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# Disaster stress: an emergency management perspective

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## Abstract

This paper examines the sources of stress likely to be encountered by emergency managers when responding to a disaster. Stressors relating to environmental (e.g. time pressure, level of risk, heat), organisational (e.g. bureaucracy, appropriateness of information, decision support and management systems) and operational (e.g. incident command, decision making, interagency liaison, team and media management) demands are considered. The mediating role of personality and transient states of physical (e.g. fitness and fatigue) and psychological (e.g. high levels of occupational stress) states are reviewed in terms of their influence on stress, judgement and decision making. Strategies for identifying which of these potential stress factors can be controlled or reduced and for training emergency managers to deal with the others are discussed.

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## Introduction

While there exists a substantial literature on disaster stress in survivors and helpers (e.g. critical incident stress), stress phenomena at the level of the emergency manager has been less extensively researched (Flin, 1996).

Consequently, little consideration has been given to understanding the specific stressors likely to affect them or their implications for their thinking and management skills when responding to a disaster. In this paper we discuss the stressors associated with exposure to high demand situations, such as major emergencies or disasters.

In addition to having to deal with a complex, unpredictable and dynamic response management environment, emergency managers may have to contend with a degree of personal danger, although this will vary depending on the incident. Time pressure is a common stressor in certain types of disaster (e.g. earthquake, flash floods), in others time may be controlled to some degree (e.g. between the escalation in alert status and the occurrence of hazard effects during a volcanic crisis). There are other stressors for emergency managers including responsibility, sight of casualties, communications (or the lack of them), dealing with the media, and operating within a team or integrated emergency management (IEM) context. What is most relevant for safeguarding well-being and promoting response effectiveness is identifying which of these potential stress factors can be controlled or reduced and how emergency managers can be trained to deal with the others.

## Personal factors

There are marked individual differences in how people react to emergency stressors, principally due to "mediating factors" which influence the extent of stress reactions. These include personal factors, not only in terms of personality but also in relation to transient states of fitness and fatigue. Individuals who are less than fully fit, perhaps due to minor illness (e.g. colds and flu) or who are already tired when called to manage a disaster are likely to be more vulnerable to experiencing stress reactions in this condition. The effects of fatigue on emergency decision making are only beginning to be understood (Flin *et al.*,

1998) and this is particularly relevant for prolonged events such as the management of volcanic crises which can last for several weeks or months. Psychological fitness is also a relevant mediating factor. A manager or commander who is suffering from occupational stress or a personal worry may be more vulnerable when faced with an acute stress situation. While such factors affect fitness for duty, in reality most emergency managers are unlikely to declare themselves unfit. They must, however, be aware that these limiting factors will affect their performance, acknowledge the need to rely on other members of the command team under these circumstances, and use other team resources when required.

The question of personality differences in command ability (or stress resistance) is often raised. The limited research available suggests that beyond obviously unsuitable characteristics (nervousness, shyness, instability) for leadership there is no one standard command personality profile (Flin, 1996). There is, however, the possibility that factors such as self-efficacy, locus of control and tolerance for ambiguity may heighten resilience to stress effects, particularly those that emanate from unpredictable and dynamic operating environments (Paton, 1989). What is important is that emergency managers have the skills to manage this role. They must also be aware of their personal strengths and limitations, and have some knowledge of how they react in stressful environments and what they have to do to control negative effects. This insight cannot be taken for granted.

Psychological research has shown that some airline pilots were not properly aware of the effects that exposure to stressors (and mediating factors such as fatigue) could have on their performance. To counter these “invincibility” attitudes, special human factors training called crew resource management (CRM) specifically teaches pilots to recognise the personal limiting factors inherent in stressful situations, and to utilise the resources of the whole crew (Gregorich *et al.*, 1990). It is possible that some emergency managers lack awareness of both the nature of such limiting factors in stressful command situations and their implications for their well-being and performance.

Difficulty recognising limitations can arise for other reasons. In prolonged, complex incidents, a mix of role expectations and

intense physical, psychological and emotional demands can interact to create a situation where the emergency manager perceives their active involvement as essential for the successful management of hazard consequences (Raphael, 1986). The net effect of the ensuing over-involvement is excessive fatigue, a decline in cognitive capabilities, and a significant decline in operational effectiveness and well-being. Time spent actively managing incidents should, therefore, be limited, adequate rest breaks taken, and performance/outcome expectations should be realistic, given the limitations under which individuals are operating (Duckworth, 1986; Paton, 1996).

### Incident management and control

Leadership and control in disaster contexts makes substantial demands on the personal resources and competence of those in management roles (Shaw, 1997; Stewart and Flin, 1996). Even with the best incident management system, functioning communications and team members who know their roles, emergency managers will have to make decisions “in the heat of the moment”, often on the basis of incomplete information and ambiguous intelligence about the unfolding events (Johnston *et al.*, 1999). Those in leadership roles may have had relatively little recent experience of operational disaster management and this can enhance the task difficulty for them and their team. Under these circumstances, the risk of experiencing acute stress can increase significantly. This risk, however, can be minimised by planning and establishing operational systems to support the management of the potentially high stress components of emergency response (e.g. co-ordination, communication, decision making), and training for emergency and disaster work.

### Operational systems and planning

Plans should be based on a detailed and comprehensive analysis of operational demands, linked to action (e.g. training programmes, resource allocation, simulation exercises) and tested regularly. Because they are intended to facilitate performance under exceptional circumstances, care should be taken to ensure that plans are not based on implicit and untested assumptions that reflect

routine operational requirements and conditions (Paton, 1996). Plans based on assumed capability will be less effective than anticipated and increase the *ad hoc* demands made on managers (Auf der Heide, 1989; Flin, 1996; Paton, 1996; Powell, 1991). Exercises and simulations must test assumptions and examine procedural and conceptual issues at operational and organisational levels. Planning should also facilitate the development of response management systems that assist performance rather than imposing additional demands on managers (Flin, 1996; Hightower and Couta, 1996; Paton, 1997; Powell, 1991), in particular, ensuring the short-term relaxation of pre-existing bureaucracy and the delegation of authority (Flin, 1996; Powell, 1991). Response management systems will be required to cover several atypical demands, including resources acquisition and deployment; delegation; communication and information management; decision making; inter-agency co-ordination, and media and community liaison (Paton *et al.*, 1998).

Responding to disasters increases the need for inter-organisational interaction substantially, requiring that effective liaison mechanisms are established (Hodgekinson and Stewart, 1991; Johnston *et al.*, 1999; Paton *et al.*, 1998). The quality of these mechanisms will have a significant bearing on the stress experienced by emergency managers. Consequently, the organisational analyses that will accompany response planning must accommodate the patterns of inter-organisational relationships that will emerge in multi-agency emergency response situations and ensure that those in leadership roles develop networks and train within multi-disciplinary contexts to facilitate their ability to operate under these circumstances.

### Co-ordination and team work

The fact that the demands encountered when responding to a disaster transcend individual capabilities is recognised within the IEM philosophy, which defines effective disaster management as involving the collective and co-ordinated activities of several agencies and professionals. Two issues emerge in this context. One involves response team management and the other concerns the implications of operating within a multi-agency context.

During a disaster, emergency managers will operate in teams to manage hazard effects. The presence of a well trained, experienced team will obviously reduce the impact of stressors on the commander as tasks can be delegated, second opinions sought, and tactics discussed and agreed. Good team work is very dependent on a proper analysis of the required team roles, training in team skills and the existence of an open work climate. A major military psychology project in the USA has been studying Tactical Decision Making Under Stress (TADMUS) in order to identify critical skills for teams performing under stress and to design decision support systems for their commanders (Brannick *et al.*, 1997). Many of the findings from these military projects are equally applicable to disaster management. Similarly, adopting the principles of Crew Resource Management, used by most major airlines to identify problems in crew co-ordination, may prove beneficial as a means of mobilising the considerable resources of the other team members (particularly their brain power) in difficult stressful situations. The need for delegation, workload sharing and joint problem solving is greatly heightened under high stress circumstances, and this is likely to be as true of managing hazard effects as it is of flight decks. In addition to their having a responsibility for co-ordinating the roles and tasks of their team, emergency managers may also find themselves responsible for co-ordinating the activities of several agencies or professionals.

The diversity of the demands created by a disaster means that the co-ordinated response of several agencies, some of whom may have little contact with one another under normal circumstances, is fundamental to comprehensive emergency management. Managing a multi-agency response is a demanding task. Having to deal with, for example, inter-agency conflict or differences in terminology, will constitute a significant source of stress for those responsible for co-ordination or who find themselves operating within such an environment. Response effectiveness relies heavily upon the activities of these agencies being integrated and their respective roles accommodated in a planned and systematic manner (Auf der Heide, 1989). Establishing who exactly is in charge of a multi-agency response at tactical and operational levels of command needs to be agreed in advance and rehearsed.

While considerable attention has been paid to the structural response models required for IEM, operational issues have been less extensively canvassed. The management of a multi-agency response can be facilitated by conceptualising it as a team-based activity. Effective team work is an essential stress reduction strategy and a crucial operational factor here is the management of diversity. This issue is particularly salient when agencies operate collectively only during a disaster, when conflicts emanating from the accrued diversity in skill, professional knowledge and philosophy, and personalities, can undermine the effective implementation of structural response models and increase the demands on those in leadership roles. While such diversity represents a strength of the IEM philosophy, its constructive use requires negotiation, the management of team diversity, training involving all prospective partners, and sound inter-agency communication. Stress management in this context is facilitated by these activities being accommodated at the planning stage and incorporated in the design of simulations and structured meetings (e.g. developing shared terminology and role allocation) prior to disaster.

In addition to addressing team development issues, team management must be considered. Psychological research into multi-disciplinary teams has developed models capable of providing a framework for the kind of transitory organisation required to manage the diverse and multi-jurisdictional demands that typify the disaster environment (Paton *et al.*, 1998). The management of diversity takes on additional importance given the relationship between it and the development of the information and communication systems which support response management.

### Communication and information

Good communication is essential for ensuring that appropriate information is available and delivered in a timely manner. This, in turn, affects the quality of decision making and decision implementation in an environment characterised by multi-agency involvement, large numbers of personnel, and conflicting, diverse and dynamic demands. Communication problems can represent a significant stressor for emergency managers. While some problems reflect hazard activity (e.g. volcanic

ash affecting communication infrastructure), others reflect inadequacies in crisis communication systems and/or the expertise available to use them (Johnston *et al.*, 1999; Paton *et al.*, 1998). A lack of processing capability, or the need for additional information processing, will introduce unnecessary response delays and constitute an additional source of stress for those in emergency management roles.

Because information needs will differ from those prevailing within routine operating environments, training will be required to develop management capability to specify information needs, interpret it appropriately on receipt, and, if required, adapt it for different functions and end users over time (e.g. incident response, liaison with other agencies, media requests). A role for computerised decision support systems is also indicated here. However, to ensure that key personnel can function in their absence (e.g. if a disaster knocks out this capability), care should be taken to ensure that they do not become over-reliant on them. Simulations should thus be conducted with and without access to decision support systems.

As a consequence of the dangers typically inherent within a disaster zone, emergency managers must also assess the risks to members of their team as well as members of the public. Consequently, risk assessment and vulnerability analysis will play a prominent role in decision making. For example, risk and vulnerability analyses can help reduce stress by assisting the process of prioritising areas for action or intervention and for making decisions about the deployment and distribution of limited resources.

Making effective use of information underlines the importance of decision-making and the need for those in leadership roles to be able to adapt their decision style and to utilise different decision making procedures. For example, the management environment encountered when responding to volcanic hazard effects is characterised by multiple, rapidly changing, unpredictable and geographically-dispersed consequences. This, coupled with the fact that the management of these consequences transcends the expertise and jurisdiction of any one agency, signals a need for the use of distributed decision-making procedures (Flin, 1996). In addition, it is pertinent to examine decision style and its

implications for decision making within a high stress environment.

### Stress and decision making

The immediate and long-term effects of acute stress can be positive or negative, and individuals may experience a mixture of both. Performance enhancing effects include alertness, faster reactions, increased energy and accelerated thinking skills. These are likely to improve an individual's ability to react to the occasion and to take decisions while under a degree of pressure. If the level of demand increases, or the individual has already started to experience a negative reaction, the effects resemble physiological and psychological symptoms of anxiety and fear, and a detrimental impact on performance and decision making will ensue. Typical problems, under these circumstances, include: "tunnel vision"; failure to prioritise; "freezing"; and loss of concentration (Flin, 1996; Flin *et al.*, 1997; Klein, 1996; Orasanu, 1997; Orasanu and Backer, 1996).

The impact of stress on decision making may depend on the type of decision process used. A range of thinking skills can be used to reach a decision. First, the decision making of those experienced in managing crises is characterised by intuitive or recognition-primed decision making (Klein, 1997). This is where the individual recognises the type of situation encountered and, from previous experience, knows what course of action is appropriate. Klein (1996) argued that the fast, intuitive decision style is less affected by stress than the more intellectually demanding analytical approach. He also has emphasised that properly trained and experienced commanders actually show adaptive reactions to stressors. "They include the selection of simpler and more robust decision strategies, narrowed and focused attention, use of heuristics, increased conservatism, and rapid closure on a course of action. To help decision makers avoid potential disruption due to stressors, it may be useful to train them to better manage time pressure, distracting levels of noise and high workload" (p. 83).

Secondly, there are situations where the person may have to spend more time thinking about the situation to remember the appropriate rule or procedure to use. A third style is the most mentally labour intensive, analytical

decision making, where the individual must consider several possible courses of action and then select the best option. This is the style which should be used during operational planning phases.

During a disaster, these three basic styles may be used to varying degrees depending on the situation. Those operating at a strategic level should use the analytic style to accommodate the broader perspective required under these circumstances. In certain situations, emergency managers may need to switch their style of decision making. For example, during a volcanic crisis, between eruption episodes, optional response plans can be carefully evaluated and compared. In this case, analytical decision making should enable selection of the best option. However, if the volcanic crisis shifts into an eruption phase, rapid decisions will have to be taken within minutes, making any new analytical decision making almost impossible and necessitating the use of a more intuitive or naturalistic decision style. Attention must be directed to understanding the naturalistic decision making of experts and how it can be modelled in simulations to develop this contingent capability in emergency managers.

### Developing response management capability

Training plays a pivotal role in managing stress reactions. A range of techniques has been tested for "stress-proofing" individuals, usually based on controlled exposure and careful debriefing in a blame-free environment. The reported benefits in terms of reduced stress and enhanced performance effectiveness appear to justify the costs involved (Driskell and Salas, 1996; Paton, 1996).

Training programmes should be based on an all-hazards approach and designed to facilitate both technical and psychological preparedness and the development of a flexible and adaptable response capability (Auf der Heide, 1989; Paton, 1997). In addition to developing an appropriate knowledge and skill base (e.g. information analysis, decision making, managing uncertainty, risk and vulnerability analysis), training should address how the disaster context influences the applicability of expertise, the initiation and control of response

activities (Paton, 1996) and how it can render routine operational procedures and expectations inadequate or inappropriate to the needs of the disaster response.

The characteristics of the routine operating environment (e.g. clear role/task expectations, hierarchical reporting and command structures) are incorporated into the psychological frameworks (schemata) that guide decision making and selection of response actions and become implicit, or “taken for granted”, facets of routine operations. However, their importance as determinants of well-being and performance effectiveness may go unrealised until faced with atypical operational demands (e.g. scale of destruction and disruption, multi-agency operating environments, rapid role change) which challenge these assumptions (Flin, 1996; Paton, 1996). This signals a need to develop procedures, and expectations, that accurately reflect the disaster operating context in which they will be applied (Paton, 1996).

Developing this capability requires that training needs analysis considers atypical circumstances and accommodates the implications of multi-agency operations to identify the demand characteristics (Paton, 1996) and competencies (Flin, 1996; Paton *et al.*, 1998) likely to be encountered and used when responding. These outputs also represent the demands and competencies that should be modelled in simulations.

Obviously, experience of leadership in major emergencies and disasters is limited by their infrequent nature. Consequently, specially designed simulations are increasingly being used to provide emergency managers with opportunities to practise dealing with high pressure situations in a safe and supportive environment. Simulations afford opportunities for emergency managers to develop and review technical and management skills, practise their use under realistic circumstances, receive feedback on their performance, increase awareness of stress reactions, and facilitate rehearsal of strategies to minimise negative reactions (Flin, 1996). One issue in simulation training is whether they expose participants to realistic levels of stress. Crego and Spinks (1997) compared the heart rates of police commanders in the MINERVA (Crego, 1995) simulator programmed for the Notting Hill Carnival in London (the biggest street carnival outside Rio) and when they were in command of the

real event, and found them to be broadly similar. It is essential that objective, critical and comprehensive process, content, and performance evaluation should follow simulation exercises and the response to any event.

An issue which should be considered when conducting evaluations concerns the need to consider how risk reduction strategies and incident management experience influence the perception of risk and future performance capability. Risk reduction activities (e.g. training), although designed to reduce vulnerability to stress reactions, can increase unsafe behaviour (e.g. risk homeostasis) and result in over-estimation of performance capability (Adams, 1995; Johnston *et al.*, 1999; Paton *et al.*, 1998). Perceptions of risk and capability are also influenced by the manner in which experience is interpreted.

While disaster planning encourages thinking in terms of scenarios that represent a serious test of their capabilities, emergency managers are more likely to encounter events that do not constitute a major test of their training, experience or systems. Similarly, simulations can only approximate the nature and complexity of a real disaster. Following such events or training, the psychological mechanisms (e.g. optimistic bias) that guide interpretation of performance can encourage overestimation of future response capability (Johnston *et al.*, 1999; Paton *et al.*, 1998) and heighten the risk status of those concerned. Consequently, the evaluation process must consider whether such interventions bias the meaning attributed to hazards and influence perceived vulnerability and response capability in a manner counter to that intended and so, inadvertently, increase vulnerability to stress effects by generating inappropriate expectations about their resilience or capability (Paton, 1996; Raphael, 1986).

## Conclusion

Research into the nature and consequences of acute stress on the performance and well-being of emergency managers is sparse. We have identified several potential stressors for those fulfilling disaster management roles and discussed how planning, communication and co-ordination, team development and management, training, and decision making systems and capabilities can be developed and/or implemented to reduce stress and

promote effective response management. Nonetheless, there remains a clear need for more systematic research into response management stress in those individuals likely to fulfil incident command and emergency management roles during and/or after disaster.

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