

Earthquake in Turkey: Disasters and Children

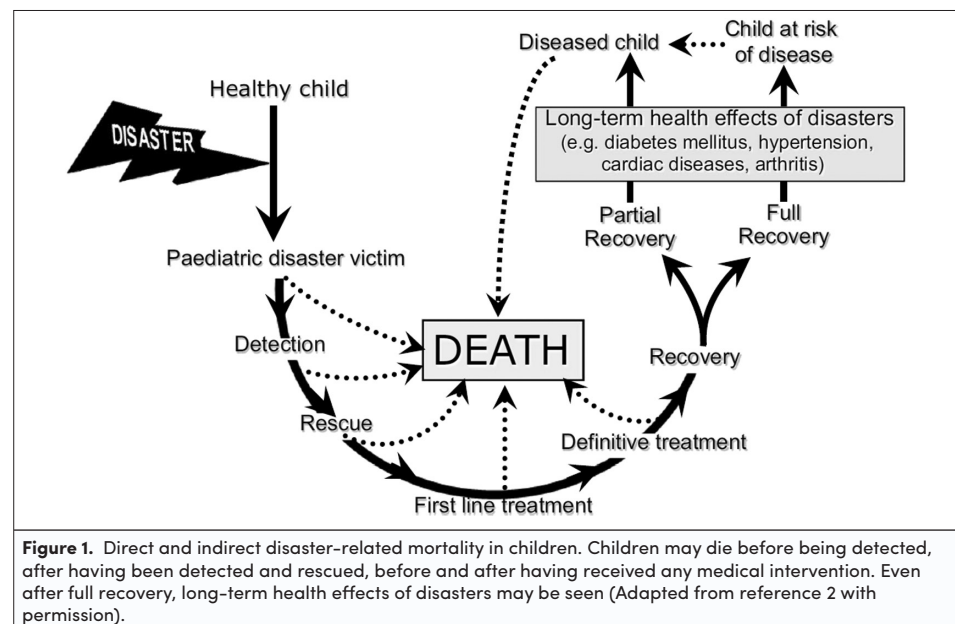
Preparing for the Unexpected, Supporting the Vulnerable!

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Very recently, on 6 February 2023, at 04:17 am local time, a devastating earthquake of magnitude 7.7 occurred in Kahramanmaraş, in southeastern region of Turkey. Some nine hours later, the same area was struck by another earthquake with a magnitude of 7.6 on the Richter scale, with more than 1000 subsequent aftershocks, some of which were greater than magnitude 6. These earthquakes were the most devastating disasters that hit Turkey in the several last centuries, and unfortunately resulted in extensive damage and some 35 000 deaths and 105 000 injured for the time being (one week after the earthquakes).

Disasters, either regional or global, natural (earthquakes, hurricanes, floods, biological hazards...) or man-made (wars, terrorist attacks, conflicts...), are overwhelming events and have significant impacts on the entire community, causing loss and damage to human, material, economic and environmental resources.¹ Because of their physical, psychological, and social vulnerabilities, children are at higher risk of mortality and morbidity than adults.² Figure 1 shows spectrum of direct and indirect disaster-related mortality in children.



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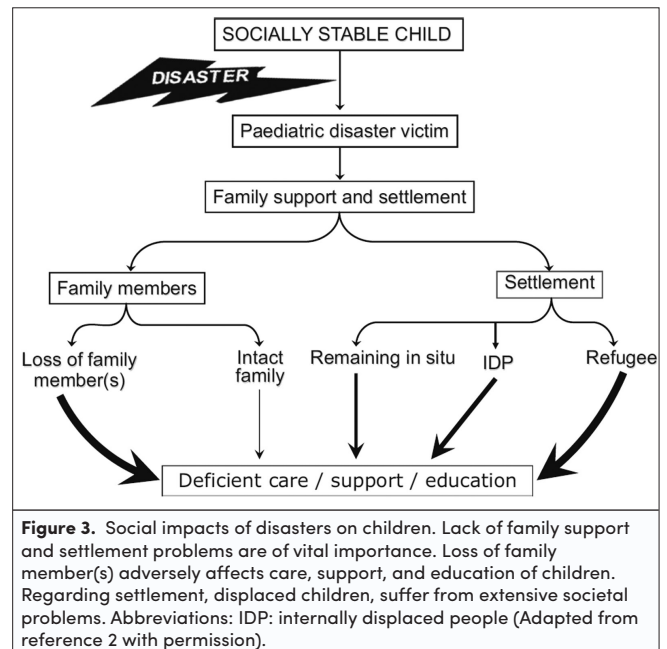
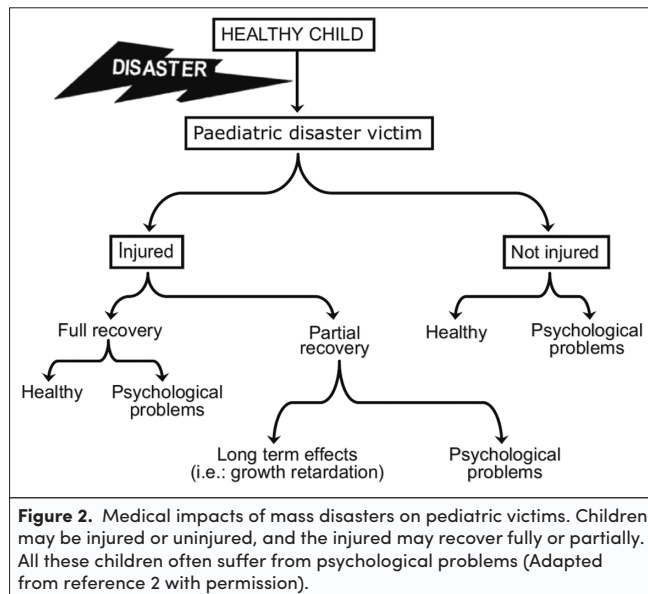
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Children, who survive disasters, may suffer from short- and long- term consequences of disasters due to inadequate settlement, social circumstances, education, and especially being separated from family members.²⁻⁴ Figures 2 and 3 show the medical and social impacts of disasters on pediatric disaster victims.

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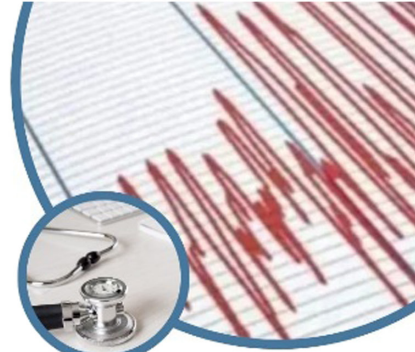


Pediatric Earthquake victims: General approach

- If possible, place an IV access before extrication
- Start **early and vigorous fluid therapy** at the site of extrication (even under the rubble)
- Perform **disaster triage***: «**START - Simple Triage And Rapid Treatment**»
- Determine the crush injury and assess its severity with the trauma team
- Remember that children with crush injury can develop "**crush syndrome**" and "**acute kidney injury**"
- Continue fluid therapy during the rescue and early after extrication
- Do not use NSAIDs for analgesia
- Do not use nephrotoxic antibiotics
- Do not forget tetanus vaccination for open wounds

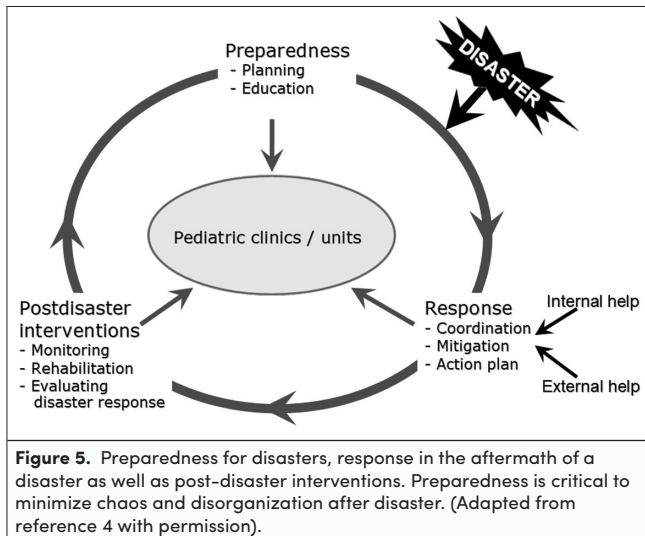


- Start isotonic saline (0.9% NaCl) as early as possible at an infusion rate of 15-20 ml/kg/h (even if the victim is still under the rubble)
- If extrication takes longer than two hours, the infusion rate should be reduced by half
- Continue fluid therapy until the victim reaches the healthcare facility (0.9% NaCl 1500 - 2000 mL/m² can be given in the first 6 hours)
- Do not use fluids containing potassium



- Monitor the patient's urine output
- If patient is anuric or oliguric, restrict fluid infusion (400 mL/m²/day + ongoing losses)
- If there is a crush injury and the patient has good urine output, give 5% dextrose 0.45% NaCl 3000-6000 mL/m²/day + 50 mEq/L NaHCO₃ (in the first few days)
- Avoid adding potassium to fluids or using fluids containing potassium without testing serum potassium levels

Figure 4. Interventions in pediatric crush victims (*see disaster triage).⁹



Crush injury, which is followed by rhabdomyolysis and crush syndrome, is frequent during destructive disasters, especially earthquakes. Undoubtedly, crush syndrome is the second most common cause of death in disasters after the direct impact of trauma.⁵ Crush-related acute kidney injury (AKI) has been reported in 2%–5% of all earthquake casualties. However, this rate varies considerably depending on the disaster, due to intensity and timing of the disaster, the ambient temperature, the structural quality of buildings and the effectiveness of rescue efforts.⁶ In the recent disaster, the exact number of children with crush syndrome or AKI is unknown for now (one week after the earthquakes), but a significant number of pediatric victims with AKI due to crush injury have been reported; some have required dialysis support.

To minimize the risk of crush injury-related AKI, early fluid therapy is of vital importance. Data from children after the 1999 Marmara earthquake in Turkey have shown that AKI did not occur in any patient in whom early fluid therapy was initiated.⁷ Similarly, after the 2003 BAM earthquake in Iran, early intravenous volume replacement has been shown to prevent both AKI and dialysis requirement in children.⁸ Therefore, early and vigorous fluid replacement should start at the site of extrication to prevent the complications of crush syndrome. Interventions in pediatric crush victims have been summarized in Figure 4.⁹

Disasters are inevitable and affect large numbers of people within a short time, leading to panic, chaos, and disorganization in health care provision, and an unexpected increase in the number of patients seeking emergency health services. Therefore, it is necessary to take precautions and to be prepared for unexpected events. Children are especially

vulnerable to disasters and have many specific needs for surgical and medical interventions. However, pediatric considerations are often overlooked in prehospital and hospital-based emergency preparedness plans.^{10,11} A recent survey of tertiary hospitals in Turkey revealed that only 34% of pediatric clinics have disaster planning (unpublished data from the Dialysis Working Group of the Turkish Society of Pediatric Nephrology). Figure 5 shows the preparedness of pediatric clinics and units for disasters.

Many organizations consider and work on preparedness strategies for disasters. The International Society of Nephrology (ISN) announced the theme for 2023-World Kidney Day as “Kidney Health for All” and the motto is “Preparing for the unexpected, supporting the vulnerable!”¹² This motto should be taken into account in all preparedness plans for health care facilities, and children should always be included in disaster scenarios.

Declaration of Interests: The authors declare that they have no competing interest.

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