Disasters and Mass Casualty Incidents Preparedness

EDITOR

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CHAPTER 1

HOSPITAL PREPAREDNESS IN DISASTER AND MASS CASUALTY INCIDENTS

Burcu ÖZKAN [1]
Esra EREN [2]

1. INTRODUCTION

Hospitals are among the critical settings that sustain the community's access to health care during disasters and emergencies. At the same time, these facilities are at risk of being damaged at precisely the moment their services are most needed. According to monitoring data from the United Nations Office for Disaster Risk Reduction (UNDRR), an average of 91,847 critical infrastructure units and facilities, including schools and hospitals, were damaged or rendered completely unusable by disasters each year during the 2015–2024 period (1). This picture moves hospital disaster preparedness beyond a mere matter of service delivery and turns it into an issue that also encompasses the institution's own capacity to remain operational.

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they do not require visible investment; yet it is these two levels that ultimately determine the institution's performance during a disaster.

What these elements have in common is that none of them can be improvised at the time of the event. When it has not been defined in advance at what threshold surge capacity will be activated, which staff will be called in, where alternate care sites will be established, where critical supplies will be obtained, and by whom the command structure will be operated, the time lost in the first hours of the event cannot be recovered later. For this reason, the existence of a hospital disaster plan and its operability should be evaluated separately; the plan should be applicable across different scenarios, tested through regular training and realistic drills, and updated considering the experience gained (3).

In conclusion, hospital disaster preparedness should no longer be treated as an obligation of regulatory compliance but as a capacity that is monitored through measurable indicators, embedded in the institution's routine operations, and encompassing all units. When disaster preparedness becomes a way of life in our homes, our communities, and our hospitals, the response to a real event will be both more effective and less exhausting for those who carry it out.

6. REFERENCES

1. United Nations Office for Disaster Risk Reduction. *Monitoring the Sendai Framework*. (Accessed August 20, 2026, from https://www.undrr.org/implementing-sendai-framework/monitoring-sendai-framework).
2. Işık Ö, Aydınlıoğlu HM, Koç S, et al. Disaster management and disaster-oriented health services. *Journal of Okmeydanı Training and Research Hospital*. 2012;28(Suppl 2): 82–123. doi:10.5222/otd.supp2.2012.082
3. Markenson D, Losinski S. Hospital and emergency department preparedness. In: Veenema TG (ed.) *Disaster nursing and emergency preparedness for chemical, biological, and radiological terrorism and other hazards*. 4th ed. New York: Springer Publishing Company; 2019. p. 51–66.
4. Farah B, Pavlova M, Groot W. Hospital disaster preparedness in sub-Saharan Africa: a systematic review of English literature. *BMC Emergency Medicine*. 2023;23: 71. doi:10.1186/s12873-023-00843-5
5. Çınar Ö, Yıldız E. Level of preparedness for disasters and emergencies

in hospitals: the effect of planning, drill, and unit effectiveness levels. *International Journal of Economic and Administrative Studies*. 2024;43: 125–140. doi:10.18092/ulikidince.1424720

6. Ali HM, Desha C, Ranse J, et al. Planning and assessment approaches towards disaster resilient hospitals: a systematic literature review. *International Journal of Disaster Risk Reduction*. 2021;61: 102319. doi:10.1016/j.ijdrr.2021.102319
7. Pan American Health Organization. *Resilient hospitals: an inter-regional guidance on strengthening resilience to health emergencies and disasters in health facilities*. Washington: PAHO; 2024. doi:10.37774/9789275129067
8. İkizceli İ, Akdeniz YS. Emergency services in disasters from the hospital perspective. *SD Journal*. 2017;42: 40–43.
9. Şahin Ş, Üçgül İ. Disaster management and occupational health and safety in Türkiye. *Journal of Disasters and Risk*. 2019;2(1): 43–63. doi:10.35341/afet.498594
10. Şahin N. Disaster management and emergency aid plans. In: *TMMOB İzmir City Symposium*; January 8–10, 2009; İzmir. TMMOB Chamber of City Planners. p. 131–142.
11. Samei B, Babaie J, Tabrizi JS, et al. Exploring hospitals' functional preparedness effective factors in response to disasters: a qualitative study in a lower middle-income country. *BMC Health Services Research*. 2024;24: 197. doi:10.1186/s12913-024-10630-y
12. Getu SB, Walle Tsegaw F, Arcos González P, et al. Hospital disasters preparedness for mass-casualty incidents at emergency units in Northwest of Ethiopia: a cross-sectional study. *Prehospital and Disaster Medicine*. 2023;38(3): 360–365. doi:10.1017/S1049023X23000365
13. Ugelvik KS, Thomassen Ø, Braut GS, et al. A national study of in-hospital preparedness for mass casualty incidents and disasters. *European Journal of Trauma and Emergency Surgery*. 2025;51(1): 18. doi:10.1007/s00068-024-02685-7
14. Ministry of Health. *Hospital disaster and emergency plan (HDEP) preparation guideline*. 2nd ed. Ankara: Republic of Türkiye Ministry of Health, General Directorate of Emergency Health Services; 2021.
15. Çiçekdağı Hİ, Bozkurt Ö. Hospital Disaster and Emergency Plan (HDEP): a comparative analysis of the 2015 and 2021 preparation guidelines. *Journal of Ankara Health Sciences*. 2022;11(2): 241–251. doi:10.46971/ausbid.1205124
16. Regulation on Disaster and Emergency Response Services. *Official Gazette*. December 18, 2013; No. 28855.
17. Lynn M. Hospital planning and response to sudden mass casualty incidents. In: Lynn M (ed.) *Disaster and mass casualty incidents*. Cham: Springer Nature; 2019. p. 29–42.
18. Nakhle R, Abou Khater D, Mouawad YA, et al. Hospital emergency

preparedness plan review in a low-resource country after a mass casualty incident: the Beirut blast. *Cureus*. 2024;16(10): e71410. doi:10.7759/cureus.71410
19. Hasan MK, Nasrullah SM, Quattrocchi A, et al. Hospital surge capacity preparedness in disasters and emergencies: a systematic review. *Public Health*. 2023;225: 12–21. doi:10.1016/j.puhe.2023.09.017
20. Petanidis S, Chandramouli K, Floros G, et al. Optimizing emergency response in hospitals: a systematic review of surge capacity planning and crisis resource management. *Healthcare*. 2025;13(21): 2819. doi:10.3390/healthcare13212819
21. Armstrong JBP. Preparing your emergency department for disaster: optimizing surge capacity during mass casualty events. *Healthcare Management Forum*. 2024;37(2): 86–89. doi:10.1177/08404704231199403
22. Hendrickson R, Horowitz BZ. Disaster preparedness and response. In: Tintinalli JE (ed.) *Tintinalli's emergency medicine: a comprehensive study guide*. İstanbul: Nobel Tıp Kitabevleri; 2013. p. 29–30.
23. Usta G, Torpuş K, Küçük U. The START triage scale in disasters. *Journal of Natural Disasters and the Environment*. 2017;3(2): 70–76. doi:10.21324/dacd.320067
24. McMahon MM. Hospital impact: emergency department. In: Powers R, Daily E (eds.) *International disaster nursing*. Cambridge: Cambridge University Press; 2010. p. 81–100. doi:10.1017/CBO9780511841415.009
25. Yüksel S. Hospital and emergency unit preparedness in disasters. In: Öztekin SD (ed.) *Disaster nursing*. Ankara: Türkiye Clinics; 2018. p. 16–22.
26. Shafiei A, Arsalani N, Beyrami Jam M, et al. The impact of surge capacity enhancement training for nursing managers on hospital disaster preparedness and response: an action research study. *BMC Emergency Medicine*. 2024;24(1): 153. doi:10.1186/s12873-024-00930-1
27. Samei B, Babaie J, Tabrizi JS, et al. Factors affecting the functional preparedness of hospitals in response to disasters: a systematic review. *Bulletin of Emergency & Trauma*. 2023;11(3): 109–118. doi:10.30476/BEAT.2023.97841.1414
28. Regulation on the Implementation of Hospital Disaster and Emergency Plans (HDEP). *Official Gazette*. March 18, 2020; No. 31072.
29. Karcıoğlu Ö, Topaçoğlu H. Emergency department triage in war and terror disasters. *The Medical Journal of Okmeydanı Training and Research Hospital*. 2017;33(Suppl): 1–8. doi:10.5222/otd.2017.001
30. Açıksarı K. Scene management and central management in disasters. *Türkiye Clinics: Emergency Medicine – Special Topics*. 2019;5(1): 40–48.
31. Kemaloğlu M. The history and legal development of disaster management in Türkiye. *Akademik Bakış Journal*. 2015;52: 126–147.

CHAPTER 2

EMERGENCY DEPARTMENT PREPAREDNESS IN DISASTERS AND MASS CASUALTY INCIDENTS

Burcu ÖZKAN [1]

1. INTRODUCTION

Disasters and mass casualty incidents can upset the balance between needs and available resources by causing several patients or casualties that exceeds hospitals' existing capacity to present to health care facilities within a short time (1). Hospital preparedness for such events therefore requires planning for different scenarios and establishing an effective incident command system that supports rapid decision-making (2).

The emergency department is one of the areas where this preparedness is tested first and most critically. While the emergency department forms the link between prehospital emergency medical services and in-hospital diagnostic, treatment, and definitive care processes, it is also a critical node through which the increasing patient load is transmitted to the entire hospital system. The simultaneous arrival of large numbers of casualties at the hospital without prior notification can place sudden pressure on triage, staff, treatment areas, bed capacity, and other hospi-

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In conclusion, strong emergency department preparedness means not only being able to care for more patients when faced with large numbers of casualties but also being able to recognize changing conditions quickly, reset priorities, allocate resources appropriately, and maintain service continuity.

This capacity can be built only through a system that is planned, tested in practice, measured, and further developed after each disaster experience. Consequently, the resilience of the emergency department in disaster and mass casualty management is one of the key determinants not only of the response at the time of the event but also of the capacity of the health care system to continue functioning under extraordinary conditions.

7. REFERENCES

1. Işık Ö, Aydınlıoğlu HM, Koç S, et al. Disaster management and disaster-oriented health services. *The Medical Journal of Okmeydanı Training and Research Hospital*. 2012;28(Suppl 2): 82–123. doi:10.5222/otd.supp2.2012.082
2. Markenson D, Losinski S. Hospital and emergency department preparedness. In: Veenema TG (ed.) *Disaster nursing and emergency preparedness for chemical, biological, and radiological terrorism and other hazards*. 4th ed. New York: Springer Publishing Company; 2019. p. 51–66.
3. Çakın Ö, Yüce Aktepe M, Acar S, et al. Kahramanmaraş-Pazarcık earthquake 2023: characteristics of patients presented to the emergency department of a tertiary hospital far from the region and infection characteristics in hospitalized patients. *Prehospital and Disaster Medicine*. 2024;39(1): 25–31. doi:10.1017/S1049023X24000062
4. Ugelvik KS, Thomassen Ø, Braut GS, et al. A national study of in-hospital preparedness for mass casualty incidents and disasters. *European Journal of Trauma and Emergency Surgery*. 2025;51(1): 18. doi:10.1007/s00068-024-02685-7
5. Suda AJ, Franke A, Hertwig M, et al. Management of mass casualty incidents: a systematic review and clinical practice guideline update. *European Journal of Trauma and Emergency Surgery*. 2025;51(1): 5. doi:10.1007/s00068-024-02727-0
6. Aldossari FM, Al Bensaad HS. The evolving role of the emergency department in mass casualty incident (MCI) response: a review of triage, surge capacity, and decontamination strategies. *Asian Journal of Medicine*

and Health. 2025;23(10): 27–40. (Accessed September 15, 2026, from https://hal.science/hal-05309255).
7. Faul M, Sasser SM, Lairet J, et al. Trauma center staffing, infrastructure, and patient characteristics that influence trauma center need. *Western Journal of Emergency Medicine*. 2015;16(1): 98–106. doi:10.5811/westjem.2014.10.22837
8. Bucher L. Emergency, terrorism, and disaster nursing. In: Lewis SL, Dirksen SR, Heitkemper MM, et al. (eds.) *Medical-surgical nursing: assessment and management of clinical problems*. 8th ed. St. Louis: Mosby; 2011.
9. McMahon MM. Hospital impact: emergency department. In: Powers R, Daily E (eds.) *International disaster nursing*. Cambridge: Cambridge University Press; 2010. p. 81–100. doi:10.1017/CBO9780511841415.009
10. Slepski LA. Emergency preparedness: concept development for nursing practice. *Nursing Clinics of North America*. 2005;40(3): 419–430.
11. Karcıoğlu Ö, Topaçoğlu H. Emergency department triage in war and terror disasters. *The Medical Journal of Okmeydanı Training and Research Hospital*. 2017;33(Suppl): 1–8. doi:10.5222/otd.2017.001
12. Nakhle R, Abou Khater D, Mouawad YA, et al. Hospital emergency preparedness plan review in a low-resource country after a mass casualty incident: the Beirut blast. *Cureus*. 2024;16(10): e71410. doi:10.7759/cureus.71410
13. Bloch YH, Leiba A, Veaacnin N, et al. Managing mild casualties in mass-casualty incidents: lessons learned from an aborted terrorist attack. *Prehospital and Disaster Medicine*. 2007;22(3): 181–185. doi:10.1017/S1049023X00004623
14. Açıksarı K. Scene management and central management in disasters. *Türkiye Clinics: Emergency Medicine – Special Topics*. 2019;5(1): 40–48.
15. Usta G, Torpuş K, Küçük U. The START triage scale in disasters. *Journal of Natural Disasters and the Environment*. 2017;3(2): 70–76. doi:10.21324/dacd.320067
16. Koop D, Ward M. Major incident preparedness management. In: Curtis K, Ramsden C (eds.) *Emergency and trauma care for nurses and paramedics*. Chatswood: Mosby Australia; 2011. p. 185–220.
17. Frykberg ER. Medical management of disasters and mass casualties from terrorist bombings: how can we cope? *The Journal of Trauma*. 2002;53(2): 201–212. doi:10.1097/00005373-200208000-00001
18. Bazyar J, Farrokhi M, Salari A, et al. Accuracy of triage systems in disasters and mass casualty incidents: a systematic review. *Archives of Academic Emergency Medicine*. 2022;10(1): e32. doi:10.22037/aaem.v10i1.1526
19. Lerner EB, Schwartz RB, Coule PL, et al. Mass casualty triage: an evaluation of the data and development of a proposed national guideline. *Disaster Medicine and Public Health Preparedness*. 2008;2(Suppl. 1): 25–34. doi:10.1097/DMP.0b013e318182194e

20. Lerner EB, Cone DC, Weinstein ES, et al. Mass casualty triage: an evaluation of the science and refinement of a national guideline. *Disaster Medicine and Public Health Preparedness*. 2011;5(2): 129–137. doi:10.1001/dmp.2011.39
21. Kahn CA, Lerner EB, Cone DC. Triage. In: Koenig KL, Schultz CH (eds.) *Koenig and Schultz's disaster medicine: comprehensive principles and practices*. 2nd ed. Cambridge: Cambridge University Press; 2016. p. 208–218. doi:10.1017/CBO9781139629317.017
22. Romig LE. Pediatric triage. A system to JumpSTART your triage of young patients at MCIs. *JEMS: a journal of emergency medical services*. 2002;27(7): 52–58. PMID: 12141119
23. Usoro A, Mehmood A, Rapaport S, et al. A scoping review of the essential components of emergency medical response systems for mass casualty incidents. *Disaster Medicine and Public Health Preparedness*. 2023;17: e274. doi:10.1017/dmp.2022.235
24. Singh P, Sapkota S, Achour N, et al. Learning from the past: a scoping review of hospital disaster preparedness assessment. *BMC Emergency Medicine*. 2026;26(1): 43. doi:10.1186/s12873-026-01474-2
25. Maimone S, Creary K, Miele J, et al. Crisis-optimized patient tracking: a novel approach for mass casualty incident management in emergency departments. *Disaster Medicine and Public Health Preparedness*. 2026;20: e97. doi:10.1017/dmp.2026.10360
26. Özkan B, Çetinkaya Kutun F. Disaster psychology. *Health Care Academician Journal*. 2021;8(3): 249–256. doi:10.52880/sagakaderg.868877
27. Özkan B. Mass casualties and disaster psychology. In: Uyar Hazar H (ed.) *Health & Science 2025: Nursing-III*. İstanbul: Efe Akademi Publications; 2025. p. 87–106. doi:10.59617/efepub2025169
28. Anesi GL. Hospital transfers across US regions to address the "space" shortage in a pandemic: a public good. *Clinical Infectious Diseases*. 2021;73(11): e4111–e4112. doi:10.1093/cid/ciaa1596
29. Gerdan S, Yazıcı A, Yılmaz S, et al. Sustainability of health services in a university hospital during disaster: the Kahramanmaraş earthquakes experience. *Bezmialem Science*. 2025;13(4): 334–341. doi:10.14235/bas.galenos.2025.25993
30. Sarzynski SH, Mancera AG, Yek C, et al. Trends in patient transfers from overall and caseload-strained US hospitals during the COVID-19 pandemic. *JAMA Network Open*. 2024;7(2): e2356174. doi:10.1001/jamanetworkopen.2023.56174
31. Tayfur I, Kako M, Gündüz A, et al. Exploring key capacities: insights from assessing the resilience of the public health system before and after the Kahramanmaraş earthquakes. *International Journal of Disaster Risk Science*. 2024;15(5): 688–702. doi:10.1007/s13753-024-00588-0
32. Hasan MK, Nasrullah SM, Quattrocchi A, et al. Hospital surge capacity preparedness in disasters and emergencies: a systematic review. *Public*

Health. 2023;225: 12–21. doi:10.1016/j.puhe.2023.09.017
33. Petanidis S, Chandramouli K, Floros G, et al. Optimizing emergency response in hospitals: a systematic review of surge capacity planning and crisis resource management. *Healthcare*. 2025;13(21): 2819. doi:10.3390/healthcare13212819
34. Semerci M, Şahinöz S. Disaster preparedness of public hospitals. *Urban Academy*. 2024;17(1): 294–307. doi:10.35674/kent.1399123
35. Seyghalani Talab F, Ahadinezhad B, Khosravizadeh O, et al. A model of the organizational resilience of hospitals in emergencies and disasters. *BMC Emergency Medicine*. 2024;24(1): 105. doi:10.1186/s12873-024-01026-6
36. Pan American Health Organization. *Resilient hospitals: an inter-regional guidance on strengthening resilience to health emergencies and disasters in health facilities*. Washington: PAHO; 2024. doi:10.37774/9789275129067
37. Shafiei A, Arsalani N, Beyrami Jam M, et al. The impact of surge capacity enhancement training for nursing managers on hospital disaster preparedness and response: an action research study. *BMC Emergency Medicine*. 2024;24(1): 153. doi:10.1186/s12873-024-00930-1
38. Presidency of the Republic of Türkiye, Presidency of Strategy and Budget. *2023 Kahramanmaraş and Hatay earthquakes report*. Ankara; 2023. (Accessed September 15, 2026, from https://www.sbb.gov.tr/2023-kahramanmaras-ve-hatay-depremleri-raporu/).
39. Yarkaç A, Buyurgan ÇS, Bozkurt Babuş S, et al. Mersin University Medical Faculty Hospital Emergency Department and triage organization after the 2023 Kahramanmaraş earthquake. *Global Emergency and Critical Care*. 2023;2(3): 109–116. doi:10.4274/globecc.galenos.2023.35220
40. Köroğlu M, Karakaplan M, Ergen E, et al. The initial response of a local hospital in the earthquake zone during the February 6, 2023 Kahramanmaraş earthquakes: injuries and challenges. *Acta Orthopaedica et Traumatologica Turcica*. 2023;57(6): 315–321. doi:10.5152/j.aott.2023.23138
41. Sarı H, Özel M, Akkoç MF, et al. First-week analysis after the Turkey earthquakes: demographic and clinical outcomes of victims. *Prehospital and Disaster Medicine*. 2023;38(3): 294–300. doi:10.1017/S1049023X23000493
42. Atmis B, Bayazit AK, Cagli Piskin C, et al. Factors predicting kidney replacement therapy in pediatric earthquake victims with crush syndrome in the first week following rescue. *European Journal of Pediatrics*. 2023;182(12): 5591–5598. doi:10.1007/s00431-023-05250-3
43. Buyurgan ÇS, Bozkurt Babuş S, Yarkaç A, et al. Demographic and clinical characteristics of earthquake victims presented to the emergency department with and without crush injury upon the 2023 Kahramanmaraş (Turkey) earthquake. *Prehospital and Disaster Medicine*. 2023;38(6): 707–715. doi:10.1017/S1049023X23006416
44. Sofuoğlu Z, Başer A, Sofuoğlu T, et al. First responders' experiences with major earthquakes in Türkiye: a qualitative study of innovation needs and

challenges. *BMC Emergency Medicine*. 2025;25(1): 60. doi:10.1186/s12873-025-01217-9

45. Tahernejad A, Sahebi A, Salehi Sahl Abadi A, et al. Application of artificial intelligence in triage in emergencies and disasters: a systematic review. *BMC Public Health*. 2024;24(1): 3203. doi:10.1186/s12889-024-20447-3

CHAPTER 3

EMERGENCY DEPARTMENT PREPAREDNESS AND DECONTAMINATION IN CBRN INCIDENTS

Burcu ÖZKAN [1]

1. INTRODUCTION

The concept of chemical, biological, radiological, nuclear, and explosive (CBRNE) incidents encompass events caused by chemical or biological agents, radioactive or nuclear materials, and explosive elements that can seriously threaten public health and the functioning of health services (1,2). While the term CBRNE offers a broader framework that brings these five risk groups together, the abbreviation CBRN is used in Türkiye's national disaster management terminology to refer to chemical, biological, radiological, and nuclear hazards (3). Within this framework, CBRN can be defined as the set of incidents that, when hazardous agents are released into the environment accidentally or intentionally, can affect large numbers of people within a short time and disrupt the normal functioning of health services (4). Although health care institutions are the main centers where medical intervention is carried out in

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8. CONCLUSION

Preparedness undertaken before an incident lies at the foundation of a safe and orderly response to CBRN incidents. To this end, preparedness should not be viewed merely as procuring equipment or setting up a decontamination area. Assessing possible risks in advance, defining duties and responsibilities, ensuring that staff have the knowledge and skills to carry out these duties, and keeping the necessary physical conditions ready form a complementary whole.

The unexpected presentation of a contaminated patient to the emergency department clearly shows why preparedness should be treated as part of daily operations. Recognizing the patient early, directing the patient to a safe area, and initiating the appropriate decontamination process are important for the safety not only of the patient but also of health care workers and other patients. In this process, the route the patient will follow from entry to the safe care area must be determined in advance, just as much as how decontamination will be performed.

CBRN preparedness should therefore be thought of not so much as equipment standing by but as a system that staff know, can implement, and can operate together when necessary. Testing this system through regular training and drills makes it possible to identify shortcomings before a real incident occurs and to keep plans up to date. Such an approach to preparedness will help the hospital act more safely and in a more coordinated manner in the face of the uncertainty of CBRN incidents and will contribute to maintaining health services as uninterrupted as possible.

9. REFERENCES

1. Goulart De Medeiros M, Lequarre A, Geypens B, et al. *EU CBRNe glossary*. Luxembourg: Publications Office of the European Union; 2022. JRC128863. doi:10.2760/0
2. Health Canada. *Chemical, biological, radiological, nuclear and explosive (CBRNE) events*. Ottawa: Government of Canada; 2021. (Accessed September 18, 2026, from https://www.canada.ca/en/health-canada/

services/health-concerns/emergencies-disasters/chemical-biological-radiological-nuclear-explosive-events.html).
3. Disaster and Emergency Management Presidency (AFAD). *CBRN glossary of terms*. Ankara: Republic of Türkiye Ministry of Interior; 2021. (Accessed September 18, 2026, from https://www.afad.gov.tr/kurumlar/afad.gov.tr/e_Kutuphane/Kitaplar/KBRN-Terimler-Sozlugu-2021.pdf).
4. Qzih ES, Ahmad MM. Hospital-based preparedness measures for CBRNE disasters: a systematic review. *Environmental Health Insights*. 2024;18. doi:10.1177/11786302241288859
5. Ranse J, Mackie B, Crilly J, et al. Strengthening emergency department response to chemical, biological, radiological, and nuclear disasters: a scoping review. *Australasian Emergency Care*. 2025;28(1): 37–47. doi:10.1016/j.auec.2024.09.003
6. Razak S, Hignett S, Barnes J. Emergency department response to chemical, biological, radiological, nuclear, and explosive events: a systematic review. *Prehospital and Disaster Medicine*. 2018;33(5): 543–549. doi:10.1017/S1049023X18000900
7. Daniels R, Nicoll L. Mass casualty care. In: *Contemporary medical-surgical nursing*. 2nd ed. Clifton Park (NY): Delmar Cengage Learning; 2012. p. 1885.
8. McMahon MM. Hospital impact: emergency department. In: Powers R, Daily E (eds.) *International disaster nursing*. Cambridge: Cambridge University Press; 2010. p. 81–100. doi:10.1017/CBO9780511841415.009
9. Markenson D, Losinski S. Hospital and emergency department preparedness. In: Veenema TG (ed.) *Disaster nursing and emergency preparedness for chemical, biological, and radiological terrorism and other hazards*. 4th ed. New York: Springer Publishing Company; 2019. p. 51–66.
10. Regulation on Duties Regarding Chemical, Biological, Radiological and Nuclear Threats and Hazards. *Official Gazette*; October 1, 2020, No. 31261.
11. Chilcott RP. Managing mass casualties and decontamination. *Environment International*. 2014;72: 37–45. doi:10.1016/j.envint.2014.02.006
12. Republic of Türkiye Ministry of Health, General Directorate of Emergency Health Services. *Directive on the duties of the Ministry of Health and its affiliated institutions regarding chemical, biological, radiological and nuclear hazards*. Ankara: Republic of Türkiye Ministry of Health; 2014.
13. Regulation on Disaster and Emergency Response Services. *Official Gazette*; February 24, 2022, No. 31760.
14. Johnston GM, Wills BK. *Chemical decontamination*. Treasure Island (FL): StatPearls Publishing; 2023. (Accessed September 18, 2026, from https://www.ncbi.nlm.nih.gov/books/NBK538161/).
15. Institute of Medicine (US) Committee on R&D Needs for Improving Civilian Medical Response to Chemical and Biological Terrorism Incidents. Personal protective equipment. In: *Chemical and biological terrorism: research and development to improve civilian medical response*. Washington

(DC): National Academies Press; 1999. (Accessed September 18, 2026, from https://www.ncbi.nlm.nih.gov/books/NBK230676/).
16. Zhang HL, Yang S, Luo HX, et al. The error-prone operational steps and key sites of self-contamination during donning and doffing of personal protective equipment by health care workers. *Disaster Medicine and Public Health Preparedness*. 2022;16(6): 2486–2491. doi:10.1017/dmp.2021.142
17. Malek A, Hertelendy AJ, Alshaikh E, et al. Effectiveness of chemical, biological, radiological, nuclear, explosive (CBRNE) event-response training in a hospital setting: a scoping review. *Disaster Medicine and Public Health Preparedness*. 2025;20: e2. doi:10.1017/dmp.2025.10274
18. Héon D, Foltin GL. Principles of pediatric decontamination. *Clinical Pediatric Emergency Medicine*. 2009;10(3): 186–194. doi:10.1016/j.cpem.2009.06.006
19. Chilcott RP, Larner J, Matar H. UK's initial operational response and specialist operational response to CBRN and HazMat incidents: a primer on decontamination protocols for healthcare professionals. *Emergency Medicine Journal*. 2019;36(2): 117–123. doi:10.1136/emermed-2018-207562
20. Alshaikh E, Hertelendy AJ, Issa F, et al. Evaluating the effectiveness of dry decontamination methods for hazmat incidents: a scoping review. *Disaster Medicine and Public Health Preparedness*. 2025;19: e160. doi:10.1017/dmp.2025.10058
21. Karcıoğlu Ö, Topaçoğlu H. Emergency department triage in war and terror disasters. *The Medical Journal of Okmeydanı Training and Research Hospital*. 2017;33(Suppl): 1–8. doi:10.5222/otd.2017.001
22. Chilcott RP, Mitchell H, Matar H. Optimization of nonambulant mass casualty decontamination protocols as part of an initial or specialist operational response to chemical incidents. *Prehospital Emergency Care*. 2019;23(1): 32–43. doi:10.1080/10903127.2018.1469705
23. Amlôt R, Carter H, Riddle L, et al. Volunteer trials of a novel improvised dry decontamination protocol for use during mass casualty incidents as part of the UK's Initial Operational Response (IOR). *PLOS ONE*. 2017;12(6): e0179309. doi:10.1371/journal.pone.0179309
24. Kassouf N, Syed S, Larner J, et al. Evaluation of absorbent materials for use as ad hoc dry decontaminants during mass casualty incidents as part of the UK's Initial Operational Response (IOR). *PLOS ONE*. 2017;12(2): e0170966. doi:10.1371/journal.pone.0170966
25. Aldossari FM, Al Bensaad HS. The evolving role of the emergency department in mass casualty incident (MCI) response: a review of triage, surge capacity, and decontamination strategies. *Asian Journal of Medicine and Health*. 2025;23(10): 27–40. (Accessed September 15, 2026, from https://hal.science/hal-05309255).
26. Newgard CD, Lin A, Malveau S, et al. Emergency department pediatric readiness and short-term and long-term mortality among children

receiving emergency care. *JAMA Network Open*. 2023;6(1): e2250941. doi:10.1001/jamanetworkopen.2022.50941
27. Alshaikh E, Issa F, Hertelendy AJ, et al. Pediatric decontamination considerations in CBRN events: a scoping review. *Disaster Medicine and Public Health Preparedness*. 2025;19: e333. doi:10.1017/dmp.2025.10260
28. Hignett S, Hancox G, Otter ME. Chemical, biological, radiological, nuclear and explosive (CBRNe) events: systematic literature review of evacuation, triage and decontamination for vulnerable people. *International Journal of Emergency Services*. 2019;8(2): 175–190. doi:10.1108/IJES-05-2018-0030
29. Carter H, Drury J, Amlôt R, et al. Effective responder communication improves efficiency and psychological outcomes in a mass decontamination field experiment: implications for public behaviour in the event of a chemical incident. *PLOS ONE*. 2014;9(3): e89846. doi:10.1371/journal.pone.0089846
30. Kippnich M, Schorscher N, Sattler H, et al. Managing CBRN mass casualty incidents at hospitals—find a simple solution for a complex problem: a pilot study. *American Journal of Disaster Medicine*. 2024;19(1): 25–31. doi:10.5055/ajdm.0471
31. Lee J, Henne JE, Welsh J. Emergency preparedness in perioperative services [Safety First]. *AORN Journal*. 2024;120(4): 251–257. doi:10.1002/aorn.14221

BÖLÜM 4

VULNERABLE GROUPS IN DISASTERS: AN ASSESSMENT FROM A NURSING PERSPECTIVE

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1. INTRODUCTION

Disasters are a major public health problem that affects millions of people worldwide each year, leading to increases in morbidity and mortality, disruptions in health services, and significant economic losses (1). However, the effects of disasters on society are not the same for everyone. Children, older adults, individuals with disabilities, pregnant and postpartum women, people with chronic illnesses, and migrants and refugees may face greater risks and difficulties before, during, and after disasters. In the literature, these groups are generally defined as "vulnerable groups" (2).

The February 6, 2023 Kahramanmaraş earthquakes brought the visibility of vulnerable groups in disaster management in Türkiye, and the gaps in practice in this area, back onto the agenda (3). The inadequacy of planning for vulnerable groups in the processes of sheltering, access to health care, evacuation, and psychosocial support has been demonstrated repeatedly by field experience (3–5).

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ing education programs. It should also be emphasized that health care workers who provide culturally sensitive services to migrants and refugees (9) and mental health professionals (17) are an integral part of this multidisciplinary team.

6. CONCLUSION

The vulnerable groups discussed in this chapter face more severe consequences than the rest of society before, during, and after disasters. At the same time, it is evident that this situation is shaped by the intersection of factors such as age, health status, gender, socioeconomic status, and migration status and cannot be reduced to a single cause.

Health professionals, nurses in particular, play an important role in meeting the needs of vulnerable groups in all phases of disaster management. However, the existing educational and regulatory infrastructure for disaster nursing in Türkiye has aspects that need to be developed to meet these needs (16). Accordingly, it is important to give greater emphasis to disaster care specific to vulnerable groups within the scope of disaster nursing in nursing and midwifery education programs, to develop practices in local disaster plans that take group characteristics into account in areas such as evacuation, triage, and psychosocial support, and to increase empirical research based on samples from Türkiye. Such efforts can contribute to better meeting the needs of vulnerable groups in disaster preparedness and response processes and to planning health services more inclusively.

7. REFERENCES

1. İpekçi NN. Health of vulnerable groups in disasters. *Journal of Health Sciences and Clinical Research*. 2023;2(3): 147–156. doi:10.5281/zenodo.10445745
2. Arı Kovancı Y. Disasters and vulnerable groups. *The Journal of Siirt University Institute of Social Sciences*. 2024;12(1): 13–30. doi:10.53586/susbid.1474653

3. Needs Map. (2025). Lessons learned from the Kahramanmaraş earthquakes response process: Vulnerable groups thematic analysis report. Needs Map.
4. Sözer H. Identification of vulnerable groups among Kahramanmaraş earthquake survivors and the development of policies on safety, security, and trust. In: Öztürk M, Kırca M (eds.) *Academic recommendations for the aftermath of the Kahramanmaraş-centered earthquakes*. Gaziantep: Özgür Publications; 2023. p. 411–424.
5. Altıok B, Arıcı A, Özüçelik DN. Effects of the February 6, 2023 Kahramanmaraş earthquakes on women and children and social work interventions. *Socrates Journal of Interdisciplinary Social Researches*. 2025;11(52): 1–28. doi:10.5281/zenodo.15244885
6. Wisner B, Blaikie P, Cannon T, et al. *At risk: natural hazards, people's vulnerability and disasters*. 2nd ed. London: Routledge; 2004.
7. Cutter SL, Boruff BJ, Shirley WL. Social vulnerability to environmental hazards. *Social Science Quarterly*. 2003;84(2): 242–261. doi:10.1111/1540-6237.8402002
8. Yılmaz S. *Disasters and vulnerable groups*. Emergency Medicine Association of Turkey, Disaster Commission, Disaster Article Series; 2024. (Accessed September 16, 2026, from https://tatd.org.tr/afet/afet-yazi-dizisi/afetler-ve-kirilgan-gruplar/).
9. Doust Mohammadi MM, Salmani I, Farahmandnia H. Social vulnerabilities among immigrants and refugees in emergencies and disasters: a systematic review. *Frontiers in Public Health*. 2024;11: 1235464. doi:10.3389/fpubh.2023.1235464
10. Aral N. Effects of earthquakes on children. *Journal of Child and Development*. 2023;6(11): 93–105. doi:10.36731/cg.1299175
11. Özkan B, Çetinkaya Kutun F. Disaster psychology. *Health Care Academician Journal.* 2021;8(3): 249–256. doi:10.52880/sagakaderg.868877
12. Açık B, Demir M, Adalı S, et al. Psychological interventions for post-traumatic stress disorder developing after earthquakes in Türkiye: a systematic review. *Journal of Disaster and Risk*. 2025;8(2): 468–486. doi:10.35341/afet.1422407
13. Bayraktar N, Dal Yılmaz Ü. Vulnerability of elderly people in disasters: a systematic review. *Turkish Journal of Geriatrics*. 2018;21(3): 467–482. doi:10.31086/tjgeri.2018344062
14. Türk A. A disability-sensitive disaster management model specific to earthquakes. *Journal of Disaster and Risk*. 2022;5(1): 61–77. doi:10.35341/afet.1078869
15. Küçükkaya B, Özoğlu M. The effect of earthquakes experienced during pregnancy on maternal health and birth outcomes: a review. *The Journal of Social Health*. 2025;5(1): 1–14. doi:10.69514/sosyalsaglik.1476363
16. Gümüş D, Yılmaz Z, Tuncer M, et al. The role of nurses in disaster management. *Journal of Disaster and Risk*. 2024;7(2): 354–367.

doi:10.35341/afet.1329817
17. Arıca F, Çakır C, Kağnıcı DY. Psychosocial services in disasters with a focus on vulnerable groups. *Journal of Disaster and Risk*. 2023;6(1): 176–187. doi:10.35341/afet.1173165
18. Al Thobaity A. Overcoming challenges in nursing disaster preparedness and response: an umbrella review. *BMC Nursing*. 2024;23: 562. doi:10.1186/s12912-024-02226-y