Deliberations and recommendations of the Pediatric Emergency Mass Critical Care Task Force: Executive summary

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Executive Summary

Despite difficult challenges during responses to the terrorist attacks of September 11, 2001, Hurricane Katrina, and the 2009 Pandemic Influenza A/H1N1 and severe acute respiratory syndrome outbreaks, no North American emergency to date has overwhelmed intensive care unit (ICU) services on a widespread basis since the modern development of the field of critical care. However, planners have recognized that in a future public health emergency we may not be so fortunate. To deal with very large emergencies involving many patients whose survival depends on immediate access to intensive care, an international Task Force for Mass Critical Care proposed recommendations in January 2007 to extend critical care resources for the adult population, referred to as the Emergency Mass Critical Care (EMCC) approach (1–5).

The EMCC approach triples critical care capabilities for a period of up to 10 days in a very large public health emergency by focusing on immediately life-saving interventions, while delaying or forgoing less urgent care. Crisis standards of care in a large public health emergency would attempt to optimize population outcomes, rather than use unlimited efforts to maximize survival of each individual. Available resources would be substituted or adapted for equivalent or nearly equivalent unavailable resources. Resources would be conserved, reused, and reallocated to those patients most likely to benefit from them. Modest increases in stockpiles and major changes in the organization of care would be essential. While planners in the field acknowledge that mass critical care is a reasonable concept, we lack evidence that such an approach is feasible. However, failure to begin operational planning for mass critical care guarantees a failed response. As public health emergency planners begin to consider the EMCC framework, it is urgent that pediatric implications be detailed for integration into these developing plans. This supplement represents the discussions of a multidisciplinary panel convened by the Oak Ridge Institute for Science and Education (supported financially by the Centers for Disease Control and Prevention), and provides guidance for pediatric EMCC (PEMCC).

Work of the PEMCC Task Force was directed by a 17-member Steering Committee selected on the basis of their expertise and experience, and included representatives from the Task Force for Mass Critical Care, World Federation of Pediatric Intensive and Critical Care Societies, American Academy of Pediatrics, American College of Critical Care Medicine, American College of Emergency Medicine, Royal College of Physicians (Canada), and National Commission on Children and Disasters, as well as several unaffiliated disaster preparedness experts. This Steering Committee led development of all manuscripts and selected individuals for the PEMCC Task Force. The full PEMCC Task Force comprised 44 experts from fields including bioethics, pediatric critical care, pediatric trauma and surgery, neonatology, obstetrics, general pediatrics, emergency medicine, pediatric emergency medicine, disaster preparedness and response, emergency medical services (EMS), infectious diseases, toxicology, military medicine, nursing (including critical care nursing), pharmacy, veterinary medicine, information sciences, public health law, maternal and child public health, and local, state, and federal government emergency planning and response agencies.

Priority topics were organized on the basis of MEDLINE and Ovid database literature searches, bibliographies, state and federal government planning documents, after-action reports of recent medical responses to catastrophes, and through participation in local, state, and federal government working groups on hospital and disaster preparedness. Where evidence was available, it was utilized in formulating recommendations. Where evidence was lacking, recommendations represent expert opinion. Whenever possible, recommendations are consistent with and easily integrated into prior recommendations of the adult Task Force for Mass Critical Care. The Steering Committee produced draft outlines by synthesizing information obtained in the evidence-gathering process and convened October 6–7, 2009, to review and
revise each outline. Eight draft manuscripts were subsequently developed from the revised outlines.

The full PEMCC Task Force convened March 29–30, 2010, to present and discuss the draft manuscripts. Feedback on each manuscript was compiled and the Steering Committee modified the draft documents to reflect this input, in addition to updating the manuscripts based on the most current medical literature. The Steering Committee revised the manuscripts from March to October, 2010, working primarily via email and conference calls. New versions were electronically transmitted to all Task Force members to obtain concurrence with manuscript revisions. All authors and reviewers completed disclosure statements; there were no conflicts of interest. The authors were given complete autonomy by the Oak Ridge Institute for Science. The views expressed in these summaries are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

Based on the recognition of the special needs of children during disasters and extensive discussion, the following recommendations are made by the PEMCC Task Force. These recommendations are described in detail in nine subsequent articles. Readers should refer to individual articles for all recommendations rather than those highlighted in this executive summary.

**Treatment and triage recommendations for PEMCC (p. S109)**

**PEMCC in Pediatric Hospitals.** These recommendations provide the basis for hospitals to prepare for PEMCC:

- Every hospital with a pediatric ICU or neonatal ICU should plan and prepare to provide PEMCC, and should do so in coordination with regional health planning efforts.
- Hospitals with ICUs should plan and prepare to provide PEMCC every day of the response for a total critically ill patient census at least double the pediatric ICU bed capacity and at least triple usual ICU capability.
- Hospitals should prepare to deliver PEMCC for 10 days without sufficient external assistance. Care should be coordinated with the emergency department for triage and transfer of patients to/from ICUs.
- All communities should develop a graded response plan for events across the spectrum from multiple casualties to catastrophic critical care events.
- To optimize medication availability and safe administration, the Task Force suggests that modified processes of care should be considered before an event, such as the following: rules for medication substitutions and restrictions; safe dose and frequency reduction; conversions from parenteral to oral/enteral administration; shelf-life extension; and use of length-based weight estimations.
- PEMCC for pediatric patients ideally should occur in hospitals or similarly designed and equipped structures with experience in providing critical care to pediatric patients.
- Principles for staffing models should include the following: strategies to achieve and maintain adequate staffing levels; patient care assignments for the unit should be managed by the most experienced clinician available; and assignments should be based on staff abilities and experience, with delegation of some duties and efforts to reduce care variability and complications.

**PEMCC in Nonpediatric Hospitals**

- All hospitals must plan to care for children in their proportion to the population or for those affected by the mass casualty event. To facilitate such planning, nonpediatric hospitals should include a pediatrician or pediatric medical liaison in those committees responsible for disaster planning, appeals, and determining when crisis standards of care should be implemented.
- During a disaster, it may be more efficient to transfer skilled pediatric critical care teams to nonpediatric centers to support those facilities in providing care to critically ill pediatric patients. Nonpediatric hospitals may not have the pediatric equipment needed to sustain critically ill patients; therefore, these teams may need to take their own equipment.
- Establish referral network for pediatric consultation or transfers to support hospitals that do not normally receive pediatric patients.
- Nonpediatric hospitals should preidentify hospital staff with experience in care of pediatric patients and create key positions in which these individuals would serve.

The Task Force was unable to recommend a protocol for allocating scarce pediatric critical care resources (tertiary triage) during PEMCC. However, they suggest that:

- Resources should be allocated on the basis of need, benefit, the conservation of resources, and finally lottery or queuing. Younger children should not be discriminated against based on age alone.
- While a validated pediatric scoring system is being developed, tertiary triage should be based on expert opinion and conducted by triage teams, including experienced trauma surgeons and/or intensivists, using their best medical judgment as is the current standard of practice.
- The Task Force recommends that the American Academy of Pediatrics and the Institute of Medicine, bodies with subject-matter expertise and necessary positioning, develop a set of research priorities for disaster pediatric medicine such that the evidence base can be established to facilitate the development of necessary tools (i.e., decision matrices).

**Supplies and equipment for PEMCC (p. S120)**

This chapter focuses on strategies and paradigms for purchasing and stockpiling equipment that will be necessary in PEMCC. This includes specific equipment (not including personal protective equipment, which is beyond the scope of this chapter) and supply lists necessary to triple pediatric ICU capacity for up to 10 days for a scenario in which the surge includes patients across all ages, and another scenario in which most patients are from a single age group.

Recommendations include the deployment of mechanical ventilators including specifications (see p. 128 for further details), ventilation ancillary equipment (including equipment that could be disinfected or sterilized between patient uses in a pandemic situation), other options for assisted ventilation and nonconventional ventilation, suggestions for a ventilator inventory, equipment for hemodynamic management, and supplies for sedation, analgesic, antimicrobials, and nutrition. Additional equipment and supply recommendations necessary for various types of pediatric hospitals to prepare for disasters have been provided by
the New York City Department of Health and Mental Hygiene’s Pediatric Hospital Disaster Toolkit (http://www.nyc.gov/html/doh/html/bhpp/bhpp-focus-ped-toolkit.shtml); the toolkit has been positively viewed and is an additional resource that should be considered.

**Neonatal and pediatric regionalized systems in PEMCC (p. S128)**

This chapter outlines the present system of care in the United States and Canada, and the systems likely to be available for providing mass critical care. Topics discussed in this manuscript include: gaps between anticipated needs and existing resources, changes in functioning of regional systems necessary for PEMCC, protocols for patient transfer, agreements with healthcare institutions that primarily provide adult care, just-in-time training of healthcare workers, transport systems for patients, and allocating staff to other healthcare facilities.

Recommendations are provided for operational planning integrated across jurisdictions necessary to implement PEMCC. All preparations for mass critical care for the general population must include pediatric aspects. For this to occur, pediatric experts must be involved in all aspects of emergency and disaster planning.

**States and Regions.** States and regions should:

- Facilitate PEMCC by providing legal protections for those involved in PEMCC.
- Reaffirm ethical norms in PEMCC.
- Ensure that all hospitals are prepared to provide care for children in a mass casualty scenario, including a level or scope of care beyond what they might ordinarily provide during normal operating conditions.
- Plan to share scarce resources with neighboring states and ensure effective public-private collaboration to meet the needs of a pediatric patient surge and optimize pediatric critical care capacity in a mass casualty event.
- Develop pediatric-specific performance criteria to hold regional systems accountable for PEMCC preparations and responses.
- Perform vulnerability analyses to estimate anticipated pediatric mass critical care needs, including especially vulnerable populations. Inventories of functional resources (space, equipment, supplies, and staff) for mass critical care must be performed at every hospital with an ICU. State information systems must be developed to track critical care needs and resources in real time during public health emergencies.
- Integrate operational plans for mass critical care and triage allocation (rationing) across all jurisdictional levels and all response agencies, and integrated with all aspects of emergency preparedness planning.
- Define regional mechanisms to direct the distribution of patients and resources in a public health emergency.

**Federal.** Action at the federal level should include:

- Plans for federal involvement are consistent with state plans for mass critical care and triage allocation (rationing).
- Federal expertise and guidance to promote consistency in informing state laws and regulations regarding mass critical care and triage allocation (rationing) in public health emergencies.
- Federal incentives, specific readiness requirements, readiness, and performance measures germane to pediatric care capabilities and capacity to ensure that all states prepare sufficiently for mass critical care and triage allocation (rationing).
- Federal support for research on best practices ahead of time, as well as real-time surveillance, epidemiologic research, and clinical trials during a public health emergency, which will result in better evidence-based practices at the level of regional systems of care, and better clinical care.

**Education in a PEMCC setting (p. S135)**

Prospective and just-in-time training modules for pediatric critical care providers and the public are discussed within this article. Recommended topics for skilled clinicians, particularly those who do not typically treat pediatric patients, include: training in pediatric triage, administration of EMCC coordination and planning, and training in use of nonstandard equipment.

As part of comprehensive emergency preparation, educational needs should be identified and addressed.

- Practitioners should work to maintain their basic pediatric care levels pertinent to their job, and contemplate whether additional training might benefit them in preparation for potential mass critical care events. If they are likely to be involved in a PEMCC response, they should seek out additional proactive training.
- Hospitals should: identify team leaders and pediatric care providers and encourage them to receive additional training and stay current in the management of critically ill children; identify just-in-time resources that could be used in times of need, and contemplate how they could best implement those resources, particularly if infrastructure, such as internet access, is compromised; and, if they do not have pediatric critical care capabilities, establish a relationship with a regional children’s hospital to look for potential educational and training collaboration and offer these courses to their hospital staff.
- Regional pediatric critical care centers should: maintain an active educational role in both self-education in management of critically ill children and in regional education in their usual referral network; identify potential local hospitals that could help with surge capacity and ensure that those hospitals are receiving necessary training to manage potential surge patients; and work to develop just-in-time resources for remote assistance in training, such as telemedicine or telephone consultation.
- State/federal/professional societies should fund and develop additional training courses for pediatric mass critical care, both proactive courses and for development, evaluation, and distribution of just-in-time training modules.

**PEMCC: The role of community preparedness in conserving critical care resources (p. S141)**

This section of the supplement addresses the role of the wider community in preparing for disasters and PEMCC. Community preparedness reduces extraneous use of hospital resources and conserves scarce critical care resources by delivering population-based care in the community by utilizing the following: citizens, hotlines/healthlines, EMS/9-1-1, alternate care facilities, pediatric-specific agencies and organizations (i.e., schools, daycares, after-school programs), and integration with a health emergency oper-
ations center linked to community incident command systems.

The Task Force recommends the following actions by pediatric leadership (those who represent, care for, and advocate for children):

- Actively promote programs to ensure, before and during a crisis, an informed citizenry and the education of children and families in the Centers for Disease Control and Prevention guidelines on community mitigation strategies. Advocate for a community level of preparedness that leads to empowered self-awareness, knowledge of the information that best prepares the public to provide basic lifesaving information and self-care, and builds physical and mental health resilience.
- Advocate for the establishment of permanent national- and state-level call systems and disease- and child-specific healthlines as crucial adjuncts during public health emergencies.
- Advocate for 9-1-1 telephone triage with pre-established criteria and protocols for the proper use and safety of EMS and EMS-sanctioned transportation during pandemics.
- Work with community planners to identify the logistic support necessary for establishing and operating alternate care facilities, and identify and create protocol-driven, patient management objectives based on assumptions about the types of patients that would be managed in such facilities.
- Advocate for creative operational concepts that provide guidance and protocols sensitive to the needs of the pediatric population.

**Legal considerations during PEMCC events (p. S152)**

Liability is a significant concern for healthcare practitioners and facilities during PEMCC. While many of the legal issues associated with providing PEMCC are not unique within the context of disaster health care, the scope of *parens patriae* power of state, principles of informed consent, and security should be considered in PEMCC planning and response efforts since parents and legal guardians may be unavailable to participate in decision making during disasters. This article describes the legal considerations inherent in planning for and responding to catastrophic emergencies and makes recommendations for PEMCC legal preparedness.

To address gaps in existing liability protections for public health and PEMCC emergency responses, the Task Force recommends strengthening several areas of legal preparedness. As outlined in the Institute of Medicine crisis standards of care guidance (6):

- Necessary legal protections must be provided for healthcare practitioners and institutions that implement crisis standards of care plans. Unless comprehensive, national liability protections are implemented, state governments must link existing health practitioner and entity liability protections to crisis standards of care.
- Courts and other adjudicators should consider whether adherence to the Institute of Medicine guidance provides evidence of meeting the standard of care and “the legal effect of changing standards of care during emergencies” in medical malpractice claims.

In addition to the Institute of Medicine recommendations, the following suggestions should be considered for PEMCC preparedness:

- PEMCC disaster protocols should be properly vetted and accepted; when providing pediatric mass critical care, practitioners who follow such accepted and vetted protocols in good faith should be protected from civil liability (5–7). PEMCC protocols should be included in state disaster plans. Health facilities should ensure that their pediatric disaster plans are consistent with state plans and, to the extent possible, with neighboring health facilities.
- Facilities that care for pediatric patients should develop specific informed consent and security protocols to incorporate into their disaster plans.
- Facilities that do not normally care for pediatric patients or that do not routinely provide care for critically ill pediatric patients should also consider incorporating such planning or partnering with other facilities that provide such care in the event that pediatric patients arrive at their facilities during emergencies.

**PEMCC: Focus on family-centered care (p. S157)**

Family-centered care (FCC) is especially a concern and challenge in PEMCC. This article addresses the tension between offering FCC and effective disaster treatment/triage. It offers a list of practical suggestions for incorporating FCC principles into each of the following healthcare settings during a disaster, including a PEMCC event: EMS transport, emergency departments, pediatric ICUs, general pediatric wards, and alternative sites. Disaster and PEMCC responses must incorporate FCC principles to the extent possible in a variety of healthcare settings.

**Family-Centered Care in EMS Care of Children.** Practical suggestions have been developed for EMS professionals planning for and responding to mass casualty/pandemic events that involve children. These include encouraging families, local pediatricians, and local groups (champions) to engage in every stage of planning and preparation for disasters.

**FCC in Emergency Departments and ICUs in a Mass Event.** Overcrowding, panic, security concerns, staff stress, and separation of families during triage make practicing FCC an imperative and demanding task. The fundamental precepts of FCC, such as attention to the family as a unit, respect of parental rights, and assessment of the health of the entire family unit, remain critical to the success of disaster management.

The following are some high-level recommendations for emergency department professionals as they plan and respond to the needs of children and their families in a mass event:

- When possible, EMS and emergency departments should allow a parent to remain with the child during the triage and stabilization process. This may require providing care for parents in addition to children.
- The local triage and intake tools should allow for a digital photograph and should employ a standardized method of collecting identifying information, including at least name, gender, ethnicity, eye color, date of birth, and fingerprints. Identifiers should be obtained as quickly and accurately as possible, and if necessary sent to the National Center for Missing and Exploited Children (www.missingkids.com), an agency designated by the government to assist with reuniting families in a mass disaster.
- Mental health professionals trained in triage and emergency treatment of children should be available on the scene.
- In the pediatric ICU, designation and clear identification of a family liaison
contact, such as a social worker, child life specialist, or nursing assistant, to gather and disseminate general information of interest to families could reduce demand on the highly trained and skilled medical personnel attending to the acute needs of critically injured or unstable patients.

**FCC in Alternative Sites.** Planning should include a mechanism for reuniting children with families and proper supervision for children. The Task Force also recommends planning for FCC during PEMCC at alternative sites, and includes: obtaining a medical history; strategies to unite families; establishing lines of communication when families are separated; and welcoming and supporting families, including those with cultural and language barriers.

**Ethical issues in PEMCC (p. S163)**

The specific focus here is ethical issues unique to children in disasters due to their particular vulnerabilities and needs. It emphasizes that children should be treated not in proportion to existing needs, but relative to their proportion of the general population or those affected by the event. While the ethical principles of triage remain the same for adults and children, the lack of a validated pediatric scoring system necessitates reliance on expert opinion. The article explicitly rejects the proposal to prioritize individuals between 15 and 40 yrs of age.

- Surge capacity for children should be based on their proportion of the population, or preferably, in proportion to those currently or likely to be affected by the mass critical care event, rather than in proportion to existing infrastructure.
- When standards are to be altered, resources should be allocated on the basis of medical need, medical benefit, and the conservation of resources. Given the absence of a simple validated objective pediatric system, the Ethics Subcommittee hesitantly recommends the use of expert opinion. Neither waiting lists nor lotteries are clearly preferable to the other. Resources should not be allocated based on the complete lives system, or on gender, race, religion, ethnicity, sexual orientation, or ability to pay.
- Public engagement in this discussion is essential.

**The reality of PEMCC in the developing world (p. S169)**

Population-based care in developing countries is discussed, as well as the lessons that can be gleaned for offering mass critical care in developed nations during disasters. Many countries operate consistently in scarce resource situations and routinely make difficult allocation decisions. This article presents examples and gives recommendations for providing the most good with limited resources through linking with existing primary healthcare sources and using available resources to increase patients’ outcomes. The definition of pediatric critical care should include “the treatment of the child with a life-threatening illness or injury in its broadest sense, without regard for the location and including prehospital, emergency, and intensive care.”

- Responses to disasters in developing countries have to take into account the available resources short and long term (i.e., ability to provide long-term special needs care that results as a consequence of immediate lifesaving care). The response in these countries needs to be tailored to the particular stage of development of the health services and resources.
- In the least-developed countries, emphasis must be placed on first improving primary care, prevention, and basic emergency care, where possible. Advances in care should move incrementally without compromising primary care resources.
- A first step in preparing for a pandemic in a developing country comes from building public health infrastructure and surveillance systems, and developing strategies for community containment and mitigation strategies.
- Clinical care strategies must focus on reducing all-cause premature mortality using the United Nations Children's Fund/World Health Organization (WHO) guidelines and algorithms for Integrated Management of Childhood Illness and Integrated Management of Adolescent and Adult Illness.
- International assistance is provided to resource-poor countries during pandemics through mandates provided by the International Health Regulations Treaty of 2007 and the WHO Regional Organization emergency response capabilities and their partnerships.
- Partnerships through the WHO Regional Organization with international donors, such as U.S. Agency for International Development (United States), Australian government overseas aid program (Australia), Canadian International Development Agency (Canada), Department for International Development (United Kingdom), Japan’s International Cooperation Agency (Japan), and others, will expedite the deployment of scarce resources.

There are many issues pertaining to PEMCC that are unresolved, such as formulation of appropriate triage and decision making tools, and research priorities that need to be addressed. Most importantly, institutions need to make use of these recommendations as guidelines to determine their readiness and in preparation for PEMCC.

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Appendix

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