

## Efficiency in Health Care and Surge Capability in Disasters. Is it a Trade-Off?

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### Abstract

The global economic downturn has affected many aspects of modern life. In such times of financial uncertainty with competing priorities, drastic funding cuts are often made to lower priority projects. Health policy makers argue that limited funds and resources mean rationing and prioritization are required. They call for efficient health care by trimming funds to “luxury” services and focusing on high priority services. Health care disaster preparedness is rarely a priority issue for policy makers except immediately after major disasters for a short time until complacency sets in. Therefore, disaster preparedness has always been under-funded and the current difficult financial times exacerbate the situation. This article provides a conceptual overview of the relationship between efficiency in health care and its impact on surge capability. This relationship resembles an inverted-U curve where the peak of the U is the maximum efficiency point and the maximum surge capability in a balanced funding situation for a health care system. A question that stems from this is how to estimate the level of funding required to achieve maximum efficiency and surge capability?

Advances in medicine and technology have led to increased costs of health care delivery. This increase in health care cost is associated with a steady rise in demands for health care services [1,2]. For example, in the United States, there has been an average of about 26% increase in emergency department visits per year for the last five years with at least a 100% increase in emergency service funding to meet increased demand [3]. Funding available for health care services is finite and so health care policymakers strive to find solutions to meet rising health care demands. This drive has led the concept of “efficiency” being integrated into health care system planning. Efficiency is primarily, but not purely, an economy-driven attempt to compact the rising cost of health care and meet the increased demand for health care services [4]. Health care systems across the globe have - to varying degrees - adopted “efficiency” as a target for health care delivery. The goals of “efficiency” in health care are to minimize cost, reduce unmet demand and streamline health care services [2]. Rationing of health care services is central to these processes.

The recent global economic recession has pressured health care policymakers to take drastic measures to cut funding for services that do not have immediate and obvious outcomes such as public health preparedness programmes [5]. In such times of economic downturn, efficiency seems an even more appealing goal. Disaster preparedness has always been under-funded because the value of disaster preparedness is long term and not appreciated until disasters strike [6]. Funding for disaster preparedness activities in the United States is reactive and tends to increase after major disasters and then taper down during peaceful times. Before 9/11, the federal funding for emergency trauma preparedness was less than 2% of the total budget of the US Department of Health and Human Services (DHHS) and then jumped to about 10% after 9/11 [7]. Then complacency ensued as it was a relatively disaster-free time so, by 2005, the funding for emergency preparedness was cut again to levels similar to before 9/11. After Hurricane Katrina in 2006, the funds increased again to about 20% of DHHS expenditure [7]. Trends show that the proportion of funding has again been diminishing since 2008 [7]. This reflects a reactive approach to emergency preparedness in the US and over-use of the idea of “efficiency” in the health care system in reducing funds to emergency preparedness activities. Emergency planners have expressed their concerns that cutting funds from disaster preparedness activities and taking the concept of “efficiency” too far will severely influence health care system functioning and surge capability during disaster times [6,8,9]. Underfunding of a health care system threatens both

efficiency and disaster preparedness alike [2]. However, this does not mean that over-funding improves efficiency or disaster preparedness. In fact, experience from the United Kingdom and New Zealand shows that sustained efficiency gains and improved emergency preparedness activities have not followed substantial funding injections [10,11].

### Surge Capability and Efficiency

Traditionally, surge capability was thought of as being largely the amount of surplus resources a health care system has in place to meet the demand of a disaster or a crisis [8,12,13]. However, in reality, there is more to surge capability than the “extra stuff needed during a disaster.” Surge capability is a dynamic process that goes hand-in-hand with efficiency during normal operations and disaster times alike. Surge capability is a measure designed to achieve efficiency of health care services during daily surges and disaster surges [14,15]. Efficiency is a target that health care systems should strive to achieve during daily and disaster times alike in order to meet the outcome of providing optimal health care during normal operations and “sufficient” care during disaster operations. Thus, “surge capability” refers to the ability of a health care system to safely expand its operations to meet the demand of an abnormally large influx of patients in response to an event [14,16,17]. Surge capability of a health care system relies on the three S's: Staff, Stuff and Structure [15]. The interplay between these three main facets constitutes the overall surge capability of a health care system.

### How Does Efficiency Enhance Disaster Surge Capability?

Efficiency measures of a health care system – during normal

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operations - enhance each component of surge capability. One example of an efficient health care measure enhancing the "Staff" component of surge capability is that efficient health care systems of major academic institutions usually run their services in a tiered fashion [8,9]. In this model, senior clinical staff supervises junior staff who, in turn, provide care to patients as part of an integrated team. This model ensures the maximum utilization of senior experience in providing care for the highest possible number of patients. Furthermore, it provides a systematic and a team approach to health care delivery rather than individual health care provider to patient approach which is less efficient [14]. In addition, skills such as rationing limited resources and triaging patients to more advanced secondary and tertiary care, which are normal practices in most community hospitals, are key skills required for disaster situations [18]. In addition, the shift in mindset from normal "standard" of care operations during times of routine service provision to "sufficient" care operations during disaster times is easier among health care providers accustomed to working in systems with limited resources [8]. Therefore, efficiency provides the framework and skills critical during disasters when surge capability is required.

Second, contrary to traditional thought, efficiency can enhance resources available to meet surge demands. It is true that efficiency restricts storage and stockpiling of resources on-site but a properly designed efficient system is flexible and must have plans and protocols to mobilize resources from regional and national sources [19]. Memorandum of Understanding agreements with other health care services in the community is one example of an efficient health care system that enhances resources of surge capability of the overall system during a time of crisis [20,21]. This is to say that the system does not have to have surplus resources to be well equipped to expand; rather it should have efficient and flexible plans, protocols and supporting systems of transportation and communication to rapidly mobilize resources from other areas when needed [22]. Thus, efficiency is a drive for more coordination and cooperation between different health care providers in a community. Lessons from recent earthquake in Haiti showed that coordination of resources is a bottleneck factor in surge capability more than the availability of resources per se and the Haitian health care system being inefficient to start with compromised the surge capability of the nation [23]. Therefore, efficiency in a health care system drives pre-disaster coordination and cooperation between agencies in the community, which is critical during crisis times more so than the mere physical availability of "stuff."

Thirdly, during a disaster the structure and space where the health care system normally operates might need to be transformed to meet the surge of disaster victims. An example of this is to transform emergency department corridors into treatment cubicles. Furthermore, the physical structure of the hospital may be damaged by the initial disaster itself [24]. Efficient health care systems provide plans and protocols for alternative health care facilities such as relocating a hospital to a local playground to provide basic health care. For example, in 2007, when a tropical cyclone in the Sultanate of Oman in 2007 flooded the national trauma centre and rendered it dysfunctional, health care operations were carried out from the national airport [25]. Efficiency mandates anticipatory agreements between health care providers and local authorities such as airports and schools to utilize spaces and facilities available in the community to provide health care for victims of disasters.

Finally, the glue to the above-mentioned three facets of surge capability is a supporting system which includes transportation, logistics and communications. Efficient health care systems have robust supporting systems that will function as the backbone during a surge

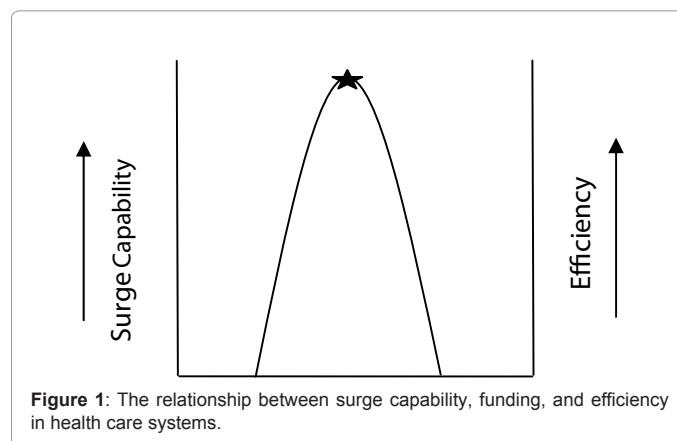
capability of a disaster time. Good funding of a health care system will lead to better and redundant backup systems for efficiency in normal operations but optimal surge capability in disaster situations.

## What Is the Balance Between Funding, Efficiency and Surge Capability?

The balance between optimal efficiency and optimal surge capability is a fine one with funding as a major determinant [6]. Theoretically, surplus funding causes less need for prioritization and rationing and may lead to wasted resources (eg: expiry of unused stockpiles of medications), rendering the health care system inefficient [2]. On the other hand, restricted funding may reduce resource wastage but also lower surge capability (eg; less trained Staff, less Stuff, poor Structure) [26]. Perhaps the relationship between the two can be conceptually modelled as an inverted-U curve with the peak of the curve representing optimal efficiency and optimal surge capability (Figure 1). Every health care system should aim for the peak in this inverted-U relationship, as the extremes are detrimental to both efficiency and surge capability. The ultimate question is how to determine the peak of the U-curve? First, it is critical to appreciate that disasters are complex situations with a matrix of factors inherently surrounded by uncertainty. Hence, policymakers should be flexible and attempt to determine the peak of the U-curve by analysing the community situation they work in. Many studies have attempted to provide some guidance on how estimate appropriate disaster preparedness funds in order to achieve a balanced surge capability and efficiency [6,8,13,16,26,27]. Hanfling conducted an extensive economic analysis to estimate the cost for "basic surge capacity", concluding that the immediate cost required to expand the health care system to manage victims of disasters is around 1.3\$ million dollars per 100 victims [26]. This figure does not include long-term cost nor does it include pre-disaster training of staff. There is an urgent need to have more research to develop comprehensive tools that could assist policymakers in estimating the appropriate funding level to achieve optimal surge capability while also maintaining optimal efficiency [28].

## Conclusion

The benefits of a well-established efficient health care system are more evident when the system is under test during a disaster. Health care system efficiency enhances surge capability before, during and after a disaster. Efficiency is an essential aim for active pre-event disaster planning as well as an important target for the rebuilding phase of a health care system after a devastating event. The exact amount of funding required to achieve optimal efficiency and surge capability depends largely on a community and its standards for disaster



preparedness. Research is needed urgently to develop comprehensive tools to help estimate the optimal point between efficiency and surge capability.

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