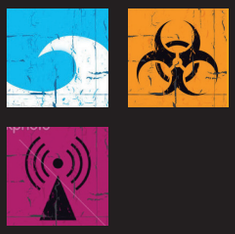

Chapter 13

Pediatrics in Disasters

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Preface

Disasters affect all segments of the population. Many subsets of the general adult population have specific needs and vulnerabilities.

One group with specific needs, and that is always of high risk in disasters, is children. The physiological, anatomical, developmental, and psychological requirements in children differ from those of adults. Disaster planning must recognize and adapt to this. In addition to being high risk and having unique requirements, children are also hard to service because many of the guidelines for equipment, supplies, and treatment protocols are designed with adults in mind. This chapter will outline specific pediatric issues in disasters and that must be addressed in any planning document by disaster planners in the Canadian context, both hospital and community based. This chapter is not meant to provide guidance for situations of prolonged famine, warfare, or disruption of social fabric.

Over the past 5 years, there has been a concerted effort by Canadian healthcare facilities to prepare for disasters. This has been largely a provincial effort with few, if any, Federal/National guidelines or standards against which to assess the true capability of the hospital care system should disaster strike. Limited data collected nationally suggest that there are gaps in readiness.[1] Furthermore, studies have shown that such readiness as does exist in healthcare systems often neglects the unique risks and special needs of children, in both the planning stage and supplies or equipment.

The goal of this chapter is to provide guidance on pediatric risks and planning so that healthcare facilities and systems can better prepare to service children. This document was prepared under the auspices of The Centre for Excellence in Emergency Preparedness by a team composed of Emergency Department physicians, rescue workers, pediatricians, social workers, administrators, and pediatric nurses.

Contents

Section 1: Problems Specific to Pediatric Population

PHYSIOLOGIC

Children have higher minute ventilation and as such are more likely to be affected by any disaster involving air quality or hypoxia. In addition, due to shorter stature, they are more likely to be exposed to respiratory toxins that are heavier than air and thus, hovering at ground level.

Children have a large skin to body mass ratio and less subcutaneous fat, and thus, they are more prone to hypothermia (both as a result of the event and through medical care such as washing) and also a higher risk of transdermal absorption of toxins. Because children have a high risk of hypothermia and because the onset of hypothermia may be rapid, there needs to be a capacity to provide rapid shelter and/or protection to children in the event of a disaster.

Malnutrition is a more significant problem with smaller children than with adults. There is significant information on the impact of protein–energy malnutrition in children and in the event that a disaster will be of long duration or that it might involve a prolonged isolation of children. There needs to be a process in place to provide and store adequate supplies of age-appropriate food and water.

Because of a smaller fluid reserve, children are at a much higher risk of dehydration and shock. This is of specific relevance in situations involving diarrhea, vomiting, or other fluid loss. In addition, it is harder to establish intravenous access in children, and thus, it is often harder to initiate intravenous rehydration.

Oral rehydration has long been recognized as an appropriate and effective therapy for the treatment of dehydration. The American Academy of Pediatrics and the Canadian Paediatric Society have published guidelines for ORT.[2–4] B.C. Children's Hospital has reviewed this, and it is widely used throughout the hospital daily.

Despite this, it is underused for a variety of reasons, including expense, palatability, parental and healthcare provider knowledge, and acceptance of ORT.[5–7] In addition, although a recipe for homemade oral rehydration solution exists, and is widely used in the developing world, it is not as frequently offered in North America. This may be due to concerns that it will be improperly mixed and result in potential morbididty.[5] To avoid this, premixed ORT powder is easily available in pouches that just need water added. A simple approach to ORT is available on the Canadian Paediatric Society website (www.cps.ca) under "information for parents" and diarrheal disease. It includes, for babies 6 months and younger: give 30–90 mL (1–3 oz) every hour; at 6–24 months: give 90–125 mL (3–4 oz) every hour; and children older than 2 years: give 125–250 mL (4–8 oz) every hour. If an infant refuses the ORS by the cup or bottle, give the solution using a medicine dropper, small teaspoon, or frozen popsicles. If a child vomits, you may need to stop giving food and drink but continue to give the ORS using a spoon. Give 15 mL (1 tablespoon) every 10–15 minutes until the vomiting stops. Increase the amount gradually until the child is able to drink the regular amount.

In addition, there are inherent issues associated with an exclusively breastfed infant in case of disaster and parental separation/demise.

Children vary enormously in both size and weight, and thus, routine protocols and dosages of everything from fluid to medication and ventilatory parameters needs to be written per kilogram and calculated on an individual basis.

ANATOMIC

Children's skeletons are far more pliable than adults, and as such their pelvis and thoracic cage may not provide the same rigid protection to underlying organs that an adult may be able to deliver. Thus, in a disaster scenario involving blunt trauma, children may have higher incidence of underlying injuries without fractures.

The ratio of mass of head to body is larger in children than adults, and thus, the likelihood of a head injury in children is higher. This is coupled with the fact that it requires use of different pediatric-specific skills to perform a full neurologic assessment on a younger patient, posing diagnostic difficulty.

DEVELOPMENTAL

Children's cognitive and motor skills vary with age, development, and occasionally with other underlying illnesses. It is not always possible to know whether children have deviated from their usual norm because there may not be anyone available to provide information as to what their normal level of function is. This is very different from adults where caregivers have an innate understanding of what a normal level of function is.

Children do not always have the psychological and cognitive maturity to be able to process events. Thus, their risk of emotional injury, anxiety attacks, separation anxiety, or posttraumatic stress disorder (PTSD) is higher than adults.[8–10] Also, in an event where a child is separated from a caregiver, the child may not have the cognitive ability to recognize the risk and evade it.

PSYCHOSOCIAL

Families should, ideally, be treated as a unit. It may not be reasonable, feasible, practical, or compassionate to separate families when performing decontamination or providing other treatment. This also needs to be taken into consideration for any situation where isolation is required.

There is a need to plan for the care of children in situations where a large number of adults are victims of a disaster. Even though children may not be the primary victims, they may be truly or virtually orphaned as a result of an event that impacts on their parents.

Disaster planning needs to involve liaison among schools, childcare staff, and social services—both community and hospital based—which may play a key role, particularly if a disaster occurs during daytime hours. Also, in an event that involves long-term closure of schools, disaster planning must take into account the need for childcare and its impact on the ability of workers to respond in disasters

PAIN MANAGEMENT

Children do not always identify that they are in pain or may not be examined due to pain and caregivers are not always comfortable providing analgesia to smaller children. There need to be analgesia protocols in place, particularly for mass casualty events.

Pain management must be considered in all children who have sustained an injury. Children may not have the intellectual ability to report or describe

the location and severity of pain that they are experiencing. Untreated pain has adverse physiological and psychological effects. The presence of pain may make the assessment of an injured patient very difficult, and the physiologic effects of pain may be confused with the signs of hemodynamic instability. It is the responsibility of the caregiver to recognize the clinical features of pain in children and initiate appropriate treatment.

ASSESSMENT OF PAIN

In the pediatric patient, assessment of pain must take into account the developmental level of the child and the nature of the injury. In infants, the best determination of pain is the use of behavioral and physiologic factors. The best behavioral indicators of pain are crying, facial expressions, and motor movements. Physiologic changes include elevated heart rate, increased blood pressure, increased respiratory rate, decreased oxygen saturation, and pupil dilation. Most toddlers will be able to express pain using basic words and may be questioned directly. School-age children and adolescents will be able to express pain directly and may be able to quantify pain using numeric pain scales. The emotional effects of shock, as well as the impact of possible previous trauma, need to be taken into account and may interfere with a child/youth's ability to report pain accurately.

PHARMACOLOGIC MANAGEMENT

The goal of pharmacologic therapy is to provide safe and effective analgesia. The weight of the child must be approximated and the dose calculated appropriately. Mild to moderate pain may be managed with oral agents. For severe pain, intravenous medications should be considered (Table 13-1).

Ibuprofen is a nonsteroidal, antiinflammatory agent that is effective in the treatment of mild to moderate pain. As a single agent (10 mg/kg), it was found to be superior to both acetaminophen (15 mg/kg) and codeine (1 mg/kg).[11]

Acetaminophen can be used for mild pain and given orally or rectally. The rectal route may be used in children who are unable to tolerate oral medication.

Morphine should be used as the oral opioid agent of choice. Codeine should no longer be used in children. Codeine must be metabolized to morphine to

AU: Please confirm whether Tables 1, 4, and 5 are cited appropriately in text.

Table 13-1: Pharmacologic Management of Pain

Drug	Dose	Dosing Interval	Maximum Dose
Ibuprofen	10 mg/kg PO	6 hr	600 mg
Acetaminophen	15 mg/kg PO/PR	4 hr	1000 mg
Morphine	0.2–0.3 mg/kg PO	4 hr	10 mg
Morphine	0.05–0.1 mg/kg IV	2 hr	5 mg
Fentanyl	1–2 µg/kg IV	30 min	300 µg

Abbreviations: IV, intravenous; PO, orally.

have therapeutic effect. This metabolism is variable, and there are case reports of patients with significant toxicity from therapeutic doses. This is attributed to patients who rapidly metabolize codeine and achieve very high blood levels. Conversely ~10 % of the population cannot metabolize codeine and will not receive any analgesic effect.

Intravenous opioid agents should be used for patients with moderate to severe pain. The opioid dose should be titrated cautiously in children due to possible respiratory depression. Morphine is the most commonly used opioid agent and very effective. *Fentanyl* is also commonly used and has a faster onset time but also a shorter duration of action and needs to be given more frequently.

NONPHARMACOLOGIC MANAGEMENT

Nonpharmacologic interventions may be helpful in minimizing the pain that the child is experiencing. They may help to calm the child and decrease anxiety. Whenever possible the parent should be present to support the child. Infants will respond well to swaddling, rocking, sucking on pacifier, or sucrose on pacifier.[12,13]

In toddlers, holding/hugging, distraction techniques (toys or music), and security objects (blanket, stuffed toy) may be helpful. School-age children may also benefit from distraction techniques (books, games, and storytelling). For adolescents, breathing techniques, relaxation exercises, and imagery (favourite place) may be helpful.

MECHANISMS OF INJURY

Head Injury. Head injuries account for approximately 60% of all mass casualty incidents (MCIs) and disaster injuries in the pediatric population. This high rate can be explained by the large and heavy heads of children relative to their bodies. Furthermore, in states of unconsciousness, children's upper airways tend to get obstructed by their relatively large, flaccid tongue or kinked because of the head flexion induced by the prominent occiput. Children tolerate multiple organ injuries better than adults, and prognosis usually depends on the severity of the head injury, if present.

Skeletal Injury. Children have more pliant and flexible bones than adults and are therefore subject to fewer bone fractures. However, internal organ injuries in the absence of fractures of the overlying bones, in the chest or upper abdomen, for example, are not uncommon. Injuries to children and adolescents also include growth plate injury.

Thermoregulation. The less mature thermoregulatory mechanism in children and higher surface area-to-mass ratio compared with adults make heat loss and hypothermia more common in the pediatric population, particularly during exposure to extreme conditions, such as cold weather, decontamination with cold water during biochemical events, or when undressed at triage. Infants are also more susceptible to hyperthermia.

Blood Loss. As children have relatively small amount of blood (80 mL/kg), what may seem to be minor bleeding may represent a significant volume loss and severe shock. Children do tolerate cardiovascular stress better. Their compensatory mechanism is inotropic, that is, they can greatly

increase heart rate to compensate, considerably more than an adult; thus, children may tolerate hypovolemic stress better than adults. However, they may decompensate quickly. The clinical implication of this is that children can look quite well and the only sign of impending decompensation is an extremely high heart rate. They can quite quickly go from this state of compensated shock to completely uncompensated shock and arrest.

Emotional Trauma. In addition to physical injuries, emotional trauma, for example, caused by separation from the parents, is an important factor in pediatric care. Children may also be more easily frightened by events that they cannot understand such as a healthcare provider in PPE.

OTHER

The vaccination protocols that are being designed for pandemic scenarios do not include children younger than 6 months. Other potential disasters could include infectious agents for which there may be a vaccine or a treatment that is not studied, approved, or applicable to children, particularly infants.

Children exposed to radiation are at a higher risk of developing radiation-induced cancer such as thyroid cancers. Having higher minute ventilation, children are also at a risk of greater internal exposure to radioactive gases of all types. For children who are being breastfed, it is worth noting that radioactive iodine can be absorbed and secreted in human breast milk.

Children, particularly small children, cannot provide consent for medical treatment. There is implied consent for most resuscitative therapy, but the consent issues are less clear when it comes to nonacute care. There needs to be review of the Canadian legislation to make sure that hospitals are allowed to provide immediate and ongoing care to children who are unable to provide consent and whose guardians are not available for a variety of reasons.

Section 2: General Planning Considerations for Pediatric Disasters

This section will review some of the general planning issues and their implications in pediatric disaster planning. The section is organized along the classic four phases of disaster: mitigation, preparedness, response, and recovery.

MITIGATION

It is important to make sure that the following is addressed in your disaster planning:

- Review what pediatric sites (schools, daycare centers, etc.) are within the community and the region. These can generate a large clinical load for the facility, and it is important to know that they exist. More so, the planner may wish to contact them and see what assessments they have made and what hazard vulnerability analysis they have performed.
- Identify within your region and community what facilities and institutions provide services for children with special healthcare needs. These could be short-term programs that are disrupted in an event of a disaster or

long-term facilities for children with chronic illness. It is worth considering also whether there is a juvenile detention facility within your region as this may pose special challenges in the event of a disaster.

- It would be useful, if there are multiple pediatric facilities within your region, to have a centralized and standardized identification method for all children in these facilities as well as a centralized repository for information on the residents in residential facilities. This would be important in patient tracking in the event of a disaster that involves the evacuation of one or more pediatric facilities.

PREPAREDNESS

This includes items related to the preparation of the facility plan and preparation of any exercises that will involve pediatric patients.

- Work within the community and community agencies to identify sources of children, particularly those younger than school age who may be victims in a disaster.
- Work with schools near the facility to identify children who may require hospital because of special needs during an emergency. At the same time, identify the facility to the schools, daycare centers, and other pediatric centers in your region and provide them with a contact person whom they can call in an event of an emergency.
- Formalize a pediatric locating/parent matching/tracking form (see Appendix E).
- Establish inventory for appropriate pediatric supplies, equipment, and nutrition for a minimum of 72 hours (see Appendix H).
- Prepare a job action sheet that is integrated into the overall hospital disaster plan and the IMS structure (see Appendix I).
- Negotiate mutual aid and transfer agreements amongst clinicians and institutions that can assume some of the clinical load in the event of a pediatric MCI. This may extend beyond the immediate region of the hospital in case a disaster covers the entire region.
- It may be useful to have digital photography capability for registration and tracking of patients. This would obviously have to integrate into your existent system.

Section 3: Prehospital Care

Emergency medical services (EMS) personnel and response vehicles must be equipped with pediatric-specific equipment and medications. This includes supplies for decontamination and assessment/treatment for biological, chemical, and radiological terrorism.

Establish model guidelines and best practices for communication, documentation, community involvement, equipment, medical oversight and strong Incident Command Systems, protocols for basic and advanced pediatric

life support, children with special healthcare needs, day care centers, and schools (both public and private).[14]

Section 4: Triage in Mass Casualties

Triage is the medical screening of patients according to their need for treatment and the resources available. It is particularly relevant to mass casualty situations, when conventional standards of medical care cannot be delivered to all victims. The goal is to optimize care for the maximum number of salvageable patients. Patients who will do well with minimum care are distinguished from those who will die despite maximal care. Attention is addressed to those who will benefit most from optimal care and rapid surgical intervention.

Effective triage at the scene and within the medical institution is often a major determinant of outcome. In adults, priority for treatment is based on rapid assessment of level of consciousness and vital signs. In children, triage poses a greater challenge, as measurements of vital signs, particularly of blood pressure, are difficult to obtain and cooperation is limited. Although children may account for a significant percentage of victims in mass casualty events and disasters, most of the triage studies to date have focused on the adult population.

Multiple casualty and mass casualty events are different by definition. In *multiple casualty* situations, the number of patients and the severity of their injuries do not exceed the ability of the facility to render care, and patients with life-threatening problems or multiple system injuries are treated first. In *mass casualty* situations, the number of patients and the severity of their injuries exceed the capability of the facility and staff. In this situation, patients sustaining major injuries who have the greatest chance of survival with the least expenditure of time, equipment, supplies, and personnel are managed first.

All accepted methods of triage are subject to under- and overtriage. An undertriage rate of 5% is considered acceptable; anything higher may lead to unnecessary morbidity and mortality in severely injured but potentially salvageable patients. An overtriage rate of about 50% is acceptable, to minimize the number of patients who are undertriaged.[15]

Practically, patients are broadly categorized into one of three groups: (1) immediate care, (2) urgent or delayed care that includes the ambulatory patients, and (3) unsalvageable. Numbers, colors, or symbols may be used to denote the different triage categories. For example, red (priority 1) tags are attached to patients allocated to the immediate-care group, yellow tags (priority 2) to the delayed-care group, and black tags to unsalvageable patients. In Israel, triage models also add a blue tag to identify children and a grey one to identify patients with a combined injury (induced, for example, by chemical and conventional weapons). No matter what the method, the signs need to be appropriate, clear, and uniform across the medical care system. In North America, this is commonly (1) immediate (red), (2) delayed (yellow), (3) ambulatory (green), and (4) unsalvageable (black or yellow/black).

There is a variety of triage tools designed for the field although these are primarily for adults such as START mentioned above. Pediatric triage tools include JumpSTART and SMART TAPE.

In general, ambulatory patients are automatically triaged for delayed care. For others, categorization is based on vital signs for nonambulatory patients. A quick look will determine whether the patient can verbally respond and the

airway is open. Otherwise, the physician performs a simple chin lift or jaw thrust maneuver or attempts removal of oral debris. If there is no respiration after the airway is opened, the patient is declared dead. If respiration is established, the pulse and capillary refill are checked, and if there is no peripheral pulse or capillary refill is delayed, the patient should be triaged for immediate care. If a good peripheral pulse exists and capillary refill is normal, the patient should be triaged for urgent care. Any ongoing bleeding should be stopped in the field.[15] This assessment of airway, breathing, and circulation is also called the pediatric assessment triangle (PAT).

Some PAT systems classify patients using the CUPS acronym for *critical* (e.g., absent airway, breathing, or circulation), *unstable* (e.g., compromised airway, breathing, or circulation, depressed level of consciousness, significant active bleeding, or active seizure), *potentially unstable* (e.g., normal airway, breathing, and circulation but significant mechanism of injury or illness or infant younger than 3 months with fever), and *stable* (e.g., normal airway, breathing, and circulation with no significant mechanism of injury or illness).[16] Although this is a functional method, the authors of this chapter feel that it would be confusing to have different classification systems for adults and children and, as such, suggest that the classification of pediatric patients also follow the adult color codes.

The following recommendations address the minimal elements for proper triage and prehospital care of children by first responders:

- Incorporate use of a pediatric-specific triage system by all first responders and hospital personnel. This will provide guidance for triage personnel making potential life and death decisions that otherwise may be influenced by emotional issues when triaging children. At this time, JumpSTART Paediatric Multiple Casualty Incident Triage (see Figure 13-1) and SMART TAPE (see Figure 13-2) are 2 objective triage systems that address the needs of children.
- Designate a pediatric-specific triage process for use in training by first responders and emergency personnel.
- Continue to develop, improve, and implement triage systems that are objective and child specific to advance the efficiency and accuracy of triage.
- Ensure integration and consistency of use of pediatric triage processes among local, regional, provincial, and federal responders, including Disaster Medical Assistance Teams.
- Ensure the availability of a green area for minor wounds and unaccompanied or displaced children, ideally away from the Emergency Department (ED) or resuscitative areas as this eases the clinical burden of the yellow area.
- Include evaluation of triage processes and performance in quality assessment procedures (performed after the event) at federal, provincial, and local levels, as well as in future research initiatives.[14]

In adults, the patient's ability to walk is an important criterion in the initial decision-making process. For nonambulatory patients, triage is based on the radial pulse and the motor component of the Glasgow Coma Scale. However, infants are

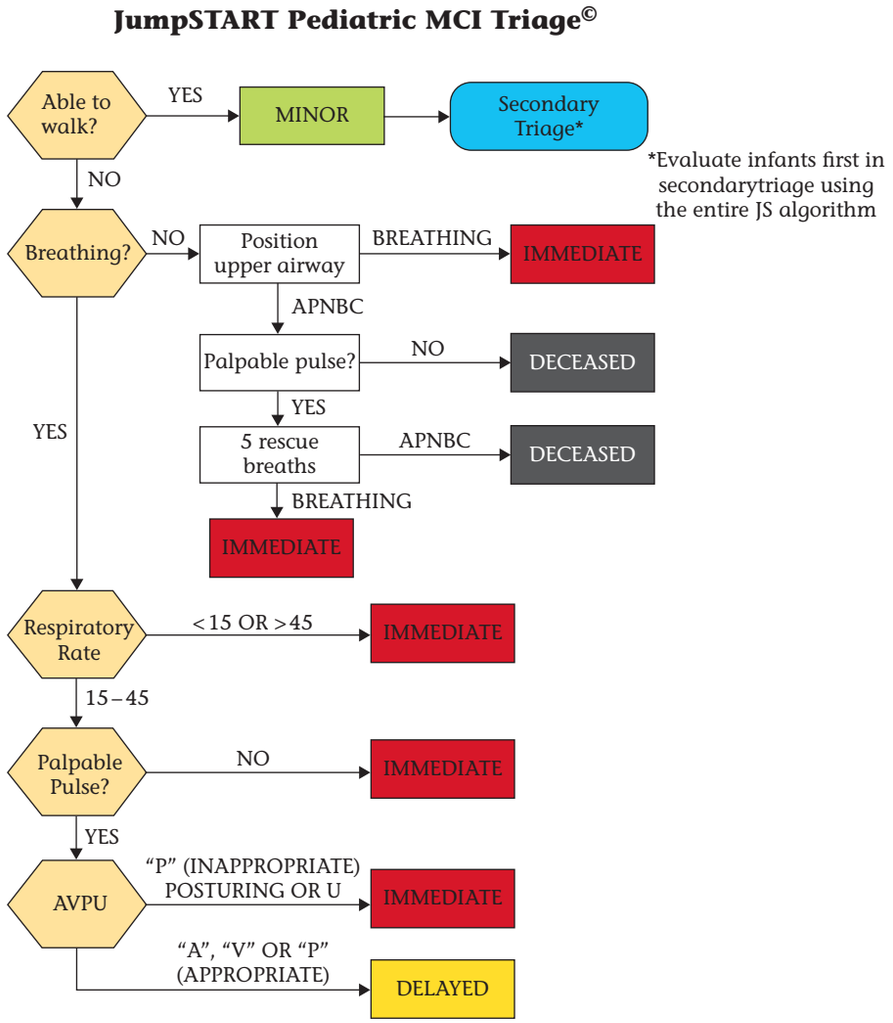


Figure 13-1: JumpSTART Pediatric MCI Triage.

unable to walk, and older children are often strapped to a stretcher by the time they get to the ED. Furthermore, communication with children in the preverbal stage may be difficult, and older children may be terrified or refuse to cooperate.

In general, the principles of triage are the same for children and adults, although the priority of children over adults within the same categories is controversial. The Save the Children Fund in 1923 and United Nations Children's Fund (UNICEF) in 1990 declared that children must receive relief first,[15] but this recommendation is not universally accepted.

Several researchers introduced assessment tools, such as the Pediatric Trauma Score (with the Eichelberger modification)[17] and the algorithm proposed by Mackway-Jones et al.[18] to aid clinicians in the triage process. However, both these tools have been found to have some major limitations: (1) Young infants cannot walk and are therefore immediately categorized as at least priority 2. (2) There is no airway-opening maneuver, other than possibly a jaw thrust. (3) The methods require blood pressure measurement, which is difficult to perform and time consuming in children in crises. (4) The methods do not account for differences in physiological parameters with age. Pediatric Canadian Triage and Acuity Scale

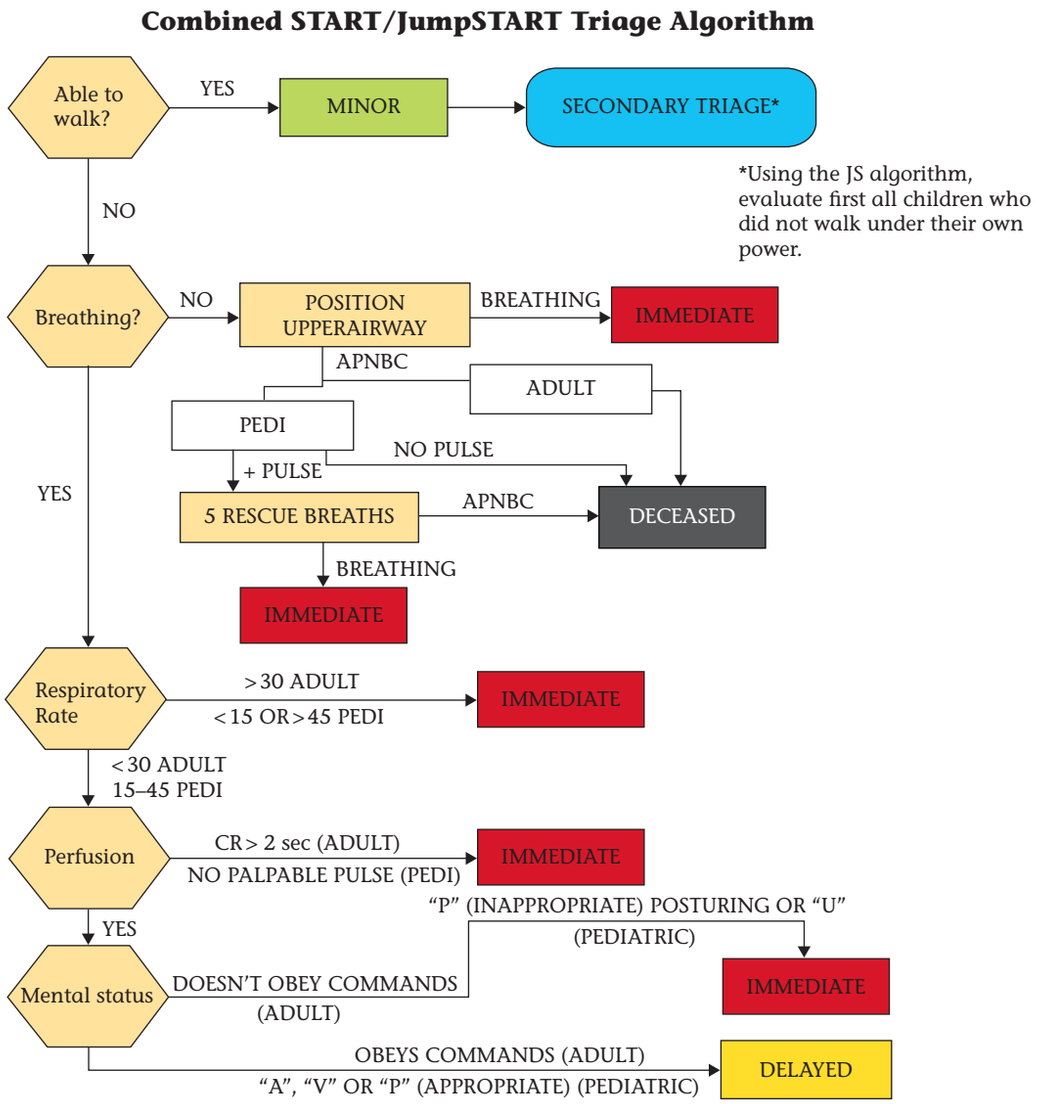
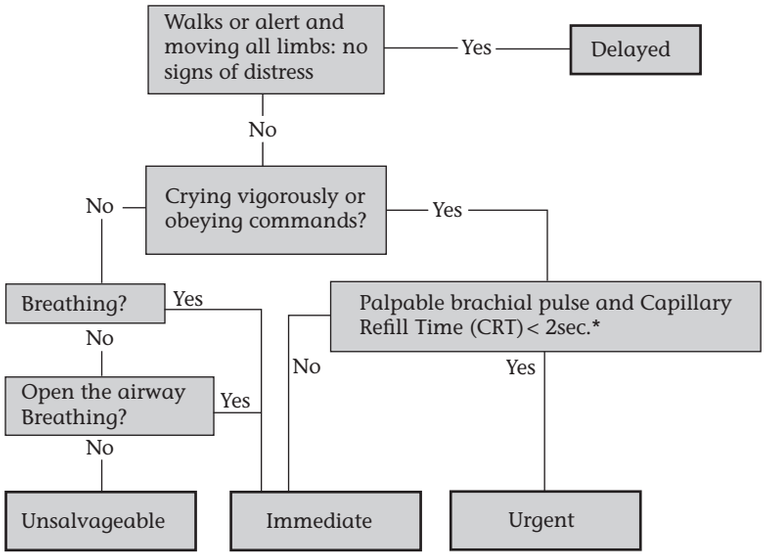


Figure 13-2: Combined START/JumpSTART triage algorithm.

(PedsCTAS) is very accurate and quick; the PAT with a quick assessment of the apex beat will usually tell you whether a patient is in need of resuscitation (Red) or delayed care (Yellow).

To address these challenges, Israeli EDs have formulated a new algorithm for pediatric triage in mass casualty events[15] (see Figure 13-3), which has several advantages over the earlier ones. It eliminates time-consuming vital signs measurements; takes into account the level of consciousness in children too young to walk; and uses 4 priority categories instead of 3: 1, immediate care/resuscitation room; 2, urgent care/ED; 3, delayed care; and 4, unsalvageable. In view of the lack of objective measurements for triaging children, their algorithm emphasizes the need for a clinician with experience in pediatrics and trauma care for the quick and accurate assessment of respiratory, circulatory, and central nervous system function in this age group. The most important decision of triage is rapidly identifying patients in category 1. A finding of bradycardia is an indication for the resuscitation room and tachycardia for the immediate-care group. Children with bleeding are assigned to the



* CRT is a less reliable indicator of perfusion in our Canadian climate than it may be in Israel where this algorithm was derived.

Figure 13-3: Algorithm for mass casualty pediatric triage.

immediate-care group as well. As noted in the work of Hirshberg et al.,[19] of the patients in the immediate-care group, it is particularly important to identify critically injured children who require treatment in resuscitation rooms, and of those in the delayed-care group, it is important to identify children with anxiety and acute emotional stress who need to see a social worker or mental health professional.

Differences between conventional triage systems and mass casualty triage used in Israel are summarized in Tables 13-2 and 13-3.[15]

Table 13-2: Main Differences Between Conventional Triage Systems and the Mass Casualty Triage

Parameter	Conventional Triage	Mass Casualty Triage
Triage Site	Inside Emergency Department	Outside Emergency Department
Triage Professional	Nurses	Senior Physician
Assessment Technique	Clinical + Physiological Measurements	Clinical
Measurement of Vital Signs	Required	Not Performed
Extent of Resuscitation	Maximal Care for Every Patient	Unsalvageable Category Implemented With No or Limited Care
Decision to Transfer	Performed After Initial Care	From Triage, According to Patient Condition and Availability of Local Resources

Table 13-3: Routine Medical Practices Unaltered Between Conventional Triage Systems and Mass Casualty Triage Formulated by Authors

Parameter	Conventional and Mass Casualty Triage
Extent of Care	Immediate attention to airway, breathing and circulatory emergencies in potential viable patient
Pain Management	Appropriate management of pain
Patient Assessment	Systematic, although abbreviated in mass casualty events
Reassessment	Frequent reassessment for changes in status

TRIAGE GUIDELINES FOR NONDISASTER PATIENTS

Nondisaster, nonemergent pediatric patients presenting to emergency during a disaster will be registered in emergency or an alternate area per standard triage and registration protocol and then taken to the appropriate care area. This may be outside the ED if the ED is required to deal with the disaster. Consideration should be given to discharging deferrable patients by a PA or RPN/RN without treatment by a physician. From a medico–legal standpoint, in order for a PA, RN, or RPN to be allowed to discharge a patient, there needs to be a formal medical directive in place outlining the special circumstances and criteria for the action. If an alternate clinic is not yet staffed or registration is delayed because of staff priorities, an RN/RPN should remain with the patients. Treatment and disposition will be by clinic staff, according to their usual guidelines.

Nondisaster patients should be triaged as per the PedsCTAS. "Resuscitation" (CTAS level 1) conditions are patients who present with conditions that are a threat to life or limb (or imminent risk of deterioration) and requiring immediate aggressive interventions. "Emergent" (CTAS level 2) conditions are a potential threat to life, limb, or function and require rapid intervention. "Urgent" (CTAS level 3) are patient's conditions that could potentially progress to a serious problem requiring emergency intervention. "Semi-urgent" (CTAS level 4) are conditions that relate to patient age, distress, or potential for deterioration or complications, which would benefit from intervention or reassurance within 1–2 hours. "Non-urgent" (CTAS level 5) are conditions that may be acute but nonurgent, as well as conditions that may be part of a chronic problem, where the investigation or interventions for some of these illnesses or injuries could be delayed.

Nondisaster patients presenting as "resuscitation" or "emergent" will be triaged, registered, and handled as usual in the ED. All other patients may be transferred and managed in an alternate care area.

A triage site dealing with pediatric patients should be ideally staffed by two experienced physicians, one with expertise in emergency medicine and the

other with expertise in pediatrics, pediatric emergency medicine, or critical care. The physicians should be assisted by one nurse each for tagging patients and delivering care. In addition, auxiliary personnel are needed to carry stretchers; and security guards should also be available. At least one physician and nurse should be available for each patient admitted to the immediate-care area. All medical staff assigned to triage must be specially trained in the necessary techniques, a training that is routine for ED triage nurses in Canada. Obviously, the scale of the event will impact on the human resources that are required or available. These guidelines are meant to suggest skill sets more than absolute numbers.

Section 5: General Guidelines for Treatment Areas and Their Staffing

The following guidelines are extracted from document "Surge Management in Disasters" of The Centre for Excellence in Emergency Preparedness (see Chapter 7).

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Patient Flow. Patient flow must be in only one direction. Easy-to-read signs and arrows directing staff and ambulatory patients to the appropriate treatment site should be prepared in advance and hung at the time of the event. Walkie-talkies or other means of communication among personnel and the different treatment sites should be stocked and provided as necessary (Table 13-4).

Table 13-4: Patient Flow

Triage Code	Patient Flow	Staff
Major injuries: Requires Resuscitation	Resus Room or Room Adapted for Pediatric Resuscitation	• Emergency MD/RN • Anesthesia • Trauma Team Leader • Trauma Fellow • Surgical Staff • Respiratory Therapy • Patient Tracking Team • Clerical Staff
Major injuries: Requires stat assessment or stabilization	Examination Rooms with a bed and a line of sight to Staff	• Emergency MD/RN • Trauma Team Leader • Pediatric Residents • Patient Tracking Team • Clerical Staff (Multiple)

Table 13-4: Patient Flow *(continued)*

Triage Code	Patient Flow	Staff
Major injuries: Stable	Examination rooms with beds	• Emergency MD/RN • Trauma Team Leader • Pediatric Resident • Patient Tracking Team Member • Clerical Staff
Minor injuries: For assessment and treatment	Area ideally away from ED	• Emergency MD/RN • Patient Tracking Team Member • Clerical Staff (as required)
Minor injuries: Assessed by waiting room staff	Treatment Area away from ED	• Emergency RN • Emergency MD/ Resident • Outpatient Department RPN • Patient Tracking Team Member
Expectant/Palliative	Treatment Area away from ED	• Security • Social work/family and child care • Clergy • Palliative-care staff.
DOA	Morgue	• Pathologist • Transport Staff

Abbreviation: ED, emergency department.

This table provides guidance for a situation with maximal resources such as an urban teaching hospital. Individual facilities may or may not have the locations or staff outlined in this table—each site must adapt these guidelines to their own situation.

Child-care workers or social workers should not be in fixed locations but should case find independently. They would likely find themselves moving between major injuries (stable) and minor injuries. Volunteers who work with children need to be clearly identified, screened (usually including a police check), trained and have well-defined tasks. Once they have been oriented to the layout of the facility, they can also be used as runners and messengers. Social workers are needed to repatriate displaced/ unaccompanied children with correct family.

Triage Site. Ideally the triage site is located outside the ED, between the area for ambulance unloading and the entrance to the ED. At the triage site, patients are categorized to one of the designated sites listed below.

History suggests that up to 80% of patients will present themselves and assuch there may be value to a separate triage area for ambulances.

Immediate-Care Site. The ED resuscitation area or an easily accessible equivalent is reserved for patients in the immediate-care and, unless another appropriate area exists, urgent-care categories. Ideally, the urgent-care area will be in the "routine" areas of the ED. In a general facility, a separate area in the ED should be designated and equipped for children, unless they require the resources of the resuscitation areas.

Delayed-Care Site. An area outside the ED but in close proximity to it should be reserved for delayed-care patients. A large waiting room, outpatient clinic, or hallway not normally used for patient care may be used. Again, a separate area should be set aside for children. Carts with appropriate equipment for this level of care should be prepared in advance and brought to the site at the time of the event.

This site may be further subdivided into delayed, ambulatory, and palliative/unsalvageable areas. The area for unsalvageable patients should be away from the ED and ideally allow for grieving families, morgue facilities, and the collection/safeguarding of forensic evidence.

Equipment in the delayed-care areas should take into account the potential for episodic under triage of immediate-care and palliative-care patients. There should be a separate area for the latter group.

The path from the triage site to the delayed-care site should not cut through the ED.

Patient registration at all sites is minimal and should occur at the bedside or "chair side." A number of preprinted prepared packages should be ready ahead of time including admission, ID bracelet, laboratroy and X-ray requisitions, and nursing notes, all associated with the same patient ID that should be already entered in the hospital computer (for more information on this subject, see Surge chapter in the *Disaster Medicine Textbook*). Most admission information is electronic now, and however, power/staff/equipment may not be available, so the hospital must be ready to work from a paper chart.

On the basis of the assessment, the patient will be sent with a transport nurse to:

AU: Please note the sentence "On the basis of the assessment…" is incomplete. Please check and provide appropriately.

Section 6: Pediatric Treatment Area Considerations

A detailed equipment and supply list can be found in Appendix H.

- Appropriate hygiene/waste disposal resources and supplies for infection control
- Basic health screening to ensure appropriate levels of available care including specific pediatric screening tool
- Safety and supervision of children around frail adults (including preventing access of children to medications)
- Security of unattended or unsupervised minors. An area that can keep children in and safe from possible predators or media

- Availability to public of medical information resources (computers, posters, phone referral lines, etc.) to aid in appropriate use of medical resources
- Standardized healthcare data collection
- Environmental considerations—distancing from smoking, alcohol, other drugs, and weapons
- Secure transportation within the shelter and the medical care and resources system (transportation of shelter occupants must include appropriate official supervision of and accountability for unattended minors)
- Arrangements for children with special healthcare needs, including providing for patients on long-term medications without affecting local emergency-care resources and battery backup for children with power needs, that is, respirators/electric wheelchairs and so on
- Availability of pediatric information resources for caregivers, specifically age- or weight-related protocols/doses
- Clear identification of children
- Clear identification of caregivers/family members
- Entertainment/distractions

Section 7: Psychosocial Needs and Treatment

The impact of natural disasters on individuals is substantial. Aside from the hardships of daily living, the survivors may experience injuries and be exposed to other distressing events including witnessing someone dying or being injured, seeing dismembered bodies or body pieces, being trapped under debris, or being separated from family (UNICEF, 2004). Survivors of disasters often experience a range of losses, including loved ones, their home, neighbourhood, and place of worship. Although distressing for all, children may be particularly affected by the loss of their familiar environment (home, school, and peers), as children feel safe and secure when they have consistent and predictable routines in life. Caregivers, during such times, are also often unable to give the care and comfort they provided before the disaster. This can cause anxiety, fear, and a great sense of insecurity among children.

SUGGESTED GUIDELINES FOR DEALING WITH DISTRESS

- Talk openly about feeling of fear and anxiety.
- Reassure children by word and deed (“we are all together and safe”).
- Keep the family together. This provides concrete reassurance.
- Listen to what children say about their fears.
- Encourage them to talk (“It is normal to be afraid”).
- Restore a sense of routine and avoid inactivity.

- Be aware of your own feelings and the effect these feelings, and your own reactions, have on children.
- Don't focus on temporary, immature behavior—it is typical for children's emotions and behavior to temporarily regress during extreme stress situations.
- Give additional attention and reassurance.
- Encourage contact with friends.
- Rehearse safety measures to be taken in future disasters.

WHEN PROBLEMS PERSIST

Professional assistance, such as that from a counselor or therapist, can help deal with "adjustment reactions" relatively quickly and easily. Useful interventions may include the following:

A. *Understand and monitor child emotional reactions*. When children face any traumatic event, they have both emotional and physical reactions. These reactions and feelings are normal responses and occur in most children who face an event that overwhelms them. Children of different ages may have different reactions. Encourage parents, teachers, and other caregivers to observe the child and report any changes in him or her.

B. *Help reduce effects by offering emotional support and security to the child*. Talking about the event and allowing the children to share their experiences and feelings may help to decrease emotional distress in some children and youth. Others may not talk at all but may find it comforting to know that there is somebody who cares. The caregiver should be readily available and should re-assure the child that their feelings are normal. Being available and offering reassurance to the child can help to restore a greater sense of safety and security.

C. *Facilitate recovery by modeling healthy coping strategies:* The caregiver should normalize life routines by helping children and youth get involved in routine tasks like returning to school or engaging in recreational activities. Children will look to caregivers to learn how to cope with traumatic incidents. Caregivers should try to model healthy coping by acting with calmness, following regular sleep times, eating well, taking an interest in outside activities, and exercising regularly.

WHAT TO EXPECT

Most children and adolescents, if given support such as that described earlier, will quickly recover almost completely from the fear and anxiety caused by a traumatic experience. Specific time frames for recovery are difficult to set out; however, there should be evidence of a gradual reduction in anxieties, a decreasing of sadness, and other symptoms of depression over a period of days to weeks. Failure to see positive changes increases the likelihood that a more formal intervention may be needed. When a child is severely traumatized,

enlisting professional support with therapists *trained* in working with children and PTSD is paramount.

Section 8: Healthcare Facility Risk Assessment—Pediatric Specific

It is critical to engage in a pediatric-specific disaster risk assessment with the community, including school districts, the Office of Emergency Services, EMS, the police department, the fire department, private practitioners, child welfare organizations, child-care establishments, public health organizations, and mental health facilities. It may be that schools or other children's organizations and facilities do not have the information required for disaster readiness.

In addition to the routine risk assessment that the hospital must perform (see Chapter 2), the following pediatric risk assessment (Table 13-5) should be performed.

Table 13-5: Pediatric Risk Assessment

Contacting the Following Organizations	Potential of Patients (yr)			Any Special Needs
	0–5	>5–10	>10–15	
Local Schools				
Local Childcare Centers				
Child Welfare Organizations				
Mental Health Facilities				
Other Facilities Housing Children or Adolescents (jails, group homes, etc.)				
Others—Church, Day Care Areas				

Section 9: General Readiness Assessment (Pediatric Specific) for Hospitals and Healthcare Facilities

HOSPITAL PREPAREDNESS

- Ensure preparedness in all hospitals, with children's hospitals playing a crucial role in educating the community, training healthcare providers, and directing the care of children in general hospitals when the numbers of children or logistics prevent transport to a children's hospital.

- In the absence of specific guidelines regarding supply stores, the authors recommend 1 of 2 options: (1) facilities should ideally perform a focused risk assessment to estimate the potential pediatric impact of likely disasters and the potential sources of patients (e.g., schools) within their caption area and estimate their needs based on this (Dr. Hezi Waisman, Schneider's Children's Hospital, Israel, July 17, 2009, personal communication) or failing this and recognizing that there is limited evidence to support this option and (2) keep a 48-hour supply of pediatric equipment and pharmaceuticals on hand for the average daily number of patients plus the larger of 50 patients or 0.02% of the local population. This is based on Canadian statistics[20] assuming that 20% of population would be younger than 16 and that 0.1% of those might be casualties.
- Include a detailed pediatric component in web-based hospital resource availability networks.
- Develop informational resources and training for pediatric-specific responses to biological, chemical, and radiological terrorism.
- Ensure that all hospital emergency operations and preparedness policies include pediatric care and treatment guidelines and account for the unique aspects and needs of children.
- Ensure that all agents and equipment that are stocked for disaster and terrorism preparedness are either specifically for pediatric use or can be appropriately substituted for pediatric use.
- For hospitals that do not routinely treat pediatric patients, there may be benefit to an agreement with a regional pediatric hospital to send a team to assist with pediatric patients who present during a disaster.

AU: Please note per style "Personal communication" given as Ref. 20 has been moved to text and the subsequent reference has been renumbered.

COMMUNITY PREPAREDNESS

- Designate a pediatric specialty resource center and system in every regional or city's disaster plan to include—at a minimum—pediatric critical care, pediatric trauma, and pediatric burn capabilities.
- Form disaster medical and psychological incident response teams capable of managing pediatric patients in every region. The response teams must plan for and receive training in the care of pediatric patients and include appropriately trained providers and provision for pediatric equipment.
- Promote communication and consultation between facilities by availability of multiple horizontal communication systems that include patient records and medical information, which is commonly accessible. A common medical record is ideal, but, in the absence of this, a transfer checklist with attached documents is a minimal requirement.
- Involve pediatric-trained providers in physician volunteer programs. Such programs must have plans to provide pediatric-trained providers to facilities that need additional support in disaster events.
- Fund regional planning efforts.
- Develop multiple systems capable of transporting pediatric patients to link patient care resources.

GUIDELINES FOR BIOLOGICAL TERRORISM

- In the absence of specific antidotal therapy (see Table 13-6), isolation, or vaccination, there is little role for physical protection beyond handwashing and other hygiene measures against bioterrorist agents in a civilian population.

Table 13-6: Recommended Therapy and Prophylaxis in Children for Additional Select Diseases Associated With Bioterrorism

Disease	Therapy or Prophylaxis	Treatment, Agent, and Dosage
Smallpox	Therapy	Supportive care
	Prophylaxis	Vaccination may be effective if given within the first several days after exposure
Plague	Therapy	Gentamicin—adjust doses to corrected age. Monitor peak, trough, renal and auditory function.
		Streptomycin 15 mg/kg IM q12h (maximum 2 g/d, although only available for compassionate usage and in limited supply is a preferred agent) or doxycycline 2.2 mg/kg IV q12h (maximum 200 mg/d) or ciprofloxacin 15 mg/kg IV q12h or chloramphenicol[b] 25 mg/kg q6h (maximum 4 g/d)
	Prophylaxis	Doxycycline 2.2 mg/kg PO q12h or ciprofloxacin[c] 20 mg/kg PO q12h
Tularemia	Therapy	Same as for plaque
Botulism	Therapy	Supportive care, antitoxin may halt progression of symptom but is unlikely to reverse them

Table 13-6 *(continued)*

Disease	Therapy or Prophylaxis	Treatment, Agent, and Dosage
Viral Hemorrhagic Fevers	Therapy	Supportive care, ribavirin may be beneficial in select cases[d]
Brucellosis	Therapy[e]	Trimethoprim/ sulfamethoxazole 30 mg/kg PO q12h and Rifampin 15mg/ kg q24h or gentamicin 7.5 mg/kg IM qdx5

Abbreviations: IM, intramuscular; IV, intravenous; PO, orally.

This table was created from recommendations developed at the Consensus Conference and in part is based on reviewed reference materials from the AAP, Centers for Disease Control and Prevention, and Infectious Disease Society of America.

AU: Please cite footnote "a" in Table 6.

[a]In a mass casualty setting, parenteral therapy might not be possible. In such cases, oral therapy (with analogous agents) may need to be used.

[b]Concentration should be maintained between 5 and 20 mcg/mL: Some experts have recommended that chloramphenicol be used to treat patients with plague meningitis, since chloramphenicol penetrates the blood-brain barrier. Use in children younger than 2 may be associated with adverse reactions but might be warranted for serious infections.

[c]Other fluoroquinolones (levofloxacin, ofloxacin) may be acceptable substitutes for ciprolfloxacin; however, they are not approved for use in children No quinolones have pediatric approval in Canada.

[d]Ribavirin is recommended for Arenavirus, Burryavirus and may be indicated for a viral hemorrhagic fever of an unknown etiology although not FDA approved for these indications. For intravenous therapy, use a loading dose: 30 kg IV once (maximum dose 2 gm), then 16 mg/kg IV every 6 hr for 4 days (maximum dose, 1 gm) and then 8 mg/kg IV every 8 hr for 6 days (maximum dose, 500 mg). In a mass casualty setting, it may be necessary to use oral therapy. For oral therapy, use a loading dose of 30 mg/kg orally (PO) once then 15 mg/kg/day PO in 2 divided doses for 10 days.

[e]For children younger than 8 years. For children older than 8 years, adult regimens are recommended. Oral drugs should be given for 6 weeks. Gentamicin, if used, should be given for the first 5 days of a 6-week course of trimethoprim/sulfamethoxazole.

GUIDELINES FOR CHEMICAL TERRORISM

- There is no pediatric autoinjector kit that is currently produced and marketed in Canada that the authors could identify. Doses need to be individualized on a per kilogram basis.
- All agents listed in Table 13-4 should be available and in appropriate dosage and forms for children in all chemical terrorism medication provision plans. This would include the NPS, Push Packs, federal, provincial, and local health department stocking and deployment of these agents, and local responder and chemical terrorism treatment provisions. If items are not stocked in your facility, ensure that the facility disaster plan includes instructions on how to obtain them promptly.
- Make an organized body of knowledge regarding chemical weapons readily available to pediatric and emergency services healthcare

professionals. Include details on the known pediatric toxicology of chemical weapons, with management protocols based on a consensus guideline development process, and real-time contact resources (e.g., poison control centers, CDC).

- Provide educational programs on possible chemical terrorism for EMS and community healthcare workers (e.g., school nurses) and provide for ongoing training and assessment.
- Publicly disseminate a condensed version of this information and include advice on the mental health care of children. This information should be reviewed by professional organizations and/or government agencies to ensure that it is appropriate for the general public.
- Include pediatric and mental health input in decontamination and treatment protocols in state, regional, and local EMS plans. This implies some national consensus process for hospital-based decontamination.
- Keep adequate stocks of antidotes, especially those for nerve agents, available for use by EMS and hospital EDs. The numbers of stock items should be based on risk assessment to determine the numbers of all possibly exposed children and those children being transported for treatment. The NPS must include adequate provisions for pediatric dosing and administration of antidotes.
- Ensure that EMS and EDs have protocols for rapid delivery of critical nerve agent antidotes and for use of the current Mark 1 autoinjector in children.
- Make cyanide antidotes, with clear size-adjusted dosing regimens, widely available.
- Strongly consider developing a universal, size-adjusted dosing system (such as the Luten–Broselow color coding paradigm) for cyanide antidotes and other critical care medications that require intravenous administration.
- Because pediatric doses are based on weight, it may be helpful to have preprinted medication sheets with doses per kilogram. This would help prevent medication errors occurring when calculating doses under stressful conditions and, for those hospitals with budget constraints, would cost less than Broselow kits.
- Treatment protocols for chemical terrorism should be based on the recommendations in Tables 13-7 and 13-8.

Table 13-7: Recommended Treatment and Management of Chemical Agents Used in Terrorism

Agent	Toxicity	Clinical Findings	Onset	Decontamination[a]	Management
Nerve agents					
Talurin, sarin, soman, VX	Anticholinesterase, muscarinic, nicotinic, and central nervous system effects	Vapor, miosis, rhinorrhea, dyspnea	Vapor: seconds	Vapor: fresh air, remove clothes, wash hair	Airway, breathing, circulatory support Atropine 0.05–0.1 mg/kg IV,[b] IM[c] (minimum 0.1 to maximum 5 mg), repeat q2-5 minimum PRN for marked secretions, bronchospasm, hypoxis, respiratory compromise, apnea, cardiopulmonary arrest Pralidoxime 25–50 mg/kg IV, IM[d] (maximum 1 g IV; 2 g IM), may repeat within 30–60 min PRN, then again q1h for 1 0r 2 doses PRN for persistent weakness, high atropine requirement Diazepam 0.05–0.3 mg/kg (maximum 10 mg) IV, lorazepam 0.1 mg/kg IV or IM

Table 13-7 *(continued)*

Agent	Toxicity	Clinical Findings	Onset	Decontamination[a]	Management
					(maximum 4 mg), midazolam 0.1–0.2 mg/kg (maximum 10 mg) IM PRN for seizures or severe exposure
		Liquid: diaphoresis, vomiting Both: coma, paralysis, seizures, apnea	Liquid: minutes to hours	Liquid: remove clothes, copious washing of skin and hair with soap and water, ocular irrigation	
Vesicants					
Mustard	Alkylation	Skin: erthema,	Hours	Skin: soap and water	Symptomatic care
Lewisite	Arsenical	vesides. Eye: inflammation. Respiratory tract: inflammation, respiratory distress, acute respiratory distress syndrome	Immediate pain	Eyes: irrigation (water) Both: major impact only if done within minutes of exposure	Possibly British anti-Lewisite 3 mg/kg IM q4-6h for systemic effects of lewisite in severe cases

Table 13-7 *(continued)*

Agent	Toxicity	Clinical Findings	Onset	Decontamination[a]	Management
Pulmonary agents					
Chlorine, phosgene	Liberate HCI, alkylation	Eyes, nose, throat irritation (especially chlorine) Bronchospasm, pulmonary edema (especially phosgene)	Minutes Bronochospasm: minutes Pulmonary edema: hours	Fresh air Skin: water	Symptomatic care
Cyanide	Cytochrome oxidase inhibition: cellular anoxia, lactic acidosis	Tachypnea, coma, seizures, apnea	Seconds	Fresh air Skin: soap and water	Airway, breathing, circulatory support, 100% oxygen. Sodium bicarbonate PRN for metabolic acidosis. Sodium nitrite (3%): Dosage (mL/kg) Estimated hemoglobin (g/dL) for average child 0.27 10 0.33 12 0.39 14

Table 13-7 *(continued)*

Agent	Toxicity	Clinical Findings	Onset	Decontamination[a]	Management
					Maximum 10 mL Sodium thiosulfate (25%) 1.65 mL/kg (maximum 50 mL)
CS, CN (Mace®), capsaicin (pepper spray)	Neuropeptide substance P release, alkylation	Eye: tearing, pain, blepharospasm Nose and throat irritation Pulmonary failure (rare)	Seconds	Fresh air Eye: irrigation (water)	Topical ophthalmics, symptomatic care

AU: Please spell out "CS" and "CN."

Abbreviations: IM, intramuscular; IV, intravenous.

[a]Decontamination, especially for patients with significant exposure to nerve agents or vesicants, should be performed by healthcare providers dressed in adequate personal protective equipment. For emergency department staff, this consists of a nonencapsulated, chemically resistant body suit, boots, and gloves with a full-face air purifier mask/hood.

[b]Intraosseous route is likely equivalent to intravenous.

[c]Atropine might have some benefit via endotracheal tube or inhalation, as might aerosolized ipratropium.

[d]Pralidoxime is reconstituted to 50 mg/mL (1 g in 20 mL water) for IV administration, and the total dose is infused over 30 min, or it may be given by continuous infusion (loading dose 25 mg/kg over 30 min, then 10 mg/kg/h). For IM use, it might be diluted to a concentration of 300 mg/mL (1 g added to 3 mL water 0 by analogy to the Mark 1 autoinjector concentration), to effect a reasonable volume for injection.

Table 13-8: Autoinjector Usage

Approximate Age (yr)	Approximate Weight (kg)	Number of Autoinjectors (Each Type)	Atropine Dosage Range (mg/kg)	Pralidoxime Dosage Range (mg/kg)
3–7	13–25	1	0.08–0.13	24–46
8–14	26–50	2	0.08–0.13	24–46
>14	>51	3	≤0.11	≤35

Each Mark 1 kit contains two autoinjectors (0.8-inch needle insertion depth), 1 each of atropine 2 mg (0.7 mL) and pralidoxime 600 mg (2 mL); although not approved for pediatric use, they should be used as initial treatment in circumstances for children with severe, life-threatening nerve agent toxicity for whom intravenous treatment is not possible or available or for whom more precise intramuscular (milligram/kilogram) dosing would be logistically impossible. Suggested dosing guidelines are offered; note potential excess of initial atropine and pralidoxime dosage for age/weight, although within general guidelines for recommended total over first 60–90 min of therapy for severe exposures. *This table lists usage of the Mark 1 kit only down to age 3 based on adherence to recommended dosages for atropine and pralidoxime. However, if an adult Mark 1 kit is the only available source of atropine and pralidoxime following a nerve agent exposure; it should be administered to even the youngest child. In such a situation, one should follow weight-based dosing guidelines.*

GUIDELINES FOR RADIOLOGIC TERRORISM

- Potassium iodide (KI) is a valuable intervention for children exposed to radioiodines. Determination of need for KI should be based on a community risk assessment to determine based on possible events what population of children would receive the minimal exposure of 5 cGy, which would require treatment. Typically this is a minimum of a 10-mile radius but could be as great as a 50-mile radius.
- Develop plans and distribution systems in all localities that provide for KI administration within 2 hours of exposure to radioactive iodine to ensure that all children who need KI can receive it.
- Adhere to graded dosing of KI whenever possible. If local emergency planners conclude that graded dosing is logistically impractical for populations at risk for radioiodine exposure, the overall benefits of receiving 130 mg of KI instead of the lower doses recommended for certain age groups far exceed the small risks of overdosing.
- If KI dosing based on projected thyroid radioactive exposure is logistically impractical during a radiological emergency, administer KI to children at the lowest possible threshold that is ≥5 cGy projected internal thyroid exposure in children.
- Involve pediatric experts in the development of plans for a safe and effective response to a radiation event. This is essential because children are significantly more affected by radiation exposure than adults.
- Increase the knowledge base among all pediatric care providers about medical and psychological aspects of radiation exposure.

- Except as stated above, ensure that the dosing of KI conforms to Table 13-9.
- Assure availability of appropriate marrow stimulative agents for children who may be victims of radiologic terrorism or radiologic exposure through a nonterrorism event. The marrow stimulative agents available and their dosages are listed in Table 13-10.

Table 13-9: Guidelines for Potassium Iodide Dose Administration

Patient/Age	Exposure, GY (RAD)	KI Dose[a] (mg)
>40 yr	>5 (500)	130
18–40 yr	0.1 (10)	130
12–17 yr	0.05 (5)	65
4–11 yr	0.05 (5)	65
1 mo through 3 yr of age	0.05 (5)	32
Birth through 1 mo of age	0.05 (5)	16
Pregnant or Lactating Women	0.05 (5)	130

This table was created from recommendations developed at the Consensus Conference and in part is based on reviewed reference materials from the American Academy of Pediatrics, Centers for Disease Control and the Food and Drug Administration.

[a]Children/adolescents weighing more than 70 kg should receive the adult dose (130 mg).

Table 13-10: Marrow Stimulative Agents

Agent[a]	Action	Dosage[b]
Epoetin Alpha[a] (Epgen, Procrit)	Induces erythropoieses	150 units/kg/dose
Filgrastim (Neupogen)	Granulocyte colony-stimulating factor	2.5–5 µg/kg/d (dosages of 20 µg/kg/d may be needed in selected patients)
Sargramostim (Leukine)	Colony-stimulating factor (AMCSF)	5–10 µg/kg/d (dosages of 30 µg/kg/d may be needed in selected patients)

[a]Epostin Alpha may also be useful to reduce the overall requirements for blood transfusion in any mass casualty incident.

[b]Dosage derived from Medical Management of Radiological Casualties, Armed Forces Radiobiology Research Institute, 1999 and accepted dosages for pediatric oncology and pediatric congenital neutropenia and erythropenia patients.

AU: Please confirm whether the expansion of "AMCSF" is appropriate.

Table 13-11: Radionuclides Produced After Radiologic Terrorism or Disaster, Internal Contamination, Toxicity, and Treatment

Element	Respiratory Absorption	Gastrointestinal Absorption	Skin Wound Absorption	Primary Toxicity	Treatment
Americium	75%	Minimal	Rapid	Skeletal deposition, marrow suppression, hepatic deposition	Chelation with DTPA or EDTA
Cesium	Complete	Complete	Complete	Whole-body irradiation	Prussian blue
Cobalt	High	<5%	Unknown	Whole-body irradiation	Supportive
Iodine	High	High	High	Thyroid ablation, carcinoma	Potassium Iodide
Phosphorus	High	High	High	Bone, rapidly replicating cells	Aluminum hydroxide
Plutonium	High	Minimal	Limited, may form nodules	Lung, bone, liver	Chelation with DTPA or EDTA
Radium	Unknown	30%	Unknown	Bone, marrow suppression, sarcoma	Magnesium sulfate lavage
Strontium	Limited	Moderate	Unknown	Bone	Supportive
Tritium	Minimal	Minimal	Complete	Panmyelocytopenia	Dilution with controlled water intake, diuresis
Tritiated water	Complete	Complete	Complete	Panmyelocytopenia	Dilution with controlled water intake, diuresis
Uranium	High	High to moderate	High absorption, skin irritant	Pulmonary, nephrotoxic	Chelation with DTPA or EDTA, $NaHCO_3$ to alkalinize urine

Abbreviations: DTPA, diethylenetriaminepentaacetic acid; EDTA, ethylenediaminetetraacetic acid.

- Include in all medication availability for radiologic exposure antiemetics to treat the emesis caused by this exposure and prevent dehydration for which children have increased susceptibility.
- Ensure availability of all the medications listed in Table 13-11 for treatment of radiological internal contamination and that all testing of these agents and their treatment protocols include considerations for the treatment of children.

DECONTAMINATION

- Design decontamination systems so that they can be used for decontamination of children of all ages (including infants), the parentless child, the nonambulatory child, and the child with special healthcare needs.
- Address the following pediatric considerations in all federal, provincial, and regional/local protocols and guidance for decontamination: (1) water temperature and pressure (high-volume, low-pressure, and heated water systems), (2) nonambulatory children, (3) children with special healthcare needs, and (4) clothing after decontamination.

Section 10: Children With Special Healthcare Needs

- Incorporate considerations for Children With Special Healthcare Needs (CSHCN) in all disaster and terrorism planning at the national, provincial, and regional/local levels (e.g., water, dialysis, medication).
- Identify all CSHCN to ensure each child has a medical home, adequate medical coverage, and support mechanisms before a disaster or terrorist event.
- Ensure that all CSHCN are considered in emergency preparedness plans.
- Develop mechanisms for identification of and community planning for children with increased vulnerability in disasters, including CSHCN and their families, at the national, provincial, and regional/local levels.
- Provide federal, provincial, and local government funding for emergency preparedness planning and implementation of services to meet the needs of CSHCN. This funding must be timely, immediately accessible, and of sufficient duration.
- Explore, within government agencies, development of nontraditional, community-based support systems for CSHCN and their families (e.g., independent living centers, faith-based groups, parent-based groups).
- Mandate continuity of operations and mutual aid planning among community health facilities to address disaster and terrorist events for pediatric populations, including CSHCN.

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AU: Please provide more details for Ref. 1, so as to help the reader to locate the same.

AU: Please check the insertion of authors name is correct.

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Appendix A – General Activation Plan for Ambulatory Care Areas in a Mass Casualty Incident

During working hours

Notified by: Overhead Announcement (Emergency Voice Communication System) of Code Orange

FUNCTIONS:

1. All clinics will close immediately, and patients will be asked to leave by the main entrance.
2. Designated areas will prepare to treat nondisaster emergency patients according to the established guidelines for triaging patients (2 RNs).
3. One designated area will become the patient discharge area if declared by the Command Post. This area will be staffed by ambulatory care staff and available inpatient staff (2 RNs and 1 clerical, if available).
4. One designated area will prepare for the reception of disaster patients with minor injuries. This area will be staffed by ambulatory care and emergency staff (1 RN).
5. Designated area can be used to accommodate overflow suture cases depending on the type of disaster victims.

After Normal Working Hours

Notified by: Admin on call

Note that based on the scenario and the resources available, those units can be combined or divided/duplicated.

FUNCTIONS

1. Areas and their function are the same as in working hours.
2. Fan out will occur to enlist staff (requires a fan out protocol).
3. Dedicated preassigned staff from inpatient areas will report to and set up the treatment areas in ambulatory clinics.
4. As staff arrives, the incoming staff are delegated to the intake areas first and then the discharge areas and the depleted wards.

NOTE
Staffing in brackets is only a suggestion; each facility must decide its own staffing structure. For another model, see Table 13-4.

This and other plan templates are included for only examples. Every facility is different, and organizations must develop their own specific versions.

Appendix B – Behaviors Manifest in Emotionally Traumatized Patients Generally and by Age Groups

When there is a major interruption in the natural flow of life, children can experience anxiety and fear. Disaster such as earthquakes, tsunamis, and fires are dramatic and intense experiences, especially unsettling to children.

During and after these problems, adults can help children cope by understanding (1) what children feel, (2) how they act, and (3) what actions can be taken to deal with distress.

Children traumatized by events or disasters often experience a pervasive sense of loss:

- Loss of feeling safe
- Loss of identity /future
- Loss of feeling of control over one's life
- Loss of trust in others
- Loss of hope
- Loss of personal power

In children, such feelings of loss may present in physical symptoms:

- Headaches
- Aches and pains
- Overeating or loss of appetite
- Bowel problems
- Skin disorders
- Sleep disorders (nightmare or excessive sleeping)
- Emotional/behavioral reactions
- Loss of interest in activities
- Decrease performance levels
- Disruptive behavior
- Resistance to authority
- Increase difficulty in relating to parents and siblings

- Sadness or depression
- Antisocial behavior such as stealing and lying

These reactions are understandable. Fear and anxiety are normal reactions to danger. Recognize that a child's fears may arise from imagination as well as "accurate" reactions to real events.

Preschool children (0–5 years): Typical reactions can include crying, whimpering, and screaming. Nonverbal signs include trembling and frightened facial expressions. Helplessness and passivity may be manifested by a fear of being separated from the parent, immobility and/or aimless motion, excessive clinging, and total withdrawal. Children may return to behaviors exhibited at earlier ages (these are called regressive behaviors), such as thumb sucking, bedwetting, and fear of darkness. Children may not understand that the immediate danger is over or may feel magically that what happened is a punishment for something they have done or thought. Children in this age tend to be strongly affected by the parents' reactions to the traumatic event. Preschool children have an incomplete understanding of death.

School-aged children (6–12 years): School-aged children may show extreme withdrawal, disruptive behavior, and/or inability to sustain attention. Regressive behaviors, nightmares, sleep problems, irrational fears, irritability, refusal to attend school, outbursts of anger, and fighting are also common in children of this age. Also, the child may complain of stomach aches or other bodily symptoms that have no medical basis. Schoolwork often suffers. Depressed mood, anxiety, feelings of guilt, and emotional numbing or "flatness" are often present as well. Children in this age group may feel a sense of responsibility for what has happened and express guilt and fear for the safety of insecurity. Some may feel overwhelmed by all the feelings they are experiencing.

Adolescents (13 and older): Adolescents may exhibit responses similar to those of adults, including flashbacks, nightmares, emotional numbing, avoidance of any reminders of the traumatic event, depression, substance abuse, problems with peers, and antisocial behavior. Also common are withdrawal and isolation, physical complaints, suicidal thoughts, school avoidance, academic decline, sleep disturbances, and confusion. The adolescent may feel extreme guilt over his or her failure to prevent injury or loss of life and may harbor revenge fantasies that interfere with recovery from the trauma.

Note: Some children may initially overfunction, appearing quite emotionally stable until weeks or months after the disaster when there are expectations for more "normalized" functioning.

Some youngsters are more vulnerable to the effects of extreme stressors than others. The impact of a traumatic event is likely to be greatest in the child or adolescent who had a pre-existing mental health problem, a history of prior trauma, greater exposure to the disaster and its aftermath, and those who lack family and peer support.

Appendix C – The Role of Urgent-Care Centers and Primary Care Providers

Urgent-care providers, community health centers, and primary care providers should participate in local plans to handle acute pediatric patients in addition to their normal patient load during disaster and terrorist events. Primary care providers have numerous roles and are invaluable in pediatric terrorist and disaster preparedness. They should:

- Prepare, regularly update, and practice an office disaster plan
- Provide guidance on home disaster preparedness and encourage families to develop family disaster plans, which may include distribution of the Family Readiness Kit (endorsed by the Canadian Paediatric Society)
- Be educated in issues of pediatric disaster management, including biological, chemical, and radiological events
- Assist in developing their local hospital disaster plan that ensures the proper care of children
- Be involved in EMS (e.g., be proficient in CPR and first aid)
- Know liability and licensure issues in providing care during and after disasters
- Participate in provincial and regional/local community response team planning
- Participate in Provincial Health Alert Network/Communications and Information Technology
- Anticipate and prepare for loss of community services
- Aid schools and child care facilities in developing disaster plans
- Provide guidance to families of children with special healthcare needs
- Contact volunteer organizations to provide onsite emergency and primary health care at emergency shelters and to encourage and support community efforts to develop plans for addressing communication, transportation, and other logistics related to children in out-of-home settings
- Advocate for inclusion of the needs of children in all federal, provincial, and regional/local disaster planning
- Advocate for research on the pediatric aspects of biological, chemical, and radiological terrorism including mechanisms, pathophysiology, and treatments (including availability of appropriate medications and antidotes)

Guidelines for Children with Special Healthcare Needs

- Incorporate considerations for CSHCN in all disaster and terrorism planning at the national, provincial, and regional/local levels (e.g., water, dialysis, medication).
- Identify all CSHCN to ensure each child has a medical home, adequate medical coverage, and support mechanisms before a disaster or terrorist event.
- Ensure that all CSHCN are considered in emergency preparedness plans.
- Develop mechanisms for identification of and community planning for children with increased vulnerability in disasters, including CHSCN and their families, at the national, provincial, and regional/local levels.
- Provide federal, provincial, and local government funding for emergency preparedness planning and implementation of services to meet the needs of CSHCN. This funding must be timely, immediately accessible, and of sufficient duration.
- Explore, within government agencies, development of nontraditional, community-based support systems for CSHCN and their families (e.g., independent living centers, faith-based groups, parent-based groups).
- Mandate continuity of operations and mutual aid planning among community health facilities to address disaster and terrorist events for pediatric populations, including CSHCN.

Guidelines for Displaced Children

- Develop plans for communication, healthcare delivery, contacting and reuniting children and their families in communities, local school districts, and child care facilities. Integrate these plans into state, regional, and local disaster plans.
- Develop plans in government agencies for temporary medical and mental health care, shelter, guardianship, and placement of children during disaster and terrorist events in case of injured or deceased family members.
- Facilitate prompt communication among family members in community disaster plans. Develop evacuation plans that allow for contacting and reuniting children with their families.
- Consider development of a single-point information collection system to facilitate contacting and reuniting families in community disaster plans.
- Develop a plan to ensure documentation through the continuum of care to ensure appropriate tracking of family members.

Guidelines for Disaster Simulations and Drills

- Include sufficient proportions of pediatric victims and child-related scenarios in all regional disaster drills and actively involve the major pediatric care providers within the community (e.g., children's hospitals, pediatric societies, day care centers, schools). Such drills should also

address the needs of children with special healthcare needs and mental health emergencies.

- Conduct drills with federal, provincial, and regional/local emergency managers that include exclusively pediatric victims or a majority of pediatric victims in various circumstances (e.g., in schools, day care facilities, school buses) to adequately test the capacity of the system to handle pediatric patients.
- Develop educational adjuncts for disaster and terrorism planning that accounts for events with pediatric patients in proportion to their existence in the population and for events that disproportionately affect children. However, these should not supplant physical pediatric disaster drills or the regional planning efforts necessary to stage them. Such adjuncts should address the variety of ages, developmental levels, and sizes of children who would require care during a disaster or terrorist event, as well as children with special healthcare needs and children with mental health emergencies.
- Facilitate the development of a model pediatric disaster drill template and related best practices. In addition, foster the creation of technical assistance teams to help regions conduct pediatric disaster drills in their areas. Such model drill templates and best practices must address the mental health needs of participants and actors before, during, and after pediatric disaster drills.
- Promote the standardization of pediatric disaster-related vocabulary with respect to incident command structures and field triage tools.

Appendix D – Terrorism/ CBRN-Specific Readiness Assessment for Pediatrics

Once the needs of children have been addressed in general for all types of emergencies, preparedness specifically for a terrorist event must be considered. Addressing the needs of children is especially important in terrorism preparedness and response because the unique physiology and anatomy of children not only make them more susceptible to terrorist agents but also may require unique therapies.


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There are inherent difficulties in providing pediatric care while wearing CBRN gear. Aside from complicating even the simple task of taking the pulse of a 1-year old with gloves on, the suits are potentially frightening. In an attempt to alleviate this, there have been child-friendly masks proposed (such as the Mickey Mouse Mask (left) designed by the Fun Rubber Company in WWII), but these have never been mass manufactured.

The following recommendations address the needs of children in preparedness and response to biological, chemical, and radiological terrorism including decontamination and the National Emergency Stockpile System.

- Keep all agents listed in Tables 13-2 and 13-3 in appropriate dosages and forms for children in all bioterrorism medication provision plans. This would include the Strategic National Stockpile (Push Packs, Vendor Managed Inventory), state and local health department stocking and deployment of these agents, and local responder and chemical terrorism treatment provisions.
- Chemotherapy and chemoprophylaxis protocols should be based on the recommendations in Tables 13-2 and 13-3.
- Include provisions for study and/or use in children in any new investigational vaccine studies.
- Anthrax: The currently licensed anthrax vaccine (Anthrax Vaccine Adsorbed, AVA, Bioport, Lansing, MI) is approved for persons aged 18–65 years. This vaccine may have a limited role as an adjunct to postexposure chemoprophylaxis, although data are limited. There is limited potential for use of this vaccine in a civilian pre-exposure setting, but advocate that future studies of new-generation vaccines include children.
- Smallpox: The currently licensed smallpox vaccine (Dryvax, Wyeth, Philadelphia, PA) makes no mention in its package insert of an approved age range. In practice, until the early 1970s, this vaccine was administered

AU: Please confirm whether the list starting from "Anthrax" to "Plague" should be set as sub-list under the sentence "Include provisions for..."

to 1-year olds. Currently, the CDC recommends against vaccination of children younger than 1 year. All contraindications to smallpox vaccination are relative. After bona fide exposure or known usage of weaponized smallpox, even the youngest exposed at-risk infants should be vaccinated. Moreover, future studies of new-generation vaccines must include children.

- Botulism: A licensed trivalent (types A, B, and E) antitoxin is available through the CDC. This antitoxin is to be used in children of any age known to have been exposed to botulinum toxin of the appropriate serotypes. An IND pentavalent (types A–E) botulinum immune globulin (human) is available through the California Department of Health specifically for the treatment of infantile botulism. The study of this product must be continued and that licensure be pursued.
- Plague: No licensed plague vaccine is currently in production. A previously licensed vaccine was approved only for persons aged 18–61 years. There is little, if any, role for this or similar vaccines in a bioterrorist context.

For information on specific Biological Terrorism agents, see Table 13-6 in the main document and Appendix G.

For information on specific Chemical Terrorism agents, see Tables 13-7 and 13-8 in main document.

For information on specific Radiological Terrorism response, see Tables 13-9 through 13-11 in main document.

Appendix E – Parent Matching Form/Patient Tracking Form

INITIAL COPY STAYS AT PARENT RECEPTION CENTER

ONE COPY STAYS WITH PATIENT CHART

PATIENT IDENTITY STICKER OR STAMP

PART A - INTAKE

Information taken (please circle) By phone In person

Support worker's name: (1) _____

(2) _____

Child's Name _____

Sex: ☐ M ☐ F ☐ Age _____ ☐ D.O.B. _____

Address _____

City _____ ☐ Prov _____

Height: _____ Weight: _____ Race: _____

Eye Colour: ☐ Brown ☐ Blue ☐ Green ☐ Other _____

Hair: ☐ Brown ☐ Blond ☐ Black ☐ Other _____

Clothing: ☐ jacket: colour _____ ☐ top: colour _____

☐ bottom: colour _____ ☐ other _____

Birth Mark or Other Identifying Information: _____

_____

Allergies or Other Medical Information: _____

_____

Language Spoken: ☐ English ☐ French ☐ Other _____

Mother's Name: _____ Phone (h): _____

Identity Verified by (Staff initials)_____ (w): _____

(c): _____

Father's Name: _____ Phone (h): _____

Identity Verified by (Staff Initials)_____ (w): _____

(c): _____

Alternate Guardian: _____ Phone (h): _____

Identity Verified by (Staff Initials)_____ (w): _____

Relationship Verified by (Initials) _____ (c): _____

PART B - DISPOSITION

Child reunited with: ☐ Father ☐ Mother ☐ Guardian ☐ Care transferred (add details below) Care Transferred to:

☐ Child care authorities (name of agency)_____

Individual receiving child for transfer_____

Identity Verified by (Staff initials)_____

☐ Other facility (name of facility)_____

Individual receiving child for transfer_____

Identity Verified by (Staff initials)_____

Comments:_____

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Appendix F – Topics for Didactic Lectures and Case Histories

- Definition and overview of disasters: the international humanitarian disaster response system
- Introduction to case history, small-group assignments, preceptors
- Rapid epidemiological assessment
- Triage
- Malnutrition
- Renal emergencies for children in disasters
- Water, shelter, and sanitation: logistics and resource management
- Personal preparedness
- Infectious diseases part I–II
- Immunizations
- International humanitarian law and Geneva Conventions
- Emergency obstetrics and basics of newborn resuscitation
- The psychosocial issues for children who suffer disasters
- Ethical issues
- Breastfeeding
- Security issues for relief workers
- Negotiation and conflict resolution: issues affecting women and children
- Sex- and gender-based violence

Source: Olness K, Sinha M, Herran M, et al. Training of health care professionals on the special needs of children in the management of disasters: experience in Asia, Africa, and Latin America. *Ambul Pediatr.* 2005;5(4):244–248.

Appendix G – Biological Weapons Recommended Diagnostic Procedures, Isolation, and Treatment in Children

Agent	Incubation Period	Diagnostic Sample(s)	Isolation Precautions[a]	Treatment Options[b]	Prophylaxis[c]	Comments
Anthrax	1–60 d	Blood culture, blood smear; skin lesions or tissue, culture, or fluorescent antibody (FA) staining	Routine, contact for skin lesions	Ciprofloxacin[d] or doxycycline[e] or (penicillin G and streptomycin),[f] vaccine, if available (see text)	Ciprofloxacin[d] or doxycycline[e]	Alternate agents: gentamicin, erythromycin, chloramphenicol
Brucellosis	5–60 d	Blood or bone marrow, culture, acute/convalescent sera	Routine, contact if lesions are draining	Doxycycline and rifampin; if <8 yr, trimethoprim–sulfamethoxazole	Doxycycline and rifampin	Trimethoprim-sulfamethoxazole may substitute for rifampin with doxycycline
Plague	2–3 d	Blood, sputum, lymph node aspiration, culture, or FA staining	Droplet	Streptomycin or gentamicin, doxycycline or chloramphenicol	Doxycycline, tetracycline	Trimethoprim–sulfamethoxazole is alternative; chloramphenicol for meningitis

(continued)

Agent	Incubation Period	Diagnostic Sample(s)	Isolation Precautions[a]	Treatment Options[b]	Prophylaxis[c]	Comments
Q fever	10–40 d	Acute/ convalescent sera	Routine	Doxycycline or tetracycline	Doxycycline, tetracycline	
Tularemia	2–10 d	Sputum or tissue, culture,[g] FA available, acute/ convalescent sera	Routine	Streptomycin or gentamicin	Doxycycline, tetracycline	
Smallpox	7–17 d	Pharyngeal swab or lesions, culture	Airborne, contact	Cidofovir[h]	NA (vaccine effective but not available)	
Botulism	1–5 d	Serum for toxin if <3 d; stool or gastric secretions, culture for organism and look for toxin; nerve conduction	Routine	Antitoxin (CDC)[i]	If ingested, induce vomiting, gastric lavage, purgation and high enemas may benefit	Aminoglycosides potentiate paralysis; antitoxin after exposure for asymptomatic not usually given

(continued)

Agent	Incubation Period	Diagnostic Sample(s)	Isolation Precautions[a]	Treatment Options[b]	Prophylaxis[c]	Comments
Staphylococcal enterotoxin B	1–6 h	Nasal swab, culture serum, and urine for organism and look for toxin	Routine	Supportive care	NA	
Ricin					NA	

[a]For decontamination guidelines, see text.

[b]See the Report of the Committee on Infectious Diseases (*Red Book*) 24th ed, 1997 (or the most current edition) for drug doses. Intravenous therapy for severely ill patients is usually indicated, but oral therapy can be effective and may be the only practical alternative when large numbers of people are exposed.

[c]Prophylaxis should only be initiated after consultation with public health officials in situations where exposure is highly likely. The duration of prophylaxis has not been determined for most agents.

[d]If susceptibility unknown. Ciprofloxacin is not FDA approved for persons younger than 18 years but is indicated for potentially serious or life-threatening infections (see *Red Book*).

[e]If susceptibility unknown. Tetracyclines, including doxycycline, are not FDA approved and usually contraindicated in children younger than 8 years, but treatment is warranted for selected serious infections (see *Red Book*, 2000).

[f]Penicillin should be used only if the organism is known to be susceptible.

[g]Special media required for culture, laboratory hazard: only immunized technicians should ordinarily process cultures.

[h]Pediatric dose not established.

[i]Centers for Disease Control and Prevention Drug Service. 404-639-3670 (weekdays, 8–4:30 ET) or 404-639-2888 (weekends, evenings, and holidays).

Appendix H – Supply and Equipment Lists

The following is a suggested supply use (excluding linens) for a pediatric disaster response.

- Please note the following:
- Supplies are organized by areas (clinical, resuscitation, and incident).
- This does not include equipment, which would be in the treatment areas already, only consumables.
- This is a suggestion list based on the requirements of a tertiary care pediatric center and, as such, can only be viewed as a suggestion. Each facility needs to review its own needs and modify the list appropriately.
- In addition to the items below, consideration should be given to nonmedical equipment such as books, toys, TVs, diapers, formula, glucose water, and soothers. Containers of bubbles can be very helpful to help in calming children—both emotionally and physiologically.
- Blank space has been left in these tables for facilities to insert their own specific supply needs.

Incident Supply Cart – ED Examination Area

Items	Amount	Items	Amount
Normal Saline 500 mL	10	Dressing, Elastoplast 7.5 cm	2 Boxes
Normal saline 1000 mL	12	Tape clear 1/2"	6
Dextrose 5% NaCl 45%	10	Tape clear 1"	6
Ringer's Lactate 500 mL	10	Sponge gauge, 4" × 4"	5 Boxes
Ringer's Lactate 1000 mL	10	Sponge gauge, 2" × 2"	5 Boxes
Tubing, IV Pump	10	Pad abdominal	50
Solution Adm. Set	10	Bandage Conforming 7.5 cm	12
Armboards, Child	10	Bandage Conforming 10 cm	12
Armboards, Infant	10	Bandage Conforming 15 cm	12
Catheter Tray	3	Syringes 1cc	50
Urine Drainage Bag	3	Syringes 3cc	50
Foley # 8 FR	3	Syringes 5cc	50
Foley # 12 FR	3	Syringes 10cc	50
Face mask	1 Box	Syringes 20cc	40

(continued)

Items	Amount	Items	Amount
Sterile gloves size 6 ½	1 Box	Syringes 60cc	30
Sterile gloves size 7	1 Box	Needles 23 G	1 Box
Sterile gloves size 8	1 Box	Needles 28 G	1 Box
Sterile gloves size 8 ½	1 Box	Butterflies 23 G	50
Catheter IV Insyte # 24 G	1 Box	Gloves Medium	1 Box
Catheter IV Insyte # 22 G	1 Box	Gloves Large	1 Box
Catheter IV Insyte # 20 G	1 Box	Intraosseous Needle 16 FR	3
Catheter IV Insyte # 18 G	1 Box	Intraosseous Needle 18 FR	3
Tubes, Connecting	5	Minor Suture Trays	5
Tubes, Yankuer Suction	5	Major Suture Trays	2
Chest Tube Thal Quick size 10 FR	1	Savlon	3
Chest Tube Thal Quick Size 16 FR	1	Suture 4 Nylon	1 Box
Catheter Central Vein 24 FR	1	Suture 5 Nylon	1 Box
Catheter Central Vein 20 FR	1	Suture 4 Silk	1 Box
Catheter Central Vein 16 FR	1	Suture 4 Plain Gut	1 Box
Four-Way Stopcock	5	Suture 5 Plain Gut	1 Box
Oxysensor Neonatal	5	Betadine	1 Bottle
Oxysensor Infant	5	Connecting Tubes	5
Catheter Dual Lumen 4 FR	1	Chlorhexidine	1 Box
Stethoscope	2		

Incident Supply Cart – Resus Room

Items	Amount	Items	Amount
Wash basins and K basins	10	Normal Saline 500 mL	5
Sterile Gowns	20	Dextrose 5%, NaCl 45% 500 mL	5
Burn Dressing Bundles	10	Ringer's Lactate 500 mL	5

(continued)

Items	Amount	Items	Amount
Burn Dressing Trays	3	Tubing IV Pump	10
Burn Linen Bundles	10	Y-Type Blood Sol. Set	2
Minor Suture Trays	5	Solution Adm. Set	5
Major Suture Trays	3	Syringes 1 mL	25
Cut down Trays	2	Syringes 3 mL	25
Normal Saline 500 mL	8	Syringes 5 mL	25
Sterile Water 1000 mL	5	Syringes 10 mL	25
Chest Tube Tray With Heimlich Valve	1	Syringes 20 mL	15
Osysensor Neonatal	5	Syringes 60 mL	10
Oxysensor Infant	5	Catheter IV Insyte # 24	1 Box
4" × 4"	1 Box	Catheter IV Insyte # 22	1 Box
2" × 2"	1 Box	Catheter IV Insyte # 20	1 Box
Bandage Conforming 7.5 cm	1 Box	Catheter IV Insyte # 18	1 Box
Bandage Conforming 15 cm	1 Box	Needles 23 G	1 Box
Sterile Gloves Size 6 1/2	1 Box	Needles 18 G	1 Box
Sterile Gloves Size 7	1 Box	Tubes Connecting	5
Sterile Gloves Size 8	1 Box	Tubes, Yankuer Suction	5
Sterile Gloves Size 8 ½	1 Box	Catheter Suction # 10 FR	5
Dressing, Thermal Saline	2 Boxes	Catheter Suction # 12 FR	5
Chlorhexidine	1 Box	Catheter Suction # 14 FR	5

(continued)

Items	Amount	Items	Amount
Suture 4 Nylon	1 Box	Catheter Tray	5
Suture 5 Nylon	1 Box	Foley # 8 FR.	5
Suture 4 Silk	1 Box	Foley # 12 FR	5
Suture 4 Plain Gut	1 Box	Urine Drainage Bag	3
Suture 5 Plain Gut	1 Box	Tegaderm Small	1 Box
Normal Saline 1000 mL	10	Armboards, Child	10
Armboards, Infant	10	Bruselow Tape	3
Tape 1" Plastic	6	Endotracheal Tubes	Variety of sizes, cuffed and uncuffed, at least 2 of each

Incident Supply Cart

Items	Amount	Items	Amount
Bandage Conforming			
5 cm	10 Rolls	Bandage, Elastic 7.5 cm	10
7.5 cm	10 Rolls	Bandage, Elastic 10 cm	10
10 cm	10 Rolls	Bandage, Elastic 15 cm	10
15 cm	10 Rolls	Plaster Slab 7.5 × 38 cm	1 Box
Tissue Facial	6 Boxes	Plaster Slab 10 × 76 cm	1 Box
Towel J-Cloth	1 Box	Swab Cotton 15 cm	1 PG
Dressing Elastoplast			
3.8 cm	1 Box	Water for Irrigation Sterile 1 L	5
6.3 cm	1 Box	Normal Saline 500 mL	5
7.5 cm	1 Box	Container Specimen Clean 90 ml	15
Closure Skin 6 × 75 mm	1 Box	Mask Face Isolation	1 Box
Tincture Benzoin	2 Bottles	Proviodine-Iodine Solution 500 mL	1 Bottle
Gloves			
Small	1 Box	Isopropyl Alcohol 70%, 500 mL	1 Bottle

(continued)

Items	Amount	Items	Amount
Medium	1 Box	Dressing, Thermal Saline	2 Boxes
Large	1 Box	Brace Clavicle Infant	2
Sterile Gloves			
6 ½	1 Box	Brace Clavicle Pediatric	2
7	1 Box	Brace Clavicle Adult	2
8	1 Box	Bandage Cast Padding 10 cm	1 PG
8 ½	1 Box	Bandage Cast Padding 15 cm	1 PG
Sponge Gauge Sterile 5 × 5 cm	4 Boxes	Scrub Brush	10
Eye Pad	10	Dressing Nonadhering 3" × 8"	10
Bandage Bandaid 1.3 × 7.5 cm	1 Box	Suture Removal Kit	4
Bandage, Triangular 44" × 36"	15	Blue Basins	10
Bandage, Elastic 5 cm	10	K-Basins	10
Burn Dressing Trays	2	Polysporin Tubes	5
Burn Dressing Bundles	2	Ventolin	1
Minor Suture Trays	10	Aerosol Mask Pediatric	2
Suture 4 Nylon	1 Box	Aerosol Mask Adult	2
Suture 5 Nylon	1 Box	Normal Saline (3 mL)	20
Suture 4 Silk	1 Box	Peroxide	1 Bottle
Suture 5 Silk	1 Box	Adaptic	1 Box
Suture 4 Plain Gut	1 Box	Abdominal Pads 4 × 4	1 Box (20)
Savlon	5 Bottles		

Appendix I – Sample Job Action Sheets

These job action sheets are examples based on the disaster plan at specific facilities. Each facility will need to modify the sheet to match its own risks. These are presented as examples only. Many thanks to Children's Hospital of Eastern Ontario – CHEOnet April 2008, for providing this information.

Pediatric Logistics Unit Leader Job Action Sheet		
Immediate	___	Receive briefing from Logistics Chief: • Number of expected pediatric patients and their conditions • Timeline for supply needs
	____	Depending on extent of HEICS expansion, meet with Logistics Chief and the following Unit Leaders: • Procurement • Transportation • Materials Supply • Nutritional Supply
	____	For Procurement Unit Leader: • Receive briefing from Logistics Chief and Pediatric Logistics Unit Leader • Initiate Disaster Call list if warranted • Work with vendors of the following pediatric supplies ❑ Hospital Vendors ❑ Local Community resources (local pharmacy, grocery chain, hardware store) ❑ Back-up resources
	____	For Transportation Unit Leader: • Receive briefing from Logistics Chief and Pediatric Logistics Unit Leader • Initiate Disaster Call list if warranted • Assess transportation requirements for pediatric patients.

(continued)

Pediatric Logistics Unit Leader Job Action Sheet		
		• Count open stretchers, carts, cribs, and wheelchairs for pediatric transportation • Report transportation options to Logistics Chief • Coordinate delivery of transportation options to designated pediatric area or ED depending on scenario • Designate transporters as needed from CS staff or Labor pool
	____	For Materials Supply Unit Leader: • Receive briefing from Logistics Chief and Pediatric Logistics Unit Leader • Initiate Disaster Call list if warranted • Collect and coordinate essential pediatric medical equipment and supplies to include but not limited to: ❑ Food, Formula ❑ Bottles/Nipples ❑ Pedialyte ❑ Diapers ❑ Pacifiers ❑ Toys/Diversion Supplies ❑ Pediatric blood pressure cuffs • Assist in preparation of predesignated pediatric disaster care area with Pediatric Services Unit Leader
	____	For Nutritional Supply Unit Leader: • Receive briefing from Logistics Chief and Pediatric Logistics Unit Leader • Initiate Disaster Call list if warranted • Estimate the number of pediatric meals needed for 48 hours
Intermediate	____	Obtain regular updates from Logistics Chief
	____	Assess additional equipment/supply needs for pediatrics

(continued)

Pediatric Logistics Unit Leader Job Action Sheet		
Extended	____	Addresses pediatric concerns, questions and issues as needed
	____	Document actions and decisions and reports to Logistics Chief • Review areas of success • Identify opportunities for improvement • Thank and congratulate team
	____	Participates in debriefing and makes recommendations as needed

Pediatric Services Unit Leader Job Action Sheet		
Immediate	___	Gather external information from Treatment Area Supervisor/ED Charge Nurse: • Type of disaster • Number of expected pediatric patients and their conditions • Current total number of ED patients • Time frame for patient arrival
	____	Gather internal information • Determine number of available pediatric/crib beds (ED and in-patient) and report number to Operations Chief for planning purposes • Determine onsite pediatric qualified staff members • Determine additional staff needed based on expected patient volume • Alert Discharge Unit Leader to institute early discharge/transfer of patients
	____	Initiate the Pediatric Disaster Call Team as per Plan • Predetermined Physicians (Pediatric/Family Practice/Staff and Community) • Predetermined Nurses (with Pediatric experience and/or PALS/ENPC certification)

(continued)

Pediatric Services Unit Leader Job Action Sheet		
		• Predetermined technicians with pediatric experience • Others as predetermined
	____	Communicate with Operations Chief to assure coordination of non- pediatric ancillary/support personnel as per the HEICS plan
	____	Assure preparation of pre-designated Pediatric Disaster Care Area • Clear area • Designate each specific area based on expected casualties • Assign personnel to each area • Assure delivery of medical and nonmedical pediatric equipment • Assure set up of pediatric equipment by clinical staff
	___	Communicate preparation status "ready" with Treatment Area Supervisor
	___	Receive pediatric patients Determine patient status Communicate findings to Treatment Area Supervisor for dissemination as per disaster plan
	___	Following triage of all children, move uninjured/unaffected children to pre-designated safe area with adult supervision to await family reunification
Intermediate	___	Assess ongoing staffing needs based on patient status report: Pediatric healthcare personnel Nonpediatric ancillary/support personnel Additional resources utilizing the HEICS model (i.e., Treatment Area Supervisor to Operations Chief to Planning Chief to Labor Pool)

(continued)

	___	Assess additional medical and non-medical equipment/supply needs Communicate with Pediatric Logistics Unit Leader via Operations Chief to Logistics Chief Assure delivery of needed supplies
	___	Assess Pediatric Disaster Call Team basic needs: • Food • Rest • Psychological well-being
	___	Obtain status of pediatric casualties (planned discharges, admissions and transfers) and report through to Operations Chief
		Hold information sessions with Public Information Officer as needed
Extended	___	Debrief Pediatric Disaster Call Team: • Summary of Incident • Review areas of success • Identify opportunities for improvement • Thank and congratulate team

Emergency Charge Nurse/Clinical Leader Job Action Sheet
1. Immediately notify the Emergency Physician on duty with the following information: • Number of casualties expected • Status of casualties • Estimated time of arrival
2. Notify: • Operations Director • Operations Director on-call (after normal working hours) • Switchboard, to initiate incident fan-out/calls
3. Assess staffing status/needs in consultation with the Emergency or on-call Operations Director as follows: • Emergency staff currently in department • Available staff from other departments • Emergency Fan-Out System as required

(continued)

Emergency Charge Nurse/Clinical Leader Job Action Sheet
4. Obtain red apron labeled NURSE IN CHARGE from blue Emergency Preparedness Cupboard in the Emergency Department Conference Room
5. Assess the need for extra supplies and make appropriate arrangements to obtain them
6. Assign area Charge-Nurse and support staff for: • Resus • Examination Rooms • Examination (nonincident) • Surgery clinic
7. Make a quick round of all regular emergency patients with the ED physician in-charge and make a decision on their disposition (admit to inpatient units or discharge)

Emergency Physician In-Charge Job Action Sheet
1. In consultation with Clinical Leader declare a state of "Major External Incident" following an assessment of the situation and in consultation with the Emergency Medical Director and Emergency Department Operations Director
2. Notify the Charge-Nurse of Emergency
3. Assess the need for additional medical manpower, in consultation with the Medical Director of Emergency Department or designate
4. Initiate the callback of Emergency medical personnel
5. Assign available Trauma Team Leaders to resus or Emergency Department room
6. Assign medical staff to the designated treatment area for the casualties
7. Make a quick round of all regular emergency patients, with the Charge nurse, and make a decision of their disposition (admit to inpatient units or discharge)
8. Assign staff specialist if required or direct them to the Professional/ Personnel Pool
9. Hand over coordinating duties to Medical Director, once arrived onsite.

Messengers/Runners Job Action Sheet
Notified by Regular hours: On standby after announcement over Public Announcement System. After activation, Professional/Personnel Pool will make requests of respective departments Off-Hours: Call-back initiated by Vice-President, Patient Services, and Allied Health or equivalent
Qualifications 1. Good knowledge of the lay-out of Emergency and the location of various hospital departments such as the Laboratories and Diagnostic Imaging 2. Able to deal with patients and public 3. Able to handle stressful and chaotic situations 4. Able to handle the sight of blood and severe injuries
Functions of Messengers/Runners 1. Report to the charge-nurse of Emergency who will assign an area of work, in any of the following areas: • Command Post: 6 runners stationed at entrance to be available for immediate dispatch • A runner with each Emergency Triage Team (A and B), stationed outside the emergency entrance to courier Incident Patient Information Form to Patient Tracking Team Coordinator • A runner in each of the Emergency Department areas: Resus, ED waiting room, Examination area, surgery clinic, etc. • Receive an identifying apron (yellow, labeled MESSENGER), a cue card with "role" description, as well as a brief orientation of your duties
2. Deliver laboratory specimens to the laboratories 3. Escort parents to the Parent Reception Area and Registration 4. Deliver messages throughout the Emergency Department 5. Obtain additional equipment, such as wheelchairs and stretchers from other areas in the hospital 6. Assist with the transport of stretcher patients 7. Escort nonincident patients and their parents to appropriate location

(continued)

Messengers/Runners Job Action Sheet
Functions of Secretaries 1. Report to the Patient Service Clerk of Emergency who will assign an area of work, a clipboard with role description and an apron with identifying role 2. Potential assignments would include: ❑ Act as secretary to an assigned area, according to role on clipboard ❑ Log in all incident patients taken to each treatment area of Emergency and the Surgery Clinic on the appropriate forms ❑ Communicate effectively on the phone ❑ Handle any other clerical duties as requested by the Charge Nurse of Emergency

Emergency Patient Registration Clerk Job Action Sheet
Notified by Charge Nurse, Emergency Key Responsibility Responsible for maintaining accurate patient demographic information in the ADT system as received.
Functions 1. Assign registration clerk to each of the following areas: ❑ Two clerks to emergency registration desks ❑ Triage Teams A and B (1 clerk for each team) 2. Enter patient demographic information to the ADT system as received. To Register Incident Patients: ❑ Complete "Incident Patient Information Form" or equivalent with as much information as available at the time of encounter ❑ Parent/guardian of incident patients (when present) will be sent to Emergency Registration by Patient Tracking Team member, escorted by a runner when deemed appropriate ❑ Runner will present to Registration with parent/guardian and the copy of the emergency chart from the patient's bedside Registration Clerk will: ❑ Use the patient's unique number transcribed onto this copy of the emergency chart to access patient file in the ADT system ❑ Update the ADT system will all pertinent patient information using the patient care level O/DSAS and the service Med/Emer

(continued)

Emergency Patient Registration Clerk Job Action Sheet

- ❑ Transcribe all pertinent information onto the copy of the Emergency chart
- ❑ Give completed copy of emergency chart to runner who will then accompany parent/guardian back to the patient's bedside and will ensure that the Patient Tracking Team member receives completed copy of the emergency chart

To Register Emergent/Resuscitation Emergency Patients:

- ❑ Registration of these patients will occur according to standard protocol for registering emergency patients
- ❑ Patients will access registration via the triage nurse using the usual triage assessment record

Registration Clerk will:

- ❑ Register patients in the ADT system
- ❑ Instruct the parent/guardian where to wait post registration as per triage nurse instructions

To register Nonurgent Emergency Patients:

- ❑ Registration of these patients will be done according to standard protocol for registering emergency patients.

- Patients will access registration via the triage nurse using triage assessment record.

Registration Clerk will:

- Register patients in the ADT system
- Instruct the patient/parent to wait in the Emergency waiting room until transport person is able to relocate them to the appropriate area

Appendix J – Pediatric Safe Area Checklist

YES	NO	
☐	☐	1. Needle boxes are at least 48 inches off the floor
☐	☐	2. Do the windows open?
☐	☐	3. Are the windows locked?
☐	☐	4. Do you have window guards?
☐	☐	5. Can you contain children in this area? (Consider stairwells, doors, elevators)
☐	☐	6. Do you have distractions for the children? (Videos, games, toys)
☐	☐	7. Poison—proof the area (cleaning supplies, hemaoccult developer)
☐	☐	8. Choking hazards (cords)
☐	☐	9. Are your med carts and supply carts locked?
☐	☐	10. Do you have a plan for security for the unit?
☐	☐	11. Do you have a plan to identify the children?
☐	☐	12. Are there any fans or heaters in use?
☐	☐	13. Are they safe?
☐	☐	14. Do you have an onsite or nearby day care?
☐	☐	15. Could they help you?

Appendix K – Pediatric Preparedness Nonmedical Needs Outline

In the event that your hospital will take care of 20 pediatric clients less than 5 years of age for 48 hours; below is an outline and issues to consider for the nonmedical needs of pediatric patients:

Job Action Sheets which reference pediatric considerations

1. Dietary Department
2. Materials Management
3. Pharmacy

Nonmedical Needs

1. Food/formula
2. Diapers
3. Pedialyte
4. Bottles/Nipples
5. Pacifiers
6. Toys/Child Life
7. Others

Process of ordering/reordering nonmedical supplies during disaster

1. Memorandum of understanding with vendors
2. Reconcile on-hand available pediatric supplies with what will be required to manage the pediatric patient surge
3. Define delivery system/modalities to hospital/designated unit

Nonmedical Needs Resources

1. Hospital vendors you have a contract with
2. Others: (Local Community Resources)
   a. Local pharmacy
   b. Grocery chain
   c. Hardware store
3. Back up resource other