



Strengthening core public health capacity based on the implementation of the International Health Regulations (IHR) (2005): Chinese lessons

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Abstract

As an international legal instrument, the International Health Regulations (IHR) is internationally binding in 196 countries, especially in all the member states of the World Health Organization (WHO). The IHR aims to prevent, protect against, control, and respond to the international spread of disease and aims to cut out unnecessary interruptions to traffic and trade. To meet IHR requirements, countries need to improve capacity construction by developing, strengthening, and maintaining core response capacities for public health risk and Public Health Emergency of International Concern (PHEIC). In addition, all the related core capacity requirements should be met before June 15, 2012. If not, then the deadline can be extended until 2016 upon request by countries. China has promoted the implementation of the IHR comprehensively, continually strengthening the core public health capacity and advancing in core public health emergency capacity building, points of entry capacity building, as well as risk prevention and control of biological events (infectious diseases, zoonotic diseases, and food safety), radiological, nuclear, and chemical events, and other catastrophic events. With significant progress in core capacity building, China has dealt with many public health emergencies successfully, ensuring that its core public health capacity has met the IHR requirements, which was reported to WHO in June 2014. This article describes the steps, measures, and related experiences in the implementation of IHR in China.

Keywords: International Health Regulations (IHR), Health Emergency, Core Public Health Capacity

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The International Health Regulations (IHR) is considered an international legal instrument that is binding in 196 countries worldwide, especially in all the member states of World Health Organization (WHO) (1). The IHR is also applied to the whole region of China. The IHR aims to prevent, protect against, control, and respond to the international spread of disease and aims to cut out unnecessary interruptions to traffic and trade.

The IHR (2005) is a result of the revision of its predecessor, which did not adapt to the development of international trade and disease spectrum, especially the Public Health Emergency of International Concern (PHEIC). To lower the transmission risk of diseases at international airports, ground crossings, or ports, the IHR (2005) is designed to meet the requirements. As a legally binding global framework, the IHR (2005) aims to prevent, protect against, control, and provide a public health response to the international spread of disease as well as avoid unnecessary interruptions to traffic and trade (2).

In recent years, China has promoted the implementation of the IHR comprehensively, continually strengthening the core public health capacity and advancing the building of core public health emergency capacity, points of entry capacity, as well as risk prevention and control of biological events (infectious diseases, zoonotic diseases, and food safety), radiological, nuclear and chemical events, and other catastrophic events. With significant progress in core capacity building, China has successfully dealt with a series of public

health emergencies, such as the H1N1 flu and the H7N9 avian flu.

Last year, the Ebola epidemic that haunted West Africa aroused worldwide attention. Using the IHR (2005), the director-general of the WHO assembled a special commission on August 6, 2014, and declared the event as PHEIC on August 8, 2014. This declaration means that international cooperation is needed to prevent and reverse the spread of Ebola. As a result, a series of measures had been proposed to lower the contagion risks. The WHO and member states collected all the resources to fight Ebola on a global scale. The WHO also did not recommend that countries try to control travel or close their borders, which would make the affected countries suffer humanitarian crises and undermine efforts preventing the epidemic. A significant amount of work was done by the WHO and member states of IHR (2005), especially on sharing epidemic information and reducing unnecessary interference on international travel and trade. WHO successively released: “Travel and Transport Risk Assessment: Guidance for Public Health Authorities and the Transport Sector and Ebola Event Management at Points of Entry: Interim Guidance by IHR (2005)”, guiding all the states to minimize the effects on travel and trade and to prepare for the epidemic.

While addressing the Ebola epidemic in China, we have improved the conventional screening level at entry points and warned the medical staff to be vigilant to patients with

symptoms related to Ebola (fever, flu-like aches and pains, diarrhea, vomiting, rash, and hemorrhage). Doctors were requested to collect the travel history of the patients carefully. Self-protection and nosocomial infection protection were also strengthened. The medical staff was trained to take blood samples safely and to transport suspicious samples to certified laboratories for testing. In addition, China sent several medical teams and provided a large amount of material and technical assistance to Africa, helping those countries to fight Ebola. China has fully met the obligations under IHR (2005).

Importance of implementing International Health Regulations (IHR)

The world we lived in today is highly mobile, interdependent, and interconnected, giving tremendous opportunities for diseases to spread rapidly. Furthermore, the public has been focusing on new health events caused by chemical, nuclear, and sudden environmental changes in the recent past (3). The prevalence of globalized travel and trade transmits pathogens to distant populations rapidly (4). Regarding new intimidations from emerging diseases and other public health risks threatening the world, the IHR is needed to confront all the new challenges now more than ever (2).

First approved by the World Health Assembly (WHA) in 1969, the IHR, which covered six “quarantine diseases”, was revised in 1973 and 1981, reducing the number of diseases from six to three (yellow fever, plague, and cholera). Compared with IHR (2005), the disease spectrum of the previous IHR was narrower (cholera, plague, and yellow fever), being highly dependent on official notifications of contracting states and lacking an international cooperation system to prevent worldwide spreading. With the development of cross-border travel and trade as well as communication technology, all kinds of news could be spread in different ways officially and unofficially. The previous IHR is unable to deal with the increasing public health risks. Additionally, some countries even withheld epidemic information with regard to the unnecessary ban on travel and trade. All of these call for a new regulation to response, leading to the production of IHR (2005). The disease spectrum of IHR (2005) has been widened to include the existing and emerging infectious diseases as well as the emergency events caused by non-communicable factors. The new legal framework ensures the quick collection of information, which makes it easy to acquire international understanding of PHEIC and prepare for supporting the countries in need.

In addition, the IHR (2005) requests the establishment of national focal points in the WHO and authorities of the member states, making it more convenient to communicate and report. The IHR also demands that member states should strengthen, develop, and maintain the core public health capacity by using existing resources. The IHR (2005) also includes procedures for obtaining independent technical advice concerning IHR implementation. Especially in recent years, new infectious diseases potentially emerge and spread across borders with the development of international travel and trade. The 48th WHA in 1995 decided to make significant revision on the former IHR formulated in 1969. The revised IHR, which took effect in 2007, was approved in the 58th WHA. The IHR seeks to protect the international community

against any disease or medical situation with probable public health threats instead of certain diseases or transmission modes. The countries meeting the IHR requirements need to develop a minimum particular core public health capacity and to notify the WHO of any event that is considered a PHEIC, which should be confirmed and declared by the WHO. At the same time, the IHR clarifies a series of procedures that should be observed by the WHO to protect global public health safety (5).

The revised IHR focuses on public health crisis prevention, which has been expanded from certain “quarantine diseases” to any public health emergencies that may cause international repercussions. The implementation of the IHR shifts from the passive barrier of entry and exit points to the proactive risk management, aiming at early detection of any international threat before its formation and at stopping it from the very beginning (6).

To meet the IHR requirements, the countries need to develop, strengthen, and maintain core response capacities for public health risk and PHEIC and to meet the related core capacity requirements before June 15, 2012 (within 5 years after the enforcement of the revised IHR). If not, then an extension of the application to 2014 and another 2-year extension afterward for particular circumstances will be approved (5).

Steps and measures of International Health Regulations (IHR) implementation in China

As approved by the State Council, the National Health and Family Planning Commission (NHFPC, formerly Ministry of Health, MoH) is responsible for organizing, coordinating, and communicating work of IHR implementation in China. The Ministry of Agriculture (MoA); Ministry of Environmental Protection (MoEP); General Administration of Quality Supervision, Inspection, and Quarantine (AQSIQ); State Administration of Work Safety (SAWS); State Forestry Bureau (SFB); former States of Food and Drug Administration (SFDA); former Food Safety Office of the State Council, State Administration of Science, Technology, and Industry for National Defense (SASTIND); and other departments are the main units that implement the IHR. These departments work closely together to adopt a large number of effective measures to jointly promote the implementation of the IHR:

A. Improvement of related laws and regulations

The revisions of the following laws were launched successively: “Law of Communicable Disease Prevention and Control”, “Regulations of Public Health Emergency”, and “Law of Frontier Health and Quarantine”. The revisions of “Animal Epidemic Prevention Law” and “Dangerous Chemicals Safety Management Regulations” are completed. China has also timely released the “Management Approach of Human Infectious Bacteria Pathogenic Microorganisms (viruses) Collection Agency”, “Zoonosis Disease List”, “Management Approach of Wild Animal Epidemic Disease Prevention, Monitor, and Control”, and other regulations and normative documents. In terms of strategies and plans, the government issued the “Sudden Acute Infectious Disease Prevention and Control Strategy”, “Twelfth Five-Year-Plan of National Plague Prevention (2011–5)”, and “Long-term Animal

Disease Prevention and Control Plan (2012–20)”. A series of action plans is revised, such as the “National Plague Control Emergency Plan”, “National Food Safety Emergency Plan”, and “National Nuclear Emergency Plan”.

B. Establishment of multi-sectorial coordination mechanism

The former MoH established multi-sectorial working groups and expert groups for the implementation of the IHR, developed the “notification rules of the probable PHEIC”, and was responsible for regular communications, consultations, and technical exchanges.

The State Council set up a multi-sectorial joint prevention and control mechanism initiated by the NHFPC, which cooperated well with other departments and successfully responded to the H1N1 flu, the H7N9 avian flu, and a series of outbreaks. The former MoH together with the MoA revised and improved “the Cooperation Mechanism on the Prevention and Control of Zoonotic Diseases Mechanisms (2005) of MoH and MoA”. The SAWS initiated the establishment of the dangerous chemical production supervision inter-ministerial joint conference, covering 21 relevant ministries. The National Nuclear Accident Coordination Committee and the former Food Safety Office of the State Council jointly established and improved the coordination mechanism.

C. Proactive participation in public health emergency risk prevention and control among various departments

The former MoH identified the basic framework of public health emergency monitoring and advanced warning system and determined public health emergency risk assessment management practices and technology solutions. The former MoH also launched the national and provincial monthly risk assessment to actively investigate potential risks. The MoA established and improved a four-level animal disease surveillance network system, achieving the full coverage of animal epidemic prevention information reporting in the central, provincial, prefectural (municipal), and county levels. The animal disease surveillance and epidemiological investigations were conducted, and an epidemic emergency risk assessment mechanism was established to strengthen animal disease risk assessment. The MoEP investigated hidden environmental risks in the chemical industry. The AQSIQ actively promoted the Port of Entry (PoE) core capacity building and launched timely risk warnings of cross-border infectious diseases. A long-term mechanism of investigating the risks of hazardous chemicals in the industry was established by the Administration of Work Safety. The Administration of Forestry promoted the active surveillance and early warning of epidemic diseases caused by wild animals. The National Nuclear Emergency Management Office coordinated relevant departments to actively promote emergency networks, such as nuclear and radiation emergency radiation monitoring, marine monitoring, weather monitoring, medical aid, and other activities.

D. Improvement of core capacity through assessment and supervision

Since 2010, the WHO has been publishing an annual survey on IHR core capacity building progress to support national core capacity self-assessment (7). The questionnaire contains core

capacities for 13 categories, namely, national law, policy and financing capacity; coordination skills in the national level and communication skills of the national focal point in the global and national level; monitoring capacity; response capacity; emergency preparedness; risk communication capacity; human resource capacity; laboratory service capacity; entry and exit port capacity; zoonotic disease prevention and control capacity; food safety incident prevention and control capacity; chemical incident prevention and control capacity; and nuclear and radiation incident prevention and control capacity. In recent years, the compliance rate of core public health capacity indicators has been increasing steadily. The indicator reached 98%, much higher than the world's average level (8). To further improve core public health capacity, the NHFPC together with relevant ministries conducted a joint supervision on core public health capacity in Xinjiang, Ningxia, Hunan, and Hainan in 2014. Some problems were found, and targeted improvements were made.

E. Enhancement of information exchange and technical cooperation with international organizations and relevant countries and regions

The NHFPC continues to strengthen communication and cooperation with the WHO and relevant countries and regions, especially in fields including timely information exchange on public health emergencies, public health emergency risk control, and core capacity building. In terms of animal disease prevention and control, collaboration with the International Animal Health Organization (OIE) has been further strengthened. With the designation of a collaboration center of the Asia-Pacific region and reference laboratories of OIE, we aim to enhance the national disease prevention and control capabilities and to improve the ability to participate in veterinary affairs in the international level. Other relevant ministries also continue to strengthen international exchange and cooperation to promote core public health capacity in their fields.

Progress and effectiveness of core public health capacity building

According to the core public health assessment results of the WHO in recent years, our core competence in public health has steadily improved and is significantly higher than the average level in the world or in the Asia-Pacific region (9). In 2002, China's self-assessment result of core public health capacity showed that main monitoring indicators have already met the requirements. Those non-compliance indicators focused on laboratory testing capacity, incident prevention and control on zoonotic diseases, food safety incident prevention and control, chemical incident prevention and control, entry and exit points, and other aspects.

We conducted a self-assessment according to the IHR monitoring questionnaire in 2012, and the compliance rate reached 84.8%. The weak links were the testing ability of the laboratories, prevention and control of zoonosis, food safety, chemicals, and entry and exit points. We have taken measures as follows:

A. Building and strengthening laboratory capacity and regulation on biosafety

The investment for the construction of a high-level laboratory

was increased; the coordinated testing mechanism for public health emergency was perfected; and the network of laboratory testing for public health emergency was established. The surveillances of pathogenic microorganism in the laboratory and of bacterial and viral strains for reservation was strengthened. The safeguard mechanism of dangerous samples was improved, especially for taking, packing, and transporting infectious samples. The training and education for the staff working in the laboratory or in transportation were also enhanced.

B. Strengthening core ability in Port of Entry (PoE)

The abilities of inspection and quarantine, health surveillance, media monitoring and control, supervision and screening of nuclear-biological-chemical factors, and laboratory capacity were enhanced. The 24-hour evaluation working system, contingency plans, and fieldwork procedures for emergency events were established and improved. Resources for emergency reserves were enriched, and more training and exercises were carried out.

C. Building and strengthening prevention and control capacities for zoonosis

The prevention and control cooperation of information exchange and technology sharing were improved. The triple-synchronous system was also implemented, which meant synchronized arriving, inspecting, and dealing.

D. Strengthening prevention and control capacity for food safety

The data on intact food contaminants, adverse factor monitoring, and toxicologic health effects were comprehensively collected to strengthen the national capacity for food safety risk surveillance and evaluation. The coverage area for monitoring food contaminants and adverse factors was enlarged, and sentinel hospitals of foodborne diseases surveillance network, epidemiological investigation, and institutions for information summary were increased. The capacities for food safety response and epidemiological investigation were also improved.

E. Strengthening public health emergency response capacity for chemical, nuclear, and radiation

The database for risks of chemical contamination, dangerous chemicals, nuclear device, and radiation source was established, and the information sharing system was improved. The standard construction for processing nuclear-biological-chemical crises was enhanced, and the related workforce was trained.

F. Strengthening capacities for responding to public health emergencies

The coordinating mechanism for responding to public health risks and emergency events was established and improved. The direct online reporting system was enhanced to improve the quality of reports from the grassroots. The monitoring and warning system and risk evaluating mechanism were set up. In 2012, the former MoH, together with relevant ministries and with the approval of the State Council, requested in comprehensive consideration in name of the Chinese government for a two-year extension to the WHO to improve

our core competencies in public health in the next few years. To advance the core IHR capacity building process, the NHFPC together with relevant ministries in early 2013 drafted the "Guidance of implementing IHR 2005 and accelerating the improvement of core public health emergency response capacity", which was forwarded on behalf of the General Office of the State Council to all provincial governments and all departments of the State Council. The Guidance stressed the importance of strengthening the core public health capacity and clarified the goal, major tasks, and measures taken.

In the past two years, the NHFPC, MOEP, MOA, AQSIQ, SAWS, SFDA, SFB, SASTIND, and other departments have been attaching great importance to core public health emergency capacity, coordinating and cooperating closely in accordance with IHR, carefully analyzing problems and gaps, and developing specific work plans to strengthen the guidance and surveillance of the core public health emergency response capacity of their respective system. All provincial governments reinforced the organization and support in the establishment and improvement of the coordination mechanism on public health risk and emergency response, with the participation of other departments including health and family planning, environment protection, agriculture, quality quarantine, safety control, food and drug surveillance, forestry, national defense and scientific industry, and other departments. Information exchange and joint measures were carried out, such as increasing infrastructure investment in entry and exit ports, strengthening laboratory testing capacity and biosafety regulatory level, and regularly holding emergency trainings and drills. These measures focus on improving public health emergency response capacity caused by biological, chemical, and nuclear radiation factors and other factors. After two years' efforts, the self-assessment results show that all indicators of core public health capacity in China have met the IHR requirements, which was reported to the WHO in June 2014. The result of the evaluation administrated by related authorities reveals that the achieved rate is 91.5% of core public health capacity in 2014. Especially in recent years, the Ministry of Finance and local governments have invested more than RMB 700 million yuan to strengthen the core capacity of ports of entry and exit. Until late May 2014, 259 points reached the core capacity standard of all entry and exit points in China. The capacity of the entry and exit points has been significantly improved for testing nuclear-biological-chemical risks. In the future, all the related departments will further cooperate to improve the long-term mechanism for core public health capacity, guide the development of building capacity in local governments, and increase the level of response to public health emergency events in China.

Reflections on promoting the implementation of the International Health Regulations (IHR)

A. The law and regulation are fundamental in enhancing the core public health capacity

A complete law and regulatory system consists of a legal basis for carrying out public health safety risk prevention and public health emergency response in accordance with regulations. This system is a legal guarantee for core public health capacity development. A normalized system ensures that every work

has rules to follow and provides a basis for scientific, orderly, and unified work, making it possible to improve public health emergency prevention and control in a strong, effective, orderly, and planned way. In the future, we should continue to promote the institutionalization and standardization of laws and regulations as a fundamental guarantee to strengthen core public health capacity.

B. Mechanism is a guarantee to improve core public health capacity

The building of core public health capacity involves multi-sectorial and multi-field departments. Especially in recent years, with the rapid economic and social development, the frequent and rapid flow of people and goods has greatly increased the public health safety risks. At the same time, challenges on food and drug safety and chemical and nuclear radiation incidents are becoming severe. Nowadays, public health risk prevention and control is not the responsibility of a single department, and relying on one's own efforts to accomplish the task is not possible. Cross-sectorial and cross-regional collaboration prevents and controls public health emergencies. Therefore, the establishment of inter-sectorial and inter-regional collaboration mechanism that strengthens communication and joint interaction is a necessary guarantee for the prevention of public health risks and the improvement of core public health capacity. The working group of IHR implementation, composed by members of the multi-sectorial departments, carried out many fruitful works in cross-sectorial collaboration and played an important role.

C. Assessment and feedback are important parts of improving core public health capacity

In the process of implementing the core public health capacity, carrying out timely evaluation and assessment is important to find weak points and to focus on improvements in the future. For the IHR implementation, relative departments make a joint evaluation of annual work by evaluation indicators issued by the WHO and a periodic joint supervision, and the results will help set the priorities in the next steps. When our country requested an extension in 2012, various departments jointly proposed the directions and goals of key areas in the next two years based on the assessment results. These areas include laboratory testing capacity, zoonotic disease prevention and control capabilities, food safety incident prevention and control capabilities, chemical incident prevention and control capacity, and entry and exit port capacity. After two years' joint efforts of various departments, the core capacities in the above-mentioned areas have all reached the requirements of the IHR.

D. The establishment of a long-term mechanism is an inevitable choice for core public health capacity building

Although the core public health capacity has achieved the goal required by IHR, further development and maintenance of our core capacities in the public health sector is important. Currently, the NHFPC, MOEP, MOA, AQSIQ, Administration of Work Safety, Food and Drug Administration, Administration of Forestry, National Defense Science and Industry Bureau, and other relative departments are working on the establishment of a long-term mechanism

of core public health capacity to maintain and develop the core public health capacity and to continue to promote the smooth and effective implementation of IHR in our country through the development of the core public health capacity technical guidelines and the reinforcement of guidance in local departments, regular assessment, supervision, and other bodies.

E. The long-term mechanism of building core public health capacity lies in qualified personnel

Improving the knowledge and skills of related staff is important in the process of developing, strengthening, and maintaining the core public health capacity. Training efforts should be increased to build the legal and scientific sense to deal with health emergencies. Health emergency staff should be aware of basic theories, methods, and skills for processing and should apply them in practice. On the one hand, building training plans and programs for different professionals is necessary. On the other hand, improving teachers' training, developing new training method, and strengthening organization to yield good results are equally important. At the national level, the related departments will further cooperate to build sophisticated core public health capacity, establish long-term mechanism, and enhance standardized and meticulous management of building core public health capacity to respond to public health emergency events in China. At the local level, the central authority should guide local governments to keep and develop core public health capacity, especially at the grassroots. On the one hand, the related mechanisms should be improved to ensure the building of core public health capacity required in IHR 2005. On the other hand, the targeted training of knowledge and skills should be provided to local staff, and the emergency exercises should also be carried out to improve the capacity. Furthermore, the critical area for building core public health capacity at the local level should be strengthened.

Ethical Issues

Not applicable.

Competing interests

Authors declare that they have no competing interests.

Authors' contributions

Study concept and design (BL, ZZ, and LZ); acquisition of data (BL and QD); analysis and interpretation of data (BL and YS); drafting of manuscript (BL, YS, and QD); critical revision of the manuscript for important intellectual content (ZZ and LZ); administrative, technical, or material support (ZZ); supervision (LZ).

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