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Toxicological Mass Disaster Management:

a Hospital Deployment Scheme

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Toxicological mass disasters have occurred frequently in the past and constitute a permanent threat in urban areas. From the standpoint of hospital planning, special consideration is needed to treat a large number of poisoned casualties in a relatively short period. Several unique medical aspects characterize toxicological mass disasters: casualties present a single disease entity with many "borderline" cases, most medical personnel are unfamiliar with the problem and casualties present a potential contamination hazard to the hospital. A hospital deployment scheme is presented recommending Decontamination, Triage and simple Treatment Algorithms to meet the medical and organizational challenge of such a mass casualty situation. A further specific deployment scheme for treatment of organophosphorus agents poisoning is described to illustrate the principles presented.

Toxicological disasters have become a constant and threatening hazard in our industrialized world, resulting over the years in thousands of poisoned casualties. The severe incident in 1976 in which an entire community was exposed to Dioxin, the disaster in Bhopal where thousands died of methylisocyanate poisoning, demonstrate the vulnerability of our society to these accidents and emphasize the need for proper handling and planning in advance of such events. From the standpoint of hospital planning, special consideration is required and adequate measures taken to cope with a situation in which, in a relatively short time, a large number of poisoned casualties require immediate treatment.

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Toxicological mass disasters can be characterized by certain distinct features. Analyzing these specific points can help to organize a hospital deployment scheme to meet the medical and organizational challenge posed by these events.

The majority of casualties of a toxicological accident present a single disease entity since, in most instances, a single chemical is responsible for the symptoms of the victims. Thus, a large number of patients will present different degrees of a single clinical syndrome requiring a limited range of therapeutics.

A unique group of casualties will be those who were mildly exposed and consider themselves poisoned despite the lack of any objective symptoms. These casualties comprise a population "at risk," in need of repeated medical evaluation and surveillance. At the acute stage, no treatment is needed and only correct assessment and supervision must be provided in any disaster management scheme for this group.

A further problem to be overcome is the inexperience of most medical personnel with clinical toxicology and the treatment of poison victims. This, and the possibility that the clinical course of the poisoning will be highly dynamic and require prompt initiation of specific antidotal therapy, deserve special attention. Relevant clinical information and guidance must be readily accessible to hospital personnel treating such casualties, who may be contaminated by a persistent toxic chemical and become a risk to medical staff and facilities. This unique hazard of toxicological disasters warrants the use of a special decontamination facility and the wearing of protective clothing by personnel in close contact with the casualties before they are decontaminated.

To avoid inundating the hospital with numerous contaminated victims, some basic organization and layout scheme must be in force to assure an orderly flow of casualties. The hospital entrance should be staffed by police or wardens and isolated by barriers. If primary risk assessment shows that the toxicological insult is contraminative, the casualties must be directed to a decontamination facility before definitive treatment is undertaken. This site should include prefixed riggings, a good water supply and a suitable drainage system — all placed in a large hall or open space.

Efficient triage is of special importance in a toxicological disaster because the large mass of casualties is likely to contain only a relatively small number of severely poisoned people in need of intensive medical treatment.

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The pharmaceutical scheme should be designed to give rapid minimal treatment to the majority of casualties. Since most forms of mass poisoning present a stereotypic clinical problem, paramedical personnel can be employed in the management of these patients with minimal guidance. All staff — medical, paramedical and administrative — should be deployed in teams trained to give primary treatment to groups of casualties.

Clinical aspects are relatively simple.

The medical problems posed by a toxicological mass disaster may be summarized as follows:

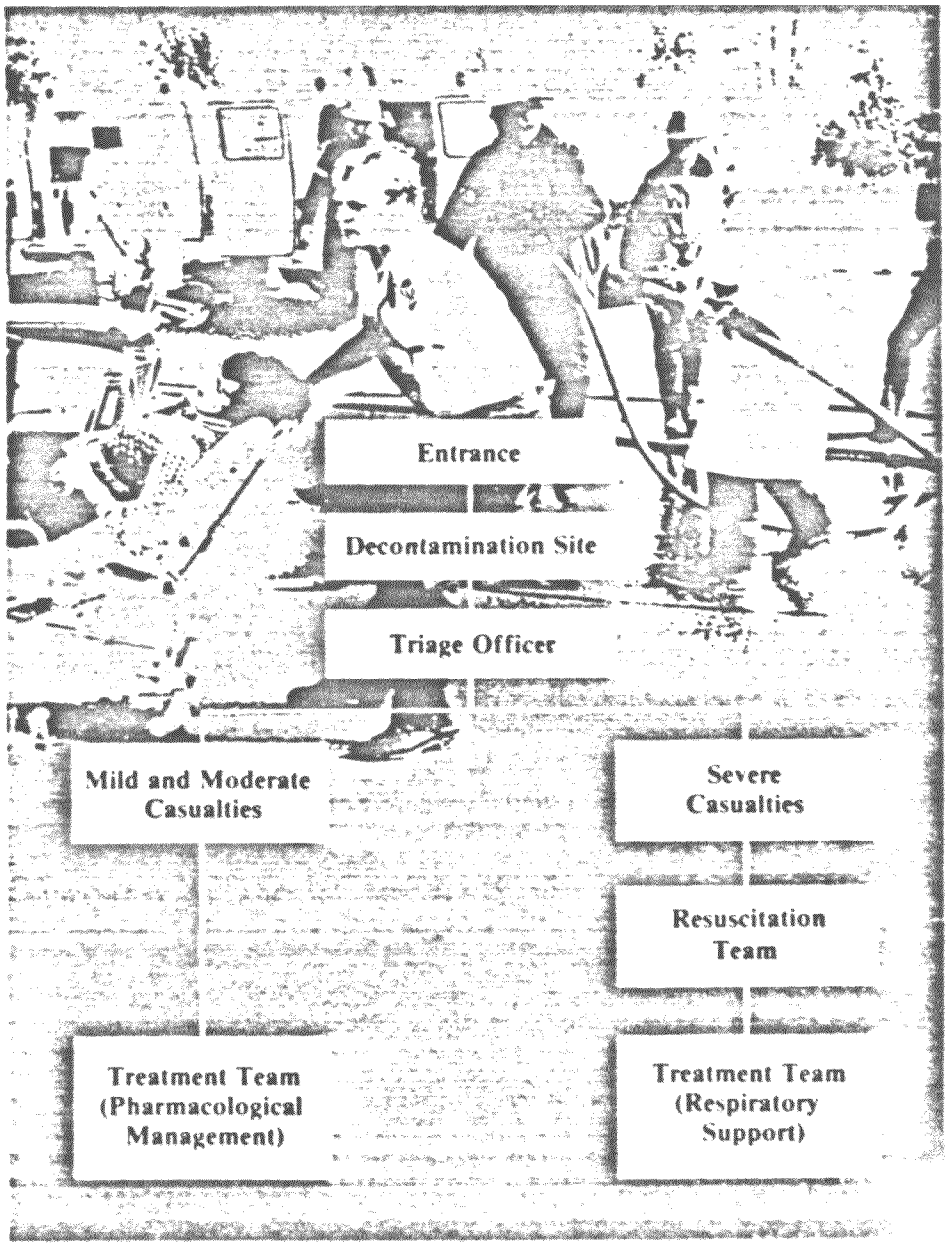
- A large number of casualties presenting with a single disease entity.
- Many "borderline" cases require only supervision.
- Most medical personnel are unfamiliar with the problem.
- Specific prompt intervention may be needed.
- Casualties present a potential "health hazard" until decontaminated.

As this list indicates, clinical aspects are relatively simple and, since the symptoms are stereotypic, a schematic treatment plan can be followed

To illustrate the application of these general principles in a disaster, we will present a hospital deployment scheme for treatment of casualties of organophosphorus (OP) agents. These agents were chosen as our reference hazard because they are highly toxic and constitute a realistic and very demanding threat. A suitable plan for such a scenario might serve as an adequate model for dealing with less threatening toxic substances.

Casualties reaching the hospital are directed to the first station — Decontamination.

Figure 1: Hospital deployment plan for the management of chemical mass disaster casualties.



Casualties reaching the hospital are directed to the first station — Decontamination. Potentially contaminated clothes are discarded and a shower is taken. Non-ambulatory casualties are decontaminated by paramedical personnel on site. Except for minimal life-saving measures, no treatment is given at this site, so as not to impede the flow of casualties. Just a small group of paramedics, without any physicians, comprise the group in charge. Decontamination enables all staff from this stage on to work without the restriction of protective clothing.

The senior triage officer, an experienced physician, is stationed at the exit of the decontamination site. The casualties are divided into two categories by one simple criterion: whether or not there is a need for respiratory support. Spontaneously breathing casualties are directed to treatment teams for mild and moderate casualties, while those in need of respiratory support are resuscitated by a small team of intensive care specialists and nurses. The resuscitation team will open airways, begin artificial respiration by ambu-bags, and pass casualties on for stabilization. Children are cared for by special teams of pediatricians and pediatric nurses.

Treatment teams are composed mainly of qualified nurses supervised and aided by a small number of physicians.

Treatment teams are composed mainly of qualified nurses supervised and aided by a small number of physicians. The nurses can act almost independently by using simple action cards containing all data relevant to the management of OP casualties, thus minimizing the need for clinical judgement.

The action card is based on a computerized data bank derived from experience gained in the treatment of OP insecticides poisoning in this country (Hirschberg and Lerman, 1984). Similar treatment cards are available for various hazardous chemicals and special geriatric and pediatric dose-adjusted treatment algo-

Gazette, Jean Pierre Ricci

A good triage system ensures that the injured receive the right treatment quickly.

Our approach for applying respiratory support is based on the mass casualty potential of the threat. An unconventional scheme must be deployed, as treatment in the format of intensive care units will be inadequate because of the large numbers of casualties requiring simultaneous artificial ventilation. Nursing students, medical students and non-clinical professional staff can be trained to ventilate casualties with ambu-bags and to take care of tracheal tubes or airways. They form an integral part of the

Our treatment scheme as a whole is based on the fact that the administration of antidotes and respiratory support are the main interventions in the treatment of OP casualties. Triage and treatment are performed according to clinical criteria which are stated in a simple and workable format.■

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