School of Medicine
& Health Sciences
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Symposium on Pediatric Disaster Science

The Action Collaborative on Disaster Research

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Andrew Garrett, MD, MPH, NRP

Disclaimer

The opinions expressed in this presentation are those of the speaker and do not necessarily represent the position of the Department of Health and Human Services, the U.S. Government, or The George Washington University

Image: meninblack.fandom.com

By now, I'm certain you appreciate that:

Image: FEMA.gov

The story of children in disasters is one of:

1. Disproportionate risk

and

2. Disproportionate representation in preparedness, response, and research efforts

(albeit with the best intentions!)

Since I only have 6 and ½ minutes left…

- Let's focus on the preparedness gap
  - How do we identify and quantify the risk to children in a disaster?
  - How does this information inform preparedness efforts specific to children or the whole-community?

Looking to the literature…

- As you've likely heard by now on day one of this conference, the disaster literature isn't as robust as for other medical disciplines
  - The "answer" likely doesn't exist to your question about how best to deliver the best _____ for children in a disaster (*triage, decon, medical countermeasures*, *preparedness, response capabilities*, *patient distribution & destination*, etc.)
  - It's all a work in progress as the discipline matures

Looking to the scientific literature…

in Disaster Medicine

CONCEPTS

Public Health Disaster Research: Surveying the Field, Defining Its Future

by David M. Abramson, PhD, MPH, Stephen S. Morse, PhD, Andrew L. Garrett, MD, MPH, and Irwin Redlener, MD

Disaster medicine and public health preparedness are commonly perceived as subfields of the larger fields of medicine and public health rather than being recognized as an emerging academic field embracing all of the disciplines that contribute to effective disaster response. As such, they serve as appropriate subjects for multidisciplinary work in the social sciences, whether it is a sociological analysis of mass behavior during a disaster, psychological studies of the willingness to work of various workforces, or organizational theory or network analyses applied to ad hoc disaster coalitions. Laboratory sciences and bioinformatics contribute as well to the development of new treatment modalities, medical products, and surveillance technologies. As is true in the broader medical and public health fields, much of the work is empirical and evaluative. In this article, the authors survey the literature in the field and suggest that broader, more ecologically based research is needed.

METHODS

To survey the current state of the research methodology, the authors conducted a literature review of all medical and public health journals from January 2002 through the present for English-language articles containing the phrases "disaster medicine" or "public health preparedness" in the title, subject, body, or as key words. The search was conducted using both MEDLINE and PubMed databases, and all duplicates were removed. In addition, all of the articles from the journal *Prehospital and Disaster Medicine* were included in the analysis, regardless of whether they met the inclusion criteria noted above. Articles excluded were editorials, letters to the editor, or conference abstracts, as well as any articles that focused solely on an emergency medicine or prehospital issue that was not disaster-related. A total of 303 articles were identified. Two of the authors (D.M.A. and A.L.G.) reviewed and coded all of the records independently. All coding discrepancies were discussed and reconciled through a consensual process.

All of the articles were coded by the type of research methodology used (eg, survey, secondary data analysis, clinical trial, case study), the primary research objective (eg, descriptive, epidemiological or health services research, evaluation research, guideline development, hypothesis-testing, organizational or policy planning), the primary unit of analysis (eg, individual, organizational, social or communal-level, or political/legal/ethical frameworks), and the primary hazard phase being addressed by the research (eg, prevention or mitigation, preparedness, response or event-phase, short- or long-term recovery). As a group, these selected articles represent the core disciplinary literature in the evolving fields of disaster medicine and public health preparedness.

RESULTS

A majority of the articles reviewed were based on qualitative data, reviewed common disaster-related practices or strategies, or presented conceptual frameworks (Table 1). One third of the articles surveyed were review articles and another one fourth were based on case study research; fewer than one third were based on quantitative analyses, and the majority of those were descriptive surveys. A number of the survey-oriented articles reported on questionnaires directed at medical and public health disaster workers to evaluate or determine the efficacy of a training protocol or to establish opinion about existing or proposed disaster response practices. Training was discussed or mentioned in 80 of the 303 abstracts included for review, suggesting a widely acknowledged interest in the skills and knowledge required for the evolving science of disaster medicine.[1–3]

In line with the methodology employed in the majority of the research articles, most of the literature was either descriptive (36.0%) or oriented toward organizational development or policy planning (25.1%; Table 2). Frequent topics included disaster response and recovery system improvement, as well as the need to develop cross-jurisdictional or nontraditional partnerships.[4–7] A small proportion of the literature was devoted to epidemiological and health services analyses (11.9%), which generally characterized the nature and types of injuries encountered in disasters or patterns of service utilization trends.[8–13] An additional 20% of the literature focused on evaluating programs and policies, described or proposed operational guidelines or protocols, or reported on needs assessments principally related to workforce and organizational capacity. A small percentage of the research literature used advanced study designs, such as clinical trials or quasiexperimental methods (8.9%), and even fewer used such methods in hypothesis-driven studies (5.3%).

The unit of analysis for three fourths of the literature was either the individual or an organization (Table 3). Furthermore, when viewed along the hazard-phase continuum (prevention/

- The bulk of disaster medicine articles on all topics, including pediatrics, are:
  - Reviews/commentaries
  - Case studies
  - Surveys
- These accounted for ~70% of the articles on disaster medicine and public health preparedness research (n=303) 2002-2007
  - Doesn't look like this has changed much since then…

Research Methodology Used in Disaster Medicine and Public Health Preparedness Research Literature (n = 303 Articles, January 1, 2002–March 10, 2007)

	n	%
Review/commentary	98	32.3
Case study	74	24.4
Survey	37	12.2
Program or policy evaluation	25	8.3
Quasiexperimental/observational	20	6.6
Secondary data/administrative data analysis	20	6.6
Key informant interviews/consensus	12	4.0
Clinical trial	7	2.3
Epidemiological investigation	6	2.0
Operational research/computer modeling	3	1.0
Focus group	1	0.3

Primary Research Objectives of Disaster Medicine and Public Health Preparedness Research Literature (n = 303 Articles, January 1, 2002–March 10, 2007)

	n	%
Descriptive	109	36.0
Organizational/policy planning or development	76	25.1
Epidemiology/health services research/service utilization	36	11.9
Evaluation research	24	7.9
Guideline, algorithm, or protocol development	24	7.9
Hypothesis-driven	16	5.3
Needs assessment	15	5.0
Other	3	1.0

So the "answer" isn't really there…

- In pediatric disaster science, we tend to focus more on the child's response to a hazard, and less on hazards themselves and how they can impact children differently…
  - "kids aren't just little adults" paradigm across all realms of the bio-psycho-social model of health
    - ✓Thinner skin, faster respiratory rate, decision-making capabilities, different psychological manifestations and timing
    - ✓This is so important for managing patients, but it doesn't tell us much about how and *why* they got hurt in the first place…

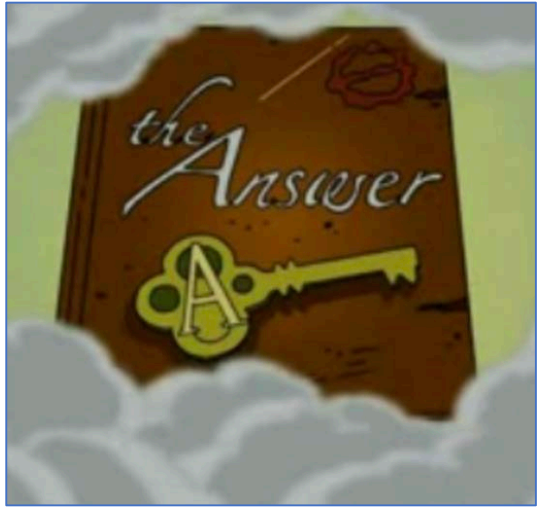


Image: simpsons.fandom.com

So the “answer” isn’t really there…

- But it’s critical to also understand how hazards generate risks that are disproportionate to children:
  - How, where, and why do children get injured in active shooter events?
    - ✓Different question vs. what happens once they are shot
  - During and after Hurricane Katrina, what types of injuries did children receive from wind, water, evacuation, sheltering, etc.? What were the mechanisms of injury?
  - How do children get injured during earthquakes? Are the injury patterns different compared to adults in the same incident? (yes)

So the “answer” isn’t really there…

- Record-keeping and data collection is really hard during a disaster
  - Especially during the early response phase
  - Less reliance on E.H.R.s and written documentation
    - ✓More of a focus on delivering care vs. establishing a patient record
    - ✓Recollection of incident details can be problematic
- And this is where we are extremely challenged in our world
  - Every other specialty of medicine has a good paper (or electron) trail of injuries and illnesses observed, care delivered, and treatments rendered-- often for many, many decades or longer

So the “answer” isn’t really there…

- You’ll here more later about “just in time” research during the response phase of a disaster– this one of the keys to better understanding what is actually happening to children as close to “ground zero” and “time zero” as possible
- Better understanding the patterns and mechanisms of injury to children in disaster can inform purposeful, targeted preparedness
  - As it has with child injury prevention programs related to sports, vehicles, etc.

What do we know?

- The limited literature on this topic suggests:
  - In some no-notice disasters (e.g. terrorism, earthquake), immediate actions taken may be associated with different outcomes
    - ✓These actions differ by age– older kids being more capable of taking action (e.g. moving around during an EQ)– which may be a good or bad thing…
    - ✓Children also affect the dynamics of what adults do in disasters– and the outcomes of this are not clear
    - ✓Major implications for how and what we teach children about disasters that could impact them

What do we know?

- The limited literature on this topic suggests:
  - Although we typically say that children are more/particularly/disproportionately vulnerable to injury and death in disasters this is not universally true (at least in the physical sense)…
    - ✓COVID-19 and SARS (2003) pandemic/outbreak
    - ✓Earthquakes
    - ✓Aircraft crashes
  - Are we missing the opportunity to better understand why children are sometimes less vulnerable?

What do we know?

- The limited literature on this topic suggests:
  - Effectiveness of preparedness?
    - ✓If you survey healthcare workers about the effectiveness of pediatric preparedness exercises at work, the results are positive
  - But what about outcomes?
    - ✓Anecdotal evidence exists when considering the 2011 tsunami in Japan
      - ”prepared” vs. “under-prepared” schools in terms of disaster response exercises
    - ✓Couldn’t find anything more substantial methodologically- no cohort that has been followed from preparedness through to response and recovery
  - And unintended effects/consequences of preparedness?
    - ✓Do preparedness drills impact children’s perceptions of school safety and promote anxiety? Limited evidence suggests no, and the opposite may be true- that preparedness possibly increases confidence (resilience)…
    - ✓Some argue for and some against using children as a vector for preparedness
      - (e.g. “stop, drop, and roll”, seatbelt use, etc.) vs. stress/anxiety concerns

What do we know?

- The limited literature on this topic suggests:
  - Underwhelming family preparedness and concurrent lack of confidence in government capabilities persists
    - ✓One third to almost half unsure of their school's evacuation and relocation plans
    - ✓Half are unsure of the government's ability to meet the needs of children in a disaster
  - Little information about how many schools have effective preparedness plans in place
    - ✓Anecdotally- lockdown and fire evacuation drills are almost universal now, shelter in place (weather) drills done in about 76% of schools
    - ✓Evidence suggests that children retain the information
    - ✓Little knowledge of the <u>efficacy</u> of these plans and exercises, however

What do we know?

- The limited literature on this topic suggests:
  - If we have what we think is an "answer" in disaster science, it's probably not or under-validated in pediatric patients
    - ✓Existing triage systems for disaster– even those that incorporate the concepts of *Model Uniform Core Criteria* (MUCC)– likely do not deliver well in children, with 57-59% accuracy (with 33-39% *under*triaged)
    - ✓Existing triage systems for children do not accurately predict patient outcomes
    - ✓After children are triaged in the field, it is unclear where they should go to obtain the best outcomes

What do we know?

- The limited literature on this topic suggests:
  - Even when we are fortunate enough to have an "answer" that is supported by research and evidence, it may not be acted upon
    - ✓e.g the use of lights and sirens in our cousin discipline EMS
    - ✓We know it's dangerous and doesn't improve patient outcome in most cases
    - ✓Yet that data is almost completely ignored in most communities because it's not how business is done

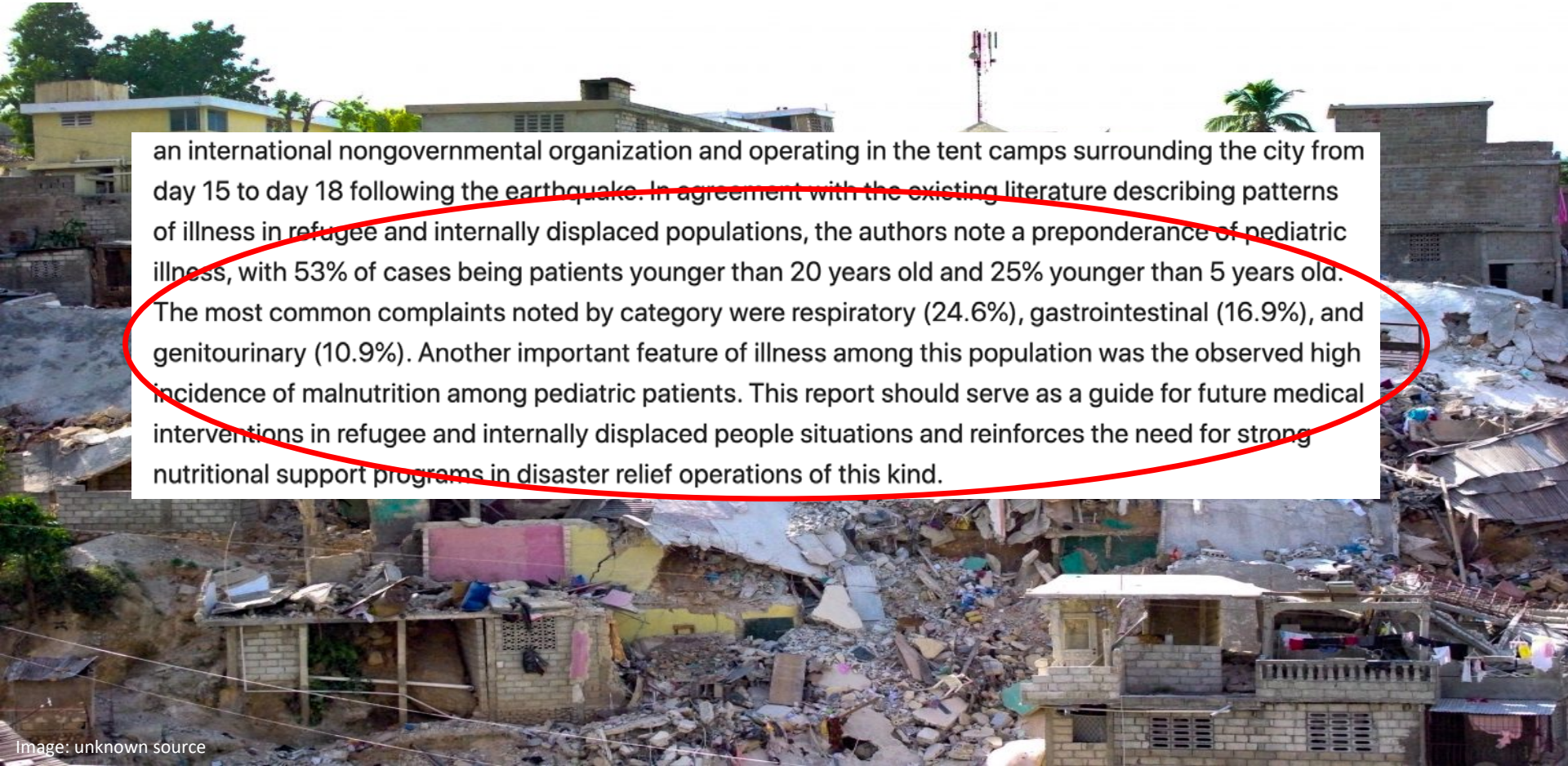
So, in summary

- There is a growing number of articles that consider the topic of preparedness for children and how disasters impact pediatric patients
  - Most of it doesn't meaningfully move towards the "answer" to many of the persistent knowledge gaps in this space
  - "Random acts of preparedness" (Redlener) remains the norm as it has for the past two decades
    - ✓Not a malicious statement- lots of great work is being done
    - ✓But we need to set a better coordinated agenda with funding to develop the right studies with the right methodologies to drive our field and give us some of the answers we need

What do we know?

- I was asked to say a word about how the literature informs deployable disaster response teams
- Given that children make up about a quarter of the population, it makes sense that a major disaster will likely involve children
  - Recent example: Haiti
  - A situation where many disaster response teams were deployed

Example – Haiti field hospitals in 2010



an international nongovernmental organization and operating in the tent camps surrounding the city from day 15 to day 18 following the earthquake. In agreement with the existing literature describing patterns of illness in refugee and internally displaced populations, the authors note a preponderance of pediatric illness, with 53% of cases being patients younger than 20 years old and 25% younger than 5 years old. The most common complaints noted by category were respiratory (24.6%), gastrointestinal (16.9%), and genitourinary (10.9%). Another important feature of illness among this population was the observed high incidence of malnutrition among pediatric patients. This report should serve as a guide for future medical interventions in refugee and internally displaced people situations and reinforces the need for strong nutritional support programs in disaster relief operations of this kind.

Image: unknown source

What do we know?

- While a disaster may involve a lot of children, their needs might not be what you would expect
  - As was seen in Haiti and Hurricane Maria- overall, most of the children had issues that are surprisingly like what we see pediatrics clinics and the ED every day- respiratory, genitourinary, gastrointestinal, dermatologic, etc.
  - In violent disasters like earthquakes and tsunamis, there is typically a switchover from surgical to medical cases over time
  - So how you configure a disaster response team is important
    - ✓All response teams need to be pediatrics-capable
    - ✓Co-management (trauma/medical) capabilities are needed
    - ✓"All pediatrics" disaster response teams are difficult to support in the long term, but may have a role in the response to mega-disasters

This is not easy work

Images: whitehouse.gov

Drop me a line if you want

andrew_garrett@gwu.edu