KAMEDO Report No. 82 Explosion at the Fireworks Warehouse in the Netherlands in 2000

Viveka Björnhagen; Torbjörn Messner; Helge Brändström (ed)

KAMEDO = Swedish Disaster Medicine Study Organization

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Abstract

A fire and subsequent explosions occurred in a fireworks warehouse on 13 May 2000. A total of 947 persons were injured and 21 persons died, including four firefighters and one reporter. Communication networks became overloaded and impaired notification chains. The hospital disaster plan was followed, but was proved inadequate. Public information was a high priority. A counselling center was established early and was planned to continue operation for five years. The command function did not perform to expectations. Hospital triage was impaired as many responsible left the triage area. Short-term psychosocial support evolved to long-term programs. Liability issues were examined.

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Summary

The call came into the fire and rescue service in Enschede, the Netherlands, on Saturday, 13 May 2000 at 15.25 hours. A fire had erupted in a fireworks warehouse in a former textile factory. A series of explosions occurred during the effort to extinguish the fire and four fire fighters closest to the site of the explosion, along with one reporter died.

A total of 947 people were injured in the explosion and treated by the medical care system. Of the injured, about 600 were treated at Enschede Hospital. A total of 21 people died, of whom three still are missing.

The hospital's emergency notification chain broke down because the mobile and landline telephone networks were overloaded. The consequences were not as devastating as might have been expected: many medical professionals reported to the hospital spontaneously within 10–15 minutes of the onset of the event. The explosion and smoke served as an alarm.

Hospital staff organized an assembly site outdoors near the scene of the accident where initial triage was performed. However, there was a large ammonia tank and released asbestos within the accident area, both of which constituted additional serious hazards to all involved.

Keywords: command; disaster; explosion; fire; fireworks; information; liability; medical care; Netherlands; organization; psychosocial care

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The first and most seriously injured patients arrived in trauma rooms in the emergency department in Enschede after 10 minutes. The most common injuries from the explosion were caused by flying objects.

Enschede Hospital can be compared most closely to a Swedish regional hospital. The primary catchment area serves about 200,000 people and the hospital is a trauma center for a population of about 700,000. There are 10 trauma centers in the Netherlands, where the total population is slightly less than 15 million. Sections of the emergency department at Enschede Hospital were undergoing construction at the time. There was good access to experienced personnel with comprehensive medical skills at all levels at the time of the accident. For instance, one of the surgeons involved in writing the hospital's disaster plan was on call that particular Saturday.

In accordance with the disaster plan, patient charts were on hand for 100 injured, but they were far from enough for the heavy influx of patients. Consequently, some patients had no charts and were examined repeatedly by doctors and nurses. Another problem was that early on, the hospital ran out of tetanus vaccine. The heavy influx of patients and the many serious injuries led to certain departures from the disaster plan.

Ambulances and trauma teams were sent to the scene from other areas in the Netherlands. Eight helicopters carrying trauma teams were sent from Germany and dog handlers with specially-trained dogs came from Belgium to search for people trapped under the collapsed buildings.

Keeping the public informed was awarded high priority. Several mayoral press conferences were held within the first 24 hours, and were effective. The local authority set up a counselling agency within the first week after the explosion. This counselling center provided assistance for every imaginable problem, from insurance matters and financial, medical, or psychological concerns, to inquiries about lost pets. The city of Enschede expected to keep the agency open for five years. The local authority also regularly printed and distributed a large number of circulars with information about the accident and where people could go for help. A Website was set up and continually updated.

The fire and rescue service's command function did not work satisfactorily, which may, in part, have been due to the deaths of the four fire fighters early in the course of the event. After the immediate emergency response, command efforts were impeded by lack of clarity between the local authority and the overall disaster organization with respect to allocation of tasks and responsibility.

In connection with a 1992 plane crash in the Netherlands, (Swedish National Board of Health and Welfare Report 1994:16/KAMEDO 64), it was unclear whether toxic substances had been released. Many of the people involved in the event believed they had suffered symptoms from those substances. It is likely that the symptoms at that time were mainly psychological reactions. The causes of these psychological reactions could not be confirmed because no samples were taken from the air or soil at the scene.

In order to prevent psychological problems in connection with the accident in Enschede, samples were taken from the air and soil. All survivors also were invited to answer a survey and to submit blood and urine samples. The results of the blood and urine tests were normal. The survey was repeated after 18 months, and for purposes of comparison, was expanded to control groups not affected by the disaster. That survey gave evidence of lingering psychosocial problems. Another follow-up was planned for 18 months later.

Two weeks before the accident, a television team had filmed a report in the area where the explosion later occurred on the social aspects of housing. After the accident, the team returned to the area and filmed all buildings and foundations so that victims could orient themselves. Psychological assistance was offered in conjunction with the broadcast of the video and all victims were given a copy of the film.

The Dutch government appointed several commissions to investigate liability issues and management of the event. Their final report identified shortcomings on the part of state and local authorities as well as the company that owned the warehouse.

Conclusions

Many fortuitous circumstances helped ameliorate the consequences of the event:

1. The event occured in the daytime, during good weather, which meant that many people were outdoors. As a result, they were spared injury or death caused by collapsed buildings. When there is risk of explosion, authorities should consider whether to advise people not to remain indoors;
2. The professionals on duty at the hospital were highly experienced;
3. The head of the general disaster organization (GHOR) was about to be replaced, but this change had not been implemented when the event occurred;
4. It was relatively easy to locate new housing for those whose homes had been destroyed;

Command-organization

5. The fire and rescue service's command function did not work satisfactorily. This partially was related to the deaths of four firefighters early in the accident phase;
6. There was a lack of clarity between the local authority and the general disaster organization (GHOR) with respect to allocation of tasks and responsibility;

Communication

7. Upon several occasions, communications have proven to be a weak link when major events or accidents occur. Once again, this was the case in the fireworks explosion and fire in Enschede;
8. Landline and mobile telephone networks were overloaded and later became unusable. Communication at the scene was also a problem;
9. The emergency notification chain did not work as planned because the telephone network was overloaded. The explosion itself seemed as an alarm signal for those concerned;
10. Communications within the hospital were difficult to manage because the telephone network was not

functioning and many people directed their inquiries to the hospital;

Medical care

11. Implementation of the disaster plan's patient flow pattern was effective, but the work was inefficient because the registration procedure was inadequate to manage the heavy influx of patients;
12. The triage process in the emergency department did not work satisfactorily. Those in charge of triage left the emergency department on several occasions to go to the surgical wards;
13. Personnel were forced to depart from certain aspects of the disaster plan and improvise due to the large influx of patients and the large number of victims with serious injuries;
14. Coordination between local authorities and the medical care system was important and effective;

Information

15. Official information was distributed rapidly in several languages and helped prevent the development and spread of rumors;
16. Keeping the public informed was awarded high priority during and after the explosion. An information agency was set up early on, with of objective of minimizing the spread of rumors;
17. Several press conferences led by the mayor were held during the emergency disaster management phase, and were very effective in providing facts and minimizing rumors;
18. Victims were informed repeatedly and in various languages both during and after the immediate phase;
19. A local radio and television station acted as the primary channel of information to the public and other media;

Psychosocial care

20. The social and medical organizations in Enschede cooperated closely from an early stage. Plans were made for interagency cooperation to continue for at least five years;
21. The psychological aspects of the disaster were prioritized through health examinations and the video;
22. It is important that plans are in place for a smooth transition from a short-term, massive, and primarily medical response to a long-term, primarily local, social and psychological response;

Liability

23. The Dutch investigations into how the fire and explosions could have occurred, as well as how the situation was managed, were described in the Dutch final report. The report identified shortcomings within state and local agencies, on the part of the business owners involved, and within the disaster organization; and
24. The report also shows that the disaster could have been prevented or at least limited in scope if the authorities and company management had complied with all rules and ordinances. In particular, the report noted that: (1) communication within and among government agencies was inadequate; (2) those involved had failed to learn from earlier disasters and accidents; (3) the fragmentation of responsibility and knowledge within regulatory authorities impeded overall evaluation, e.g., the risks inherent in storing fireworks; (4) regulatory authorities must react more vigorously to violations of existing laws and ordinances; (5) as companies in the fireworks business were consulted by the authorites with respect to certain issues, the roles of regulator/regulated were mixed in an unfortunate manner; and (6) the classification of fireworks was unreliable.

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