



# Prevention and control of novel coronavirus pneumonia in Medical Waste Disposal Institutions in Jiangsu

Jianan Xu<sup>1#</sup>, Ning Wang<sup>2#</sup>, Qing Chang<sup>3</sup>, Huanxi Shen<sup>4</sup>, Dandan Yang<sup>1</sup>

<sup>1</sup>Jiangsu Provincial Center for Disease Control and Prevention, Nanjing, China; <sup>2</sup>Nanjing Center for Disease Control and Prevention, Nanjing, China; <sup>3</sup>Wuxi No. 8 People's Hospital Group, Wuxi, China; <sup>4</sup>Kunshan Center for Disease Control and Prevention, Kunshan, China

*Contributions:* (I) Conception and design: J Xu, N Wang; (II) Administrative support: D Yang, Q Chang; (III) Provision of study materials or patients: Q Chang; (IV) Collection and assembly of data: N Wang; (V) Data analysis and interpretation: J Xu; (VI) Manuscript writing: All authors; (VII) Final approval of manuscript: All authors.

<sup>#</sup>These authors contributed equally to this work.

*Correspondence to:* Dandan Yang. Jiangsu Provincial Center for Disease Control and Prevention, Nanjing 210009, China. Email: yangdan1997@163.com.

**Abstract:** The novel coronavirus pneumonia is an infectious disease caused by the SARS-CoV-2 virus. It has been widely spread worldwide. At present, the situation of novel coronavirus epidemic prevention and control in China is still bleak. Waste disposal for the novel coronavirus should be standardized, a necessary measure for avoiding the re-spread of novel coronavirus and preventing secondary disasters. The management and disposal of medical waste is increasingly valued worldwide. International organizations represented by WHO are actively providing developing countries with comprehensive medical waste management and disposal systems to protect the health and environmental safety of people in more countries. The current investigation has found that there may be novel coronavirus in the medical waste. If the medical waste generated from the treatment of novel coronavirus pneumonia patients is not properly disposed of, it is likely to cause the novel pneumonia epidemic to break out again. Effective management of medical waste disposal related to novel coronavirus pneumonia is an essential requirement for the prevention and control of novel coronavirus pneumonia in medical waste disposal institutions. According to the types and hazards of medical waste and the characteristics of medical waste disposal, specific control measures are put forward for the management of the premises, personnel management, disposal of medical wastes, and emergency management.

**Keywords:** Novel coronavirus pneumonia; medical waste; waste disposal

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## Introduction

Since the emergence of the novel coronavirus pneumonia in December 2019, the COVID-19 epidemic has spread rapidly, causing a pandemic worldwide. China's health commission regards the disease as an acute respiratory infectious disease, included in the national class B infectious disease and managed according to class A. Meanwhile, the novel coronavirus pneumonia is being controlled by the national authorities to control the spread of the epidemic. Medical institutions at all levels have been fully committed

to the treatment of novel coronavirus pneumonia patients, and an immense number of medical waste has been generated during the treatment. As a pollutant, medical waste has the characteristics of space pollution, acute infection, and latent infection. Medical and health institutions in China are concentrated on the main urban areas of the city. The collection, storage, and treatment of medical waste, especially infectious waste, should be treated and managed to prevent the possible dispersion of infectious substances and harmful chemicals. During

the novel coronavirus epidemic, these medical wastes may contaminate novel coronavirus, and if mishandled, there will be two transmissions. According to the process and characteristics of the medical waste disposal, Jiangsu Provincial Center for Disease Control and Prevention has formulated technical specifications for the prevention and control of the novel coronavirus pneumonia epidemic in the medical waste disposal institutions, which may guide medical waste disposal institutions to carry out the preventive and control measures correctly.

### Types and hazards of medical, solid waste

Medical institutions produce numerous medical, solid waste daily, and its types are various, which can be roughly divided into several groups. (I) Infectious medical, solid waste, including disposable infusion set and syringe, without treatment, will increase the chance of patients' infection. Further, used cotton swabs, gauze, other dressings, discarded blood samples, and infectious patients' old clothes, old quilts, and other wastes that have become infectious medical waste that contain many pathogenic microorganisms, which can infect the human body through skin wounds, outer mucosa, inhalation, and intake. (II) Harmful medical, solid wastes, including used needles, surgical blades, etc., are susceptible to cause infection and cause accidental injury to hospital staff and patients. (III) Expired pharmaceutical solid waste or deteriorated drugs and vaccines in medical institutions need to be treated in a timely and reasonable manner. If they are used again due to poor management, they may lead to severe medical accidents. (IV) Chemical medical, solid wastes, including chemical reagents, disinfectants, mercury sphygmomanometers, mercury thermometers, etc. In the laboratory of a medical imaging room, these wastes need to be treated with specific treatment technology in time. Otherwise, it will cause severe damage to the surrounding environment and poison the people in the environment. According to the relevant test report of the health department in China, the harmfulness of hospital waste is far higher than domestic waste and has the particularity of high space pollution (1).

### Prevention and control measures

#### Basic requirements

- (I) Medical waste disposal institutions should strictly implement the primary responsibilities of the

relevant departments for epidemic prevention and control. A novel coronavirus pneumonia epidemic emergency prevention and control work organization system should be set up, led by the main person in charge of the medical waste disposal institution. The leading group for epidemic prevention and control and the specialized departments in which personnel handle epidemic prevention and control work also should be set up.

- (II) The medical waste disposal institution shall establish its own novel coronary pneumonia epidemic prevention and control working mechanism, clarify and implement the prevention and control responsibilities, tasks, and measures, and formulate a work plan following the actual work of the medical disposal institution.
- (III) Guarantee the funds and materials necessary for the prevention and control of the pneumonia epidemic caused by the novel coronavirus, and strengthen the supply of disinfection supplies and personal protective equipment to deal with the outbreak.
- (IV) According to job responsibilities, determine the training content for personnel in different positions, so that they are proficient in the knowledge, methods, and skills of prevention and control of novel coronavirus infection, to achieve early detection, early reporting, and first isolation.
- (V) Earnestly implement various prevention and control measures for the novel coronavirus pneumonia epidemic. When a novel coronavirus pneumonia epidemic occurs, it should cooperate with the disease control agency to manage the epidemic.

#### Workplace management

- (I) At the entrance of the workplace, do information registration, temperature measurement, hand disinfection, etc., and report to the leader in charge of the unit and the local disease prevention and control center when abnormal temperature, cough, and other suspected novel coronary symptoms are found.
- (II) Strengthen the natural ventilation and mechanical ventilation of workers' work, living places, and service places to support air circulation. It is advisable to reduce using air conditioners, open windows regularly, and clean the air conditioners. For centralized air conditioning systems with return

air, low-resistance, medium-efficiency air filters should be installed at the return airports, and the cleaning and replacement of air filters at new airports should be strengthened.

- (III) Following requirements from GB19193, at the end of each shift, the staff should clean and disinfect the surfaces and floors of the workplace and make a record (2).

### *Personnel management*

- (I) The outgoing staff shall wear medical protective masks, rubber gloves, goggles, work shoes, and work clothes according to the technical guidelines for the selection and use of masks for different groups of people. When the medical waste in the medical waste transfer box is poured into the treatment system, workers who are in close contact need to perform personal protection. They should wear work clothes, disposable work caps, disposable gloves, protective clothing, medical protective masks, protective screens, rubber boots, waterproof boot covers, etc.
- (II) Drivers of transfer vehicles should wear medical protective masks, rubber gloves, goggles, work shoes, and work clothes.
- (III) Cleaning and disinfection are needed for the collection and transportation area. Also, cleaning and disinfecting are needed for the vehicle after the completion of the collection operation. During disinfection, ensure that the interior and exterior of the vehicle are adequately disinfected; disinfection personnel should wear N95 masks, rubber gloves, goggles, work shoes, and a one-piece protective suit.
- (IV) The office and on-site management personnel should wear medical surgical masks and work clothes according to medium-risk exposure, and using protective clothing, masks, and other items should be treated following medical waste.

### *Transfer boxes for vehicles and medical waste*

- (I) When transporting medical waste, medical waste disposal institutions shall comply with relevant national regulations on the transportation of dangerous goods and use special vehicles that meet relevant requirements and have noticeable medical waste marks.
- (II) After the use of the vehicle transporting the medical

waste, the carriage shall be disinfected and cleaned following GB19193 in the medical waste disposal institution promptly. The carriage shall be used exclusively, and other items shall not be transported.

- (III) After the medical waste transfer box is transported to the medical waste disposal institution, the external surface shall be disinfected on the spot before later treatment. The medical waste transfer boxes should be thoroughly disinfected according to GB19193 after use.

### *Medical waste disposal process*

- (I) The transport route and handover requirements should be determined before the transfer of medical waste. Transport routes should avoid populated areas, transport time to avoid rush hours. Clinical waste should be transported to the disposal facility within not more than 48 hours. Vehicles should be disinfected according to the GB19193 guidelines after unloading. Medical waste disposal institutions shall fix select vehicles to transport infectious medical waste generated during the prevention and control of pneumonia epidemic separately, do not mix and transport it with other medical waste, fill in transfer joint form with other medical waste separately, and establish a standing book.
- (II) Medical waste disposal institutions should be given priority for the collection and disposal of infectious medical waste generated during the prevention and control of pneumonia epidemics. The medical waste delivered to the disposal site should be disposed of at any time, and the temporary storage time in the disposal institution should not exceed 12h. An isolation zone for medical waste disposal shall be set up in the disposal institution. The isolation zone shall be marked, and no irrelevant personnel shall enter. The isolation zone of the disposal unit shall be in charge of a particular person who shall spray or mop walls, floors, and object surfaces for disinfection following GB 19193.
- (III) Medical waste disposal institutions should designate special discharging receiving area, cleaning and disinfection area for COVID-19 prevention and control of medical waste, add constant rain and rain prevention and leakage prevention measures, plan unique driving routes for medical waste transport vehicles, and assign specialized personnel for

management. Warning and warning restriction measures shall be set up on the receiving site. Special feeding equipment should be used to prevent secondary cross-contamination between medical waste and other incinerators. Pay attention to the compatibility of medical waste and other incineration materials to ensure the smooth and controllable operation of the process equipment.

- (IV) Medical waste disposal institutions should train operators on COVID-19 knowledge, operating procedures, wearing personal protective equipment, and disinfection knowledge.

### **Emergency management**

- (I) Establish emergency response areas. When people with suspected symptoms appear, they should go to the area for temporary isolation and arrange for nearby medical treatment.
- (II) When COVID-19 cases occur, they should be immediately transferred to designated hospitals for diagnosis and treatment, timely report to the local CDC and superior departments, and cooperate with the CDC to identify close contacts.
- (III) Under the guidance of the local CDC, the site shall be end-disinfected, and the air conditioning and ventilation system shall be cleaned and disinfected. The site shall be reactivated after the evaluation of hygiene.

### **Discussion**

In the 1990s, the medical wastes have been included in the list of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (3). In medical waste treatment, many countries have gradually formed a complete medical waste treatment system. This system has strict requirements for each link. The Chinese government has put forward relevant requirements for the generation, transportation, storage, and treatment of medical waste. During the SARS period in 2003, many medical institutions had severe problems in the treatment of medical waste, which have aroused considerable concern. Therefore, relevant domestic departments have successively issued relevant regulations and management methods for the management and treatment of medical waste (4). Since then, some medical institutions have developed a management system

for medical waste, set up procedures for the classification and collection of medical waste, and implemented relevant policies and regulations. Numbers of facts have proved that infectious medical waste is an essential factor for the spread of human immune viruses and hepatitis viruses (5). When the novel coronavirus epidemic is prevalent, there may be several COVID-19 in medical waste, making it possible to become a new source of infection again. We have proposed strategies to deal with the problems of pathogen control in medical waste disposal institutions, and formulated DB32/T 3761.20-2020 “Novel Coronavirus Pneumonia Epidemic Prevention and Control Technical Specifications Part 20: Medical Waste Disposal Institutions”, concerning the requirements of “Management and Technical Guidelines for Emergency Treatment of Medical Wastes of Pneumonia with Novel Coronavirus Infection (Trial)” (6). The technical specifications formulated are of superior guiding significance for medical waste treatment institutions to do an excellent job in the waste disposal and control the spread of the epidemic during the epidemic of the novel coronavirus.

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### **Footnote**

*Conflicts of Interest:* All authors have completed the ICMJE uniform disclosure form (available at <http://dx.doi.org/10.21037/jphe-20-72>). Dr. Huanxi Shen serves as an unpaid editorial board member of Journal of Public Health and Emergency. The other authors have no conflicts of interest to declare.

*Ethical Statement:* The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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## References

1. Yanchun P, Wen X, Junyu X. Research for incineration of solid waste. *Ke Ji Feng* 2010;233.
2. National Health Commission of the People's Republic of China. (2015). General principle on disinfection for infectious focus. Available online: <http://www.nhc.gov.cn/ewebeditor/uploadfile/2015/07/20150731104831511.pdf>
3. Deyu W, Jinyan W, Chunhui D. Medical waste disposal status and countermeasures. *Shandong Medical Journal* 2006;79.
4. Ministry of Ecology and Environment of the People's Republic of China. Technical specification for centralized disposal of medical waste. (2003). Available online: [http://www.mee.gov.cn/gkml/zj/wj/200910/t20091022\\_172250.htm](http://www.mee.gov.cn/gkml/zj/wj/200910/t20091022_172250.htm).
5. Reinhardt PA, Chelsea GJ. Infectious and Medical Waste Management. *Journal of Clinical Engineering* 1991;16:259.
6. Ministry of Ecology and Environment of the People's Republic of China. (2020). New Coronavirus Infected Pneumonia Outbreak Medical Waste Emergency Management and Technical Guideline (Trial). Available online: [http://www.mee.gov.cn/ywdt/xwfb/202001/t20200129\\_761043.shtml](http://www.mee.gov.cn/ywdt/xwfb/202001/t20200129_761043.shtml).

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