PERSPECTIVES

Responding to mass burn casualties caused by corn powder at the Formosa Water Park in 2015

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On the night of June 27th, 2015, a tragedy occurred while young people were celebrating the start of their summer break at the Formosa Fun Water Park in New Taipei City, Taiwan. At 8:32 PM, a blast caused by flammable cornstarch-based powder injured 499 people, including nine international tourists from five countries. Among the injured, half suffered burns over 40% of their body surface area (BSA), and 75% suffered from second or third degree burns to >20% BSA. The Taiwan emergency health care system encountered a very difficult challenge, and high fatality rates were expected based on the seriousness of the injuries.

The explosion was accidentally ignited from an overheated spotlight on the stage in a dry swimming pool when colored powders were sprayed over the crowd. The unprecedented number of burn casualties caused panic in the Taiwanese public, and also brought into question the appropriateness of how ambulances were dispatched and the care received in the hospitals.

8:32 PM. Mass-casualty response mechanism

Immediately after the blast, the Ministry of Health and Welfare (MOHW) activated its two Regional Emergency Medical Operation Centers, notifying all emergency-designated hospitals to recall their medical personnel and prepare for mass burn casualties, and to report individual patient information and the number of patients entering each hospital. Facing the geographical limitations of the water park and the tremendous numbers of the injured, New Taipei and Taipei City dispatched >70 ambulances to the scene, along with ambulances from the cities of Keelung and Taoyuan, with the hospitals in these four cities volunteering to support the rescue.

9:00 PM. Pre- and posthospital medical care

For better on-site response, the Ministry assisted in collaboration with the hospitals to set up on-site medical stations, and urged local health departments in these four cities to ensure that all burn units and intensive care units under their jurisdictions were well-prepared for the injured. With the intense cooperation and collaboration of fire departments and health departments, almost all of the 499 injured were sent to hospitals within an incredibly short period within 4 hours after the blast.

11:24 PM. Hospital surge capacities motivated by health officials

The surge capacity of emergency rooms handling the injured was triggered in a very efficient way. It allowed these emergency rooms to obtain adequate staff, supplies, and equipment, as well as structures and systems to provide sufficient care to meet the immediate needs of patients following such a large-scale incident.

Conflicts of interest: The authors have no conflicts of interest relevant to this article.

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In addition to telephone contact, the administrative staffs of the Ministry were stationed in the office within 2 hours of the blast for real-time monitoring of medical-resource utilization, and to speed the control of casualties. Minister Chiang of the MOHW visited the injured at 11:59 PM with other officials.

June 28 and after. Casualty monitoring

Suffering from severe burns combined with inhalation pulmonary injuries, patients were unstable, and further intensive care was required. Patients were transferred to several hospitals with better burn-unit facilities to ensure the best medical care. Initially, the injured were treated in six hospitals in three cities in northern Taiwan. After they were stabilized, patients were distributed to 38 hospitals in seven cities by the following morning, with this distribution widened to 54 hospitals in 13 cities nationwide after 1 week. By the end of the 1st week, due to the less severely injured patients being discharged, patient distribution dropped to 46 hospitals in 13 cities (Figure 1).

During this mass casualty incident, there were initially >230 patients reported as being critically injured. However, there were no deaths within the first 24 hours after the blast, which indicated the high quality of the emergency medical capacity in this region of Taiwan. The first death took place at 2:20 PM on June 29th, which was 42 hours after the blast. During the 100 days following the explosion, 12 patients unfortunately passed away due to severe burns and multiple organ failure (on October 28th, 2015, another patient passed away, increasing the number of deaths to 13). The extremely low mortality rate has been attributed to the excellent care, as well as the great efforts, delivered by many agencies. The Ministry took control of the disaster response, focusing on the need of the hospitals to ensure high-quality patient care, supporting them with all resources needed, assisting them with backup expertise, volunteering human resources, and transferring patients. During the 1st month, international burn-expert teams came to Taiwan from Japan and the US to share their expertise.

When disaster strikes, emergency physicians and nurses as the first responders dealt with the initial and subsequent wave of patients. Similar to other mass casualty incidents, assuring the surge capacity of emergency care was the critical key to a successful rescue for the victims. Our medical society, on which we rely when facing disasters, demonstrated their immense value to the world.

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