
Navigating the Pediatric Disaster Preparedness Literature: A Starting Point for Local Emergency Managers

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Abstract

The purpose of this discussion is to use a thorough review of the literature to offer guidance to local emergency managers on where to begin in incorporating pediatric considerations into their emergency planning. Considerations will be examined in all areas that a local emergency manager may have influence, including within the municipal, prehospital, and in-hospital realms. Important steps in each of these areas will be examined based on the literature.

INTRODUCTION

The purpose of this discussion is to use a thorough review of the literature to offer guidance to local emergency managers on where to begin in incorporating pediatric considerations into their emergency planning. Recently, there has been an increased push to integrate special populations, including children, into local disaster plans. Concurrently, there has been a push for true evidence-based disaster planning.¹ There is a significant amount of literature available to guide local emergency managers on the integration of pediatric considerations into their disaster plans in a true evidence-based approach, but this vast amount of literature can easily become overwhelming. This paper will use a review of the literature to suggest a starting point for local emergency managers looking to incorporate pediatric considerations into their municipality's disaster planning. Considerations will be examined in all areas that a local emergency manager may have influence, including within the municipal, prehospital, and in-hospital realms. Important steps in each of these areas will be presented to offer guidance on a starting point towards full integration of pediatric considerations.

CURRENT STATE

Children are a vulnerable population in disasters. Their anatomic, physiological, and immune system development leaves them at a greater risk from a number of types of disasters.² They can also be especially vulnerable to the stressors that go along with any disaster situation because of their inherent psychological vulnerabilities.³ Specifically,

children are more vulnerable to malnutrition, head injuries, dehydration, hypothermia, respiratory insufficiency, as well as exploitation.⁴ Although there are large numbers of pediatric residents in the vast majority of North American municipalities, pediatric disaster planning up to this point has been weak. Multiple studies have identified weaknesses in various parts of the pediatric response system from the prehospital,⁵ to the hospital,² and to the government level.⁶ Pediatrics are a special population that need special considerations in disaster planning to ensure that they will not have worse outcomes in the aftermath of the disaster due to their unique vulnerabilities.

TAKING THE FIRST STEP

The very first step in integrating pediatric considerations into emergency planning is simply to recognize the need. Children are not just small adults. Recognizing this and committing to strengthening the plan is the first step on the road to fully inclusive emergency planning that integrates in considerations for all special populations. The goal of the planning process must also be clear though. The purpose is to have a workable plan that truly brings in practical considerations for the special needs of pediatric disaster victims. Significant benefit will come from going through the planning process. A nicely written plan means nothing if it is not implementable and was not the result of a true planning process. This can be difficult for a municipal emergency manager who may be pressed for showing tangible results of their work in the form of a plan. A plan that is no more than words on a page amounts to poor

preparedness. Poor preparedness will translate into poor performance in an actual incident.⁷

Lack of a perfect general emergency plan cannot be used as a reason to not yet incorporate pediatric considerations.⁸ Although this may seem like a convenient excuse, no emergency plan that is truly the result of a continual planning process will ever be complete. All plans should undergo continual development, while also working to integrate in considerations for any special populations that have previously been neglected. Upon committing to plan development, pediatric considerations should be examined for integration into the municipal plan. The local emergency managers' formal responsibilities may end there, but their overall responsibility for the safety of their residents makes it prudent for them to also get involved with their local prehospital and hospital partners to integrate pediatric considerations into every stage of the disaster cycle.⁹

MUNICIPAL PROMOTING PREPAREDNESS

Specific responsibilities for disaster preparedness for each level of government vary by region. In many areas, such as Ontario, Canada, the specific responsibility for the safety of the residents is placed on the municipal governments.¹⁰ Regardless of the specific legislation, all disasters are still local. Promoting preparedness is one of the key roles in ensuring that a community is well-prepared to manage a disaster.

Pediatric disaster preparedness begins with family preparedness in the home.¹¹ Children can also be enlisted through school programs to help them to understand about the importance of being ready for emergencies and more importantly, for them to bring these lessons home. Parents may be able to ignore public service announcements encouraging every family to be prepared to be self-sufficient for 72 hours after a disaster, but the voice of a nagging child may be much more difficult to ignore. Family preparedness is also crucial to ensure that the municipality can continue to function and children can continue to be cared for during a disaster. Strong family preparedness will ensure that all healthcare providers¹² as well as key municipal employees can continue to perform their important job duties during a disaster without needing to leave to take care of their own families.

SCHOOL DISASTER PREPAREDNESS

Disaster plans often seem to be based on an underlying belief that everyone will be in their homes when a disaster strikes. During a weekday though, it is likely that many children will be in school.¹³ There is also the unfortunate possibility that the disaster could actually be something that occurs within the school.¹⁴ Plans at the municipal level often seem to ignore the possibility that children would be at school and the internal school planning does not appear to be much stronger. A study published in 2006 showed that almost half of schools surveyed had not met with local emergency medical services (EMS) representatives to collaborate on planning.¹⁴ The good news from this same survey was that the vast majority of schools did have evacuation plans, but unfortunately it was also seen that close to one third had never actually tested these plans.¹⁴

The teachers and staff must have the training to be able to take charge during emergency situations. Plans should also be in place that incorporate parental notification considerations along with workable plans to reunite children with their parents. School officials should be collaborating not only with local EMS officials but also with other first responders and the municipal emergency preparedness office. These plans must be tested in some type of exercise or drill to ensure that they can be implemented in an actual emergency. Many of these points may seem like common sense, but taking the first steps in integrating pediatric considerations into local emergency planning may be just that.

SHELTERING

Most disaster plans address sheltering to some degree, at an absolute minimum identifying possible shelter locations. Although most healthy adults may be capable of coping in a shelter that is not much more than a community centre with cots for a short period of time, children may require more consideration here. Even with a shelter being meant to be a life boat and not a yacht,¹⁵ considering board games or other activities for children may serve to reduce stress in the children and also their parents. Sleeping arrangements should also be considered for the pediatric evacuees, who are unlikely to do well on traditional adult cots.

Along with the plans for sheltering, memorandums of understanding are likely in place with local food suppliers to ensure adequate nutrition and personal hygiene products for evacuees. Appropriate food for infants and young children

will be important, as will adequate supplies of diapers. Diapers also require a private place for changing, preferably (for the sake of other evacuees) out of the way of the main shelter area. Again it may seem like common sense, but common sense becomes much more challenging when under pressure in the aftermath of a disaster.

EVACUATION

Things get especially complicated once local sheltering is not enough and evacuations are required. The challenges of evacuations are compounded when children are involved. Hurricane Katrina serves as a recent example of the potential consequences of a failed evacuation. In the aftermath of Katrina, some children were sent to different shelters from their families.¹⁶ This led to nearly 5000 children becoming missing or displaced,⁶ with some not being reunited with their families for up to six months.¹⁷

Plans must be in place before hand that specifically address the issue of reuniting children with their families. There are a number of options for how exactly this tracking and reunification will take place.¹⁷ The precise method used is not important, rather what matters is simply that there is a plan in place. Having a plan in place though does not just mean words on paper. The plan must be workable in a real disaster situation. The only way to truly gauge how a plan for unification will work is to test it in advance in a true exercise to detect and fix any faults before a disaster strikes.¹⁷

GENERAL READINESS

The foundation of a strong pediatric plan is a well-developed comprehensive general plan. Although there are a number of unique aspects of pediatric planning that must be addressed, thing such as dealing with unaffiliated volunteers and having well-prepared municipal government officials are not specific to the pediatric response and are essential for any response. Other components of this strong general plan must include emergency operations centre management and operations, a thorough hazard vulnerability analysis process with mitigation initiatives, as well as empowering all key municipal employees and first responders to truly take an active role in disaster preparedness initiatives. The importance though of this strong general plan cannot be taken to mean that pediatric emergency planning should be delayed because the general plan is not yet perfected. Lack of perfection in any of these areas must be addressed concurrently with, and not instead of, pediatric planning.

PREHOSPITAL EQUIPMENT

Pediatric-specific equipment is needed to appropriately treat this special population. There is often no substitute for the correct equipment and lacking it either results in the pediatric patient receiving a lower level of care than an adult or suboptimal care due to needing to substitute adult equipment. Studies in the United States in the early 1990s have shown a lack of pediatric appropriate equipment on ambulances.¹⁸ Although the recent literature on the subject is lacking, there does not seem to be any indication of a universal resolution of this issue.

Many areas have ambulance equipment standards set by this higher level of government to ensure uniformity in the majority of equipment carried on ambulances in the region. Even with these universal standards though, shortcomings still exist in these requirements. Updating standards can take time though and local emergency managers should encourage all ambulance operators to proactively take steps to improve their stock of pediatric equipment immediately.

TRAINING

The current training minimums for EMS providers lack a significant amount of pediatric-specific content. In-house continuing medical education often does not address a significant amount of pediatric content either.¹⁸ The relative youth of many EMS providers means that they often lack children of their own, which can compound their discomfort in dealing with this special population. Empirical studies have supported the premise that EMS providers as a whole are less comfortable treating pediatric patients as is demonstrated by their decreased likelihood to perform interventions for them.¹⁹ Courses offered within the EMS service as well as external courses such as International Trauma Life Support Pediatric, Pediatric Education for Prehospital Professionals, Pediatric Disaster Life Support could supplement this knowledge.¹²

CHEMICAL INCIDENTS

Chemical incidents are a specific threat that present unique challenges for pediatric patients. Many municipalities lack the resources to even decontaminate non-ambulatory patients, and have not even gotten to the point of considering how they would deal with pediatric victims. Hazardous materials responders should be prepared to provide appropriate decontamination to this group.²⁰ Specific challenges that have been identified include the importance

of keeping children warm during the process along with trying to keep families together to help to minimize anxiety in the children.²¹ Plans must be in place for this though, especially since children are at a greater risk to many chemical issues since they are not only low to the ground but also have poorly keratinized skin along with their high surface area to mass ratios.¹³

As chemical incident planning progresses, other contingencies can be addressed specifically. There are a number of important considerations for emergency medical services dealing with pediatric nerve agent poisoning. In addition to the difficulty in performing decontamination on this population, there is a lack of literature on antidote dosing for nerve agent exposure.²⁰ The introduction of pediatric auto-injectors of atropine and 2-PAM has sparked debate over the optimal use of these in managing pediatric patients.²⁰ Even with the unlikelihood of this type of incident, considerations should be discussed in advance to minimize confusion and debate as an incident occurs.

TRIAGE

Adequately triaging patients is a crucial component of any EMS response to a mass-casualty incident to ensure that scarce resources are best allocated to do the most good for the greatest number of people. Even though most adult prehospital triage algorithms lack clinical validation, pediatric patients do not fit well into traditional prehospital algorithms due to their differing baseline vital signs and ability to communicate and follow commands, depending on their age. Pediatric-specific triage algorithms, such as JumpSTART, should be used by field providers.¹² It must be kept in mind though that most of these algorithms were designed with trauma in mind and that triaging chemical issues is an even bigger challenge that may require clinical judgment.²²

Research has shown poor prehospital preparedness for triaging children. One published study showed that only one fifth of EMS agencies used a pediatric-specific triage algorithm and that only a half were involved in disaster exercises that involved pediatric patients.¹² Time and money must be committed to training to ensure that prehospital providers can appropriately triage all patients. Skill maintenance must also be considered, with time allotted for ongoing training to ensure skill retention.

HOSPITAL

FACILITIES AND EQUIPMENT

In terms of equipment in-hospital, the picture is unfortunately much the same as the prehospital environment. The vast majority of emergency departments fall short when it comes to pediatric equipment, with one study showing that only 6% had all equipment identified in the 2001 policy statement from the American College of Emergency Physicians and American Academy of Pediatrics.²³ Items that were identified as likely to be missing by another study included equipment such as oral and nasal airways and pediatric sized Magill forceps.²⁴ There is no easy substitution for the pediatric version of many pieces of equipment.

Dealing with an influx of pediatric patients is challenging for all areas of the hospital. This may lead to difficult decisions for the pediatric intensive care unit (ICU) about potentially modifying the standard of care or being forced to provide pediatric critical care outside of the pediatric ICU.²⁵ Plans should be put in place before hand that begin to address these contingencies to minimize the decision-making that must happen during the incident.

The emergency department will be the first line though where the effects of a disaster involving large numbers of pediatric patients would be felt in-hospital. Past events have shown that through planning in advance, health systems can manage to deal with an influx of pediatric patients effectively.²⁶ As discussed previously, all emergency departments must be prepared to treat pediatric patients.⁷ Having strong partners in all area emergency departments could help to ease the load on the pediatric-specialist hospitals.¹¹ Additionally, it has been suggested that it may be beneficial to integrate family physicians' offices into the capabilities to help to further reduce the burdens on hospitals for low acuity patients who still require assessment.¹¹ There is some evidence though that the baseline level of the readiness of family physicians to deal with emergency situations may not be at a level that would allow them to deal with patients in the aftermath of a disaster.¹⁶ Additional training in disaster and emergency medicine may be beneficial for family physicians who will be utilized as part of the disaster medical resources.

TRAINING

With the prevalence of pediatric specialty hospitals, healthcare provider levels of pediatric-specific knowledge may be lacking away from these specialized facilities. This pediatric disaster medicine knowledge is important for all

healthcare providers to have,²⁷ and there are avenues for improvement. One study sought to examine the impact of an educational intervention on the pediatric disaster medicine knowledge of emergency medicine residents. The researchers used a two hour pediatric disaster medicine course that they developed in-house. Of the 75 residents who participated in the study, the mean improvement in post-intervention scores was close to 25%. In addition to this post-intervention improvement that was seen, the retention was also said to be moderate, suggesting that this type of intervention may be beneficial if implemented more widely.²⁸ It was also suggested that the addition of a practical component could be useful.²⁸ At this point though, there is not yet a universally accepted pediatric disaster medicine course that could be easily obtained by a healthcare facility to train their staff.¹¹

It is important for all healthcare providers to have this pediatric knowledge, because there may not be the resources for all pediatric patients to be treated at the pediatric-specific hospitals during a disaster. This over demand of pediatric resources was seen on 11 September 2001, especially in terms of pediatric trauma centres and pediatric surgery manpower,²⁹ of which there is already a shortage of in the United States.³⁰ Even without the pediatric-specific resources becoming stretched thin, it is still likely that many parents will simply transport their children to the closest hospital, without involving EMS.² One other potential resource for integrating further pediatric-specific providers into the disaster medical response system is to bring in pediatricians, who have historically been an untapped disaster resource.¹³

Providers who are well prepared to deal with pediatric disaster patients must practise this to ensure that they maintain their knowledge and skills. Even something as simple as trying to perform basic treatment on a child could become quite challenging while wearing full personal protective equipment.¹³ Truly practising these skills will be the only way to keep them current to ensure a strong hospital response for pediatric disaster patients.

CONCLUSION

There is a large body of literature that addresses the various aspects of integrating pediatric considerations into local emergency plans. The very first step in this integration is to simply acknowledge that special planning is needed for this population. This paper has provided a framework for taking the initial steps of implementing pediatric-specific

considerations in local plans. The municipal emergency manager should work closely with schools and other local stakeholder groups to truly bring them into the planning process. First responders and first receivers must have the appropriate training and equipment to be able to properly manage this special population. Although pediatric patients may be a relatively small percentage of the entire patient load, there is no excuse for not having the appropriate knowledge and equipment to manage them properly. First responders and first receivers are likely not under the direct control of the local emergency manager, but hopefully the influence that this position holds can be used to offer strong encouragement to those agencies to improve their readiness. Planning is truly a continual process and this paper can only be thought of as providing guidance on how to begin the integration of pediatric considerations into local emergency planning. Continual testing of the plan, making improvements based on the after-action discussion, combined with taking the time to review the new literature as it is published will ensure that the local emergency manager safeguards all children in their region.

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