Pediatric Emergency Preparedness for Mass-Gatherings and Special Events

Bernardo L, Veenema T

Reviewed by Paul Arbon

PURPOSE: To describe the important factors that affect pediatric health care at mass-gatherings or special events.

METHODS: This is a non-research-based article examining research and other academic literature in mass-gathering medicine focusing on issues and possible healthcare needs of children attending these events.

SUMMARY: Children have been identified as a vulnerable sub-group of the population attending mass-gatherings. Bernardo and Veneema describe some of the key findings and issues related to providing care to children in the pre-hospital situation, paying special attention on planning services and the special needs of this group. The authors canvassed the relatively limited literature on the epidemiology of pediatric illness and injury at mass-gatherings. They explain the need for preparedness strategies focused on this group, and provide a summary of some of the important steps in planning, including consideration of attendance/crowd size, personnel, medical triage and aid stations, communications, transportation, medical records, public information and education, mutual aid, and data collection. Pediatric nursing skills that may be required during a special event are listed.

COMMENT: This article unites information from a number of sources and provides a good overview for those practitioners with little experience in providing health care at such events. The authors relied heavily on the work of Hnatow and Gordon (1991) and utilize this as their framework for describing nine key areas of preparation. As a result, the key points made concerning preparation are not new, but rather a summary of well-accepted principles. In addition, Bernardo and Veneema make a strong case supporting the need for special efforts to prepare for the treatment of children, including a useful description of the different needs of this client group. In light of the lack of research concerning the needs of vulnerable sub-groups attending mass-gatherings, this discussion lays a foundation, and, hopefully, will motivate some of us to focus our attention on the needs of children.

Health Conditions and Risk Factors of Sheltered Persons Displaced by Hurricane Katrina

Vest JR, Valdez AM
Prehospital and Disaster Medicine 2006;21:55–58

Reviewed by Joan Valas

PURPOSE: To describe health conditions of displaced persons in an Austin, Texas shelter following Hurricane Katrina.

METHODS: A stratified, random sample from the 4,000 individuals displaced from New Orleans served as the primary sampling unit. Sheltered adults were interviewed using a one-page questionnaire of 31 closed-ended questions to assess the prevalence of acute and chronic conditions and other risk factors. Chronic disease, demographic and risk factor assessments were adapted from the Behavioral Risk Factor Surveillance System (BRFSS). Specific interviewers conducted the health assessments and obtained consent of individuals randomly selected according to bed numbers.

RESULTS: Of 183 adults interviewed, 50% arrived with symptoms of acute illness (skin rash, diarrhea, cough, sore throat), while 59% reported at least one chronic condition (hypertension, diabetes, asthma and arthritis) unrelated to the disaster. Complicating risk factors included mental illness/disorder, physical activity limitations, substance abuse and need for a special diet.

COMMENT: The purpose of this study was to assess and describe public health concerns and immediate medical needs of displaced persons plus factors that might complicate basic shelter operations. Immediate threats of communicable diseases were of primary concern and reinforced the need for basic hygienic and public health measures in an effort to limit disease transmission. The
chronic conditions unrelated to the disaster were aggravated by the disaster and displacement. The lack of access to prescription medication, missed therapeutic regimens, or lack of regular health care providers were among the examples of aggravating circumstances noted by the authors. Mental illness and substance abuse further impacted shelter operations. Personal beliefs and religious preferences as well as dietary requirements further complicated the provision of basic needs. The “aggravating circumstances” accounted for in this study provide valuable information for future shelter planning.

Although some aspects of this assessment (the specific disaster type, delayed assessments, the exclusion of patients requiring constant nursing care and those transferred to other facilities due to critical care needs as well as population characteristics) limit its generalizability, the results do identify factors that can complicate the care of displaced persons and, thus, need to be considered in future placement plans. This study would have benefited from collaboration between the public health interviewers and the nurses providing care at this shelter who collect similar data during health and physical assessments of their patients and at an earlier time. The lack of pre-planned collaboration among emergency responders resulted in a missed opportunity for a richer set of data. Emergency preparedness planning must be not only multi-disciplinary and multi-professional, but also cross organizational boundaries to prevent coordination and communication shortfalls that may affect outcome.

Ten-Fold Expansion of a Burn Unit in Mass Casualty: How to Recruit the Nursing Staff
Posner Z, Admi H, Menashe N
Disaster Management and Response 2003;1:100–104
Reviewed by Elaine Daily

PURPOSE: To provide a large pool of competent burn nurses during a sudden influx of burn patients.

METHODS: A survey was sent to all nurses employed at the Rambam Medical Center in Haifa, Israel, to identify those interested in participating in an emergency burn care training program. Based on the survey, the experience of the burn staff and published guidelines, a didactic and clinical educational program was developed to provide the skills necessary to care for burn patients.

RESULTS: A total of 294 of the hospital’s 900 nurses (32%) completed the survey: approximately one-third stated they were willing to participate in the program; one-third was undecided; and one-third was not interested. There was an inverse relationship between the nurses’ years of experience and their willingness to participate in the program, with less experienced nurses significantly more willing to volunteer than more experienced nurses and those in administrative or managerial positions. Of the 294 respondents, 195 (66%) volunteered for the specialized training program.

COMMENT: According to the Israeli Minister of Defense, in the event of war, the need for burn-patient beds would increase by nearly 500%. At the Rambam Medical Center, the 15-bed burn unit would expand to 136-beds and the number of nurses needed to care for the patients would increase from 13 to 102. In response to, and in preparation for this potential scenario, the nurses at this center took a highly creative approach toward meeting this need. After assessing staff nurses’ interest and identifying those willing to become part of a special, trained, burn care team, an educational program consisting of 26 hours of classroom instruction and 24 hours of clinical instruction was provided. In addition to teaching the skills necessary in caring for burn patients, the program focused on reducing emotional factors that affect the ability to care for burn patients and developing tools to reduce staff anxiety. To provide ongoing training and skills maintenance, nurses spend an additional 24 hours/year in the intensive care or burn units. This unique program requires buy-in not only from the nurses being trained, but also from the managers and staff of the units in which these nurses work, as they must provide coverage during his/her absence for education/re-training, or actual burn care duty. In addition, as there is no monetary compensation, some other form of compensation and recognition is essential to maintain an adequate roster pool of trained nurses.

The model developed at this institution should be reviewed by all hospitals in war-torn areas, or in areas with a high risk of an inundation of a large number of burn casualties. This model also could be used to increase the availability of other professions as well as for other areas of highly specialized care.

This program has been in effect in the Rambam Medical Center since 1992 and the number of nurses volunteering for this program has remained fairly constant for the last few years reported. It would be of interest to know the retention rate of nurses in this program, the reasons nurses leave the special burn care team, assessment of competency skills, etc. Clearly, there is a wealth of valuable information to be gleaned from this well-established and unique program to increase a hospital’s surge capacity.

Symptom-Based, Algorithmic Approach for Handling the Initial Encounter with Victims of a Potential Terrorist Attack
Prehospital and Disaster Medicine 2005;20(5):301–308
Reviewed by Robert Powers

PURPOSE: To develop symptom-based, initial treatment algorithms for the care of civilian, terrorist attack victims.

METHODS: The algorithms were created through incorporation of military and civilian references, input from subject matter experts, and through use with computer simulated patients.

RESULTS: Six inter-connected algorithms were created; the first, basic attack algorithm differentiates patient management depending on whether the attack agent is overt (known agent) or covert (unknown agent). The remaining five, symptom-driven algorithms address initial care of victims of a biologic agent, a chemical agent, radiation, a bomb or blast, and “dirty resuscitation”.

COMMENT: Typically, nurses are the first to receive and triage incoming patients and, without proper preparedness and suspicion, could become exposed to a contaminated...
patient before precautions have been implemented. Research from such events as the Tokyo subway chemical attack, the SARS cases in Toronto and the compiled US records from ATSDR’s Hazardous Substances Emergency Events Surveillance (HSEES) system, indicate the exposure rate of healthcare workers during these types of events is a minimum of 25%. During the Tokyo subway attack, the hospital staff initially was misinformed. That the event was simply a gas explosion; later the chemical agent was misidentified.

Efforts must be made to support nurses working in the frontlines by providing them tools, such as these algorithms, to ensure that they have proper guidance in both how to treat the patient and how to minimize the risks of exposure to themselves and other staff. Use of the symptom-based algorithms presented in this article would direct attention to and basing initial treatment on the patient’s signs and symptoms rather than relying on early and often faulty information. This would assure patients receive correct and timely care, and prevent secondary contamination of hospital and staff. The authors also incorporate a treatment algorithm for victims of a covert attack, in which patients arrive before healthcare workers have been alerted that an attack has occurred.

As the authors note, future studies will help evaluate the usability and effectiveness of the algorithms. One area to evaluate and consider would be the inclusion of patient history in the algorithms. For example, the authors list fever and rash as criteria for treatment within the biological agent algorithm, but there is no mention of obtaining pertinent patient history, e.g. recent travel history or recent exposures. Under current practice, one patient presenting to the ED with a fever and a recent foreign travel history would not necessitate isolation, although presentation of two or more patients with fever would prompt isolation. However, according to the suggested symptom-based algorithm in this article, isolation would need to be started for the first patient regardless of their history.

Also, within the biological agent algorithm, incorporation of a non-symptomatic patient scenario would further broaden the categories to include all potential events. Such a scenario might be an office worker who opens a suspicious envelope, spills white powder on his/herself, and immediately drives to the hospital. This category is not addressed by the algorithms but these patients would be in need of decontamination even though they present to the emergency department without any symptoms.

Nurses receiving patients in triage areas need to maintain a high index of suspicion to properly manage the patient as well as properly safeguard themselves and their co-workers. Difficulties have arisen due to erroneous agent information or lack of knowledge concerning a current emerging infectious disease. Use of the described, symptom-based algorithms bypasses the dependence on faulty information early in the event and, instead, focuses on the symptoms with which the patients present. These algorithms seek to create a standardized approach that would allow the nurse to manage properly the initial encounter with victims of a potential terrorist attack. **A Comparison of Nurses’ Needs/Concerns and Hospital Disaster Plans Following Florida’s Hurricane Floyd**

French ED, Solo ML, Byers JF

Reviewed by Elaine Daily

**PURPOSE:** To compare and contrast hospital hurricane disaster protocols with the needs and concerns of Emergency Department (ED) nurses who responded to Hurricane Floyd.

**METHODS:** The disaster protocols of 4 eastern Florida community hospitals were reviewed and categorically summarized and 4 focus groups of 5-15 ED nurses were interviewed. The nurses’ responses were thematically analyzed and compared with their department’s disaster protocols for hurricane events.

**RESULTS:** The majority of the 30 ED nurses interviewed were female, married, >40 years of age and had been involved in Hurricane Floyd. Half of them had children <18 years of age. Primary concerns expressed were family safety, pet care, and personal safety at work. Secondary concerns were provision of basic needs such as food, water, sleep, shelter, and rest. Commitment levels to providing care during a disaster varied greatly. Nurses requested policies addressing work assignments with flexibility for extenuating circumstances, family sheltering, pay/financial compensation, pet care, and provision of basic needs.

Disaster plans at all 4 hospitals included some provision of child care (one hospital limits care to children >2 years of age), but no indication of where or by whom children would be cared for. Plans at all 4 hospitals fail to include basic provisions for food, water, pillows, blankets, beds or uniforms; policies require staff to supply these items for up to 3 days and to be prepared to remain at the facility for at least 2 days. A revised policy at one hospital has made pet care available but discouraged. Financial compensation policies have been revised to include straight time pay for all time spent at the hospital, including rest hours. Overtime pay is provided only if >40 hours/week are worked. Three of the hospitals have specific hurricane team assignments and failure of a health care member to fulfill their professional commitment may result in termination.

**COMMENT:** This informative study validates the findings of other studies identifying the barriers to nurses responding to health care crises. Although this study was specific to nurses working in the ED of hospitals in hurricane-prone areas in the US, their concerns are universal: family safety, personal safety and basic needs. The failure of any hospital’s disaster plan to address these issues reflects a failure in preparedness. The preferential treatment afforded physicians, administrators and their families (with on-campus sheltering with shower facilities) cited in this study is reprehensible. Nurses must be contributors to the development of their hospital’s disaster response plans and policies and information from this study must be incorporated into the plan in order for nurses to fulfill their professional obligations. Replication of this study in other areas and countries as well as following other types of events would be most valuable in developing strategies for preparedness and successful response.
How Does Casualty Load Affect Trauma in Urban Bombing Incidents? A Quantitative Analysis
Hirshberg A, Scott B, Granchi T, Wall M, Mattox K, Stein M
Reviewed by Robert Powers

PURPOSE: To determine how trauma casualty load affects the quality of trauma care provided.

METHODS: A computer simulation program utilizing real data obtained from an Israeli trauma center’s response to 22 multiple casualty incidents (MCI) and treatment of the resulting 223 casualties was modeled to predict how a US Level 1 trauma center could be impacted. The model uses 2 scenarios—one based on available staff and facilities and a second based on augmented staff and facilities. The computer program assigns available staff and resources to each casualty and determines what level of care each patient would receive. Level of care for each casualty is computed from six independent variables: access to triage, quality of trauma resuscitation bay (shock room or improvised facility), composition and qualifications of the trauma team, and immediate access to CT and the operating room (OR).

RESULTS: Analysis of the relationship of casualty load and level of care revealed a sigmoid-shaped relation. The flat upper portion of the curve represents the ability of the hospital to surge with a capacity of 4.6 critical patients (CP)/hour using only immediately available resources, and 7.1 CP/hour using a fully augmented disaster response. As the number of critical patients/hour increases, the level of care decreases until the curve flattens out indicating complete saturation of hospital resources. This saturation point occurred with a rate of 6.2 CP/hour with standard available resources and at 7.3 CP/hour with augmented staff and facilities.

COMMENT: From this study, the authors conclude both the potential surge capacity of their trauma center and the manner in which the decline in quality of care progresses. This computer simulation model is a step in the right direction in determining surge capacity of a hospital’s trauma assets and is vastly superior to simply counting trauma beds. However, the model assumes a continuous flow of patients during the event whereas data from actual events demonstrate clearly that casualties tend to arrive in clusters, which could affect the rate of care degradation predicted with this model. Most likely, the result would be a more rapid decline in the level of care until the final degradation from large numbers of patients, depleting all resources.

The authors selected six variables to reflect the “optimal level of care” and, by consensus, graded each of these variables using the optimal treatment of a critically injured patient during normal daily operations as the standard. A decrease in the availability of these variables was considered a decrease in the quality of care delivered to the patient. Although many of these variables are not likely to be refuted as contributing to optimal care, others may be questioned. For example, one variable they used is the presence of a surgical faculty or a resident at bedside; the presence of a resident is scored lower than faculty presence, indicating a lesser quality of care provided by them than by a faculty member. However, this subjective determination is without supporting data and would not be universally applicable. Similarly, the use of an improvised trauma room, instead of a formal trauma bay, was rated as a decrease in the quality of care. This rating also is debatable and may have little or no effect on the level of care. The experience and expertise of the trauma nursing team in effectively problem-solving issues as they arise during an MCI can substantially impact this situation. Nursing creativity and the ability to improvise are of critical importance to maintaining the quality of care and are not apt to be captured in any computer program. As the authors note, the study of the quality of care does not lend itself well to direct measurement.

The computer program used in this study assigned a static number of nurses to each trauma patient as well as a set trauma room processing time. This overlooks the crucial role of the charge nurse, who determines where to place key staff and when to relocate them to other needed areas. Additionally, experienced trauma nurses often can reduce the processing time in an MCI by decreasing the time requirements of many procedures.

Another major shortcoming of the use of this simulation model is the total absence of post-operative and intensive care needs. Being able to handle casualties effectively in the ED and OR represents one aspect of trauma care.

While acknowledging difficulties with the means of measurement and limitations of a computer model, the authors have made major initial strides in determining surge capacities for trauma casualties. However, the use and effectiveness of any type of modeling and simulation programs require further study to determine accurately which variables do impact the level of care provided and the patient outcome.