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Completing the Disaster Cycle for Children: Introducing the Pediatric After-Action Report

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Abstract

Well-established within the field of Emergency Management is the Disaster Cycle: Mitigation, Preparedness, Response, and Recovery. Less standard, however, is the inclusion of pediatric considerations in efforts within each of these phases, despite the significant population share that children hold and their unique vulnerabilities to disasters. Building upon a tool designed to spur pediatric inclusion in the "Mitigation" phase of the cycle, the Regional Pediatric Hazard Vulnerability Analysis, this paper introduces a novel Pediatric After-Action Report template. This is an all-hazards template that provides emergency managers and other partners within a region a vital resource to ensure that children are effectively considered in post-event review efforts within the "Recovery" phase, whether those reviews are customary or not. The Pediatric After-Action Report presents critical questions related to pediatric needs in previously established categories, promotes the identification of areas for improvement, and facilitates the creation of actionable plans for future preparedness.

Introduction

Historically, children have often been left out of resources available within Disaster Cycle (Mitigation, Preparedness, Response, and Recovery)[1] tools available to health care and community emergency management personnel. This lack of direct consideration of children can be a critical oversight due to their unique vulnerabilities, including the anatomic, physiologic, and psychological differences from adults, which put them at significant risk from a wide variety of disasters.[2,3] However, over the last decade, substantial efforts have been made to incorporate children into disaster planning, led by the American Academy of Pediatrics, the Pediatric Disaster Centers of Excellence (COE),[4] and the Pediatric Pandemic Network, among others. Much of the work by these organizations has been tied to identifying pediatric gaps within the disaster cycle and working to fill them, such as with disaster training modules for health care providers, hazard-specific preparedness resources for families, and pathways for sharing best practices among health care systems. The Risk and Recovery team within Region V for Kids (RVFK) COE worked to establish and promote a Mitigation tool, a specific Regional Pediatric Hazard Vulnerability Analysis toolkit for communities.[3] In-depth review of existing literature and practices identified key areas of particular importance for children that were uniquely susceptible to a disaster's impact within a community, including individual effects, health care systems, and community safety net infrastructure. To strengthen the Regional Pediatric HVA, the team sought to provide users with accessible, real-world disaster data on children. The search yielded scarce pediatric-specific information in existing sources, highlighting another critical need: a dedicated tool for incorporating children into disaster Recovery efforts. Using the framework developed for the pediatric HVA, the RVFK team created a new tool for a community review incorporating the perspective of children following a devastating community-wide disaster. The tool is introduced below: a Pediatric After-Action Report (AAR) that can be used as a supplement to general AARs.

After-Action Report

An After-Action Report (AAR) is a detailed review product developed following an exercise or real-world disaster event.[5] Initially used by the United States Army,[6] AARs are mixed-methods reports that describe the event, evaluate the response to it, and present lessons learned by the community or agencies as a result. The intent is to consider where, why, and how the response did and did not go well, and to provide recommended actions for improvement. However, the approach to completing and presenting an AAR varies noticeably.[7] AAR data collection methods may involve conducting focus groups, individual interviews, workshops, or site visits, administering questionnaires, and/or performing document review.[5,7,8] Sections in the report may include Handling Instructions, Executive Summary, Incident Timeline, Summary of Events, Background, Key Findings (Areas of Strength, Areas for Improvement), Methodology,

Conclusion, and/or Action Plan.[5] There is no overarching precedent for what kind/level of impact of an event warrants an AAR and who (what individual or agency) completes it. Still, since it has been demonstrated that children are affected differently by disasters, it would be reasonable to conclude that the pediatric population is specifically addressed in these important recovery-related documents, even without uniformity in presentation and completion.

Identifying the Need for a Pediatric-Specific After-Action Report

Exploring current AAR processes and state, local, and federal requirements surrounding AAR completion and templates was an important first step to understand the role of AARs and gauge pediatric inclusion. Internet and literature searches were conducted to meet this foundational need. Currently, there is one formal AAR template published and promoted by the Federal Emergency Management Agency (FEMA)'s Homeland Security Exercise and Evaluation Program (HSEEP), released in 2021. Though the template is quite comprehensive, it does not specifically call out children or their unique needs. And, though recommended, there is no requirement for the template to be used for real events. After-Action Reports are most often prioritized by government agencies only for exercises or drills. Even in exercises, "children" is just one of several options for populations that require additional consideration to include in planning and reporting, such as "seniors, racially and ethnically diverse communities, and people with limited English proficiency."[8]

To ascertain the inclusion status of pediatric-specific items in real-world applications, a review of 47 publicly available documents classified as AARs was performed. Many of these were obtained through a technical assistance request to the Assistant Secretary for Preparedness and Response Technical Resources, Assistance Center, and Information Exchange (ASPR TRACIE), a recognized online hub of Emergency Preparedness resources.[9] This review revealed a variety of templates and data inclusion. Eliminating documents that did not demonstrate hallmark features of AARs, such as newspaper articles or non-structured reviews, findings revealed extremely minimal mention of children, if any at all. The most direct examples were reports that included specific or categorized ages of individuals who died or were transported to hospitals/hospitalized due to the disaster event (some of whom were children). Still, most reports did not mention the ages of victims. This lack of pediatric inclusion revealed a need for resources to ensure children are represented in AARs and disaster recovery.

Creating a Pediatric-Specific After-Action Report Template

Upon identifying and naming this need, it was decided that creating a pediatric-specific After-Action Report template that could be used as a general AAR supplement would provide a valuable and comprehensive tool to help emergency managers, state, county, or city departments of health, and other individuals/agencies consider children in their post-event reviews. Ideally, the template would incorporate familiar components of AARs, such as an Executive Summary and Key Strengths and Areas for Improvement section, while also introducing novel pediatric components. Based on previously published work,[3] the categories and sub-categories outlined (Table 1) were used in the Pediatric After Action-Report (PAAR) related to their impacts on children. The terms "pediatric patients" and "children" are intentionally used differently depending on the context (i.e., "pediatric patients" for hospital/health care settings and "children" for community settings).

It was agreed that this tool would be most generalizable if it were based on contributions by experienced subject matter experts within those established categories. Community leaders in schools, shelters, public health, emergency services, and hospitals were engaged to contribute to questions specific to their areas of expertise. Authors reviewed each question, eliminated duplication, and reduced number of questions to 3-5 for inclusion in the final product (Table 2). An optional space was included within each category for site-specific questions to be added based on the scenario. Feedback from contributing leaders on overall presentation and utility of the tool was also gathered and applied.

Discussion

The Pediatric After-Action Report template was developed to be accessible, useful, collaborative, and representative of children in disasters. The tool is free and available for immediate download online,[10] and is also encouraged to be distributed and shared with others freely. It is collaborative by nature; the intent is for one person/agency to assume primary responsibility for completing the review, while establishing Point(s) of Contact (POC) with

Table 1. Categories/sub-categories within the Pediatric After Action Report (PAAR) template. Each category was selected and validated specifically for children during the creation of the Regional Pediatric Hazard Vulnerability Analysis (HVA) toolkit, which determines risk-related scores for various hazards within these domains

Human Impact	**Acute Pediatric Morbidity and *Mortality** *E.g., Numbers and types of pediatric injuries and deaths caused by the disaster*	**Long-Term Pediatric Morbidity/Surveillance** *E.g., Long-term physical and mental health effects and needs as a result of the disaster, public health surveillance, and outreach*	**Special Populations*** *E.g., How special populations were responded to during the disaster (disabilities, disadvantages, cultural or religious considerations, etc.)*
Health care System Impact	**Hospital** *E.g., The impact on hospital system(s) due to surges, equipment needs, etc.*	**Public Health/Emergency Management** *E.g., The community health ramifications a disaster presents and how local/regional departments and agencies respond*	**Emergency Medical Services** *E.g., The extent of involvement and capability of EMS to transport and treat patients*
Community Safety Infrastructure	**Family Reunification** *E.g., How displaced children will be brought back to their families*	**School/Child Care** *E.g., How school and day care closures will affect children's safety and hospitals'/community's workforce*	**Shelter/Nutrition** *E.g., How the disaster threatens the shelter and food needs of children in the community*

*Considerations of "Mortality" specifically within "Acute Pediatric Morbidity and Mortality" and the "Special Populations" sub-categories are new additions to the PAAR; they are not directly assessed in the pediatric HVA.

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Table 2. Questions included in the Pediatric After-Action Report template. Associated with each question are two free-response spaces titled "Description of Outcome" and "Opportunities for Improvement to Existing Systems (if applicable)," allowing reviewers to both describe what happened and consider where their current processes could improve based on the outcome of the event. The terms "pediatric patients" and "children" are intentionally used differently depending on the context (i.e., "pediatric patients" for hospital/health care settings and "children" for community settings)

Acute Pediatric Morbidity and Mortality	Long-Term Pediatric Morbidity/Surveillance	Special Populations
How many pediatric patients were involved in the incident?	How many affected pediatric patients do you anticipate will develop chronic medical conditions (lasting greater than 3 months)?	Were accommodations available for children with physical, intellectual, or developmental disabilities during the response?
How many pediatric patients sought immediate medical/mental health care following the event?	How many affected pediatric patients do you anticipate will develop chronic behavioral/mental health conditions (lasting greater than 3 months)?	Were there unique challenges in reaching or supporting children from underserved or socioeconomically disadvantaged populations?
What types of injuries were sustained, if any, by the pediatric patients involved?	What types of support services for medical and behavioral/mental health conditions were provided to pediatric patients, their caregivers, and families?	Were cultural or religious considerations for children and their families addressed appropriately?
Were there any pediatric deaths associated with the event?	How effective was public health pediatric population-level surveillance in the response phase of the disaster, and how is longer-term surveillance being addressed?	
Hospital	**Public Health/Emergency Management**	**Emergency Medical Services**
How many pediatric patients presented to the emergency department(s) for care?	What local, state, or federal public health agencies activated emergency response operations for this event?	How many pediatric patients were transported by EMS? How many different hospitals received patients?
How many pediatric patients required hospital admission?	Please describe any coordination between local, state, and federal levels to address public health concerns of the pediatric population.	Was any kind of pediatric medical command used (phone/virtual assistance/standing protocols)?
Were there any gaps in the needed pediatric equipment/supplies/protocols?	Were communication systems and protocols effective in informing families and caregivers about addressing specific needs of children? Any communication barriers identified?	Were there any gaps in needed pediatric equipment/supplies/protocols?
Were there any pediatric transfers from one hospital to another associated with the event? Were there any gaps identified sharing patient information between hospitals?	How were community volunteers integrated into the response? Were any gaps identified in their training (pediatric medical/mental health) to address children?	
Besides patient encounters, were there any staffing, supply chain, structural, or other impacts on hospitals or health care systems from this event?		
Family Reunification	**Schools/Child Care**	**Shelter/Nutrition**
How many children were known to be separated from parents/guardians?	How many schools/child care centers were closed due to the incident?	How many children were in shelters? Were any of them unaccompanied minors?
Where did the reunification with parents/guardians occur? (e.g., hospital, home, family assistance centers, other facilities)	If closure occurred, how long were the schools/child care centers closed?	Was short-term (<72 hours) or long-term sheltering (>72 hours) needed?
What agencies supported reunification? (e.g., Red Cross, Law Enforcement, Social Services, National Center for Missing and Exploited Children, other)	How many children were impacted by school/child care closures?	Were there any gaps in pediatric-specific resources required during shelter operations (nutrition, supplies, equipment)?
Were there any barriers/challenges in interagency coordination or prompt notification of parents?		Did any of the children in shelters require medical attention? If so, how was that provided?

individuals across the community or region where a disaster event has occurred. Not only does this allow for relationship-building with experts in important pediatric areas, but it also reflects the fact that disasters do not strike in silos, but often affect multiple systems or facilities in the surrounding area, making "whole-community integration" essential.[8] Part of the issue with lack of pediatric inclusion in emergency management efforts is that even professionals simply don't have baseline knowledge on what to include regarding children. Making these connections helps bridge that gap. The PAAR also poses questions about essential elements of

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information pre-determined by experts in each area, providing reviewers of the document with a well-founded place to start.

Managing disasters, no matter the phase of the cycle, is inherently challenging. An important feature and benefit of viewing disasters in a cyclical nature is that the phases should inform one another. Meaning, what is learned from a disaster in the Response phase should be documented as lessons learned in the Recovery phase and then incorporated as improvements in the Mitigation and Preparedness phase.[6] Though real-world evidence is key to the validity of any robust disaster planning, data on disasters can be difficult to collect due to a variety of limiting factors.[11] Researchers and emergency planners are actively seeking sources of disaster data to guide their work.[12] With data being particularly limited around children in disasters, this document provides a first step by proposing key elements of pediatric disaster data. If adopted broadly, the PAAR could serve as a foundation for data collection and sharing in this important area.

A central aim supporting the value of the PAAR was that it would promote not only retrospective reflection, but also prospective action. Despite best intentions and attempts by emergency managers, county/state departments, and public health officials, simply documenting "lessons learned" does not necessarily lead to improvement or changes that prevent those same lessons from being "learned" again.[6] Though not all AARs include an Action/Improvement Plan section, it is included in this PAAR template to ensure that opportunities for improvement identified through the PAAR completion process would be addressed with clearly delineated action items. The PAAR also brings up the importance of establishing long-term monitoring/public health surveillance plans after a disaster, as such disruptive events have been demonstrated to produce lasting mental health consequences, among others, on children.[13]

Another pillar the PAAR was built on is providing structure while also offering flexibility. Though templates and guides such as HSEEP's do exist, there is currently no universally used template or approach for real-world AARs (even general, non-pediatric AARs).[7] The PAAR offers standardization by including structured sections and specific questions. It is meant to function seamlessly as a complete supplement to general AARs if desired. As another option, if one is already completing an AAR that sufficiently addresses general metrics but would like to include specific consideration of children, they might call out age ranges throughout their report and adopt in their entirety only the Family Reunification, Schools, Shelter/Nutrition, and Special Populations sections from the PAAR.

While this template was designed to be thorough, caution was also taken to ensure users don't find the PAAR burdensome. Questions were limited to 3-5 per section, with the understanding that if a section does not apply or if there are no identified areas for improvement associated with a question, reviewers will not add any additional comments. Space for discussion of additional observations that come up after a particular event or that are important to a specific region was provided through an "Other Considerations?" question within each section.

Finally, a Frequently Asked Questions (FAQ) page was included to address questions such as who the tool is designed for, how it can be completed, and how it fits with the Regional Pediatric HVA toolkit. This provides users with guidance on how to use the PAAR without being too restrictive. For example, personally interviewing POCs is one recommended approach, but the Primary Reviewer simply reviewing documents POCs provide or asking them to fill out their specific section on their own time would also be acceptable. Further work is needed to determine the template's intuitiveness to unfamiliar users.

Limitations

As with any novel product, this introductory Pediatric After-Action Report template does come with potential limitations, particularly as users first begin to implement it. First, it is possible that the pediatric population has been recognized more than concluded in existing regional and organizational AARs and templates; these examples could simply be inaccessible to the public. It is also important to acknowledge that communities manage disasters differently, both in which groups and agencies are involved, and in what kind of events would be considered a disaster constituting this type of formal review. Until use of the PAAR becomes standard in a community, we anticipate possible challenges in identifying who would be the Responsible Reviewer/Agency, who would act as willing POCs, and where/how some of the information could be gathered. Depending on the type and severity of the disaster event, some categories may not apply, and there may be variability in when different types of data are finalized and made available, which could delay completion and future action planning. Additionally, until individuals or groups determine the best rhythm for incorporating the PAAR into their regular recovery efforts, adding a supplemental review item could also seem taxing if they are already limited in time for documenting lessons learned after an event. It is anticipated that users of the tool will initially need to discuss any specific guidelines for handling this document, such as who it should be shared with and how it will be kept compliant with the Health Insurance Portability and Accountability Act or other local regulations. Finally, this template is a concept that has been applied to limited cases, so it requires further testing with a variety of hazard types and reviewers.

Conclusion

Although managing emergencies within the model of the Disaster Cycle phases of Mitigation, Preparedness, Response, and Recovery is standard practice, tools, resources, and guidance within each phase often do not give proper attention to children, a large and uniquely vulnerable part of the population. Building on a previous tool created for the Mitigation phase of the Disaster Cycle, the Regional Pediatric Hazard Vulnerability Analysis, a novel Pediatric After-Action Report template was created as a companion tool for the Recovery phase. The PAAR incorporates the same Human Impact, Healthcare System Impact, and Community Safety Infrastructure categories developed for pediatrics in the pediatric HVA tool and is comprised of key questions crafted by subject matter experts within the identical sub-categories. These child-centric questions are intended to prompt emergency managers, health departments, or other individuals/agencies conducting post-disaster event reviews to consider the most important components of regional response, reflect on opportunities for improvement, and develop action items based on data from diverse sources. The template is free and available for public download.[10] It includes an FAQ section with guidance on how to complete it, whether a region already has established after-action review processes or not. The template is meant to be flexible, allowing users to simply skip over sections or questions that don't apply, or to discuss additional important considerations if a particular hazard or point of contact

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brings them to light. The inclusion of the PAAR as part of a region's disaster recovery repertoire could bring significantly increased awareness to pediatric concerns, help establish open lines of communication and collaboration with other health care, public/government, and community representatives, and ultimately improve the safety and well-being of children if the findings of the PAAR are effectively incorporated into the rest of the region's emergency planning. If adopted broadly, creating a voluntary "repository" of completed PAARs could provide crucial insights into the effects of disaster events on children that, if shared, could better inform each phase of the disaster cycle in communities around the country. Additional work is called for to demonstrate the practical use and value of the tool, and research approval and information technology infrastructure plans would need to be established for creating and maintaining a repository.

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- Substantial contributions to the conception or design of the work; acquisition, analysis, or interpretation of data for the work
- Drafting the work
- Final approval of the version to be published
- Agreement to be accountable for all aspects of the work and to ensure that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

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- Substantial contributions to the conception or design of the work; acquisition, analysis, or interpretation of data for the work
- Revising the work critically for important intellectual content
- Final approval of the version to be published
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