

# Health Disaster Management: Guidelines for Evaluation and Research in the Utstein Style: Executive Summary

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## Task Force on Quality Control of Disaster Management

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[Return to PDM Home Page](#)

[Return to Tables of Content](#)

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Nordic Society of Disaster Medicine  
Nordic International Rescue Foundation  
Organization of African Unity  
*Prehospital and Disaster Medicine*  
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This work was supported in part by grants from the Laerdal Foundation for Acute Medicine, the Royal Norwegian Ministry of Foreign Affairs, the Swedish National Board on Health and Welfare; the Swedish International Development Agency (SIDA); the Norwegian Air Ambulance Service, and the Nordic Council.

### **Summary Contents**

- [Key Words](#)
- [Problem](#)
- [Objective](#)
- [Definitions](#)
- [Conceptual Framework](#)
- [Basic Societal Functions](#)
- [The Templates:](#)

[Template A](#)  
[Templates B and C](#)

- [Implications](#)
- [Structure:](#)

[Role of Other Basic Societal Functions](#)  
[Severity Scores](#)  
[Pre-Event Inventories](#)  
[Dissemination and Endorsement](#)  
[Testing and Validation](#)  
[Future](#)  
[Benefits](#)  
[Limitations](#)

- [Conclusions](#)
- [Recommendations](#)

**Key Words:** analysis; catastrophe; data collection; definitions; description of disaster; disaster; disaster management; disaster medicine; disaster phases; disaster research; disaster responses; extrication; health consequences; health status; injuries; interventions; measures of effectiveness; medical responses; morbidity; mortality; preparedness; needs

assessment; public health; research; research design; research methods; risk evaluation; scope; template; type; Utstein style; warning

### **The Problem**

Disasters always have been a part of life, whether caused by unavoidable natural events or by avoidable, man-made events. Being rendered helpless by such events has caused fear and concern in all periods of history. To some extent, a disaster is expected, but there are varying degrees of uncertainty as to how and when it will occur. The occurrence of a disaster creates varying degrees of chaos combined with a mismatch between resources and needs. Therefore, in order to restore an affected society back to its pre-event status requires extraordinary efforts.

Generally, disasters have been considered as punishment. However, the mental approach to disasters seemingly is changing as are capabilities to mitigate the impact of the events responsible for them. However, the potential to influence the negative outcomes of such events has not been recognized in an institutional fashion. Also, much of the aid provided was based on intuition and anticipation, not necessarily rooted in understanding and knowledge.

Whereas, in the past, responses were slow and cumbersome, today we can respond with the provision of timely relief, but the accuracy of what we provide to meet the needs of the stricken society may have deteriorated. Seemingly, we are experiencing a "humanitarian clondyke" beyond any control and steering, only with anecdotal evaluations, and with a feedback system of performance that fits into the category: "beggars can't be choosers".

Disasters continue to increase in frequency and severity worldwide. The costs associated with these catastrophes continue to skyrocket in an unanticipated manner. These costs can be quantified in human, economic, and intangible terms. Human costs generally are computed on the basis of numbers of persons killed. More than 800,000 persons were killed in Rwanda, the floods in China have consumed >300,000 and >400,000 in Bangladesh. More than 25,000 deaths resulted from the Armenia earthquake, there are 20,000 or more persons missing or dead from Hurricanes Georges and Mitch, and >5,000 died from the Great Hanshin-Awaji earthquake, to mention only a few. However, the number of deaths does not represent the only human costs. Thousands of persons are injured physically and/or emotionally as a result of such events, and the effects will continue long after worldwide attention has disappeared; many persons will remain incapacitated for the rest of their lives, including the many children left without families and with terrifying memories and nightmares.

Recent estimates of economic costs are astounding. Estimates of the economic costs associated include [US]\$5-billion for Kobe earthquake; and \$30-billion for Hurricane Andrew in Florida. Often, the economic costs do not correlate with the number of deaths; for example, there were only 33 deaths directly attributable to the Northridge earthquake, but the disaster was the most costly in the history of the United States. Furthermore, cost estimates do not include the aid provided by external governments, United Nations

agencies, and non-governmental agencies that provide humanitarian assistance during the acute and reconstruction phases of disasters or to those costs associated with loss of production. For example, 80% of the production capacity of Honduras has been lost following Hurricane Mitch. Currently, it is estimated that disasters in the USA alone consume more than \$1-billion per day! Other costs are more intangible and their value cannot be estimated in quantitative terms. They include the loss of confidence in governments, fear for security, and loss of trust in fellow human beings. In some nations, such as the component states of Africa, disasters now are an everyday occurrence and are ongoing. Often, the risks associated with natural hazards are augmented by human actions. Deforestation leads to flooding, mudslides, and/or drought. "Development" of societies presents new risks, i.e., construction of dams over well-defined fault lines. Inter-human conflicts result in hundreds of thousands of displaced persons and refugees, in addition to thousands or hundreds of thousands of deaths and injuries.

Numerous efforts have been made to draw attention to the costs of disasters. The basic concepts expressed by each are repetitive and indicate that little progress has been made. The United Nations recognized the increasing impact on the world's population and environment of disasters by declaring the 1990s the International Decade for the Reduction of Natural Disasters (IDNDR).

Without structured and objective evaluations of the responses to and the measures taken to prevent or mitigate the effects of events resulting in disasters, it is not possible to learn from experiences obtained by others to optimize the absorbing capacity of a society and the responses to such disasters. Consequently, successful, efficient, and effective responses or measures are not codified and applied for use in future responses. Important information is lost, and errors and inefficiencies are perpetuated and potentially, vulnerability continues to increase. Often, the impact of an intervention is assessed by quantitating the output and not the outcome. It is clear that some relief and assistance efforts not only are ineffective at meeting defined needs, but actually are counterproductive and impair potentially beneficial responses and measures. Evaluations and research are designed to enhance the effectiveness, efficiency, and/or benefits of such activities and should be viewed as efforts at continuous quality improvement and are not directed at exposure or punishment. There has been little organized evaluation and research into the medical aspects of disasters. For example, careful examination of the reports from the March 1999 PAHO/UN Meetings in Santo Domingo to identify issues that arose with the impact of Hurricanes Georges and Mitch and propose solutions to the problems so they will not be problems in future events contained little actual data obtained from studies. Most of the issues and the solutions defined represent a litany that has been repeated over and over in after-action reports during the last 25 years; Such evaluations have not provoked changes or allowed the identification of resources to promulgate such changes.

Today, there does not exist any universally accepted organized methodology for the conduct and reporting of the evaluations of the medical effectiveness, efficacy, and benefit:cost relationships of disaster medical responses and relief efforts. In addition, there are no guidelines for the conduct of research efforts relative to the health aspects of

disaster responses. Current research designs and evaluation strategies usually are anecdotal and much of the data reported has little external validity (application to other events) because no common factors have been identified - no two disasters, natural or human-caused, are exactly alike. In addition, both the responses and the projects for their evaluation are multidisciplinary, and there are no universally recognized, common definitions of terms and abbreviations used among the multiple disciplines involved in reporting the results.

All of this now relates to recent developments in the evolution of the new science of Disaster Medicine. There now are techniques available that can be used in the design and conduct of evaluations and research of disasters. The validity of such techniques has been demonstrated repeatedly within the last decade. Thus, the science to conduct such studies currently exists.

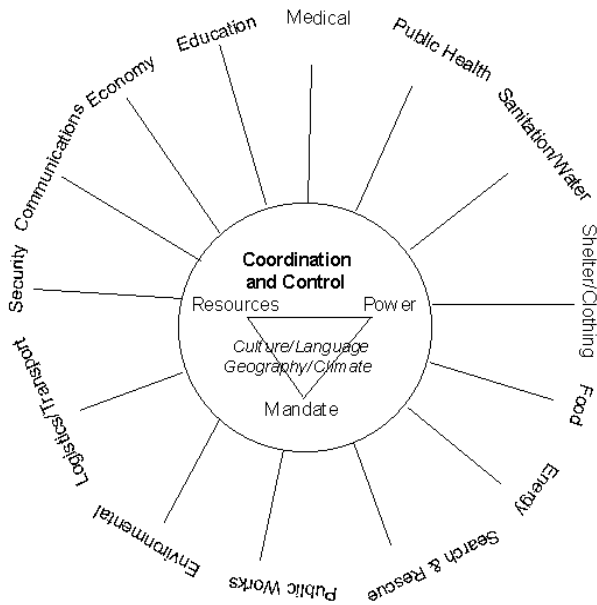
The Guidelines proposed in this report are the result of extensive research and discussions by a Steering Committee during multiple meetings over the past five years and by invited participants in an *International Workshop on the Quality Control of Disaster Management* conducted at the Nordic School of Public Health in Gothenburg, Sweden. The Task was the development of a structural framework for investigations into the medical and public health aspects of disasters that could be used as for the appropriate design, conduct, and reporting of evaluation and research. Such studies could investigate the absorbing capacity and preparation for the impact of the unfortunate realization of a hazard, the effectiveness and efficacy of the responses as they relate to the needs of the affected population, and benefit:cost relationships associated with medical responses to disasters worldwide. These studies will result in the ability to compare and integrate the findings of the evaluations and research of many disasters with the end-point of improving the effectiveness and decreasing costs associated with the health aspects of the prevention, vulnerability, preparedness, and responses to disasters.

[Return to summary contents](#)

[Return to PDM Home Page](#)

## **Objective**

Thus, the overall objective for the use of the Template and the Guidelines associated with the Template is to attenuate or eliminate the damage from disasters. This could result from the elimination of hazards, decreasing the risks for the actuation of the hazard, augmenting the absorbing capacity of the society and environment at risk, and enhancing the efficiency, effectiveness, and cost:benefit of preparedness and responses to the disaster.



**Figure 1-**Basic elements of societal functions linked by Coordination and Control

**Definitions**

Substantial confusion related to various definitions provided for the same words. Therefore, clear definitions as used in the document are provided for: 1) hazards; 2) risk; 3) mitigation; 4) prevention; 5) modification; 6) impact; 7) absorbing capacity; 8) resilience; 9) vulnerability; 10) preparedness; 11) event; 12) insult; 13) response; 14) susceptibility; 15) effects; 16) relief; 17) recovery; and 18) outcome.

**Conceptual Framework**

Until the last decade, disaster management focused on preparedness and responses. This approach, predominantly using anecdotal reports, was confining and had little scientific validity. The ultimate goal of disaster evaluation and research is to understand the pathophysiology of disasters and identify the most efficacious and efficient methods to deal with them. To systematically approach the problem of disaster evaluation, the need for a new conceptual framework evolved. For this purpose the distinction between risk, hazard, vulnerability and probability was dissected by the means of this formula:

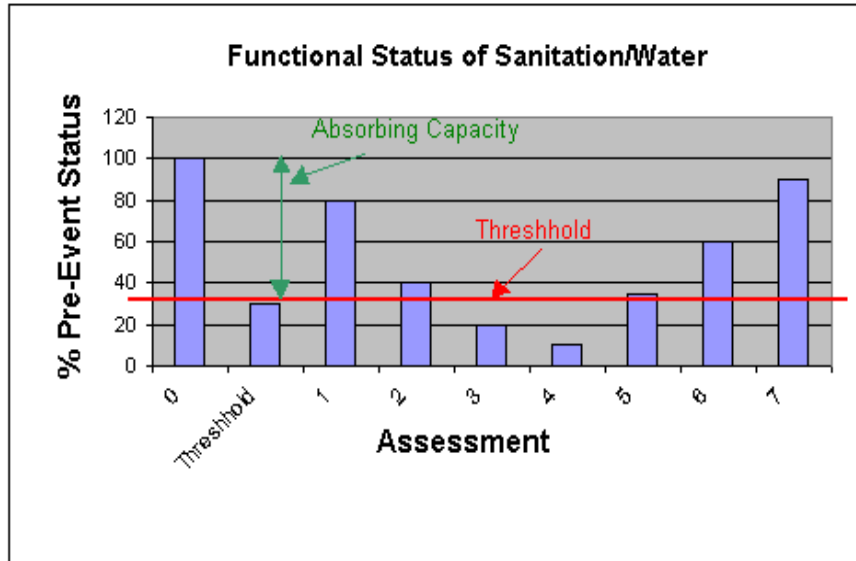
$$P_D = f (P_H)(H_{man} + H_{nat})( V_{nat} + a_1+a_2 + b_1 +b_2).$$

**Where:**

**P<sub>D</sub>** is the probability that an event will inflict damage on the society at risk; **H** is a hazard ;**f** is a function of the relationship between all of the variables contained within the brackets and between the brackets; **P<sub>H</sub>** is the probability that an event that may result in damage will occur; **H<sub>man</sub>** is the human component responsible for the hazard to exist; **H<sub>nat</sub>**

is hazard as given by nature;  $V_{nat}$  represents the natural vulnerability;  $a_1$  is the vulnerability augmentation,  $a_2$  is the vulnerability mitigation;  $b_1$  is the counter-productive disaster management; and  $b_2$  consists of productive disaster management or alleviation.

**Figure 2**-Fictitious example of changes in the functional status of the Sanitation/Water element of function following an earthquake



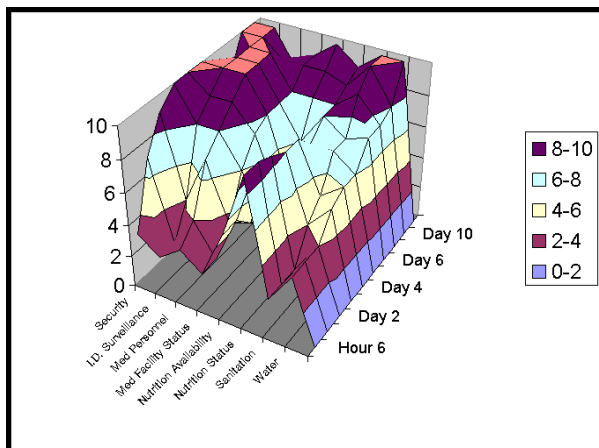
The ultimate objective of disaster management is to bring probability that damage will occur as close to zero as is possible. It can be achieved by bringing the net value in any one of the brackets to zero. Although in some situations (e.g., war or complex emergencies), it may seem the least expensive, changing the nature of nature or of man is difficult if not impossible. As part of the processes associated with development of a society, a man-made hazard may have been imposed on the society, but the project is accepted because the risk associated with the hazard is perceived to be very small, i.e., the development of Chernobyl; a dam built to provide hydroelectric power. In these situations, the probability of damage occurring would have been zero if the facilities had not been built, or it could have approached zero if more reliable preventive measures had been mandated. However, in the most situations, the main focus has been towards reduction in the vulnerability of the society by increasing preparedness and/or the absorbing capacity for when such a hazard could become an event. This can be achieved by developing and implementing mitigating measures ( $a_2$ ) or through productive disaster management ( $b_2$ ). This aspect is reflected by a Vulnerability-Preparedness Index. Thus, use of this formula facilitates identification of those elements that will be most cost-effective in reducing the probability that damage to the society will happen: it provides a rough pathophysiologic framework for a disaster.

[Return to summary contents](#)  
[Return to PDM Home Page](#)

### Basic Societal Functions

It is possible to identify at least 14 major functional elements of a society that may be affected either directly or indirectly by an event resulting in a disaster: 1) Medical; 2) Public health; 3) Sanitation and water supplies; 4) Shelter and Clothing; 5) Food; 6) Energy supplies; 7) Search and rescue; 8) Public works and engineering; 9) Environment; 10) Logistics and transport; 11) Security; 12) Communications; 13) Economy; and 14) Education (Figure 1). These functional elements are composed of many subelements. All of the basic societal elements are linked together by a Command and Control function provided by the respective governments.

During a disaster, each of these elements will be affected (damaged) to a varying degree depending upon the nature of the event and the absorbing capacity of the element of function in the affected society. When the absorbing capacity of any given function is insufficient to allow the element to continue to provide a minimum level of service to the affected



**Figure 3**-Landscape of change in societal functions following an acute onset disaster

population (threshold), then the societal element is considered to have become dysfunctional and assistance is required to return the function to above threshold levels so that it can meet its major role in the affected society. Further, the relative damage sustained to each of the component subelements may render the major societal function inadequate. Thus, the inter-action and relative impairment of any function can be depicted as a change from the pre-event status and represented in a diagram as indicated in Figure 2. Thus, the status of each of the elements during response and recovery can be plotted dynamically (Figure 3). Combinations of above threshold damage for several of the basic societal elements may render the damage a disaster as well.

Disaster science has suffered from its inability to provide randomized, controlled, experimental trials. However, adaptation of techniques commonly used in the social sciences has enlarged the capabilities of learning about disasters. Therefore, indicators used may either be measurable as numbers or qualitatively described.



[Return to summary contents](#)  
[Return to PDM Home Page](#)

## **The Templates**

A series of three templates a structure for the study of disasters (Figure 4). The first of these Templates (A) fits the aspects of a disaster into working units required for study. The second provides a structure and guidelines for the conduct of such studies, and the third provides a structure and guidelines for the design of such studies.

### ***Template A: Disaster Elements***

For the purpose of analysis, there is an absolute need to group the chronological, continuous mayhem of a disaster into recognizable, well-defined phases. Since the same phase may have a different chronological length for different disasters, the phases cannot be separated by time periods. Instead, the phases must be described functionally so that Phase A of disaster A represents the same aspect of the disaster as does Phase A of disaster B.

**1. Pre-Event Status** - In order to identify the severity of the damage resulting either directly or indirectly from an event, whether acute or slow in onset, a baseline must be available for the affected society. This baseline is called the **Point of Reference** for the function to be studied. Therefore, the pre-event status of the function(s) to be studied must be described using a universal, standardized schematic. *The endpoint of the management a disaster is the time when the pre-event situation for the societal function has been reconstructed.* A grid is provided for creating and maintaining such an inventory of the pre-event status with particular emphasis on the health and public health functions. Outlines for other elements also are provided, but will need to be adapted by experts in the respective fields. Such an inventory should be developed for all countries and maintained in a central repository, so that the information can be accessed quickly when needed.

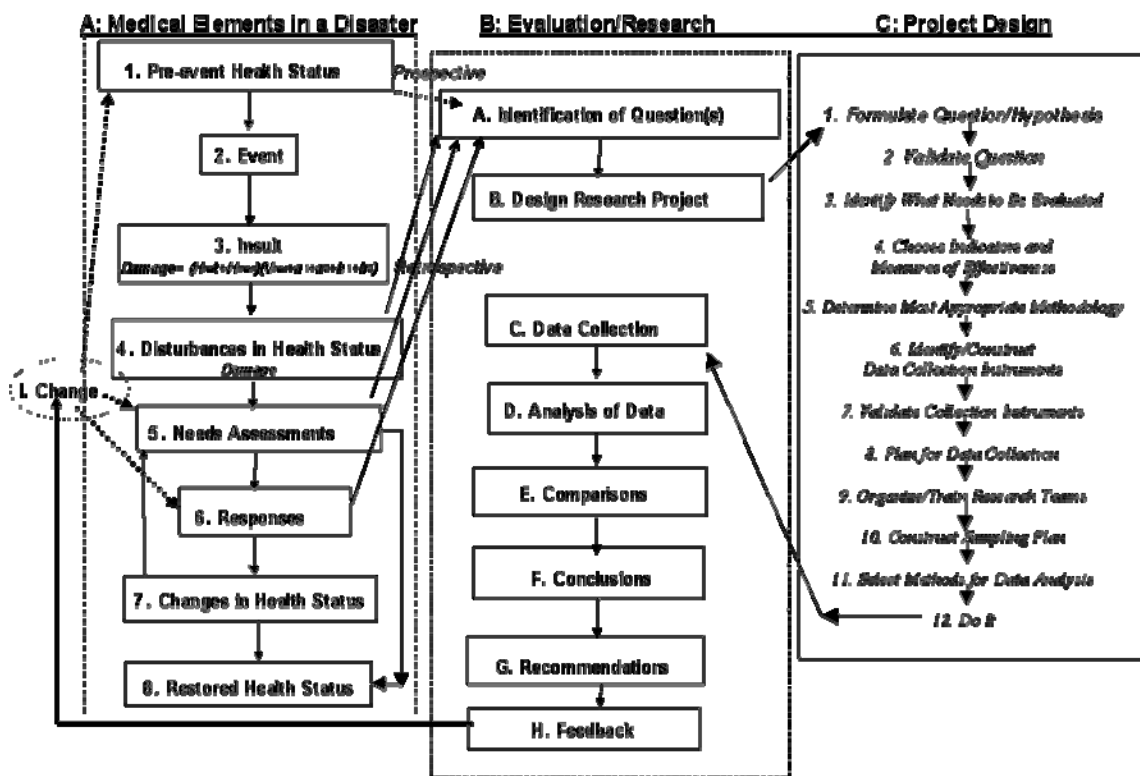
**2. Event** - The event must be described in a standardized manner also a grid/template. Guidelines for the description of the event in terms of type of event, its intensity (magnitude and duration) using a standardized, universally accepted scales, and the area and population impacted. The same descriptors should be included for the secondary events that are a direct or indirect result of the precipitating event. These descriptors are essential for comparing the effects of similar events on the same or different areas, regions, and/or populations. The Richter and Mercalli scales for earthquakes and the Safir-Simpson scale for hurricanes are examples of such scales for magnitude or intensity.

**3. Impact of the Event (Assessment of Damage)** - A comprehensive inventory of the functional status of each societal function must be conducted as soon after or during slow onset events using the same grids as used for the pre-event inventory. A similar inventory should be conducted at intervals during the disaster until the disaster no longer exists. For the study of a specific function (e.g., medical or public health) or a specific sub-function or set of functions or sub-functions, studies cannot be conducted without assessing the impact of the event. It only is through this methodology that the absorbing capacity of the

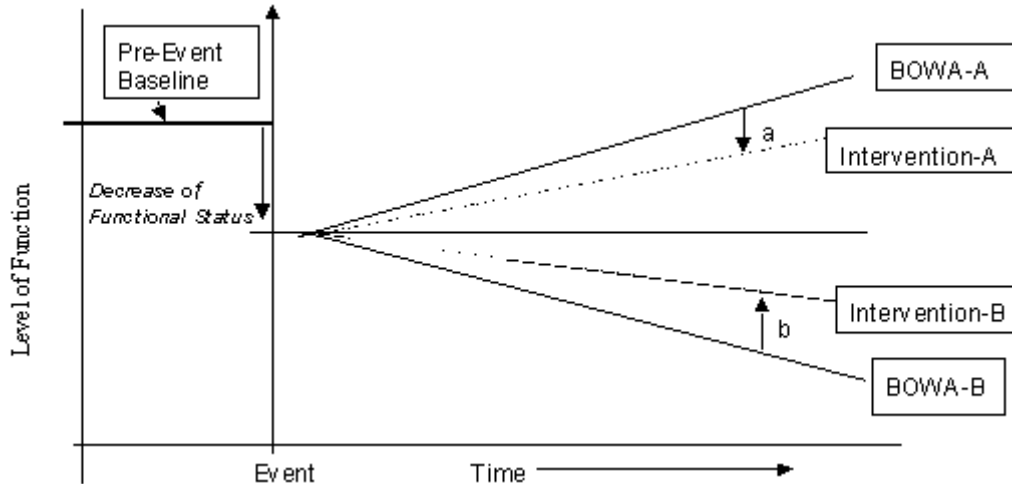
affected society can be assessed. The later includes the effectiveness of preparedness and the resiliency of the societal function(s) being studied. Identification of the factors that render the damage caused by similar events or similar magnitude is a major need in understanding disasters.

In addition, the guidelines provide two disaster severity scoring systems for grading the severity of the impact of the event: 1) overall disaster severity score; and 2) health disaster severity score. Computation of these severity scores will facilitate the comparison of the results of interventions for disasters of similar severity whether or not they be of identical type. Thus, the effects of interventions/responses on disasters caused by hurricanes and earthquakes and complex emergencies can be compared. Repetitive use of these severity scores should provide an index of the effects of the interventions being evaluated. Ideally, severity scores should be developed for each of the sub-functions. For example, a severity scale could be developed for the occurrence of infectious diseases following an event and the secondary events associated with the precipitating event.

Thus, it would be possible to identify the impact of events and the effects of interventions. These tools will become increasingly important as they are refined, as eventually it will be possible to quantitate the relative efficiency, effectiveness,



**Figure 4-**Revised Templates for the Quality Management of Medical Responses to Disasters



**Figure 5**-The effects of and recovery from an acute event in two societies (A and B). Following the immediate decrease in the functional status associated with the acute-onset event, the functional state for Society A would have increased to BOWA-A without assistance, but with assistance (Intervention A), Society A did not achieve BOWA-A (a). The effects of Intervention-A actually impeded the recovery of Society A. On the other hand, the functional state of Society B would have continued a steady decline following the event, but Intervention-B attenuated (b) the decline to BOWA-B. In the perception of the public, it is likely that Intervention-A would be deemed the most successful.

efficacy, and costs associated with changes in absorbing capacity and responses.

Importantly, the accuracy and reproducibility of these assessments will depend upon the training and skill of the assessors and upon the refinement of the tools (grids) used in the conduct of these assessments. However, the tools provided in the current Templates provide the structure necessary for further development.

**4. Needs Assessments** - It is not possible to evaluate any response or assistance (aid) provided without first knowing the need or set of needs that the intervention addresses. Furthermore, the effectiveness of previous interventions should be reflected in changes in the needs of the affected society. Currently, needs assessments are difficult and often largely subjective. This is true particularly during the initial/early phases of a disaster. Assessments of needs tend to become more accurate with the passage of time. The assessments are complicated further by confusion between real needs, perceived needs, assessed needs, and demands particularly when related to supplies.(ref Rubin) Again, it is important that standardized tools for needs assessment be developed, refined, and validated by repeated application and testing. Validated examples of tools designed and tested by the US Centers for Disease Control and Prevention (CDC) are included in the appendices to the Guidelines.(ref) Importantly, the application of such tools requires training of individuals in their use and comparative studies on the use of the tools by different assessors must be done. Inter-assessor reliability needs to be established.

**5. Responses** - Responses include not only immediate responses during the acute phase of a sudden onset event, but also all aid and assistance provided until the disaster ends. *Aid always is significant: it either helps or hurts.* Any response that is not needed will be counter-productive. Therefore, the effectiveness of any response must be measured by its ability to address identified needs. Responses that do not address identified needs are invalid and must be avoided.

A concept that may prove helpful consists of attempts to identify what would have been the Best Outcome Without Assistance (BOWA). Today, points of reference tend to be described in static terms. However, a society never is static: it always is on the move from one state of development to another. Such movements either may be positive or negative, sometimes for the society as a whole, sometimes only for special elements within the society. In a disaster stricken area, this movement may take on even greater importance. The self-healing capacity of the country impacted may be very limited and /or the situation may have been deteriorating prior to the event resulting in the disaster; without assistance, the events will result in an augmented rate of decline. In other areas or countries, the local population will be able to establish adequate coping mechanisms without outside assistance. Therefore, the end-point of returning the societal function to the Point of Reference always has a built-in error. As illustrated in Figure 5, an organization (B) that is associated with negative development in the post-event period, may be doing a better job in response to the event than is an organization (A) that is able to demonstrate a positive development during the post-event phase. As the Template evolves, ways to incorporate BOWA into these Guidelines will be identified. Currently, the point of reference still will be the baseline with regard to collection of information, but the dynamics of development will be included in the assessments of the real result of an intervention

One important key point in time is the **Disaster Critical Control Point (DCCP)**. The DCCP is the time at which the supplies balance all of the needs in terms of the function or sub-function being evaluated. Identification of this time depends on the correct, ongoing re-assessment of needs and available supplies.

**6. Changes in Health Status** - Changes in the health status of the affected population are defined by comparing the current health status of the affected population with the health status during the period preceding the initiation of the intervention being studied. These changes could be documented by a change in the overall disaster health severity score or by changes in the aspect of the component of health being studied.

**7. Restoration of Health Status** - When the pre-event status has been attained for the aspect of health being studied, that aspect of the disaster for the affected population is terminated.

[Return to summary contents](#)  
[Return to PDM Home Page](#)

## **Templates B and C: Research and Evaluation**

Clearly, most persons involved in medical research are not familiar with the use of

techniques for research other than those associated with experimental studies that attempt to prove the relationship between cause and effect. Therefore, the guidelines presented in the two research/evaluation Templates outline the steps in detail for the performance of studies related to situations in that do not lend themselves to collection of experimental data collection. Templates B and C relate to the design and conduct of research and evaluations of the medical/health aspects of disasters. Template B consists of a pattern for the development and conduct of such projects. Template C is a specific set of guidelines for the design of research/evaluation projects as pertain to the medical and health aspects of disasters. These patterns have been validated in many such projects, but they are outlined in this document to assist in the use of techniques that are not commonly used in medical research.

### **Template B**

The Research and Evaluation Template could apply to all types of research. It consists of eight sections: A) Identification of the question(s); B) Design Research Project; C) Data Collection; D) Analysis of the Data; E) Comparisons; F) Conclusions; G) Recommendations; and H) Feedback. Template C expands Section B, Design of a Project, of Template B.

**A. Identification of Question** - This section emphasizes the importance of identification of the problems or issues that could be solved or answered through the use of the techniques promulgated in these Guidelines. It suggests methods for selecting and refining these questions regardless of the societal function(s) being studied.

**B. Designing the Project** - This is the most comprehensive section of the Guidelines; it is detailed in detail in Template C. The steps outlined have several sources, but have relied heavily upon John Øvretveit's textbook, *Evaluating Health Interventions*, and include: 1) Formulation of the question(s) or hypothesis; 2) Validation of the question(s); 3) Identification of what needs to be evaluated; 4) Selection of Indicators and/or measures of effectiveness; 5) Determining the most appropriate methodology; 6) Identification or construction of data collection instruments; 7) Validation of data collection instruments; 8) Plan for data collection (including time frame); 9) Organizing and training the research team; 10) Construction of the sampling plan; 11) Selection of methods for analysis; and 12) Implementation. The Guidelines provided should allow most interested personnel to walk through the processes required for the conduct of most evaluation or research projects.

**C. Data Collection** - The requirements for the collection of data and the potential problems associated with the processes are outlined. The discussion stresses the importance of cross-checking all data acquired and the use of frequent debriefings of the data collectors.

**D. Analysis of the Data** - The processes for converting the data collected into findings are outlined. The findings are described as information. The section includes the requirements for judging adequacy of the responses or of the data gathering process and the outcomes when such are available. These may include: 1) structure; 2) process; 3)

outcome; 4) adequacy; and 5) costs. The methods used for the analysis of qualitative data are "inductive, building and testing concepts of interaction with data or the subjects. It also is iterative: the analyst forms categories from the data, and then, returns to the data to test their generalizability." (Øvretveit, 225) Categories are devised from patterns that seem to exist on review of the data, then the data are classified or "coded" into these categories. This process is repeated (iterated) until solid theories or concepts become clear. Then meanings relative to the perspectives of the users are attached to the concepts, and are related to the questions initially posed. Additional findings may be generated that are not directly related to the initial questions. The "findings" then are expressed in terms of the initial questions and conclusions are drawn relative to the initial questions posed and the supplementary finding uncovered through the evaluations. Additional findings may form the basis for future evaluations.

***E. Comparisons*** - The value of the study only can be judged by using comparisons and the comparisons usually comprise the discussion of the scientific papers. It is here that the use of the severity scores become a real asset. Establishment of linkages allow the formation of conclusions to include the external validity of the study and lead to progressive assumptions of internal validity through repetition of findings in similar events.

***F. Conclusions*** - At the very least, the conclusions must provide answers to the questions initially posed. If the answers to the question could not be provided from the evaluation, the reasons for not obtaining answers should be defined, and suggestions as to how future studies should be conducted that more likely would provide answers to the questions. The answers to the questions posed at the beginning of the project and the conclusions drawn from the findings must relate to the implications of the evaluation for future responses. Often, these will be in the form of hypotheses resulting from the research. Some of these hypotheses may lend themselves to testing in controlled, experimental studies. Of substantial importance in framing conclusions is what the findings mean in relation to other studies. Relationships of the medical/public health aspects should be related to the effects on other societal functions when they apply. As many of the conclusions as possible should relate back to the initial question. In addition, they may suggest the need for future studies in relationship to the findings of the current study.

***G. Recommendations*** - All studies should provide recommendations for future actions or changes in methodology based on the findings and discussion of the current study. Such recommendations may focus on refinements of the tools used for the study, the methodologies used, or for changes that should result because of the study.

***H. Feedback*** - Information relative to disaster responses has little value unless it is made available to others who may be able to apply it to their particular circumstances. The applicability of the information to other settings is a function of the external validity of the study. Thus, the information obtained in a study must be fed back to the planners in the setting in which the disaster has occurred and made available to others who are involved in disaster planning and response.

***I. Change*** - Implementation of change is more likely if the evaluation has paid attention to the concerns and questions of the interest groups who can support or oppose the changes recommended (Øvretveit, 23). It must be remembered that the entire motivation for the conduct of evaluation/research is to effect improvement in the way things are done. It is not the aim of any evaluation to promote punishment or to insinuate insincerity. The basic motivation for any medical response to a disaster is to provide help and this motive is not questioned by evaluation. Good evaluations regardless of the findings, will help make disaster medicine a better science. The evolution of standards, useful and realistic measures of effectiveness, and even critical pathways ultimately should make this ability to provide help better and better.

In the best of circumstances, effecting change is difficult. No change is automatic and to expect such because an evaluation suggests that making a change will increase the overall benefits derived from future responses is unrealistic. One hopes that the research will promote such change. But, change can be effected only by those with the authority to do so. Change can be effected either through education or political action. Both require the information on which to base the change.

### **Implications**

There are many potential implications that are inherent in the use of the Template and the conduct and reporting of structured evaluations and research projects.

### **Definitions**

The definitions of commonly used terms in reporting relative to disasters as outlined in this document have been subjected to scrutiny by many persons from many disciplines. Some of the newer definitions have been proposed because of confusion created by the broad use of older definitions. Currently, they are being subjected to scrutiny using the "chat" mode on the Internet. The evolution of a common language across the multiple disciplines associated with disasters will enhance communication and help to prevent duplication of efforts by parties from the different disciplines associated with disasters. The use of these definitions should enhance the multiple disciplines involved to share information and increase understanding between disciplines.

### **Structure**

The Templates provide a structure for the design, conduct, and reporting of evaluations and research into disasters, and especially the health aspects of disasters. Their use should enhance the reproducibility of the studies and hence, increase the external validity of studies in a more complete and rapid fashion. Thus, overall, their use should improve the cost-effectiveness and cost:benefit associated with the development of hypotheses that will contribute to meeting the objectives documented in the preceding sections of this report. The structure also provides for the study of any aspect of any disaster and facilitates comparison with the same or similar aspects of similar or dissimilar events in terms of type and intensity (Figure 8).

### **Role of Other Basic Societal Functions**

This document recognizes the interdependence of societal functions upon one another.

None of the basic elements of function operates in isolation during normal times, but their interdependence becomes a crucial factor during periods of disaster. Failure to recognize this interdependence often results in unrealistic approaches to disaster. It is this interdependence that highlights the need for Coordination and Control. The role of each of these functions should be addressed in the evaluation of any element or elements in any of the functions so as to provide continuity between the multiple disciplines. This represents an important new step in the analysis of disasters.

[Return to summary contents](#)

[Return to PDM Home Page](#)

### ***Severity Scores***

The use of the proposed severity scores for the overall disaster and the health aspects of the disaster will facilitate the comparison of the damage of disasters of similar severity and should allow the identification of factors that mitigate or intensify the effects. The comparison of differences in the damage resulting from similar events in different areas and different cultures and terrain for events of similar intensity should promote identification of factors that determine the absorbing capacity. In addition, the repeated calculation of severity scores should be a good indicator of the progress of the disaster. Progressive declines in the score would indicate improvement in the overall status and increases in the scores would indicate the opposite. Thus far, the severity scoring systems as proposed have not been field tested and they may need substantial refinement. They should be tested both prospectively and retrospectively and modified as indicated from their use.

### ***Pre-Event Inventories***

All of the aspects of this Template and of these guidelines are dependent on accurate inventories for each of the specific Societal Elements of Function. Such inventories not only will serve as the baseline for judging changes in the functional status of the Elements, but also will serve as the target for disaster responses. In addition, they will provide valuable information for the determination of the pre-event vulnerability and preparedness of the affected area and population. A Vulnerability/Preparedness Index is provided. The ultimate goal in the later aspect will be identification of those elements that will provide the greatest improvement in absorbing capacity for the lowest cost. Lastly, they will serve as information to orient and prepared external responses coordinate with the demography of the area. It is recognized that these inventories will be difficult to obtain. The need for them must be sold to the countries/areas at risk and assistance may be required to complete and maintain them. Lastly, a repository for this information that can be accessed easily and quickly and that maintenance of the database will be required.

### **Dissemination and Endorsement**

This Executive Summary and the most current draft of the Guidelines will be presented for endorsement and adoption at the meeting of the Board of Directors and to the General Assembly of the World Association for Disaster and Emergency Medicine convened in Osaka, JAPAN in May 1999. Pending endorsement of the product by the World Association and incorporation into the document of the recommendations of the Board of Directors and the General Assembly, the full document will be prepared for presentation



to the major supporting governments and organizations that made this project possible (Norway, Sweden, the Nordic Council, Laerdal Foundation). In addition, the full document will be distributed to the members of the Gothenberg Congress and to Disaster Medicine organizations affiliated with WADEM for review and comment. These comments will be incorporated into the final document prior to general dissemination. The formal presentation will be conducted at the Utstein Abbey in Stavanger, Norway in late summer/early fall of 1999.

Following endorsement by the WADEM and incorporation of comments into the document, the updated Guidelines will be disseminated by:

- 1) Publication of the Executive Summary in *Prehospital and Disaster Medicine* (July 1999);
- 2) Review of the guidelines by experts in the fields of Disaster Management and Disaster Medicine and publication of these reviews in PDM;
- 3) Attempt to get other journals in these fields to publish the Executive Summary (Japanese Journal of Disaster Medicine; JMBC; Disaster Management; Annals of Emergency Medicine; British Journal of Prehospital Medicine; European Journal of Emergency Medicine; Journal of Trauma; Resuscitation; etc.);
- 4) Publication of the full document as a Supplement to PDM (Supplement 1, January 2000);
- 5) Distribution of the full document to United Nations agencies associated with Disasters and Humanitarian Medicine, the PAHO, non-governmental agencies, governmental agencies, educational institutions including schools of public health;
- 6) Place full document on the web page of PDM seeking feedback and comments using the Internet.

[Return to summary contents](#)

[Return to PDM Home Page](#)

### **Testing and Validation**

The document will need to be refined into a working methodology and operational manual. Following this, each Template will be subjected to application to known events given the data available in the literature or in other sources such as after-action reports. This activity will be conducted by the Steering Committee or by other members of the Gothenberg Congress. The Guidelines should be tested using data from acute and delayed onset disasters and from complex emergencies. Modifications that arise in this testing process will be incorporated as appropriate.

Simultaneously with the testing using available data, educational curricula for training in Disaster Medicine will be developed and disseminated to educational institutions that

provide training in Disaster Medicine and Disaster Management. Each of the institutions will be requested to incorporate the processes contained in the Guidelines as outlined in the educational materials provided into their respective teaching programs. Feedback from these courses will be incorporated into another revision not only of the educational materials, but of the full document. Each of the revisions will be published as addenda to the initial report on the PDM webpage. In addition, its application in educational efforts will be documented and appropriate papers written and published as to its effectiveness and efficacy in the educational setting.

Lastly, the Guidelines will be applied to the study and evaluation of disasters by a team knowledgeable in its use. These projects will be designed in association with the Steering Committee and will be conducted by teams trained in the use of the Guidelines by the Steering Committee. It is hoped that such projects will be supported by grant funds. When possible, such studies should be conducted in parallel with evaluations not using the Guidelines and Templates and the results compared.

### **Future**

The Guidelines must be a dynamic document. As modifications are proposed and documented, the Guidelines will be modified to incorporate these refinements. Decisions as to modifications and refinement of the Guidelines should be the responsibility of a standing committee of WADEM. Suggested modifications should be ratified by the Board of WADEM prior to changes in the documents. The Guidelines should be modified through consensus congresses conducted no longer than at five year intervals.

### **Benefits**

There are many benefits that should accrue with the application of the techniques outlined in these Guidelines. The Templates provide a structure and set-out Guides for the development and implementation of evaluation and research projects into the medical aspects of disasters. In addition, the structure and processes are generic enough to have application in our sister disciplines. The use of the structure and process should result in increasing validity of the findings and enhance the reproducibility of the findings. In addition, the Guidelines present many new perspectives about the practice of Disaster Medicine.

The application of these Guidelines should result in more efficient, efficacious, and cost-effectiveness of the medical responses to disasters. Ongoing use of the processes outlined and the reporting of the findings should facilitate documentation of the effects of prevention and mitigating measures applied to societies at risk.

Further development of the Guidelines should include elaboration of a set of indicators for each of the Societal functions and their respective subfunctions. Once the indicators have evolved, a set of measurements and potentially critical pathways should develop for each of the indicators. Ultimately, appropriate benchmarks will evolve and be tested using select indicators and methods for measurement. Once this is achieved, real quality monitoring capabilities will be in place. Numerous examples of tools for use in rapid needs assessment are provided as models.

### **Limitations**

These guidelines have not been field tested. They are the results of years of experience in Disaster Medicine and Disaster Management. In addition, although much of what is laid-out in the guidelines already has been tested in the classroom, their use by persons who have experience in teaching Disaster Medicine and Management will refine the guidelines further. Currently, there do not exist any teaching or instructional materials associated with these guidelines. At least initially, the Guidelines should be used only by personnel who have been instrumental in their evolution or who have been trained in their application and analysis.

Many of the techniques promulgated by the Guidelines currently are not accepted as "true" science by other parts of Medicine who continue to rely on quantitative, randomized, prospective controlled studies as the only valid science. Most of these critics have little or no training in the use of the tools set-down in these Guidelines. The technique outlined should not be viewed as revolutionary or unusual as they are used in many other branches of medicine outside of the Disaster Medicine arena. Education of such individuals will be needed.

### **Conclusions**

The structure and processes outlined in the Guidelines are the first of their kind for use by the medical sciences. The Guidelines must be considered as a dynamic document and will require ongoing verification and enhancement. The Guidelines do provide a minimum standard for the evaluation and research into medical efforts surrounding disasters.

### **Recommendations**

Some of the recommendations resulting from the Guidelines include but are limited to:

1. The Guidelines must be subjected to both tabletop and field testing. The same applies to the testing, refinement, and evolution of the severity scores proposed;
2. The severity scores proposed should be tested initially using historical data available from previous disasters;
3. Additional severity scores must be developed for other functions and subfunctions;
4. Educational programs directed at training of personnel on the dynamics of using the Guidelines need to be developed as will the support materials required for implementation of such programs;
5. Consultation services will need to be provided to assist in the implementation of the Guidelines;
6. Programs to familiarize medical professionals with the techniques proposed for use will be required;
7. The document must be kept in a dynamic state. Use of the Internet will be key in keeping the Guidelines current; and

8. Mechanisms for establishing and cataloging the Pre-event Status for the Societal Functions must be developed and an easily accessible repository established.

Send comments to [Marvin L Birnbaum](#).

[Return to summary contents](#)

[Return to PDM Home Page](#)