

Mechanical Ventilation in Mass Casualty Scenarios

Hospitals have long responded to acute multiple-casualty events, which lead to short-lived chaos followed by a more organized medical response and rapid health-system recovery. There has been increasing recognition, though, that events can occur that require a prolonged response for many critically ill patients. These disasters will require a well-coordinated regional and extra-regional medical response, and in-patient surge capacity will be much more needed than for past events. At the same time, the past decades have seen a contraction in United States hospital beds, shrinking hospital operating margins, just-in-time purchasing, and staff shortages, which now seriously limit in-patient surge capacity. Disasters leading to mass casualty respiratory failure (MCRF), such as a severe influenza pandemic, will undoubtedly tax hospital, local, regional and possibly even national critical care capacity.

MCRF represents a scenario where insufficient numbers of intensive care unit beds and ventilators might result in deaths from normally survivable illness. In an MCRF response, respiratory therapists (RTs) will play an important role in ventilator management, the appropriate utilization of equipment, and the coordination of staffing and care. Just as importantly, RTs must participate in pre-event planning for MCRF and, in particular, decisions related to treatment space, medical equipment, staffing, and personal protection for MCRF response. The role of the RT in MCRF is, of course, as part of the health care team, working in concert with intensivists, critical care nurses, pharmacists, other critical care professionals, and hospital administrators. This conference on mass casualty care was organized in an attempt to summarize the current state of mechanical ventilation for mass casualty scenarios.

The co-chairs wanted this conference to highlight current best efforts related to key critical care surge capacity elements. The presentations on potential threats focused on crucial situational features relevant to MCRF that must be considered to adequately respond to such disasters. The conference was fortunate to have included a host of experts from a variety of backgrounds, all of whom have previously contributed to the literature in mass casualty care.

The task of framing the issue was aptly handled by Christian Sandrock, who described the challenge of febrile respiratory illness, and Pete Muskat, who described chemical agents capable of causing an MCRF.

Lewis Rubinson provided a cogent and sobering analysis of the limitations to mass casualty critical care. He offered a conceptual framework to overcome many of the challenges to providing additional critical care surge capacity. The specifics of surge capacity by increasing “staff, stuff, and space” were reviewed by subsequent presenters.

Mechanical ventilation issues were reviewed by Rich Branson, who characterized the anticipated clinical severity of respiratory failure from the events covered within the first 3 presentations. Branson used the clinical picture, together with likely need to use non-critical-care RTs in the response, to describe essential performance characteristics of surge ventilators that would be used to definitively support additional patients with respiratory failure.

Eileen Malitano reviewed the components of the U.S. Strategic National Stockpile and the process for requesting and receiving Strategic National Stockpile ventilators. She described these ventilators and the ancillary equipment.

John Wilgis then reviewed the issues of local and state stockpiling of ventilators. This discussion included issues related to education, training, and maintenance, as well as contrasting stockpiling devices at a central location versus distribution to individual hospitals.

Michael Hanley reviewed the issue of training and augmenting staff in anticipation of a mass casualty incident. The results of Project XTREME, a just-in-time training program for health care professionals to assist in less complex duties of the RT, was reviewed.

Danny Talmor reviewed the importance of definitive airway management in MCRF and options under special circumstances. He discussed the unique challenges of airway management following chemical exposures and during febrile respiratory illnesses.

Ray Ritz tackled the difficult topic of oxygen resources in mass casualty care. Hospitals routinely take oxygen supplies for granted, and few people understand the limitations of oxygen conservation and re-supply. Ritz provided some cogent data on oxygen generation and limitations in delivery of oxygen to hospitals.

Elizabeth Daugherty then reviewed the role of personal protective equipment, with a specific focus on the needs of inpatient health care workers. The role of personal protective equipment during febrile respiratory illness was summarized, and the importance of training caregivers in the donning and removal of personal protective equipment was stressed.

Dan O’Laughlin covered the timely and difficult topic of ethical issues in scarce resource allocation. His discussion of the ethical responsibilities of caregivers and use of triage to do the most good for the greatest number of people was a critical reality check. Resource allocation of ventilators in a fair and ethical process needs further attention from mass casualty planners.

Steve Nelson then reviewed continuity of information systems during mass casualty situations. This included protecting health information and backing up important data.

This was the first Journal conference to be presented before an audience, and it provided a unique opportunity for interaction between the faculty and audience. The audience submitted questions for consideration, which were answered by the faculty at the end of the meeting. Thus,

instead of a conference summary by a member of the faculty, these proceedings will end with a transcript of this discussion session addressing questions submitted by members of the audience. The success of the conference was obvious, and the faculty are grateful to Katherine Kreilkamp, David Pierson, and Dean Hess from RESPIRATORY CARE, and to Ray Masferrer and Sam Giordano of the American Association for Respiratory Care for supporting this important effort.

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