

Disaster Nomenclature—A Functional Impact Approach: The PICE System

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■ ABSTRACT

A standard nomenclature that concisely describes any disaster is currently lacking. This article describes a model taxonomy system. Instead of the term "disaster," a root word "PICE," "potential injury-creating event," is used. Descriptive modifiers to account for all possible scenarios surround this root word, as illustrated.

PICE Nomenclature				
A	B	C		Stage
Static	Controlled	Local	P	0
Dynamic	Disruptive	Regional	I	I
	Paralytic	National	C	II
		International	E	III

A modifier is chosen from each column and a stage is assigned to each PICE. Column A describes the potential for additional casualties. Column B describes whether resources are overwhelmed and, if so, whether they must simply be augmented (disruptive) or they must first be reconstituted (paralytic). Column C describes the extent of geographic involvement. "Stage" refers strictly to the likelihood that outside medical assistance will be needed. Stage 0 means there is little chance, stage I means there is a small chance (place outside help on "alert"), stage II means there is a moderate chance (place on "standby"), and stage III means local medical resources are clearly overwhelmed (immediately dispatch outside resources, commit personnel, prepare remote hospitals). For example, a multiple vehicle crash in a large city would be a "static, controlled, local PICE, stage 0." In conclusion, a new nomenclature for describing disasters is reported. A short phrase describes the incident and communicates the need for outside assistance. The model may be useful for disaster planning, management, and research.

Key words: disaster medicine; disaster planning; terminology; scaling system; nomenclature; taxonomy; classification; catastrophe.

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■ One of the difficulties in achieving precise nomenclature for disaster planning and response is that the very word "disaster" connotes a subjective assessment that has different meanings to different people. There is a tendency to have a single "disaster" plan and to send the

same "disaster" response regardless of the particular circumstances. A local, state, or federal "disaster declaration" implies commitment of financial and other resources, leaving an inherent bias in such a decision.

When describing an event, the most important consideration is the functional impact to the affected jurisdiction. In fact, the effects could be negligible in one geographic part of a "disaster" zone, while great in a neighboring area. Additionally, the same event could have minor or catastrophic effects. For example, an earthquake in the lower basin of the Yukon River of Alaska might have little or no practical consequences,

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■ **TABLE 1** Potential Injury-creating Event (PICE) Nomenclature

A	B	C		Stage
Static	Controlled	Local	P	0
Dynamic	Disruptive	Regional	I	I
	Paralytic	National	C	II
		International	E	III

while the same-scale earthquake centered on the 125th Street fault in Manhattan could readily overwhelm local resources. Furthermore, a given event might have minimal impact at one time of day, but tremendous consequences at another. An earthquake in Los Angeles during rush hour would have a much greater effect than the same event in the middle of the night.

A nomenclature for describing "disasters" should focus on the *functional impact* to the health care system. This paper will consider traditional "disaster" nomenclature, which focuses on issues other than the functional impact of the crisis and present a new concept to describe "disasters" that focuses on impact—the PICE nomenclature.

TRADITIONAL TERMINOLOGY

Historically, many terms have been used in attempts to describe disasters. A geographic basis for characterization is commonly used. Relative to a hospital, "internal" and "external" are examples of common modifiers. Yet, a major earthquake can be both "internal" and "external" to a hospital at the same time. The location of the event is not really an important issue. It is the *functional impact* on the facility that is key.

Another traditional descriptor is an etiologic classification, i.e., "natural" or "man-made." This is an inefficient and unnecessary conceptual scheme; it is of no consequence, except perhaps to the legal community, whether operations are being disrupted from natural or man-made causes. It is the effect on the health

care system that is relevant, rather than what caused the problem.

Of note, there is no standard definition for "casualty." Sometimes the word is used to imply injury (of variable degrees), sometimes death, and sometimes both. This vagueness makes it difficult to interpret scientific studies. Furthermore, the definition of casualty has financial implications. Federal reimbursement may be approved only for patients who are classified as "casualties" of a given event.

CURRENT TERMINOLOGY

Currently, there is no uniformly accepted terminology for disasters. We performed a MEDLINE search from the years 1988 to 1995 using the key words: "disaster or catastrophe or mass casualty incident (MCI)" and "nomenclature or classification or terminology or taxonomy." Aside from 3 Russian articles with no English abstracts, we found only 2 additional papers of relevance, both by de Boer of The Netherlands.^{1,2} De Boer recognizes the problem of the lack of a meaningful definition for the word "disaster" and proposes something called the "medical severity index." This index is the product of the casualty load and the severity of the incident, and is compared with the available total capacity of

medical services. Although this work is a useful beginning to focus disaster planners on resources vs needs, it has not been adopted for routine use, and much confusion still remains in terms of defining the word "disaster."

In fact, asking a group of medical experts to define "disaster," "mass casualty incident," "multicasualty incident," or "MCI" today would yield diverse definitions. A common, precise terminology is particularly important because markedly distinct responses are required for each type of event. Clear, concise language is critical not only for preparation, but also for requesting appropriate levels of outside assistance under conditions with disrupted communications.

With a common, concise nomenclature, students can be educated to communicate clearly. Responders can assess the degree of destruction, improvise on a set framework, and communicate more effectively. The plea "send all you have got" can be modified so that specific resources required are requested; the response will be more effective and efficient.

Some events that have been routinely classified as "disasters" clearly are not. For example, many would consider a plane crash a "disaster"; yet it may not overwhelm local medical resources. All victims of such an event may be either uninjured or dead; alternatively, there may be many injuries but adequate local resources available with which to respond effectively.

Disasters may or may not produce casualties. For example, a hospital nursing strike is called by some a "disaster." To cope with this dis-

■ **TABLE 2** Medical Staging

PICE* Stage	Projected Need for Outside Aid	Status of Outside Help
0	Little to none	Inactive
I	Small	Alert
II	Moderate	Standby
III	Great	Dispatch

* PICE = potential injury-creating event.

ruption, a hospital needs a response beyond its normal resources or outside of its standard operating procedures, yet no deleterious health and medical effect may result.

Sometimes local resources are plentiful, but they are not appropriately organized to provide an effective response to an event. Even with ample supplies and personnel, the result is the same as if resources were overwhelmed. Thus, appropriate organization must be coupled with available resources to avoid overwhelming response capability.

Rather than depending on current terminology, a new paradigm is needed. A more efficient way to conceptualize a scenario would be to do away with the term "disaster" altogether, and replace it with the concept of an "event." In fact, we are actually concerned with a "potential injury-creating event" (PICE).

PICE NOMENCLATURE

The *potential injury-creating event* (PICE) is the basis for the root word and its modifiers. Together they form a short phrase that concisely describes the critical features of most types or degrees of "disaster." As the event evolves over time, the description may change. Thus this system can be used both prospectively and retrospectively to describe an event. If used after the event has concluded, one must specify the time of the description (e.g., immediately after the event occurs, 24 hours later, 72 hours later). Any post-hoc comparison of events must use the same time frame following event onset or, alternatively, could use the highest observed PICE state depending on the purpose of the analysis.

Modifiers are chosen from a standardized group of prefixes and a stage is assigned (Table 1). The first prefix (column A) describes the potential for additional casualties. The second prefix (column B) describes whether local resources are overwhelmed and, if so, whether they

■ TABLE 3 Potential Injury-creating Event (PICE) Nomenclature Examples*

Multiple vehicle crash (large city)	Static, controlled, local PICE, stage 0
Multiple vehicle crash (small town)	Static, disruptive, local PICE, stage 1
Hospital nursing strike	Dynamic, paralytic, local PICE, stage 0
Hospital bomb threat	Dynamic, controlled, local PICE, stage I
Los Angeles civil disturbance	Dynamic, disruptive, regional PICE, stage I
Northridge earthquake	Dynamic, disruptive, regional PICE, stage II
Armenian earthquake	Dynamic, paralytic, national PICE, stage III
Oklahoma City bombing	Dynamic, disruptive, local PICE, stage I

*Note that over time, description of each event may change.

must simply be augmented (disruptive) or whether they must first be totally reconstituted (paralytic). In other words, the focus of the prefix is on the degree to which the facility or jurisdiction is able to respond with resources routinely available when the event is being described. The third prefix (column C) depicts the extent of geographic involvement.

PICE *stage* refers to the likelihood that outside medical assistance will be needed either to augment or to completely reconstitute resources. Stage 0 means there is "little or no chance." Stage I means there is a small chance and requires placing outside medical help on "alert." Stage II means there is a moderate chance and outside help should be placed on "standby." Stage III means local resources are clearly overwhelmed and requires the "dispatch" of outside resources and commitment of personnel (Table 2). For example, a multiple vehicle crash with a dozen injuries and several deaths in a large city would be a stage 0, while in a small rural town it might be stage III. Table 3 gives additional examples.

Staging should be performed by the most highly qualified medical person involved in the disaster response and immediately communicated via prearranged channels to the appropriate local government officials who have access to neighboring communities, and state and federal personnel as needed.

Although staging is somewhat imprecise, the experienced emergency physician should have the best

sense of the ability of a given health care emergency response system to handle the *medical* needs of the affected population. For example, a freeway crash with 10 victims in a major metropolitan area could normally be handled by local resources and would be a stage 0 event. Alternatively, a jet plane crash with an unknown number of victims might be best classified as stage I to "alert" outside agencies there may soon be a potential to mobilize resources. The same crash in a more rural community would likely overwhelm local response capabilities if there were multiple injured survivors. In this case, it would be prudent to place external resource agencies on standby so that they could move immediately to a dispatch stage if multiple casualties were confirmed. Similarly, a large magnitude earthquake with obvious casualties in one site in California might prompt a stage II classification until a better assessment is made. If it appears that hundreds or even thousands of casualties exist, the stage would be immediately upgraded to a III.

PICES can be subdivided into *static* and *dynamic* types. If there is a fire in a hospital laboratory with ongoing explosions, this is a "dynamic" situation. Alternatively, if 10 people are injured in an incident and there is little potential for further harm, the situation is "static."

Whether "static" or "dynamic," the majority of PICES can be handled by augmenting a well-rehearsed hospital or emergency medical services system response. If the event

■ TABLE 4 Paralytic Potential Injury-creating Events (PICES)

Destructive	Nondestructive
Bomb explosion	Snow storm
Earthquake	Employee strike
Tornado	Power failure
Civil unrest	Water supply cutoff
Hazardous material contamination	
Fire	
Building collapse	

does not stress the system, it is a *controlled* situation. A motor vehicle crash with 5 trauma patients in an urban area with sufficient resources to manage the patients would be such an event. Alternatively, situations that can be handled by enhancing routine operating procedures and using standard resources are termed *disruptive* PICES. The same crash with 10 victims in which additional ambulances and personnel would need to be directed from elsewhere within the system to provide an adequate response would be an example.

In some situations, the boosting of routine operations is not sufficient or possible. A PICE can completely overwhelm the capability of a health care system to mount a normal response so that a substitute plan for recovery must be available and used. Reconstitution of resources is then necessary. A hospital using an emergency generator in the case of electricity failure illustrates this concept. Situations that require significant reconstitution of critical resources are termed *paralytic* PICES.

To determine under what circumstances paralysis would exist, it is useful to prospectively identify the critical substrates necessary for the functioning of a particular agency. For example, these resources would be different for a police jurisdiction vs a water district. A hospital setting provides a useful illustration of the term "paralytic PICE." Within the hospital, there are 6 critical elements that must be functioning to provide a response: 1) physical plant, 2) personnel, 3) supervision, 4) supplies

and equipment, 5) communication, and 6) transportation.^{3,4} If any of these critical resources are compromised, an alternative plan to respond to a disaster situation must be implemented. For example, if there is an explosion in the ED with a resultant fire and hazardous substances, the physical plant must first be restored by putting out the fire and containing the hazardous material before the ED can again become operational. Consider another event in which the hospital water supply is contaminated. This would bring operations to a halt until the water supply could be restored. Paralytic PICES can be either destructive or nondestructive (Table 4).

Some situations necessitate neither reconstitution nor augmentation. The event is neither "disruptive" nor "paralytic." For example, a disaster plan may be activated if there is a multiple vehicle crash and up to 4 critical patients may be arriving. If the hospital is a busy trauma center, this may not overwhelm its resources. This could be described as a *controlled* situation. Note that the description of an event can change over time. That is, a power outage that is initially "paralytic" may become merely "disruptive" or even "controlled" within a short period.

The geographic area covered by the PICE helps to define its magnitude. Outside resources are usually more quickly and easily obtained for a local event than for a regional crisis. For incidents that cover large geographic regions, such as a catastrophic earthquake or hurricane, a hospital or community may need to

be self-sufficient for many hours to days.⁵ It should be stressed that the nomenclature prefix describes the size of the *affected* area, not the location from where outside help is requested.

A "local" event is one in which there is a single, identifiable scene. The event becomes "regional" if it crosses more than one jurisdiction such as a county or state border. A "national" event involves most of an entire country. Although this would be an unlikely scenario in the United States, it has relevance for smaller countries. Finally, an "international" crisis is one that occurs in more than one country simultaneously.

FUTURE DIRECTIONS

The PICE model provides some important concepts for disaster planners, researchers, and responders. However, the model must be validated on a wider scale to determine its practical usefulness. In addition, future refinement of the PICE model may need to concentrate on delineation of the specific type of outside aid needed. It may be ineffective to send a team of medical personnel into an affected area equipped and prepared to perform acute trauma resuscitations if the community actually requires primary care medical services. Likewise, if the group is trained and equipped for primary care and there is a need for managing acute injuries, this would also be an unfortunate mismatch of resources with need. The National Disaster Medical System (NDMS) is currently working with this concept so that resources (e.g., special teams for pediatric patients, burns, trauma, or mortician teams for mass deaths) are being matched to the needs following an event. If it proves necessary, further refinement of the type of outside aid required could be accomplished by placing a modifier after the stage classification.

CONCLUSION

Planners and responders are faced with the challenge of providing preparedness for many diverse situations. Unfortunately, there is currently no uniform terminology to describe, teach, and prepare for this large spectrum of situations. However, the concept of the importance of the *functional impact to the health care system* at a given point in time is paramount. A new nomenclature for describing disasters is needed so that a short phrase can precisely communicate: 1) the operational consequences to a hospital or community and 2) the type and amount of outside assistance needed. The PICE terminology is a model that focuses disaster planners, managers, and researchers on the functional impact of a given event.

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