

MASSIVE BURN CASUALTIES IN SWITZERLAND: THE BURN ALARM PLAN

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ABSTRACT

Disaster involving many burn patients constitutes a major problem in terms of sanitary management.

Based on the observation that catastrophe plans not dedicated to burns fail in case of burn disasters, many countries have successfully implemented concepts specifically tailored have been able to face such events. The Swiss plan development is described including the practical consideration for implementation.

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INTRODUCTION

Disaster involving many burn patients poses, in all countries, worldwide, a major problem of sanitary management. Basically, it is important to distinguish between disasters including burned few burn casualties among other victims, and those where burn injuries prevail: in the latter case the number of casualties is generally elevated. Every year in Europe, a sinister causing more than 200 severely burned victims occurs somewhere [1]. So far, fortunately, Switzerland was spared, which is actually a condition that increases the probability of an event. In Switzerland, the treatment of stationary burn patients as recommended by the American Burn Association (ABA) criteria is under the responsibility of the Lausanne and Zürich burn centers. Under normal circumstances, the existing facilities are sufficient to ensure optimal treatment of the civilian victims. However, when a disaster occurs causing many burn victims, these resources face deadlocks.

Switzerland has some particularities: the country is divided in 26 cantons, and has a federal ruling system. Health care (except epidemics), education and police activities are ruled at cantonal level, with a moderate level of coordination at the national level done under the form of “cantonal conferences of the service directors”, the latter being the cantonal ministers of the specific services. The milice army has a sanitary section with civilian physicians and nurses that receive additional trauma training: the army’s mission is “subsidiary” of civilian facilities in case of catastrophes, but there are no military hospitals or ruling activity. The cantonal organization of health care and of medical rescue systems, incurs a difficult coordination: the latter characteristic increases the organization challenges in case of a major event.

Major burns belong to the most devastating injuries, requiring very prolonged specialized care. In addition the initial field assessment is very difficult, with both under- and over-assessment [2], and the final extension of injury is only visible by the end of day [3], as the wound evolves during the first hours after injury. The burn competences and treatment facilities are sparse in all countries, leading to overwhelming of the centers in case of events with large numbers of major burns. Non specialized casualty plans have been shown to fail in case of burn disasters [3]. International support is limited as the resources are scarce in all countries. Countries such as the Netherlands that have successfully implemented concepts specifically tailored have been able to face such events [4,5]. The plans are generally based on the development of a network of emergency teams and of hospitals [6,7]. The summary of the Swiss plan [8] presented hereafter describes in telegraphic style the practical requirements to consider for the implementation of the alarm Plan in the event of a massive influx of burn victims.

OBJECTIVES

Recognizing absence of national expertise in the field, the Swiss working group based the development of the Swiss plan on experience from international countries having faced such terrible events. In particular, the emergency medicine master of Dr S en chaud dedicated to burn mass casualties and which was supervised by international specialists was used as reference [6]. The operational implementation of the burn alarm plan was then based on the following pre-requisites identified in the master:

- The development of a specific alarm plan to deal with a major disaster with a high number of burned patients
- The identification of a network of Swiss hospitals
- The classification and stratification of competences of the existing hospitals (specialized, 1st and 2nd level) (**Table 1**)
- The implementation of the alarm plan in emergency health call centers (including rescue) and the helicopter rescue systems
- Extension of the alarm plan on the whole Swiss territory using the software developed by the army to determine bed capacities
- Appropriate training programs to ensure specialized training for the concerned emergency teams
- Contacts with burn centers abroad
- Organizing simulation exercises (Proof-of-Concept)

Table 1: stratification of the hospital facilities

1	Burn centers	University hospitals of Lausanne and Zurich. Children's hospital in Zurich
2	Level 1 hospitals	Other university hospitals, cantonal hospitals with intensive care units ICU). Level A training center according to the Swiss society of Intensive care (SSMI) Presence of plastic surgeons
3	Level 2 hospitals	Hospitals with ICU's Level B training center according to SSMI General surgeons

THE PROCESS

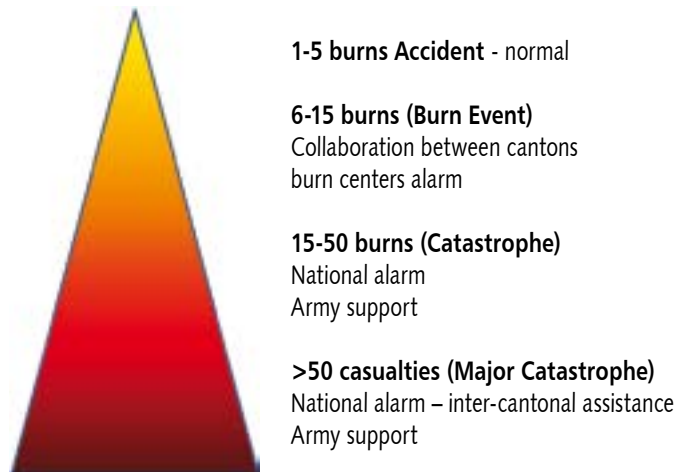
1- Triggering of the alarm plan

The normal rescue system should be used as far as possible: extraordinary things that "never" happen, do not work when required. The Director of medical rescue (DMS) is in charge of triggering the alarm plan after an initial assessment of the scene and consideration of the predefined criteria. The cutoff number of casualties defined as a burn catastrophe in Switzerland is 15 and up (**Figure 1**). If no medical director is available, the decision will be up to the sanitary intervention chief (in Switzerland this person is not necessarily a physician).

The "local cantonal" central, also called "144" (its emergency phone number), is in charge of emergency calls, and informs the helicopter rescue service about the event. The transportation of the patients (noria) will be organized according to the plans developed for other major disasters, with the support of the army.

In terms of intervention, in the Swiss system, the responsibility is cantonal and their sanitary teams which would be coordinated in case of a major event. The helicopter rescue system is responsible for transporting patients entrusted to it, to the determined hospitals

Figure 1: Event qualification based on casualties number



2- A burn expert to assist triage

Triaging burned patients is difficult and may require trained specialists. The precise estimation of burn injuries is very difficult and may result in hospitalizations in an inadequate facility. Therefore it is recommended that the Director of medical rescue considers the support of a burn specialist from one of the burn centers, particularly in present of more than 50 casualties.

3- Possible support by a burn expert for referral hospitals

A burn expert team requires plastic surgeons, intensive care physicians and specialized nurses from the burn centers. These teams can strengthen non-burn hospital teams to make a new assessment of patients, to assist and to advise the caregivers. When asked to admit burn patients, non specialist hospitals may also seek the advice of expert burn teams: hospital calls and web exchanges of photos of the patients are encouraged. Indeed, the burns center teams being heavily involved in the treatment of an increased number of patients, over their normal capacity, will not be able to visit other hospitals. This process is therefore not binding for the burns centers.

IMPLEMENTATION

After elaboration, the plan must be implemented. Switzerland is in this phase, and has started with addressing prehospital care. Training of the network of subsidiary hospitals will follow.

1- Implementation in pre-hospital care

Prehospital implementation is based on three pillars:

1. The continuous training of medical rescue directors and Heads of sanitary intervention to assess the situation in situ and trigger the alarm plan. The training will mainly focus on the triage criteria for the distribution of patients between adequate hospitals.
2. The integration of the program into the various processes and workflows of the cantonal rescue systems.
3. Implementation of the plan at the helicopter rescue company (in Switzerland a non-for profit company with the acronym REGA realized the majority of the air-transports). The helicopter rescue company together with the Army's central alarm team will alert the hospitals, and asses the available bed capacities and, if depending on the size of the event, call and transport a burn expert for triage.

2- Implementation in hospitals

The number of specialized beds is limited. In Switzerland, the critical care capacities under normal circumstances is sufficient for civilian accidents with 11-12 adults and 2-4 pediatric ICU beds and about the same number of non-ICU beds. They are occupied 90% of the time leaving few beds free in case of a major event.

2.1 Classification of hospitals

The hospitals have been classified into three categories (**table 2**) in order to properly manage an influx of massive burns. Obviously university hospital and large cantonal hospitals have by definition more competences that make them able to face unusual situations. The hospital categories are included in the army's information system and will be used stepwise depending on the size of the event to care for burn patients.

Table 2: Proposed distribution of burn injury severity according to the type of hospital, and the number of casualties.

Hospital type	Up to 50 casualties	Over 50 casualties
Burn center	Adults >30% BSA Children > 20% BSA complex lesions Associated multiple trauma	idem
Level 1	Adults 20-30% BSA children 10-15% BSA Inhalation injury	Adults <30% BSA children <20% BSA Inhalation injury
Level 2	Adults < 10% BSA	Adults < 15% BSA

2.2 Continuous training of doctors and nurses

Lausanne and Zurich burn centers offers on regular basis continuous educational courses intended for medical staff and paramedics of the university and peripheral hospitals. In addition, regular training courses are also offered to the Swiss Academy of Military Medicine and Disaster.

2.3 Establishment of expert teams in burns

Teams of experts in burns are composed of physicians in charge of burn care in both Swiss burn centers. The expert teams are in charge of the organization and delivery of the national continuous educational program. In case of a disaster with massive burn influx their roles are:

- Assisting triage in the field.
- Organization of the medical care in the university hospital facilities.
- Assistance of the peripheral hospitals physicians and nurses (level one and two).

FUNDING

The Swiss burn alarm plan as presented here is intended to ensure optimal use of pre-existing structures and procedures. It is primarily a matter of fitting with minimum effort with the existing plans, trainings and facilities. It therefore incurs no additional costs and requires no additional funding.

CONCLUSION

On the basis of a clear risk and recognized limits in terms of specialized burn care capacities, our country decided to create a suitable structure, based on the existing, to enable it to assume an event involving a large number of such victims. The working group inspired itself from the experience of other countries that had faced burn mass casualties in the past, and adapted it to the its federal system with 26 cantons and health care systems.

The project summarized above is essentially based on two pillars: the early involvement of specialists in Swiss Burn Centers, and the optimal use of existing resources, globalized in the form of a burn network.

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