

A CHINA ENVIRONMENTAL HEALTH PROJECT RESEARCH BRIEF

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Waste Mismanagement: China's Struggle with Medical Trash June 2009

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Zhang Xiuqiong Case

In November 2007, a farmer from Sichuan Province named Zhang Xiuqiong was arrested for illegally collecting hazardous medical waste. Chongqing environmental protection officials, who found 33.9 tons of medical waste inside a residential building, described the scene as “shocking.” The facility was full of medical waste including blood transfusion bags that still contained blood. It took fifteen medical waste vehicles eight hours to clean up the site.¹ One year later, Zhang Xiuqiong was sentenced to three years in jail for illegally collecting medical waste.² This case was the first court sentence of such crime in China³ and is an example of China's ongoing legal efforts towards improving proper disposal methods of medical waste. Following the arrest of Zhang Xiuqiong, six hospitals at Chongqing were fined at rates ranging from 20,000 RMB to 100,000 RMB though none of them were charged⁴.

Medical Waste Generation in China

China currently generates about 650,000 tons of medical waste each year and this amount is predicted to grow at a rate of 19 to 25 percent⁵. The main methods of disposing of this medical waste are landfills, solidification, recycling, and incineration. However, these measures are not always carried through with. A WWF study on China's Environmental Services Market reported that China generates about 20-40 tons of hazardous waste annually and more than half of it was mistreated as general disposals. While this waste is not explicitly medical, it is testament to the improvements needed in China's disposal processes.⁶

SARS Puts Medical Waste Higher on the Agenda

China did not start creating its legal framework regarding medical waste until the 2003 SARS outbreak.⁷ Prior to that, the lack of a clear definition of medical waste and improper handling guidelines resulted in what in Chinese experts have termed “chaotic” medical waste management. Chronic problems included: disposable medical equipment being recycled, toxic gases generated from the burning of plastic medical equipment, and waste disposal personnel and garbage pickers facing potential infection from needle pricks. All of these problems posed serious public health and security threats. The State Environmental Protection Administration (now Ministry of Environmental Protection, MEP)⁸ issued several notices and circulars to guide the administration and supervision of medical waste treatment during the epidemic.⁹¹⁰ The State Council promulgated the *Regulation on the Control of Medical Waste* (Order No. 380) as China's first legislation to address medical waste management. According to this regulation, medical waste refers to “directly or indirectly infectious, or poisonous, or otherwise harmful wastes generated by medical institutions in medical treatment, prevention, health care, and other relevant activities.”¹¹ This regulation was significant in that it:

- Represented the first legal definition of medical waste in Chinese law;
- Provided clear guidelines for each stage of the treatment of medical waste;
- Mandated centralized treatment by authorized entities;
- Required waste generators to properly classify and manage medical wastes; and,

- Mandated that cities above the county level complete the construction of medical waste treatment facilities by 2004. Cities at the county level were granted an additional two years to complete the facilities.

Following the issuance of the *Regulation on Control of Medical Waste*, many other departments within the Chinese government such as the Ministry of Health (MOH) also issued relevant regulations and guidelines. In October 2003, the MOH and MEP published the *Inventory of Medical Waste Classification*,¹² which classified medical wastes into five groups.¹³ During the same month, MOH promulgated the measures for *Medical Wastes Management of Medical and Health Institutions*. In May 2004, MOH and MEP issued the *Administrative Punishment Measures for the Medical Waste Management* identifying what is improper behavior relating to medical waste management. In addition to the above regulations, in 2003 MEP issued a series of technical standards for medical waste incinerators¹⁴ and transport vehicles¹⁵, as well as standards for medical waste packages, containers, and warning labels. MEP recently updated the last standard with new inspection methods that became effective in April 2008.¹⁶

Nationwide Push for Infrastructure Development

Recognizing the urgent need to improve the nation's medical waste management, MEP began implementing the *National Hazardous Waste and Medical Waste Treatment Facility Construction Plan* in 2004. The construction plan mapped out an aggressive vision of completing 31 hazardous waste treatment facilities and 331 medical waste treatment facilities by the end of 2006. However, the actual implementation has lagged behind with only 70 constructed by 2006.¹⁷ One obstacle has been the underreporting of waste generation. Specifically, a pollution control inspection report conducted by the National People's Congress (NPC) in 2006 found that the official figure of China's solid waste discharge underestimates the real situation. For fear of punishment for mismanagement, many localities reported lower figures of waste generation.¹⁸ The NPC report also indicates a slow development path of medical waste treatment facilities due to incomplete local medical treatment regulations or difficulties when choosing facility locations.

According to the most recent progress report published by the China Academy of Environmental Planning, as of May 2008 only 199 medical waste facilities have been constructed.¹⁹ To better monitor the progress of the above construction plan, during 2004 and 2005, MEP conducted annual investigations on the management and disposal of medical waste in certain cities and such checkups have been highlighted in MEP's annual *State of Environment in China* report. The 2006 *State of Environment* report indicated specific budget approvals for construction projects for hazardous and medical waste treatment facilities.²⁰ However, no word about medical waste appeared in the most recent report on the state of the environment.²¹

Although it did not yet reach the stated goal of 331 treatment centers, MEP's construction plan has brought some positive results. MEP's *Annual Report on Urban Environmental Management and Integrated Control* provides a longer term tracking of progress made in medical waste disposal. Initiated in 1997, this annual urban assessment report aims to evaluate Chinese cities' environmental performance and infrastructure development. The measurement of collected treatment of medical waste did not appear in the report until 2004; such waste was previously included as part of the measurement of hazardous waste treatment rate.²² The number of Chinese cities assessed in this report increased from 113 in 2003 to 617 in 2007, reaching over 90 percent of China's total.²³ In 2007, 74 percent of the cities achieved collected treatment of medical waste,²⁴ up from 60.4 percent in 2004.²⁵ The collected treatment rate of medical waste among the 109 key cities of environment protection (excluding the four directly governed cities) increased from 71.76 percent in 2004²⁶ to 84.06 percent in 2007.²⁷ However, it should be noted that achieving collected treatment of medical waste only indicates that the city has the capacity of treating medical waste collectively. It does not necessarily mean that cities treat 100% of their medical waste properly.

Among the four directly governed city regions, Beijing, Chongqing, Shanghai, and Tianjin, Tianjin achieved 100 percent collected treatment of medical waste since 2005 while Beijing and Shanghai lagged behind. However, Shanghai improved its collected treatment rate of medical waste from 31.6 percent in 2005²⁸ to 78.37 percent in 2007.²⁹ Beijing also achieved significant improvement in terms of waste treatment during its preparation for the Olympic Games. During 2004 and 2005, two medical waste treatment facilities with daily treatment capacity at 60 tons were completed, well covering Beijing's medical waste generation rate of 41 tons/day.³⁰

The State Council announced the start of China's first pollution census in January 2008, which aimed to identify the sources and extent of industrial, agricultural and residential pollution, as well as medical waste.³¹ The data was collected from 333 cities and 2,895 counties at a cost of 737 million Yuan.³² The survey finished the full-range data collection by the first half of 2008, completed the data analysis and census data formation by the end of 2008, and the data will be published some time in 2009.³³³⁴ The completion of this survey should provide a more up-to-date picture of China's medical waste, which is data sorely needed by MEP to update *National Hazardous Waste and Medical Waste Treatment Facility Construction Plan* and to better allocate resources where needed.

Medical Waste Management in the Rural and Remote Areas

In 2007, the relatively wealthy provinces achieved much better results in terms of medical waste treatment than their poorer counterparts. For example, Jiangsu, Zhejiang, Guangdong, and Shandong provinces had a 97 percent rate of collection and treatment of medical wastes.³⁵ In contrast, cities within the remote provinces such as Guizhou, Yunnan, Gansu and Xizang had much lower collection and treatment rates of medical waste—usually at or below 60 percent.³⁶ Notably 74 percent of China's cities have met the requirements to install medical waste facilities by the 2007 deadline mandated in the *Regulation on the Control of Medical Waste*, but many poorer cities face serious challenges in dealing with this waste.³⁷

Hospitals in the western region of China face special difficulties when it comes to medical waste management. While most of the solid waste generated from hospitals can be put in landfills or incinerated, liquid waste requires wastewater disposal facilities, which many small provinces—particularly Gansu—cannot afford.³⁸ With low or nonexistent budgets, understaffed local environmental protection enforcement officials, and lack of attention from the county-level authorities, medical waste problems among rural and remote regions remain largely unaddressed.

However, the central government has been making some efforts to bolster rural medical waste management. Within the China Rural Health Project—funded by World Bank and British Department for International Development—there is a Medical Waste Management Plan (MWMP) initiative that aims to assist rural area management of medical waste and increase public awareness of disposal issues. The MWMP initiative will cover forty counties in eight provinces and the Ministry of Health will review the final results to determine how to integrate lessons learned into broader policies and regulations.³⁹

The Heart of the Problem

Despite the significant efforts put forth to strengthen medical waste management in China, the Zhang Xiuqiong case that opened this brief suggests that the above regulations and guidelines are not fully effective at the local level. The *Regulation on the Control of Medical Waste* mandates that the waste generator, the hospitals, should have clear registration of sources, content, and eventual whereabouts of all disposed wastes.⁴⁰ However, an interview conducted by China's Central Television Network following this court case found numerous violations throughout the medical waste management process between the hospital and the authorized medical waste treatment company. Incidents include misplaced medical wastes, improper recording of medical waste, and lack of designated management

personnel. Recently, a group of scholars from the Southeast University in China published a case study of medical waste management among hospitals at Nanjing. Results from the study revealed problems occurring during each stage of the disposal process. The following table highlights problems raised in the study.

Issues of Medical Waste Management in China⁴¹	
Medical Waste Procedure	Major Findings
Medical Waste Generation	<ol style="list-style-type: none"> 1) Since only the quantities of medical waste were monitored, hospitals tend to ignore other relevant statistics required by the regulations. 2) Lack of effective management framework and lack of trained management personnel.
Segregation and Collection	<ol style="list-style-type: none"> 1) Cases of wastes handled by personnel without protective equipment. 2) Inappropriate labeling of medical wastes (e.g., wrong color coding). 3) Lack of sufficient segregation, which leads to mixture of infectious wastes with municipal wastes. 4) Lack of waste minimization and effective recycling.
Storage	<ol style="list-style-type: none"> 1) Temporary storage places of medical waste are too close to municipal waste. 2) Inappropriate storage of medical wastes. 3) Lack of dedicated personnel to manage storage locations. 4) Workers not wearing protective gear. 5) Storage areas not properly cleaned after wastes transported.
Transportation	<ol style="list-style-type: none"> 1) MEP failure to monitor the transportation of medical waste. 2) Medical waste handled by personnel without proper license or protective measures. 3) Medical wastes transported with other wastes.
Disposal of medical waste	<ol style="list-style-type: none"> 1) There is a limited choice of medical waste treatment methods. 2) The incineration of waste generates air pollutants the impacts of which are not well monitored. 3) Waste incinerator operators lack training about medical waste. 4) High disposal cost discourages hospital to follow the standard procedure.

The issues raised in the table underscore that national regulations and guidelines are not completely understood and adopted by medical institutions, waste management facilities or local environmental protection bureaus. Although the study outlined in the box only surveyed hospitals in the relatively wealthy city of Nanjing, these findings reflect some of the common issues related to medical waste

management in China. Potential solutions to the above problems in Nanjing could be applicable to hospitals and related entities throughout China.

Conclusion

The relatively late promotion of proper medical waste management and treatment in China has resulted in continued incidents, as evidenced by the Zhang Xiuqiong case. The regulations and guidelines are still relatively new to the public and the integration of such practices into every day operations at hospitals has been slow. Simply developing a legal framework and accelerating the construction of infrastructure are clearly not enough. Safe and effective medical waste management requires stringent supply chain management and monitoring which currently does not exist. Overall, waste management has not been a high priority for international assistance, but the problems in China indicate that it could be an area with many such opportunities.

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⁸ In March, 2008, SEPA was upgraded to a ministry.

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