

Alleviating Acute Pain Alongside Life-Threatening Conditions During Disaster Management

 Robyna Irshad Khan[†]

[†]Correspondence email: robyna.khan@aku.edu

Abstract

Disasters overwhelm health systems, forcing clinicians to make rapid decisions where survival takes precedence over comfort. While the triage principle of ‘the greatest good for the greatest number’ justifies prioritising life-saving interventions, pain relief is too often neglected. However, unrelieved acute pain worsens physiological instability, delays recovery, and compounds psychological trauma. In this article, we argue that managing acute pain should be recognised as a fundamental element of humanitarian response, not an optional adjunct. Drawing on global evidence and examples from the 2005 Pakistan earthquake, terrorist bombings, and floods, we explore the clinical, ethical, and operational challenges of providing analgesia in resource-limited settings. Ketamine, opioids, and regional anaesthesia techniques remain the backbone of disaster analgesia, supported by simple non-pharmacological measures and task shifting where necessary. Ethical frameworks emphasise dignity, justice, and competence as integral to disaster care. Global experiences consistently show that effective pain management is achievable even in austere conditions when explicitly planned for. Integrating pain relief into triage algorithms, disaster kits, and responder training ensures that humanitarian medicine addresses both survival and suffering, reaffirming the central purpose of health care: to relieve pain and preserve human dignity.

Key words: acute pain, disasters, pain management, analgesia, resource-limited settings, disaster medicine

INTRODUCTION

Disasters, whether natural or manmade, overwhelm health systems and force health care providers to make rapid and often agonising decisions. Earthquakes, floods, armed conflicts, pandemics, and mass-casualty incidents create sudden surges of critically ill or injured patients, frequently in environments where resources are scarce. In such circumstances, clinical teams tend to prioritise interventions that preserve life, securing the airway, maintaining circulation, controlling haemorrhage, and treating shock. This approach aligns with the long-standing triage principle of achieving the ‘greatest good for the greatest number,’ which has shaped disaster medicine globally.^{1,2} However, pain, though rarely regarded as life-threatening, is one of the most immediate and distressing symptoms experienced by survivors of disasters. Unrelieved acute pain is not merely discomfort; it exacerbates physiological stress, impedes mobilisation, delays wound healing, and can lead to long-term psychological consequences, including posttraumatic stress disorder (PTSD).³ Failure to treat pain undermines the dignity of patients when they are already profoundly vulnerable. The humanitarian imperative, to alleviate suffering and preserve dignity, places pain relief alongside

life-saving interventions as a fundamental obligation of disaster medicine.⁴

Historically, disaster and emergency medicine have often neglected pain management. Reports from field hospitals in World War II describe surgeries performed with minimal anaesthesia due to shortages, where survival was valued over comfort.⁵ Decades later, in humanitarian crises like the Ethiopian famine or Balkan conflicts, pain relief was rarely mentioned in field reports, reflecting a systemic undervaluing of its importance.⁶ More recent disasters, from the 2004 Indian Ocean tsunami to the 2010 Haiti earthquake, have shown that despite medical advances, pain continues to be sidelined, particularly in low-resource and chaotic environments.⁷

In this article, we argue that acute pain management must be integrated into disaster care protocols rather than treated as an optional extra. We will review the global challenges of managing pain in disaster contexts, discuss ethical and clinical frameworks that justify its inclusion in triage, and highlight practical approaches for resource-limited settings. Selected case experiences from

Robyna Irshad Khan
The Aga Khan University
Karachi, Sindh, Pakistan

Pakistan, including the 2005 earthquake, bomb blasts, and floods, will be used as illustrative examples, but the lessons drawn are intended to inform disaster responses worldwide.

THE DISASTER CONTEXT: GLOBAL CHALLENGES AND ILLUSTRATIVE CASES

Disasters present diverse clinical and logistical challenges, but a common theme is the overwhelming burden of injured patients arriving within a short span of time. Hospitals and field facilities are rapidly saturated, and health professionals are forced to prioritise survival over all else. In this environment, acute pain management is often overlooked, even though injuries sustained in disasters, fractures, amputations, burns, and crush injuries are amongst the most painful experiences.

- a. **Earthquakes:** Earthquakes are among the most devastating natural disasters because they strike suddenly and cause widespread structural collapse. The resulting injuries include crush syndrome, long-bone fractures, and traumatic amputations. Pain is immediate and severe yet often receives little attention in the chaos of initial triage. Reports from the 2010 Haiti earthquake documented patients undergoing debridements and amputations with minimal or no analgesia, largely due to opioid shortages and lack of trained personnel.⁷ The 2005 Pakistan earthquake illustrates similar issues. With over 86,000 deaths and an even greater number injured, health facilities were overwhelmed. International teams arrived rapidly but varied widely in competence and preparedness.⁸ Some field surgeries were performed by providers without adequate anaesthesia training, and patients endured painful procedures without proper pain relief. Beyond the clinical consequences, this neglect raised ethical concerns about dignity and justice for the injured.⁹
- b. **Bomb Blasts and Mass-Casualty Incidents:** Bomb blasts and other intentional mass-casualty events present different challenges. Injuries are often complex: shrapnel wounds, severe burns, blast lungs, and penetrating trauma. In such scenarios, providers must rapidly stabilise life-threatening injuries, airway obstruction, haemorrhage, and shock. Pain relief, while desperately needed, is frequently delayed or considered non-essential in early triage. Urban centres have repeatedly demonstrated this pattern. After terrorist bombings in Madrid (2004) and London (2005), triage systems focused primarily on evacuation and haemorrhage control.¹⁰ Patients with survivable but extremely painful injuries often waited hours for meaningful analgesia. Karachi, Pakistan, has experienced multiple bomb blasts with similar dynamics; casualty numbers far exceeded immediate capacity, and many victims endured severe burns and shrapnel pain while awaiting surgical intervention. These examples highlight a consistent global challenge: In mass-casualty incidents, pain control is rarely integrated into the first wave of triage protocols.
- c. **Floods and Displacement:** Unlike earthquakes or blasts, floods unfold over days to weeks and cause mass displacement rather than sudden surges of trauma patients. However, pain remains a significant issue. Prolonged exposure, injuries from collapsing structures, and untreated wounds all contribute to acute and chronic pain. The disruption of health infrastructure means that

even minor injuries go untreated, progressing to infected wounds and painful complications. In the 2010 Pakistan floods, more than 20 million people were affected, with large numbers displaced into temporary camps.¹¹ Health providers struggled with infectious disease outbreaks and untreated pain from lacerations, fractures, and chronic musculoskeletal conditions exacerbated by poor shelter. The 2022 floods again demonstrated the burden of untreated pain, particularly among vulnerable populations such as the elderly and children, where access to even simple analgesics was limited.¹² These experiences are not unique to Pakistan; in Bangladesh, Myanmar, and Mozambique, postflood assessments have repeatedly described inadequate access to analgesia in displaced populations.

- d. **Global Lessons:** Across these diverse contexts, a consistent pattern emerges. Earthquakes generate large numbers of patients with high-intensity traumatic pain. Bomb blasts and terrorist incidents create sudden urban surges where survival dominates, and pain is relegated to a secondary concern. Floods and protracted displacement crises cause prolonged suffering, where untreated pain compounds vulnerability. Although the clinical settings differ, the lesson is universal: Pain is rarely prioritised in disasters, yet it remains one of the most pressing human needs.

PAIN AND SURVIVAL: COMPETING PRIORITIES IN DISASTER TRIAGE

The principle of disaster triage is to save the maximum number of lives with the resources available.² Pain management is rarely built into initial triage protocols since untreated pain does not immediately threaten life. This hierarchy of priorities can be understood in the context of limited resources. In mass-casualty events, anaesthetics and opioids are scarce, and monitoring equipment is often unavailable.¹³ Providers under extreme pressure may perceive pain relief as expendable compared with interventions that prevent imminent death. However, this neglect has profound consequences. Severe pain contributes to tachycardia, hypertension, and respiratory compromise, further destabilising already fragile patients.¹⁴ In trauma victims, poorly controlled pain can impair mobilisation and wound healing, leading to complications like pneumonia, thromboembolism, and chronic pain syndromes. Beyond the physiological dimension, untreated pain in disasters represents a failure to uphold the dignity and humanity of patients. *The Sphere Handbook* identifies the alleviation of suffering as a minimum humanitarian standard.¹⁵ Survivors who endure amputations or debridements without analgesia are at risk of physiological deterioration and long-term psychological harm, including PTSD. The ethical tension is clear, while triage seeks efficiency and population-level outcomes, ignoring pain undermines the individual's right to compassionate care.

In practice, disaster teams have sometimes succeeded in balancing these priorities. Ketamine has been used effectively in mass-casualty scenarios because it provides both analgesia and haemodynamic stability, allowing clinicians to relieve pain without compromising survival interventions.¹³ Similarly, simple measures like splinting, immobilisation, and reassurance can provide partial relief during the chaotic early stages. However, such approaches remain inconsistently applied, reflecting the absence of pain relief from most disaster triage algorithms. The challenge, therefore, is not whether pain should be

treated in disasters but how it can be systematically integrated into triage protocols without detracting from life-saving care. Recognising that pain relief is both a physiological stabiliser and a humanitarian obligation reframes it as complementary to survival priorities rather than a competing demand.

ACUTE PAIN MANAGEMENT IN RESOURCE-LIMITED SETTINGS

Delivering adequate pain relief in disaster situations is one of the most demanding aspects of clinical care. Overcrowding, collapsed infrastructure, shortages of drugs and monitoring equipment, and the urgency of life-saving interventions often conspire to leave pain untreated. However, effective pain management is possible even in austere environments if responders are prepared, pragmatic, and systematic.

a. **Pharmacological Strategies:** *Ketamine* has emerged as the cornerstone agent for disaster settings. It provides strong analgesia, amnesia, and sedation while maintaining haemodynamic stability and airway reflexes.¹³ It is important to recognise that dissociative anaesthesia can limit detailed neurological assessment for a brief period after administration. However, ketamine generally preserves corneal reflexes, pupillary responses, and airway tone, making it suitable for situations in which rapid central nervous system evaluation is still required once the acute phase of dissociation resolves. It can be given intravenously, intramuscularly, or even orally, which is particularly useful when venous access is difficult. Its safety profile in haemodynamically unstable patients and children makes it indispensable for field surgery and painful procedures such as amputations or fracture reductions. Dissociative side effects and hallucinations can be mitigated with benzodiazepines when available, but these should not deter their use when no alternatives exist.

Opioids remain the gold standard for severe pain, but their use is complicated by international regulatory restrictions, logistical barriers, and the need for monitoring.¹⁶ In disasters, opioids are often in critically short supply or reserved for the operating theatre. Nevertheless, even small stocks can transform patient care when used judiciously. Subcutaneous, intramuscular, and oral routes are particularly useful in the field, where intravenous titration and continuous monitoring may not be feasible. Ensuring that at least minimal opioid reserves are prepositioned in disaster kits is a crucial preparedness step.

Non-opioid analgesics like paracetamol and non-steroidal anti-inflammatory drugs (NSAIDs) are widely available and can provide meaningful relief for mild to moderate pain.¹⁷ They are also useful adjuncts to opioid or ketamine regimens, forming the basis of multimodal analgesia. However, they should not be relied upon alone for severe injuries.

Regional anaesthesia techniques, including brachial plexus, femoral, and sciatic nerve blocks, as well as spinal anaesthesia, have proved valuable when performed by skilled providers.⁷ These approaches conserve scarce systemic drugs, provide prolonged relief, and reduce the risk of respiratory depression. However, they require sterile needles, local anaesthetics, and training, all of which may be limited in disaster zones. Integrating basic regional anaesthesia training into

disaster-response curricula for anaesthesiologists and emergency physicians would greatly enhance capacity. With portable ultrasound now far more accessible, on-arrival blocks have become a practical and effective part of disaster care. Placing a femoral, brachial plexus, or fascia iliaca block as soon as a patient reaches the field hospital can ease pain early, make splinting and imaging easier, and reduce the need for systemic opioids. In busy and crowded settings, the quick relief these blocks provide often makes patients calmer and more stable, which helps the whole team work more safely and efficiently.

Older anaesthetic agents like halothane and thiopentone continue to be used in some low-resource environments.¹⁸ While no longer standard in high-income countries, their availability and familiarity in certain regions mean disaster guidelines must acknowledge their role. Including clear instructions for safe administration is more realistic than assuming universal access to modern alternatives.

b. **Special Considerations:** *Children* are disproportionately affected in many disasters and present unique challenges for pain management. Intramuscular ketamine is particularly useful for paediatric trauma, while oral paracetamol and ibuprofen can provide adjunctive relief.¹⁴ Children's pain is frequently underestimated, especially in chaotic conditions, underscoring the need for structured assessment and age-appropriate dosing protocols.

Task shifting may also be necessary. In large-scale disasters, anaesthesiologists are too few to meet demand. Training non-anaesthetist physicians and senior nurses in safe administration of ketamine, opioid titration, and splinting techniques can extend the reach of limited specialists.¹⁹ Such delegation requires simple, algorithm-based protocols to ensure safety and consistency.

c. **Non-Pharmacological and Improvised Approaches:** Simple interventions, including splinting fractures, elevating injured limbs, dressing wounds, cooling burns, and immobilising joints, provide significant analgesic benefit. Psychological support, reassurance, and human presence are powerful adjuncts.¹⁴ In some cultures, allowing family members to remain with patients reduces anxiety and perceived pain. Creating a calmer environment, shielding patients from scenes of trauma, reducing noise, and providing hydration can also improve tolerance of pain.

d. **Barriers and Systems Considerations:** Barriers include disrupted supply chains, inadequate training, lack of monitoring, and cultural perceptions that deprioritise pain compared with survival.¹⁶ These barriers can be addressed by:

- Prepositioning disaster drug kits with ketamine, opioids, NSAIDs, and local anaesthetics;
- Training responders in rapid, safe pain management techniques, including ketamine protocols and basic regional anaesthesia;
- Simplified pain assessment tools (e.g., visual analogue or smiley-face scales) for rapid use in the field;
- Integration of pain management into triage protocols, reframing analgesia as a complement to life-saving measures.

Ultimately, alleviating acute pain is achievable in disasters if it is explicitly planned for. Pain management should not be seen as a

luxury but as a critical component of disaster preparedness and response.

ETHICAL DIMENSIONS OF PAIN RELIEF IN DISASTERS

From an ethical standpoint, the neglect of acute pain is deeply problematic. The humanitarian imperative is to keep people alive but also to alleviate suffering.⁴ *The Sphere Handbook* identifies dignity, non-discrimination, and the alleviation of suffering as minimum humanitarian standards.¹⁵ Providing life-saving care while leaving patients in severe pain undermines these principles. Pain relief is not a luxury; it is part of the right to health and a marker of respect for human beings. Ensuring fair access to pain relief, even when survival chances differ, demonstrates justice in action. The 2005 Pakistan earthquake (Figure 1a,1b,1c) illustrated how unqualified foreign teams sometimes performed surgeries with inadequate anaesthesia, leaving patients to suffer needlessly.⁸ This phenomenon, described as *philanthropic tourism*, breaches ethical obligations of competence and accountability. Disaster response must ensure that only trained providers deliver anaesthesia and analgesia, and that interventions are not left incomplete for local teams to resolve. Clinicians in disasters often experience moral distress when forced to choose between life-saving interventions and pain control. Lack of resources can create guilt and burnout, particularly when witnessing avoidable suffering. Ethical preparedness includes supporting provider wellbeing and ensuring realistic, context-appropriate pain management protocols.

Practical steps can align ethics with clinical action by

- Incorporating pain relief into triage algorithms;
- Prioritising vulnerable groups for analgesia;
- Training responders in safe, simple analgesic techniques;
- Embedding accountability through supervision and reporting structures.

Pain management in disasters is, therefore, a clinical issue as well as a moral one. Recognising the ethical duty to alleviate suffering reframes pain relief as complementary to survival care rather than in competition with it.

LESSONS FROM GLOBAL EXPERIENCES

Across different disasters, certain patterns have emerged in the way that acute pain is addressed or neglected. The first lesson is that pain management is consistently undervalued at the systems level. Whether in Haiti after the 2010 earthquake, New Zealand after the Christchurch quake, or Pakistan after its devastating floods, survivors frequently report untreated pain long after life-saving interventions have been delivered.^{19,20} This is not a problem unique to one country or income level. Disasters universally create resource-limited conditions where survival dominates and pain is considered optional rather than essential.

A second lesson is the variability of response depending on preparedness. Where pain protocols are embedded into disaster plans, outcomes improve. For example, in field hospitals after the Haiti earthquake, teams with clear ketamine protocols were able to provide safe

anaesthesia and analgesia even with limited monitoring. In contrast, ad hoc teams without training or supplies often defaulted to performing procedures with inadequate or no analgesia.¹³ The difference was not primarily wealth but preparation and organisation.

Thirdly, strong evidence shows that simple, low-cost measures make a significant impact. Splinting, immobilisation, cooling burns, and basic reassurance are repeatedly cited in field reports as interventions that reduce suffering even before pharmacological options are available. The lesson here is that pain management is not solely about drug supply; it is about embedding relief into every layer of response, from triage to rehabilitation.

Fourthly, ethical preparedness matters. International aid agencies that set clear standards on competence, accountability, and dignity report fewer instances of harmful practices, such as untrained volunteers attempting surgery. The 2005 Pakistan earthquake and later mass-casualty incidents highlighted that, without clear governance, the desperate drive to save lives can lead to interventions that ignore or worsen suffering.

Finally, global experiences show that integrating pain relief into disaster response is clinically feasible and morally necessary (Table 1). Pain management does not compete with survival care; it supports it, stabilising patients physiologically and psychologically. The lesson is clear, every disaster is different, but the obligation to prevent unnecessary suffering is the same.

RECOMMENDATIONS FOR FUTURE GLOBAL DISASTER RESPONSES

The lessons of past disasters show that pain management is both possible and necessary, even in the most resource-limited conditions. Moving forward, disaster preparedness should explicitly incorporate analgesia into planning, training, and supply chains (Table 1). This requires commitment at multiple levels, from global agencies to local hospitals, to ensure that relief of suffering is considered alongside survival. Preparedness must include stockpiling essential drugs like ketamine, opioids, NSAIDs, and local anaesthetics as well as equipping teams with sterile kits for regional anaesthesia. Training is equally critical; all responders, not just anaesthesiologists, should be confident in basic pain control techniques. Ethical oversight should emphasise competence, fairness, and dignity, preventing the recurrence of harmful practices seen in past crises. Finally, the importance of non-pharmacological interventions and psychosocial support must not be overlooked. Even when resources are scarce, simple measures can provide meaningful relief. By embedding these elements into disaster protocols, health systems can move closer to a holistic response that addresses both survival and suffering.¹⁴

SUMMARY

Disasters stretch health systems to their limits, and pain relief often gets pushed aside in the rush to save lives. Experience shows that, even in the most difficult conditions, we can still provide meaningful pain control with simple tools, good planning, and clear teamwork. When pain management is built into disaster response, we protect people's dignity, reduce long-term suffering, and stay true to the basic promise of medicine: to help, to comfort, and to heal.



Figure 1a, 1b, 1c – Pakistan earthquake (2005)²¹

Table 1 – Recommendations for integrating pain relief into disaster response

Domain	Recommendation
Preparedness	Preposition drug kits (ketamine, opioids, NSAIDs, local anaesthetics).
Training	Train physicians, nurses, and paramedics in safe, simple analgesic protocols.
Triage integration	Include pain assessment and relief within disaster triage algorithms.
Clinical techniques	Promote use of ketamine and regional blocks; ensure splinting and burn cooling.
Supply chains	Establish reliable logistics for essential drugs, especially opioids.
Ethical oversight	Require competence, accountability, and respect for dignity in all interventions.
Psychosocial support	Encourage family presence and reassurance as part of basic care.
Governance	Embed pain management standards into national disaster plans and global guidelines.

NSAIDs, non-steroidal anti-inflammatory drugs.

REFERENCES

- Christian MD, Sprung CL, King MA, et al. Triage: care of the critically ill and injured during pandemics and disasters: CHEST consensus statement. *Chest*. 2014;**146**:e61S-74S.
- Iserson KV, Moskop JC. Triage in medicine, part I: concept, history, and types. *Ann Emerg Med*. 2007;**49**:275-281.
- Brennan F, Carr DB, Cousins M. Pain management: a fundamental human right. *Anesth Analg*. 2007;**105**:205-221.
- International Federation of Red Cross and Red Crescent Societies. *Code of Conduct for the International Red Cross and Red Crescent Movement and NGOs in Disaster Relief*. Geneva, Switzerland: IFRC; 2003.
- Gawande A. Casualties of war—military care for the wounded from Iraq and Afghanistan. *N Engl J Med*. 2004;**351**:2471-2475.
- Acheson D. Health, humanitarian relief, and survival in former Yugoslavia. *BMJ*. 1993;**307**:44-48.
- Missair A, Gebhard R, Pierre E, et al. Surgery under extreme conditions in the aftermath of the 2010 Haiti earthquake: the importance of regional anesthesia. *Prehosp Disaster Med*. 2010;**25**:487-493.
- Khan R, Ahmad A, Loff B, Zion D. Ethical considerations in humanitarian aid: lessons from the 2005 Pakistan earthquake. In: Loff B, Zion D, eds. *Humanitarian Ethics in Practice*. Melbourne, Australia: Monash University; 2007:115-130.
- International Federation of Red Cross and Red Crescent Societies. *World Disasters Report: Focus on Ethics in Aid*. Geneva, Switzerland: IFRC; 2003.
- Aylwin CJ, König TC, Brennan NW, et al. Reduction in critical mortality in urban mass casualty incidents: analysis of triage, surge, and resource use after the London bombings on July 7, 2005. *Lancet*. 2006;**368**:2219-2225.
- Warraich HJ, Riffat M, Ali N. Floods in Pakistan: a public health crisis. *J Coll Physicians Surg Pak*. 2011;**21**:484-485.
- World Bank, Asian Development Bank, European Union, United Nations Development Programme. *Pakistan Floods 2022 Post-Disaster Needs Assessment (PDNA)*. Islamabad, Pakistan: World Bank; 2022.
- Trelles Centurion M, Van Den Bergh R, Gray H. Anesthesia provision in disasters and armed conflicts. *Curr Anesthesiol Rep*. 2017;**7**:1-7.
- Fink PB, Wheeler AR 3rd, Smith WR, et al. Wilderness Medical Society clinical practice guidelines for the treatment of acute pain in austere environments: 2024 update. *Wilderness Environ Med*. 2024;**35**:198-218.
- Sphere Project. *The Sphere Handbook: Humanitarian Charter and Minimum Standards in Humanitarian Response*. Geneva, Switzerland: Sphere Project; 2018.
- Berterame S, Erthal J, Thomas J, et al. Use of and barriers to access to opioid analgesics: a worldwide, regional, and national study. *Lancet*. 2016;**387**:1644-1656.
- Chou R, Gordon DB, de Leon-Casasola OA, et al. Management of postoperative pain: a clinical practice guideline from the American Pain Society, the American Society of Regional Anesthesia and Pain Medicine, and the American Society of Anesthesiologists' Committee on Regional Anesthesia, Executive Committee, and Administrative Council. *J Pain*. 2016;**17**:131-157.
- World Federation of Societies of Anaesthesiologists (WFSA). Availability of halothane is still important in some parts of the world. 2024. Accessed October 13, 2025. <https://wfsahq.org/news/availability-of-halothane-is-still-important-in-some-parts-of-the-world>
- Cammack F, Shipton EA. The Christchurch earthquake: crush injury, neuropathic pain, and posttraumatic stress disorder. *Case Rep Med*. 2013;**2013**:973234.
- Bai XD, Liu XH. Retrospective analysis: the earthquake-injured patients in Barakott of Pakistan. *Chin J Traumatol*. 2009;**12**:122-124.
- DAWN. Earthquake jolts bring back memories of 2005. 2015. Accessed October 13, 2025. <https://www.dawn.com/news/1196467>