

### Major Incidents in Region Västra Götaland, Sweden, during 25 years

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Region Västra Götaland was created in 1999 by merging three former county councils and Göteborg's decision-making functions concerned with health care. The Region's main responsibility is to provide its 1.5 million inhabitants with adequate health care. Within Västra Götaland, the vulnerability is high, as Västra Götaland together with Stockholm and Malmö are the most densely populated regions in Sweden. The infrastructure is complex with high industrial activity and intense communication network.

Over the last 20 years, the region has had several major incidents, including:

Year	Incident	Dead	Injured
1977	Landslide, Tuve	9	62
1980	Bridge collapse, Tjörn	8	
1987	Train accident, Lerum	9	130
1990	Passenger ship (Scandinavian Star) Fire	158	30
1992	Tram accident, Gothenburg	13	37
1998	Discotheque fire, Gothenburg	63	213
1999	Passenger ship (Princess Ragnhild) Fire	1	10
2001	EU-meeting, Gothenburg	143	
2002	Gas leak, Skara Sommarland	39 to hospital	

#### Questions:

How can we prevent such events? What conclusions can be drawn? What have we learned?

**Keywords:** communications; incidents, major; infrastructure; injured; lessons learned; networks; outcomes; prevention; Sweden

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### The Impact of Emergency Medical System Design on Performance of Response and Treatment for Disaster Patients

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**Objective:** Disasters generating multiple or mass numbers of casualties pose diverse and complex challenges to the medical component of response. The purpose of this study was to identify factors of Emergency Medical System Design (EMSD) that can improve response performance and potentially reduce morbidity and mortality during and immediately following an event.

**Methods:** To ensure a diversity of designs, 18 Emergency Medical Services Systems (EMSS) from five countries were reviewed. More than 25 structural characteristics of each EMSS were studied, including dispatch sophistication, response methodology, resource deployment and redeployment strategies, communication capabilities, staffing requirements, and level of training. Surveys were completed by all participants with demographics from each site collected as a baseline.

**Results:** Specific structural characteristics that affect level of performance to the typical medical or traumatic event were identified. Comparison with critical indicators from

evidenced-based data was then made to identify EMSD variables that will directly maximize the utilization of the medical response component. Clear patterns emerged that can provide strategies for the development of the EMSD best able to respond and manage the disaster that incorporates the existing political structure with operational, clinical, and economic variables.

**Conclusion:** The design of the EMS system is the most influential factor in its ability to respond rapidly, and effectively treat and transport patients from a disaster. The dynamic use of performance indicators to analyze, modify, and refine structural characteristics on an ongoing manner will optimize the EMSD and its organizational capabilities to enhance a successful disaster medical response.

**Keywords:** emergency medical system design (EMSD); indicators; patterns; politics; response; structure

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### Breakthrough in Mass and Multiple Casualty Triage May Increase the Savings of Lives during a Disaster

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This evidence-based triage and resource management system may maximize the savings of lives in multiple and mass-casualty incidents. The method is designed to provide real-time triage decisions for emergency first-responder and hospital personnel. The model uses the first evidence based triage process, and is based on an analysis of data on 102,000 victims of blunt and penetrating trauma.

This method was demonstrated during a multi-agency, disaster exercise in a large US city, and yielded results ranging from a 40% increase in survivors under an abundance of resources, to a 500% increase in survivors when transport and treatment resources were more constrained. Results from mass casualty simulations indicate the potential to increase victims' survivability by as much as 800% as compared to current triage methods. The system provides a formal methodology for prehospital and hospital triage that maximizes survivability.

Field data drive the method and real-time triage decisions that can change as conditions change within the emergency site and EMS system. Implementation is flexible: from rule-based field decisions to fully automated and integrated PDAs that can be linked with incident command to help coordinate resource management, patient tracking, and all other communication systems/processes.

**Keywords:** automation; communications; data; emergencies; field; first responders; hospital; management; prehospital; resources; survival; tracking; triage

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### High Risk Areas for Public Health Emergencies: A Risk Assessment Model for Conducting Vulnerability Analysis of Hazard-Prone Areas in Bangladesh

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**Introduction:** Approximately 40–50% of the population of

Bangladesh is living in high risk areas particularly for cyclones and floods. In an attempt to measure the level of health risks in these areas, a risk assessment model for the districts of Bangladesh has been developed by the Bangladesh Centre for Health Emergency Preparedness and Response (BCHEPR).

**Methods:** The model uses a number of indicators as determinants of vulnerability to public health emergencies: (1) Population density; (2) Under 5 years mortality rate; (3) Measles vaccination coverage rate; (4) Malnutrition rate of children under 5 year old; (5) Proportion of households with access to safe drinking water and sanitary latrines; (6) Proportion of people with incomes below the poverty level; (7) Proportion of people with access to health services; (8) Proportion of people without permanent households; and (9) Adult literacy rate. Based on the prevailing situation in the districts, the vulnerability is measured by computing a weighted index, and then each district is ranked for public health risks based on the computed score.

**Results:** Using data from the nationally representative sources, certain baseline standards and cut-off points for predicting public health risks in emergencies have been determined. These standards have been established based on past evidence as well as from international standards of best public health practice. The model is updated every year depending on the achievement of the districts in the selected indicators.

**Conclusions:** Application of this model can be used to identify the potential risk areas for public health emergencies whenever a natural hazard strikes the country. The model is used as a tool for assessing health needs in emergencies. By looking at the ranking of the districts in terms of vulnerability, the model offers opportunity for planning institutional measures that can reduce the public health risks of hazard-prone districts in Bangladesh.

**Keywords:** analysis; assessment; Bangladesh; best practice; emergencies; hazards; health; indicators; model; public health; ranking; risk  
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### Induction of Asthma in Susceptible Individuals Due to Changes in Weather Conditions

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In the Riverina region of southwest New South Wales, Australia, the occurrence of asthma epidemics is related to seasonal thunderstorms. During the last 15 years, there have been five such epidemics documented at the Wagga Wagga Base Hospital (a major non-metropolitan referral hospital) and in the surrounding areas. The most recent epidemic involved the management of 293 patients during a 24 hour period in seven different hospitals with 193 (65.9%) of these patients were managed at the Wagga Wagga Base Hospital. A number of innovative, predictive models have been developed that emphasize prediction algorithms based on interdisciplinary and interagency research.

The occurrence of epidemics of asthma has been shown to depend on the type of thunderstorm and the pollen load at the time of the storm. Longer range predictions depend

upon proximal and distal climatic conditions. Subsequent research has shown that the vast majority of patients presenting during an epidemic are allergic to rye grass pollen who had not been diagnosed previously with asthma.

A number of innovative preventive public health strategies have been implemented in an attempt to reduce the number of patients presenting with asthma during thunderstorms. The Emergency Department, hospital, and area-wide responses are based on a specific medical modification of the area disaster plan.

An overview of thunderstorm asthma that will detail available predictive models and the resources required to respond to an overwhelming influx of medical patients over a wide geographic area with a variety of medical providers are presented.

**Keywords:** asthma; disaster; epidemics; plans; responses; thunderstorms  
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## Forum: International Nursing

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WADEM Vice-President, Member Services

### Recommendations for Nursing Requirements at a Field Hospital Based on Israeli Defence Forces Field Hospital at the Earthquake Disaster in Turkey—August 1999

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**Introduction:** On 17 August 1999, an earthquake of 7.4 magnitude on the Richter Scale struck the Marmara region in Turkey causing an event resulting in massive casualties with an estimated 2,680 deaths and 5,300 injuries just in the city of Adapazari alone. A field hospital was set up by the Israeli Defence Forces at Adapazari, in order to provide temporary medical services until regular medical forces recovered. The aim of this paper is to provide an overview of the requirements of the nursing staff at a field hospital based on our experience, and analysis of the nursing activity at the field hospital at Adapazari.

**Methods:** The methods implemented include interviewing all nurses and many of the doctors who took part in the field hospital as well as a review of medical literature on disasters.

**Results:** An inverted nurse:physician ratio of 1:1.77 existed, as opposed to a 2.5–3:1 ratio in regular civilian hospitals. The nurses in this field hospital had to work longer and more intensive shifts than in a regular hospital. They also had to overcome language barriers and cultural differences, and faced difficult hygienic conditions.