CASE STUDY

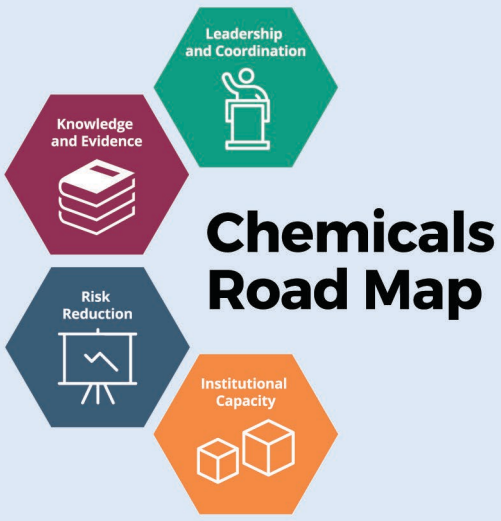
Managing the public health impact of chemical incidents in the Republic of Korea

Republic of Korea

An integrated health outcome assessment system for chemical incidents

Goals and Objectives

The objective is to raise awareness of the public health implications of chemical incidents and draw lessons learned from the Republic of Korea's experience in establishing a chemical incident management system.



Project Overview

Context

In the Republic of Korea, the system for managing the public health impact of chemical incidents has developed over time. It has drawn from experience gained in several chemical incidents including the hydrogen fluoride spillage in Gumi in 2012, silicon tetrachloride leak in Gunsan in 2015 and styrene monomer incident in Seosan in 2019. These incidents caused fatalities, with a total of more than 3000 individuals requiring hospital treatment and more than 10 000 residents in local communities undergoing physical examination. In 2013, the National Institute of Chemical Safety (NICS) was set up to oversee chemical incident response, conduct research and assess health outcomes. In 2015, the Ministry of Environment revised the safety management system for chemical substances to address community and public health concerns, replacing the previous Toxic Chemicals Control Act with the Chemical Substances Control Act. This new Act holds companies responsible for preventing incidents from recurring and establishes a legal framework to determine their impact on health and the environment.

The International Health Regulations (2005) (IHR) mandate Member States to develop capacities for detecting, assessing and responding to public health emergencies. The World Health Organization (WHO) *Manual for the Public Health Management of Chemical Incidents* (2009) provides technical guidance for managing chemical incidents and *Manual for investigating suspected outbreaks of illnesses of possible chemical etiology: guidance for investigation and control* (2021) provides additional guidance for investigation and control.

Approach

In the Republic of Korea, the Ministry of Environment investigates the health impact of chemical incidents on both the local population and the environment. An investigation committee is formed whenever an incident causes death or harm. Its findings provide a comprehensive summary of approaches adopted for health outcome assessments following chemical incidents in the country.

In order to facilitate effective response efforts, the Chemical Accidents Response Information System (CARIS) serves as a fundamental tool for assessing the magnitude of impact and determining level of exposure. It involves evaluating the scale of the incident and ascertaining whether individuals have been exposed to hazardous substances.

Following any chemical incident, a year-long follow-up survey is conducted to assess the long-term health effects on residents exposed to the chemicals. The survey is based on assessment of exposure through questionnaires, biological monitoring and physical examination, and determination of immediate and post-exposure symptoms and their time to onset. Physical examinations are performed to assess any acute health effects and to collect data on potential chemical-related health issues and psychosocial effects.

NICS collaborates with regional emergency medical centres to provide health assessments and offer physical examinations to local residents. The final step in the survey is to determine whether chemical exposure has occurred based on the outcome of physical examination, questionnaires and health impact estimations. A health impact report is then prepared.

World Health Organization

Results

The Republic of Korea has implemented various measures to enhance its management of the public health impact of chemical incidents. The country has actively followed the WHO *Manual for the Public Health Management of Chemical Incidents* and demonstrated its commitment to meet the health security requirements specified in the IHR.

To support these assessments, a comprehensive database has been established which incorporates survey and biomonitoring data such as blood and urine samples. This database helps to determine the likelihood of exposure, particularly in the event of large-scale incidents. Population-exposure assessments are conducted utilizing this valuable resource.

Furthermore, staff at five subnational hospital facilities have undergone specialized training and education to prepare for potential incident situations. These local hospitals play a crucial role in conducting physical examinations and providing medical care in the event of chemical incidents.

The likelihood of exposure is evaluated by collaborative expert groups consisting of professionals skilled in exposure assessment and clinical medicine. Local hospitals respond to individuals who express dissatisfaction with the results of the health impact survey or who report mental trauma. These hospitals provide necessary assistance and support to affected individuals, ensuring that appropriate measures are taken for their rescue and relief.

Lessons Learned

In the Republic of Korea, significant progress has been made to enhance institutional capacity, a key action area of the WHO Chemicals Road Map.

- A responsive legal framework has significantly improved management of the public health impact of chemical incidents. The Chemical Substances Control Act has bolstered the legal framework governing incident management and facilitated health outcome assessments.
- Crucial partnerships between national and subnational entities have been established to ensure efficient and effective health assessment. The Ministry of Environment and NICS collaborate with five regional and local emergency medical centres to identify and assist individuals who have been exposed, potentially exposed or otherwise affected by the reported incidents.
- Inclusion of mental health considerations in health assessments following chemical incidents has improved the management of mental trauma experienced by victims. The Republic of Korea recognizes the importance of addressing mental health effects resulting not only from chemical exposure but from the traumatic event itself.
- Medical specialist assessments with categorized outcomes have helped to determine ongoing response strategies and to enhance public confidence in response efforts. Health impact can be classified into one of four categories: unequivocally high, high, low or none.
- Additional resources have now been made available, including contributions from private business entities and aid to establish and maintain long-term health assessments and follow-up arrangements. In the Republic of Korea, any enterprise implicated in a chemical incident is required to reimburse treatment fees for affected residents in order to mitigate or eliminate subsequent damage to human health.

This Chemicals Road Map case study was authored by the Korea National Institute of Chemical Safety.

Recommendations

- ***Improve clarity regarding the responsible government agency.*** *It is crucial to clearly define the government agency or entity responsible for coordinating and managing chemical incident-related activities.*
- ***Establish appropriate and adequate legal instruments.*** *Member States should establish and utilize suitable legal instruments to operationalize their obligations under the IHR. Resources such as the WHO* Manual for the Public Health Management of Chemical Incidents *and* Manual for investigating suspected outbreaks of illnesses of possible chemical etiology: guidance for investigation and control *offer additional tools and guidance.*
- ***Form partnerships with stakeholders.*** *Collaboration with various stakeholders in government and at the municipal level, experts, local residents, chemical companies, including the private sector and the community, is essential. Engaging these stakeholders fosters a collective and coordinated approach to chemical incident prevention, preparedness and response.*
- ***Enhance capacity and capability.*** *This includes establishing poison centres and specialized institutions dedicated to chemical safety. These institutions can provide expertise, resources and guidance in assessing risks, managing incidents and ensuring the well-being of affected individuals.*

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