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### The Evolving Role of Critical Care Medicine in Disaster Medical Response

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#### Overview

We have traditionally focused on the pre-hospital care setting as the primary building block of our disaster medical response systems. We assume that the hospital will “be there,” will receive casualties on short-notice, will rapidly escalate emergency care capabilities and will reliably meet the unexpected demands imposed on the system. Unfortunately, this notion is both short-sighted and dangerous.

Most hospitals are chronically under-funded, and many struggle just to meet daily, routine care requirements. In addition, and as we have seen time and time again, during a major disaster, the need for critical care expansion becomes universal. The hospital becomes an over-sized intensive care unit (ICU), both for pre-existing patients and disaster victims. Unfortunately, most hospitals lack the necessary clinical training programs, sufficient personnel and the necessary equipment/supply stockpiles to meet these demands.

Furthermore, we assume that the hospital structure will physically “be there” and will be usable during a disaster. What if the building itself is rendered unusable? What if it is partially under water? What if a communicable disease drastically reduces the available personnel pool needed to care for patients? Many hospitals do not have reality-based, executable plans for these potential scenarios.

#### Framing the Issues in Order to Formulate Necessary Solutions

Let us enumerate the issues that we must address in order to assure that hospitals are “on-line” and capable of meeting the critical care demands when a major disaster occurs:

**1. Education and training** – Education and training are relatively low-cost, high-yield interventions that tangibly enhance disaster medical response

at every level. However, current disaster medical education programs for hospital personnel are not coordinated in scope and content and do not adequately address the needs of critical care personnel. Educational initiatives must: a) heighten disaster response awareness; b) measurably enhance skill sets; c) define and teach individual roles and responsibilities; d) teach alternate communication methods for use during a disaster; e) include self-preservation training; and, f) introduce the concept of how to work together during mayhem. Most importantly, non-critical care, hospital personnel must be taught a limited (defined) ICU skill set.

**2. Portable critical care** – A large-scale disaster response may require the provision of high-level critical care in unanticipated locales (non-hospital, non-ICU). We must develop civil response systems of portable critical care for use during large disasters. United States military experiences with “far forward” critical care, including the U.S. Air Force Critical Care Aeromedical Transport Teams (CCATT) program, offer a useful perspective for the development of civil-response, portable critical care programs. CCATT has already dealt with many of the challenges that we must overcome in order to care for patients who require care beyond the hospital, and its applicability should be further explored.

**3. Augmented on-site care capabilities** – Of all the medical device and supply issues that we face, the biggest conundrum is mechanical ventilators. In our already busy critical care units, an outbreak of pandemic influenza or avian influenza would quickly outstrip available respiratory care resources (machines and personnel). Moreover, the recent SARS outbreak harshly reminded us of the personal health risks to ICU personnel caring for afflicted patients with respiratory failure, further complicating care processes. Many questions remain unanswered. Where will additional ventilators come from? Who will pay for them? What level of machine sophistication is mandatory? Who will operate these devices?

4. The impact of chronic critical illness – We have a significantly increasing population of ICU patients for whom our therapeutic endpoint is not the elimination of critical illness, but rather establishing a sustainable equilibrium with acute disease. These patients require access to regular and frequent care. Where do these patients go for care during a disaster? This problem is not dealt with in any meaningful way by existing disaster response plans. The only workable solution involves the geographical movement of these patients to other locales in order to “offload” the disaster site response system. Again, this will require the existence of a portable critical care response capability.

5. Improved interoperability – Cooperation among hospitals during day-to-day operations is nil. Financially and otherwise, it largely remains a facility-by-facility struggle for daily survival. Therefore, the expectation that during a disaster, things will suddenly change and hospitals will effectively cooperate with each other is unreasonable. Impromptu cooperation without an effective plan for coordination ensures limited success at best. There must be an enforceable mandate and support from governmental authorities for inter-hospital cooperation and planning, before a disaster occurs.

6. Making available budgetary resources work - The cost of effective disaster planning and response is enormous. It is not realistic to expect budget-constrained facilities to absorb these additional costs, and yet, relief from governments will not fill the gap. Therefore, it seems reasonable to seek economies of scale. For example, to increase ICU surge capacity during a disaster, existing Medical Emergency Teams (MET) could, with little additional training, provide a highly effective adjunctive capability when critical care units are full and additional ICU services are required. In addition, patient safety programs require surveillance, tracking, education, ongoing risk assessment and so forth. Is there sufficient overlap to merge some of the planning, education and practice of hospital patient safety and some aspects of disaster medical response? I think that the answer is “yes.”

#### **Summary**

We have much to do. This brief essay outlines the disaster response-related problems that hospital and critical care units must solve. Fortunately, there are potential solutions. However, no single solution is comprehensive by itself. A functional solution set will consist of a “patchwork” of these measures, adjusted and quilted according to local needs. This will require some degree of central coordination by governmental agencies, as well as the development of civil critical care response teams. Disasters will continue to occur, hospitals and critical care units will respond, and the general expects them to be ready.

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