
The importance of surge capacity for emergency departments

By Brent Scrivens, RN, MA

Have you ever watched news coverage of an earthquake, a bus crash, or an explosion and had a sudden flash of guilt as you caught yourself thinking, “Boy, I’m glad that didn’t happen near our emergency department”? Has this led to the more important thought, “What would we do if this happened near our overcrowded emergency department”?

The issue of *surge capacity* is vital to emergency departments and not so foreign a concept as we monitor the patient acuity, available space, and equipment availability throughout the average shift. In the above mass casualty examples, there is a limited time to adapt to a sudden influx and perform the interventions shown to most affect the mortality rates.

The metamorphosis from normal operations to disaster mode is referred to as surge capacity, which can be defined as “the ability to cope with increased numbers of casualties” (Chapman & Arbon, 2008, p. 6). Disaster surge capacity is much more onerous than the handling of normal daily surge and is sometimes broken into *conventional*, *contingency*, and *crisis* capacity depending on the extent to which a deviation from normal practices and standards is required (Altevogt, Stroud, Hanson, Hanfling, & Gostin, 2009, p. 52).

The “four S’s of surge capacity”

The components required to effectively implement surge capacity are referred to as “the four S’s of surge capacity” (Nager & Khanna, 2009, p. S90), which include *staff*, *stuff*, *structure*, and *space*. An individual facility or department may have strengths and weaknesses in any of the surge capacity components depending upon unique characteristics such as size, experience, number and type of casualties, and speed of surge onset (e.g., pandemic versus explosion).

Staff

Recent pandemic concerns have raised the issue of adequate numbers of nurses being able and willing to work in a disaster. However, in considering the staff element of surge capacity, staffing numbers are not the only relevant factor. To be prepared for a mass casualty event, the staffing considerations of a good disaster plan include:

- specialty trained staff and specialty skills (Nager & Khanna, 2009, p. S99)
- other disaster-specific critical competencies including, disaster recognition, decontamination, the incident command system (Wisniewski et al., 2004, p. 278)
- understanding of the emergency operations plan, and critical event communications (Hsu et al., 2006, p. 30)
- background and credential checks of convergent volunteers and imported staff (Hick et al., 2009, p. S64)
- need for impromptu in-services (Nager & Khanna, 2009, p. S99); and
- plans to support workers to present for duty (Amaratunga et al., 2008, p. 5).

This last point, the need to support emergency workers, is gaining more importance in Canada, as it has been detailed in studies such as Amaratunga et al. (2008, p. 24) that have shown more efforts are needed in providing supports to our disaster response workers.

Stuff

The stockpiles of equipment, pharmaceuticals, and supplies are referred to as the “stuff” of “the four S’s of surge capacity” (Nager & Khanna, 2009, p. S99). “Hospitals should identify critical supplies for 96 hours (or longer, depending on hazard vulnerability analysis) and attempt to stockpile or ensure sources of sufficient quantities of usual or equivalent materials” (Hick et al., 2009, p. S66).

Inquiry into local hazards and likely disaster scenarios may indicate specific injury patterns that are far outside the normal ED presentation ratios such as frequent crush injuries post-earthquake leading to rhabdomyolysis and other electrolyte problems resulting in acute kidney failure requiring emergency dialysis (Briggs, 2006, p. 543). The examining of theoretical risks should also rely on lessons learned from previous experiences, such as the Canadian examples of shortages of personal protective equipment reported during the 2003 SARS outbreak (O’Sullivan et al., 2008, p. S11) and problems with vaccine distribution during the 2009 H1N1 influenza season.

Structure

Perhaps the greatest similarity between health emergency management and other areas of disaster management is in the structure element of the four S’s of surge capacity, which includes not only the physical infrastructure, but also the emergency management models ((Nager & Khanna, 2009, p. S99).

The physical infrastructure of a health care facility is best addressed through wide-ranging multidisciplinary planning efforts to ensure hospital survival (Auf der Heide, 1996, p. 465), and to avoid the disasters of the Northridge earthquake, Hurricane Andrew and, of course, Hurricane Katrina. This would then be refined through testing, exercises, evaluation and feedback, and further testing (Adini et al., 2006, p. 455).

The emergency management structure of the organization is most important in that it is well known to those who must implement the system and that it is well integrated with other stakeholders’ systems (Kaji, Koenig, & Bey, 2006, p. 1158). At the frontline level, efforts are typically directed through the “Incident Command System” (ICS), which originated with California wildfire responders, or the Health Emergency Incident Command System (HEICS). Higher levels of the organizational complexity are managed via a more multi-jurisdictional structure such as the British Columbia Emergency Response Management System.

Space

The last “S” in the four S’s of surge capacity is that of space, which alludes to the difficulties faced in many EDs in finding adequate room even in non-disaster times. As many facilities

are routinely over capacity (Dauphinee, 2009, p. 38), there is a need to plan ahead for a more aggressive expansion of ED operations in disaster response.

Often, the first step to expand the footprint in what is called a “surge-in-place”, where rooms, hallways, and nearby areas are quickly converted to become components of the ED, while supporting staff, supplies, and other resources are mobilized to assist these efforts (Hick et al., 2004, p. 255). Where these locations are located and how well they are equipped will depend on the level of surge capacity required and the pre-planning done by the facility. More aggressive expansion of the ED into other areas of the hospital and/or outside structures have the added burden of increased complexity of set-up, staffing needs, and potential cost (p. 256). The use of facilities outside of the affected hospital and acute care partners is referred to as community-based surge capacity and, while time-consuming to mobilize, may be combined with other off-site patient care in high-anxiety-inducing incidents where, “for every casualty injured or infected, hundreds more may seek evaluation” (p. 257).

What can I do?

Knowing the basics of surge capacity and having plans to implement components of it are not the whole answer, as “plans are likely to be followed only when they are familiar to those who must use them” (Auf der Heide, 1996, p. 459). I would encourage all emergency department staff to reflect on the “four S’s” of surge capacity and reflect on how your facility and your patients would fare in a mass casualty event.

As self-regulating professionals, front-line RNs in emergency departments should make use of both their department educators and emergency management departments to find out what procedures are in place and to take advantage of offered educational opportunities. One quick way to prepare yourself is to ask your supervisor how your role (and theirs) changes in a disaster. The daily experiences and wisdom of the workers who will implement plans are important in guiding the reality of planning assumptions, so it is important we all get involved.

Surge capacity level	Description
Conventional Capacity	Consistent within daily practices within the institution... spaces and practices are used during a major mass casualty event that triggers activation of the facility emergency operations plan (Hick et al., 2009, p. S60)
Contingency Capacity	Not consistent with daily practices... have minimal impact on patient care practices... used temporarily during a mass casualty incident... or on a more sustained basis during a disaster (Hick et al., 2009, p. S60)
Crisis Capacity	Adaptive spaces, staff, and supplies are not consistent with usual standards of care, but... provide the best possible care to patients given the circumstances and resources available (Hick et al., 2009, p. S60)

About the author



Brent Scrivens is an emergency department RN, having worked in four British Columbia EDs over the last 15 years. Brent has recently completed an MA in Disaster and Emergency Management with a final research project entitled “Mass Casualty Response Knowledge in B.C. Emergency Departments”. He lives in Nanaimo, B.C., with his wife, Hanna and two children, Rebecca (7) and Alex (5). Questions and comments can be addressed to brent.scrivens@viha.ca.

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