Radiation Protection Dosimetry (2009), Vol. 134, No. 3–4, pp. 191–192 doi:10.1093/rpd/ncp069
Advance Access publication 28 April 2009

POPULATIONS AT RISK—PAEDIATRICS

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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 which is always at high risk in disasters is children. The physiological, anatomical, developmental and psychological requirements in children differ from those of adults. Disaster planning must recognise and adapt to this. For the past 3 years, the Centre of Excellence in Emergency Preparedness (CEEP) has been developing a document that will outline specific paediatric issues in disasters and provide general (and, where possible, specific) guidelines for Canadian health-care providers and disaster planners. This paper discusses special issues of emergency preparedness for children and reviews the content of the document being developed at CEEP.

INTRODUCTION

Emergency preparedness is the readiness for unexpected lethal or harmful events involving more casualties than health-care infrastructures are normally designed to handle. Traditionally, this has focused on mass casualty trauma and natural disasters. Since the terror attacks of 11 September 2001, emergency planners, and specifically those in the health-care sector, have become more aware of the need to be prepared to deal with mass casualty events involving chemical, biological, radiological and nuclear substances in addition to trauma.

The Canadian Centre of Excellence in Emergency Preparedness (CEEP) is committed to facilitating and maintaining optimal Canadian health emergency preparedness by providing expert consensus based on evidence and best practice. CEEP responds to stakeholders at municipal, provincial and national levels by providing high-quality, evidence-based standards, tools, programmes, position papers and documents, which will facilitate quality, consistency, integration and seamlessness in Canadian health-care emergency planning and response.

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WHY FOCUS ON CHILDREN?

The physiological, anatomical, developmental and psychological requirements in children differ from those of adults. In terms of physiology, children have a higher minute ventilation. Due to shorter stature, they are more likely to be exposed to heavier than air respiratory toxins. Children have a large skin-to-body mass, and are, therefore, more likely to be vulnerable to hypothermia and transdermal absorption of toxins. Children are at much higher risk of dehydration and shock. It is also much harder to establish intravenous access in children. Children vary enormously in both size and weight and, thus, routine protocols and standing orders are difficult to establish. In any emergency situation, malnutrition is a more significant problem with smaller children. In terms of anatomy, children's skeletons are far more pliable than that of adults and provide less protection to internal organs. The ratio of mass of head to mass of body is larger in children than in adults and thus, the likelihood of head injury in children is higher. Developmentally, children's cognitive and motor skills vary with age, development and occasionally with other underlying illnesses. It is not always possible to know if a child has deviated from its usual functional norm. Children do not always have the psychological and cognitive maturity to be able to process events. A child may not have the language skills to provide a clinical history. In an event where a child is separated from a caregiver, the child may not have the cognitive ability to recognise the risk and evade it. For psychosocial reasons, families should, ideally, be treated as a unit. This needs to be taken into consideration in any situation where isolation is required. Even though the child may not be a primary victim, children may be truly or virtually orphaned as a result of an event that impacts their parents. Disaster planning needs to involve school and child-care staff for a disaster that occurs during day-time hours or an event that involves long-term closure of schools. In any emergency situation, the need for child care could have a huge impact on the hospital caregivers and staff. Children are possible targets of predators, more so when separated from their usual caregivers.

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In addition to above-mentioned issues, there are other issues concerning children. For example, children exposed to radiation are at a higher risk of developing radiation-induced cancer, such as thyroid cancers. Presently, hospitals are not allowed to provide immediate and on-going care to children who are unable to provide consent and whose guardians are not available for a variety of reasons. There is implied consent for most resuscitative therapy, but the consent issues are less clear when it comes to non-acute care. Children do not always identify that they are in pain or may not be examined due to pain. Caregivers are not always comfortable calculating medication doses for smaller children. Many vaccination protocols do not make allowances for children or, in fact, the vaccine may not be approved for small children. On the other hand, children tolerate multiple organ injuries better than adults. Although prognosis depends on the severity of the head injury, if present, children have a better prognosis for most, if not all, disaster-related conditions.

Child-specific injuries:

- Head injury: Head injuries account for approximately 60% of all mass casualty events and disaster injuries in the paediatric population. In states of unconsciousness, children's upper airways tend to get obstructed due to the relatively large, flaccid tongue and large head flexion induced by the prominent occiput.
- Skeletal injury: Children have more flexible bones than that of adults and are therefore subject to fewer bone fractures. Injuries to children and adolescents also include growth plate injury.
- Thermoregulation: Children are at a higher risk of thermal injury and its after effects because of the less mature thermoregulatory mechanism in children, and the higher surface area-to-mass ratio compared with adults.
- Blood loss: Children have relatively small amounts of blood (80 ml kg^{-1}). What may seem to be minor bleeding may in effect represent a significant volume loss and severe shock. Children's cardiovascular systems are generally free of chronic disabling conditions and therefore, children may tolerate hypovolemic stress better than adults.
- Emotional trauma: In addition to physical injuries, emotional trauma, caused for example by separation from parents, is an important factor in paediatric care. Children may also be more easily frightened by events that they cannot understand, such as a health-care provider in personal protective equipment.

DISASTER RESPONSE AND CHILDREN

Children have special needs and are always at high risk in disasters. In addition to being high risk and to having unique requirements they are also hard to service, since many of the guidelines for equipment, supplies and treatment protocols are designed with adults in mind.

With a team of emergency physicians, paediatricians, child-care workers and nurses, the CEEP has been developing a document that will outline specific paediatric issues in disasters and provide general (and, where possible, specific) guidelines for Canadian health-care providers and disaster planners. The team recognises the need for the following:

- Pre-hospital care paediatric guidelines
- Mass casualty triage guidelines for paediatrics (as opposed to normal triage for adults)
- General guidelines for treatment areas
- Paediatric equipment/resources lists
- Psychosocial needs and treatment guidelines
- Health-care facility for paediatric risk assessment
- Health-care facility for paediatric readiness
- Assessment tools
- Disaster guidelines for children with special needs.

Once the review and revision are completed, the document will be submitted for endorsement by the Canadian Association of Emergency Physicians, the Canadian Paediatric Society and the National Emergency Nurses Association. A final version should hopefully be ready and available by the fall of 2009. It will be added to the library of other disaster support documents found on the CEEP website at http://www.ceep.ca/tools.htm and http://www.ceep.ca/resources.htm.