

The operation of a health centre after a catastrophe in Finland

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SUMMARY. In April 1976 the most disastrous peace-time accident in Finland took place in the town of Lapua, where a cartridge-filling station in an ammunition factory exploded and 40 people were killed. I was in charge of the local health centre activities, and describe what happened.

THE readiness of the health services to cope with a catastrophe has been under increasing attention in Finland since the latter part of the 1960s. At the end of the decade, plans for what action to take in a catastrophe were made in hospitals. In February 1976 advice was given to health centres on the arrangements for first aid and emergency services. In other words, attention has been paid to the preparedness for catastrophes in the planning of health care at a national level.

The catastrophe

On Tuesday, 13 April 1976 at 07.43 hours the cartridge-filling part of an ammunition factory in the town of Lapua (population 14,800) blew up. At that moment there were 60 people working in the building. The explosion, the cause of which is still unknown, ruined the building completely. Forty people were killed and about 70 to 80 others injured. The factory, which was occupied by about 500 people at the time of the accident, is situated in the centre of the town, just over 900 metres (half a mile) from the health centre.

Table 1 shows what happened from the point of view of the health centre during that day. Most of the work was over in about three hours. During this period nearly 60 injured people were brought to the health centre alive. During that morning about 30 dead victims of the explosion were brought to the cellar of the health centre hospital (Figure 1).

Staff

The morning shift in the health centre included seven registered nurses, four public health nurses, ten auxiliary nurses, laboratory technicians, radiographers, and dental nurses: at least 21 people with some nursing education. In addition, there were six cleaners, five office clerks or health centre aides, and a janitor immediately at hand. At that time there were three doctors working in the centre and they all arrived by 07.55.

More staff were called almost at once. Some of them lived nearby and came as soon as they realized what had happened; the rest were called by the telephone operator of the health centre. Thus, within 15 to 20 minutes of the explosion 15 registered nurses, one public health nurse, two midwives, four auxiliary nurses, and two student nurses had arrived, making the total number of 40 trained staff available. Everyone was told to go to the outpatient department of the health centre so as to be in position when the real operation started.

As can be seen from Table 1, the health centre gave the alarm to the central hospital (district general hospital) 26 kilometres (16 miles) from Lapua. It was, however, difficult to maintain telephone connections because of a strike by telephone engineers and fresh damage to the telephone cables. Lapua had therefore virtually no telephone communications with the outside world.

Immediately after the place of the explosion had been identified and people had recovered from the initial shock, the health centre staff began preparing infusion equipment ('Haemacoel', 'Rheomacrodex'), bandages, and splints.

When the first badly injured person was brought in, we foresaw that there would be many others to come. After getting the patient ready for transportation I contacted the central hospital, giving preliminary information according to my evaluation. I also got a line to the ammunition factory from where, however, at that stage no further information was available, obviously because of the shock. After this there was no further telephone communication from the health

Table 1. The sequence of events occurring on 13 April 1976 at the Lapua Health Centre (times approximate).

07.43	Explosion in powder store of cartridge-filling building Alert	08.25	Intensive transfer of patients to central hospital started
07.45	Alarm to regional fire-alarm centre (fire-brigade radio)	08.40	First part of first-aid team from central hospital arrive at place of destruction State of full alert gradually lowered
07.47	Alarm to health centre Health centre in state of alert	09.30	Last transfer started. 30 injured persons transported by this time Treatment of slighter injuries started: cleaning and suturing of wounds, bandaging Doctor-in-charge in contact with central hospital reporting situation
07.50	Local ambulances on the spot Health centre nurse in contact with central hospital	11.00	Outpatient department empty
07.55	First badly injured arrive at health centre	11.30	Cleaning started
08.00	Doctor-in-charge in contact with central hospital; preliminary information given	12.00	Cleaning completed
08.05	First transfer of patient to Seinäjoki	11.00	By this time 28 corpses brought to cellar of health centre Nurses withdrawn and police taken over control of arrivals
08.05	Doctor-in-charge in contact with ammunition factory, no reliable information received Health centre in state of full alert	11.00	First newspapermen arrive at health centre
08.05	Badly injured patients start arriving for assessment. Preparation for transportation started. Infusions started, fractures splinted, wounds cleaned, bandaging, name tags	12.00	Army helicopter arrives bringing ten doctors who visit place of disaster then leave
08.15	First two dead checked in an ambulance Instruction given to take the dead direct to cellar of health centre hospital Nurses ordered to check the dead	13.00	Contact with central hospital More newspapermen arrive Corpses brought in continuously
08.20	Doctor-in-charge in contact with central hospital Nature of catastrophe beginning to be realized	16.00	Minister of Defence visits health centre
		17.30	General Director of the National Board of Health at health centre

centre to the place of disaster during the whole morning.

Transportation of the injured

The health centre at Lapua normally has two ambulances at its disposal. Both of them were on the spot at about 07.50. After the catastrophe alarm by radio to the regional fire-alarm centre in Seinäjoki 26 kilometres (16 miles) away, this centre also called the ambulance service in Seinäjoki, which has a total of seven ambulances. Five were sent to Lapua and the other ambulances which arrived were called by the Lapua health centre, in spite of the damaged telephone connections. Figure 2 shows the points of departure of

these ambulances. The two local ambulances arrived at 07.50 hours and ambulances from Seinäjoki arrived between 08.05 and 08.25 hours. The ambulance from Härmä reached the health centre at 08.35 hours and the rest had arrived by 08.45 hours. A total of 16 ambulances (15 civilian and one military) took part in the operation.

The last transfer to the central hospital started at about 09.30 hours, 107 minutes after the explosion (Table 1). During this time 30 patients had received first aid, treatment of shock had been administered to about 20 patients, and splinting and bandaging done. Only after this did the staff begin the treatment of the 25 or so people who were more slightly injured. They were then sent to the health centre ward.

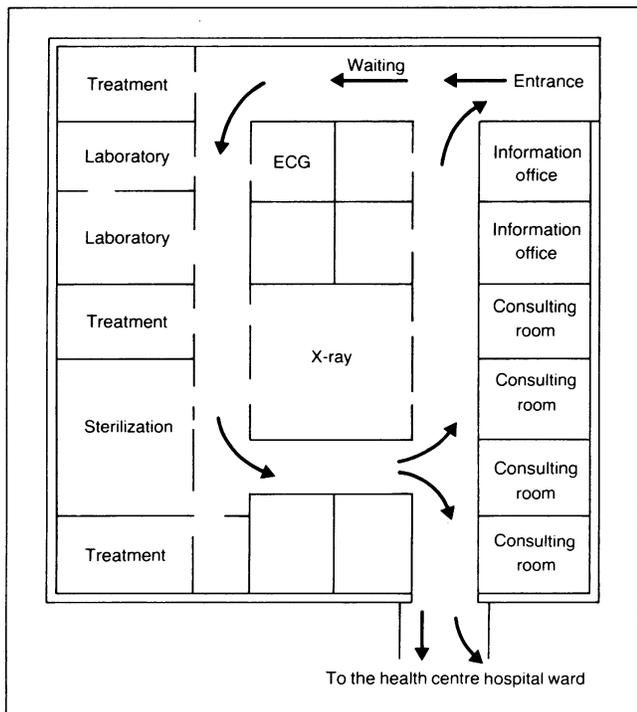


Figure 1. Plan of the outpatients wing of the health centre.

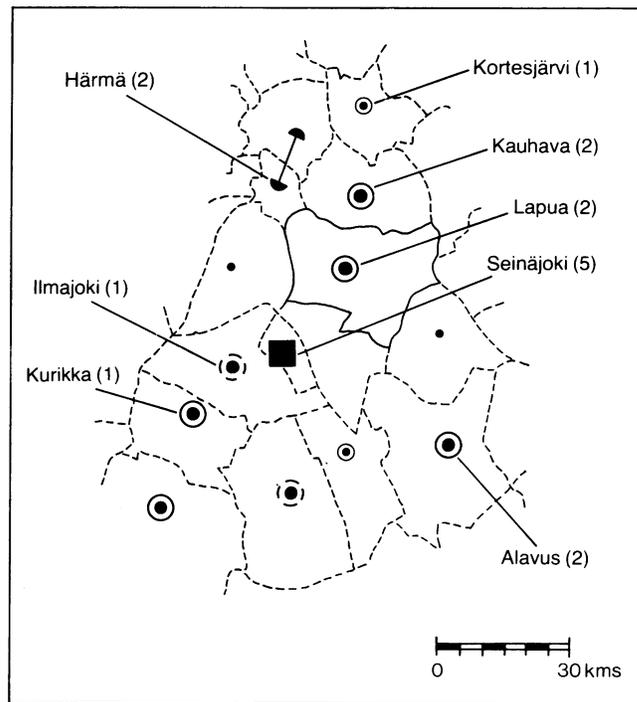


Figure 2. Points of departure of ambulances and number arriving from each district, in brackets.

Those referred to the central hospital (22 women and eight men) were suffering from multiple or compound fractures, or major injuries to internal organs.

The operation

The first-aid services in the health centre were centred on the outpatient wing (Figure 1). The first slightly injured victims, who came by private cars, were directed to side rooms and the corridors were left clear for the badly injured, who were put on benches or barrack beds where they could be easily observed. In this way the situation was kept under control.

Triage was carried out at the health centre, not at the place of the accident. When the cartridge-filling station collapsed, it buried everyone in it under stone and concrete. The rescue workers had to dig into the mass of rubble and find the victims one by one. Since the ambulances held only one stretcher patient (or two patients if one was able to sit), the health centre received a continual smooth flow of patients in groups of two to four. (Two ambulances at a time can unload at the door of the centre.) As soon as the patients were brought in I quickly checked them and gave instructions on what to do and in what order. In this respect it was helpful that the design of the outpatients wing allowed for round traffic (Figure 1). When the badly injured had been prepared for transportation to Seinäjoki they waited in the corridor in order of urgency. Every transfer ambulance was accompanied by a trained nurse from the health centre.

The health centre did not send a first-aid team headed

by a doctor to the place of the disaster because this would essentially have weakened our ability to function at the main station.

The legislation covering catastrophes required us to summon a first-aid team from the central hospital, the first part of which (a doctor and nurse) arrived from Seinäjoki in the first returning ambulance at about 08.40, approximately one hour after the explosion, just as the last of the living victims was dragged from the ruins. This team was able to do very little to help. The third member of the team arrived ten minutes later in the second returning ambulance.

Observations and conclusions

1. Communications were especially difficult because the telephone lines were either damaged or overloaded. During the whole time there was no contact with the catastrophe headquarters nor with the regional fire alarm centre. The chain of communications from the place of the accident to the health centre to the central hospital did not function. Instead, the health centre and the central hospital were in contact four times during the morning, although it was difficult to make the connection. The alarm centre in the central hospital received valuable information about the activities of the health centre.

The need for the development of communications, which are independent of the telephone lines, between health centres and hospitals with the possibility of connection via the channel of the rescue service emerged clearly during this operation. It should always be

assumed that during a catastrophe the normal lines of communication will not function.

2. There were some minor difficulties with equipment: the three different stretchers in use did not match the transportation equipment. When the fluid infusions were started, some difficulties arose because of the two different types of needle in use, one of which did not fit the giving set. This was, however, quickly corrected.

3. Sending a first-aid or emergency care team consisting of three people (a doctor, a nurse, and an auxiliary nurse or health-centre aide) to the accident is meaningless in a situation like this where the destruction is severe; the rescue staff arrive in a relatively short time with their equipment, the ambulance service functions well, and the distances are small. This would have had an adverse effect on the main first-aid activities carried out at the health centre, which was only about 900 metres away from the place of the explosion.

When the distance increases, the importance of the emergency medical care team increases, provided, however, that its equipment is sufficient and that it can be in contact with its base during its operation.

4. The importance of trained staff, a calm leadership, and the assessment of the order of transportation is obviously vital in any catastrophe.

5. A sufficient number of ambulances virtually guarantees optimum speed of transfer after first aid has been given. The badly injured here came in groups of two or four and it was then possible to give them first aid and decide about the after care before the next round arrived. By that time it had already been possible to take care of the transfer of the most severely injured in the previous groups. It was plain that co-operation between ambulance and rescue services is very important.

6. A factor which aided the quick and smooth first-aid operation was that when the first two dead were checked in an ambulance and the nature of the injuries discovered, the decision was made to send the rest of the dead directly to the mortuary of the health centre hospital, where two nurses were placed to check the dead. When the number of dead had risen to about 20 this checking became entirely unnecessary because of the nature of the injuries.

In general, the staff taking part in the first-aid activities acted quickly and effectively. Orders were carried out immediately without rush or panic. One cannot, however, overemphasize the importance of training health staff how to act after catastrophes like the explosion at Lapua. The further away from a large centre that serious accidents occur, the more important it is that primary care teams know what to do.

Acknowledgement

I wish to express my thanks to Dr Aimo Ojala, Chief of the Department of Community Health at the National Board of Health, who supervised my work when I was preparing the directive on the arrangement of the first-aid and emergency services for the health centres during the winter 1975/6. I also want to thank Professor Leo Noro, the General Director of the National Board, who has shown great understanding towards my work.

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