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### Prehospital and Disaster Medicine Centre:



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**Major incidents can be mitigated and managed through planning, training and effective coordination of available resources. These tasks may be performed by different institutions/ organisations or by only one centre. Following a national tragedy in 1998 that caused 63 deaths and over 200 casualties, a medical disaster response centre was created in Gothenburg, Sweden. The tasks for this centre were to coordinate risk assessments, disaster planning and training of staff within the region but also to act as "gold control," i.e. to take immediate strategic command over all medical resources within the region if needed.**

Deficiencies in comprehension, coordination, communication and a jointly trained organisation have been recognised as important factors in a failure to respond properly to major incidents. In order to cope with quantitative and qualitative implications of a disaster, basic healthcare infrastructure needs to be expanded and adapted. Involved organisations must be coordinated to follow a pre-defined response plan, including command and control systems and support functions to overcome all substantial challenges presented at the scene. Thus, a distinct governing body is desirable to improve the delivery of aid, to maximise resources, to tune up disaster response and reduce mortality (Johnson et al. 1999; Arnold et al. 2002; Epley et al. 2006; Lee et al. 2006; Militello et al. 2007; Wenzel 2007).

Region Västra Götaland in Sweden has over 1.5 million inhabitants, Scandinavians largest port (Gothenburg), automotive factories, refineries, chemical and petrochemical industries, several airports, major highways, and holds regular public gatherings.

This region, which also has over 200 primary healthcare centres, 10 emergency hospitals and a hospital integrated Emergency Medical Services (EMS), including Helicopter Emergency Medical Services (HEMS) has experienced numerous major incidents (Khorram-Manesh et al. 2009). The investigation following the Gothenburg disco fire, which had so many casualties in 1998, revealed certain short-comings regarding the medical response. It pointed out the need for a single regional point-of-contact (POC) as well as a command and control centre for all healthcare services within the region. This led to the establishment of the Prehospital Disaster Medicine Centre in 1999. The centre's tasks were to plan for, train for and immediately assume regional command and control in the event of major incidents (Gewalli et al. 2003; Khorram-Manesh et al. 2009). The premises, which were originally designed as a training facility for software applications, were physically rebuilt to serve as a command post over days and weeks with secure communications, back-up generators, white boards, computers, etc. A reserve central for ambulance dispatch was also installed within the building. All staff was trained to handle support functions within the command and control centre.

A system with a duty officer (RTiB) (RN, with specialised training in disaster medicine as well as in-depth knowledge about all the available regional medical resources) and a back-up physician on call (RBL; senior surgeon/anaesthesiologist with training in disaster medicine) was created. In this 24/7 system, the RTiB is the POC for all healthcare facilities within the region and has the mandate to act as "Gold Control," i.e.

to immediately assume strategic command.

The EMS dispatch centre is instructed to page the RTiB in the following instances:

1. Three or more ambulances are dispatched to a single incident;
2. More than one hospital is expected to be involved;
3. There is a potential threat may cause multiple casualties; and
4. Other authorities/emergency services request contact.

The RTiB should respond within five minutes after being paged and the RBL within 15 minutes. In cases of major incidents, other employees at the centre will be called to work as staff members. Specialists in other fields (e.g. CBRNe: Chemical Biological Radioactive Nuclear and Explosives) could be summoned to the centre when needed. All data are recorded in a web-based log (Khorram-Manesh et al. 2009).

A three-year follow up of this registry in 2009 showed over 1100 alerts being handled by the centre, producing over 6000 interventions, of which the majority was regional. However, the centre had also international activities by taking part in crisis such as South-East Asian Tsunami. In addition, the centre was the initiator of 28 large-scale exercises and offered over 145 courses in disaster- and emergency medicine such as Major Incident Medical Management and Support (MIMMS™) in association with Advanced Life Support Group (Khorram-Manesh et al. 2009). An increased number of hospital-related alerts during the study period raised concerns due to its negative impact on preparedness ("surge capacity") for medical emergencies as well as major incidents. This has been reported by other investigators, but seems to be a new and emerging problem for Sweden (Kaji et al. 2007; Fatovich et al. 2003; Sun et al. 2006). The reduction of hospital beds as a consequence of economic constraint, increased sub-specialisation of hospitals as well as increased dependency on high-tech equipment were among factors contributing to this problem, making the whole healthcare system more vulnerable in case of major incidents (Khorram-Manesh et al. 2009). During the study period, the number of local incidents decreased in favour of national and international incidents, emphasising the permanent need for crossborder cooperation based on common language and education; one of the main reasons for PKMC's (Prehospital KatastrofMedicinskt Centrum / Prehospital Disaster Medicine Centre) international cooperation with ALSG: Advanced Life Support Group, UK.

The high number of measures and contacts taken during these interventions demonstrate the need for communication and coordination. To assert perfect and desirable ground for communication and coordination with other agencies e.g. Police, Fire and Rescue departments and EMS, the centre organises continuous dialog meetings. These authorities are also invited to take part in the centre's various courses in disaster and disaster-related subjects. Personal knowledge about other agencies and their staff, gained during these activities, seems to be one of the most valuable factors in enhancing collaboration when an actual major incident strikes.

Disasters are inevitable, but can be mitigated through data accumulation, planning, training, research and practice. To coordinate these tasks, regional centres with powerful authority are needed. The combination of risk assessment, disaster planning and training of staff together with operational responsibility at the time of disaster may not only reveal various shortcomings within organisations and the healthcare system, but may also prevent the disastrous outcomes and consequences of such short-comings. Similar centres with redundant power to coordinate and communicate during a disaster have been reported in the literature (Epley et al. 2006; Kaji et al. 2007). However, to the best of our knowledge few, if any, have the regional responsibility for staff training by conducting disaster and disaster-related courses and training. The involvement of the same people in both planning for emergencies and disasters, training the staff for such events as well as executing the emergency and disaster plans in real life, adds strength to the organisation. No shorter feedback loop between planning and executing can exist!

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