipal landfills could also be increased, thus raising the costs for waste-management firms, and their healthcare clients, resulting in more efficient waste-management practices.

The Saudi regulatory system could also increase public charges to ensure more efficient and effective management practices. For example, utility charges for the use of municipal landfill and public waste-management should be adequate to cover the costs of these public operations, which could vary depending on the amount of use by the private operator, thus encouraging more streamlined waste-management practices. Operators who engage in heavy use of public waste systems will be required to pay progressively more based on usage. Given the fact that Saudi Arabian landfills are operating in excess of capacity, such charges could also be used to collect revenue for landfill expansion.

Charges could also be enacted to encourage operators of incinerators, which are the main source of air-borne pollutants from medical waste, to diminish or cease operations. Similar charges have been constructed in the legal regimes of North America and Western Europe. These charges are based on identifying pollutants that are discharged, then applying a charge commensurate to the estimated release of said pollutants (Saqqa 2004). These charges create financial incentives among polluters to adopt more sustainable technologies and systems.

These economic mechanisms cannot overcome the central problem of environmental enforcement in Saudi Arabia and other Arab countries: weak political will. Strong political will is necessary to implement these mechanisms. As one scholar notes, 'The political will is the key issue for successfully protecting the environment in all the Arab countries' (Saqqa 2004, p. 453). At the same time, scholars recognize the need for increased expertise and personnel to enforce these economic mechanisms, which represent the least intensive aspect of environmental enforcement. 'It is recommended to strengthen environmental entities in the Arab countries in order to raise their capabilities in terms of qualified staffing and equipment needed' (*ibid*). Economic mechanisms cannot exist without expertise and personnel, even if they require less expertise and personnel than more advanced enforcement systems in North America and Western Europe.

Increased public influence is another potential solution to improved enforcement of waste-management law in Saudi Arabia, though this solution also reflects intrinsic barriers as a result of the relatively hierarchical and authoritarian political system in the Kingdom. As one Saqqa notes, 'Public involvement is still very limited in most Arab countries' (2004, p. 453). Nevertheless, scholars have documented the increasing role of nongovernmental organizations and other citizen-led efforts to promote environmental awareness and legislation in a number of Arab countries. The Jordanian Environment Society along with Kuwait's Environment Protection Society for instance, have both presented their governments with models for reform. If similar nongovernmental movements can be realized in Saudi Arabia then new potentials may also be realized.

Conclusion

The disposal and management of medical waste continues to present significant challenges for Saudi Arabia. Among the reasons are the poor training of healthcare workers, a lack of legal enforcement and penalties, and the bad-practice of waste-management firms. Fortunately, there is some evidence that Saudi Arabia is beginning to tackle the challenge posed by medical-waste management seriously, even if the effort fails to replicate the ideal systems of those in industrialized countries. The 1998 guidelines and the 2001 law regulating medical-waste management reflect the basic legal mechanisms in industrial countries. Healthcare providers are required to abide by regulations in the proper handling and storage of medical waste, and private waste-management firms must be licensed and abide by regulations related to transport, treatment and disposal. The Saudi regulations, unfortunately, lack the same level of civil and criminal penalties against violators, and thus the law lacks the bite of its counterparts in industrial countries.

In the absence of a large and experienced enforcement bureaucracy, Saudi Arabia should consider the implementation of economic mechanisms to encourage proper waste-management practices. These can include pricing, charges, and taxes to raise the costs of inefficient and ineffective waste-management practices. These economic mechanisms still

require political will, however, is lacking in Saudi Arabia due to weak public influence and an authoritarian political system.

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