FAST TRACK

Patterns of war related trauma in Gaza during armed conflict: survey study of international healthcare workers

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ABSTRACT

OBJECTIVE

To systematically document the patterns of war related injuries in Gaza, Palestine.

DESIGN

Survey study of international healthcare workers, August 2024 to February 2025.

SETTING

Gaza, Palestine.

PARTICIPANTS

78 international healthcare workers deployed to Gaza.

MAIN OUTCOME MEASURES

The main outcome was the type of injuries observed by international healthcare workers during the conflict in Gaza. A Delphi informed survey was distributed through non-governmental organisation rosters and secure WhatsApp and email groups. Respondents completed the survey using contemporaneous logbooks and shift records.

RESULTS

The survey collected data on 12 anatomical regions, mechanisms of trauma, and general medical conditions. 78 healthcare workers reported 23 726 trauma related injuries and 6960 injuries related to weapons. The most common traumatic injuries were burns (n=4348, 18.3%), lower limb injuries (n=4258, 17.9%), and upper limb injuries (n=3534, 14.9%). Explosive injuries accounted for most of the weapon related trauma (n=4635, 66.6%), predominantly affecting the head (n=1289, 27.8%), whereas firearm injuries disproportionately affected the lower limbs (n=526, 22.6%). Healthcare workers reported 4188 people with chronic disease across 11 domains requiring long term treatment.

CONCLUSION

Healthcare workers deployed to Gaza reported an injury phenotype defined by extensive polytrauma (≥2 anatomical regions), complex blast injuries from high yield explosives, firearm related injuries to upper and lower limbs, and severe disruption to primary care and the treatment of chronic diseases. The results provide actionable insights to tailor humanitarian response and highlight the urgent need for structured, resilient clinical surveillance systems.

Editor's note: This paper is based on research from an active war zone, where conventional research methods may be impossible to apply.

WHAT IS ALREADY KNOWN ON THIS TOPIC

Published reports on the health impact of the conflict in Gaza have been limited to aggregate mortality figures or narrow patient subgroups

No previous studies have provided clinician reported, cross specialty data capturing the full spectrum of traumatic and medical conditions during the conflict

WHAT THIS STUDY ADDS

This study identified an injury phenotype of pervasive polytrauma, deep and extensive burns, fulminant blast and shrapnel wounds, and high rates of trauma to the head and extremities, as described by frontline international healthcare workers

Many respondents with previous experience of conflicts reported that the scale and severity of injuries in Gaza were greater than those they had encountered in previous war zones

Clinician reported data from international healthcare workers offer actionable insights for trauma and burn care, chronic disease support, and the design of resilient surveillance systems in active war zones

Introduction

Since October 2023, Gaza has faced high intensity Israeli bombardment and ground military incursions leading to a burden of traumatic injuries rarely seen in a densely populated area (formerly 2.2 million people).[1] Despite the scale and severity of injuries in Gaza, no large study has comprehensively documented injury patterns, as international access remains heavily restricted. Publicly reported figures show that more than 65 000 Palestinians have been killed and more than 165 000 wounded during the Israeli-Palestinian conflict, whereas independent analysis of excess mortality suggests even higher numbers of deaths from both direct and indirect causes.[2 3] A capture-recapture analysis of mortality up to 30 June 2024 estimated an under-count of nearly 41% for officially recorded deaths.[4]

Israeli forces have repeatedly used explosive weapons in densely populated areas, including refugee camps, raising serious concerns under the Geneva Conventions and international humanitarian law, including the principle of distinction and the obligation to protect civilians.[2 5 6] Satellite imaging indicates that two thirds of Gaza's structures are damaged or destroyed; against this backdrop, the concentration of heavy explosive and incendiary munitions within narrow urban corridors has driven injury patterns rarely observed in recent history, underscoring the urgent need for context specific surveillance.[7]

The health system itself has been a repeated target in Gaza. Hundreds of documented attacks on healthcare facilities, ambulances, and staff, including more than 1500 Palestinian healthcare workers killed as of May 2025, have had a major effect on Gaza's clinical care capacity and been responsible for the destruction of both paper and digital records.[8 9] This situation combined with siege driven shortages of fuel, supplies, medicine, and staff has left hospitals partially operational or destroyed, impeding standardised charting, trauma surveillance, and follow-up, and mirroring well documented methodological challenges in conducting health research during armed conflict.[9-11] In addition, political sensitivities and restrictions on the release of information shape the flow of healthcare data, resulting in fragmented and sometimes inconsistent reporting streams that limit transparent, comprehensive surveillance. Narratives from international healthcare workers who have returned from Gaza offer rich but anecdotal and fragmented details.[12]

Without standardised, multisystem surveillance of injuries, humanitarian responders lack the necessary data needed to tailor surgical capacity, rehabilitation services, and mental health interventions to the evolving needs of affected populations. The application of an existing framework for clinical documentation in emergencies (eg, the World Health Organization (WHO) minimum dataset) has been virtually absent in Gaza.[13] Our study addresses this gap by leveraging a Delphi informed, mapped survey of international healthcare workers deployed to Gaza during the ongoing conflict using ICD-10 (international classification of diseases, 10th revision) codes, systematically capturing the unprecedented patterns of trauma presenting to Gaza's hospitals. In mapping these injury profiles, we aimed to delineate Gaza's unique clinical phenotype of war related injuries.

Methods

This survey study explored the experiences of international healthcare workers deployed to Gaza during the current Israeli-Palestinian conflict. All participants provided electronic informed consent. This study has been reported in accordance with the strengthening the reporting of observational studies in epidemiology (STROBE) reporting guideline.[14]

Development of Delphi informed survey

A structured literature review and a Delphi informed panel of 13 international healthcare workers with experience of deployment for humanitarian reasons were used to generate a comprehensive list of medical conditions across 12 anatomical regions and medical specialties. We iteratively reviewed items over two rounds until consensus was reached on clinical relevance and ICD-10 mapping. Each final item was linked to its corresponding ICD-10 code comprising three or four characters. The initial draft questionnaire employed a 5 point Likert scale (from 0=never encountered to 4=very frequently encountered) to measure frequency. After pilot testing with 10 healthcare workers, the scale was revised into structured categorical ranges of patient counts for clarity and usability. Other revisions included reducing free text fields, clarifying instructions to emphasise the importance of logbook completion and role specific completion, and grouping items by anatomical region. No sample size was calculated; instead, sample size was dictated by feasibility and access. The final survey contained 12 anatomical regions and 161 items mapped to ICD-10 (see supplementary tables S1.01-1.05).

Survey content

Respondents provided information on their professional role (nurse, resident physician, attending physician), medical specialty, previous deployments to war zones, date of return, duration of deployment, and location.

For each ICD-10 mapped condition, respondents recorded the number of injuries they directly managed, and the anatomical site involved. By design, this survey reflects injuries among individuals who survived long enough to reach clinical evaluation and does not capture those who died before medical contact. Event counts were reported in structured categorical ranges rather than as precise counts (0, 1-5, 6-10, 11-15, 16-20, >20). Conditions were categorised into two domains: trauma (by anatomical region, including psychological trauma), and general medical and chronic disease presentations. Firearm and explosive injuries were documented through separate structured questions, each specifying the affected body regions and the reported frequency of injuries. Although coded anatomically, these data were collected in parallel to the overall injury dataset and are presented with their own denominators; they were not included in the anatomical totals shown for all traumatic injuries. A mass casualty was defined as an event involving ≥10 injured patients presenting simultaneously, consistent with operational thresholds in conflict settings.[15]

Open text fields—Each section of the survey concluded with an optional free text field where respondents could record reflections on clinical challenges, diagnostic uncertainty, or adaptations made under resource constraints. We collated and summarised these responses descriptively.

Survey distribution and participants

The final questionnaire was distributed between 1 August 2024 and 1 February 2025. Distribution channels included WhatsApp groups coordinated by non-governmental organisations (NGOs) involved in Gaza deployments, and direct email invitations from NGO team leaders to their clinical rosters.

Eligibility to be included in the study was strictly limited to healthcare workers (nurse, resident, or attending physician) who had worked in Gaza during the study period and completed the survey within three months of their deployment end date. This recall window, designed to optimise recall accuracy across

varied deployment lengths, meant that most data reflected deployments that concluded between May 2024 and January 2025. Respondents were asked to complete the sections relevant to their clinical role and to do so with reference to contemporaneous logbooks, shift records, or case notes routinely maintained as standard practice by humanitarian healthcare workers during deployment.[13] Completion of all mandatory quantitative and demographic items was required for inclusion.

Statistical analysis

We report demographic characteristics of respondents (specialty, country of practice, deployment governorate, and facility type) as counts and percentages. For each condition or injury, we report the number of injuries, the proportion of total responses, and the number of healthcare workers who completed that survey section. These figures represent clinician level case estimates and should be interpreted as a subset of the overall caseload. To mitigate recall error, event counts were captured in categorical ranges and, for analysis, conservatively coded to the lower bound (eg, 6-10 coded as 6).[16] To further minimise the risk of overreporting or duplication, survey responses were collected independently, and reporting focused on injuries and conditions that were consistently observed across multiple respondents. To emphasise anatomical patterns, we present injury data as a body atlas of war related trauma. All analyses were performed in Python 3.10.

Table 1 | Personal characteristics of survey respondents

Category	No (%) of respondents (n=78)
Training level	
Resident	16 (21)
Nurse	15 (19)
Attending/Consultant	47 (60)
Place of practice or residence	
US and Canada	26 (33)
UK	16 (21)
Europe	16 (21)
Middle East and North Africa (MENA)	8 (10)
Asia	5 (6)
Australasia	3 (4)
Africa	4 (5)
Specialty	
Trauma and orthopaedics	14 (18)
Emergency medicine	8 (10)
General surgery	9 (12)
General medicine	4 (5)
Intensive care	5 (6)
Vascular surgery	7 (9)
Anaesthetist	11 (14)
Urological surgery	3 (4)
Neurosurgery	4 (5)
Plastic surgery	6 (8)
Paediatric surgery	3 (4)
Obstetrics and gynaecological surgery	2 (3)
Public health	2 (3)
Deployment governate	
North Gaza	8 (10)
Gaza City	11 (14)
Middle Area	18 (23)
Khan Younis	32 (41)
Rafah	7 (9)
Facility type	
Fixed hospital	69 (88)
Field hospital	9 (12)

Patient and public involvement

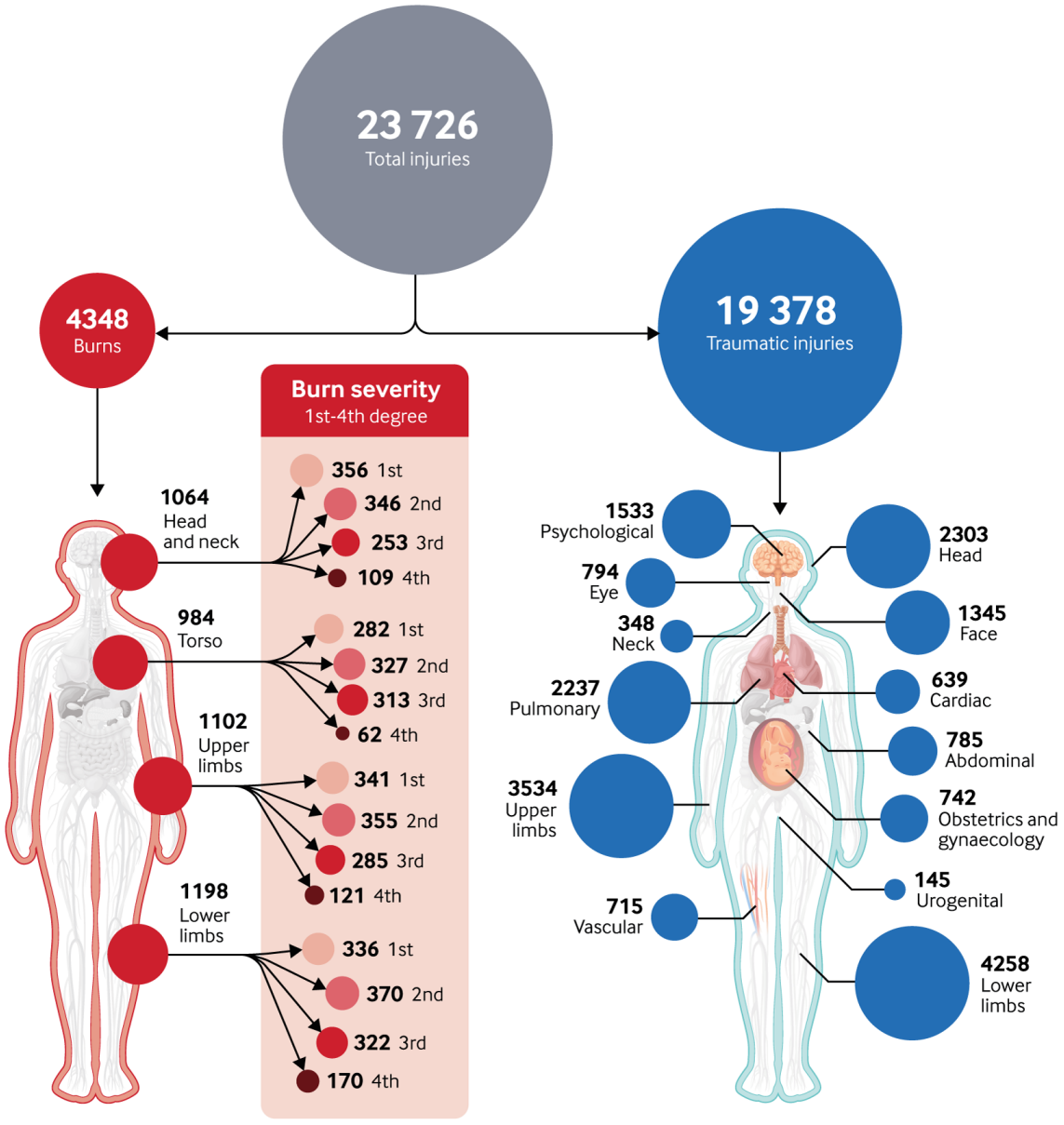
Patients and members of the public were not directly involved in the design, conduct, reporting, or dissemination of the study. The questionnaire was developed through a Delphi informed process with experienced humanitarian clinicians to ensure clinical relevance and feasibility in this setting.

Results

Of the 104 responses received, 78 healthcare workers met the inclusion criteria and completed the full survey between August 2024 and February 2025. Reasons for exclusion included missing demographic fields, responses submitted more than three months after deployment ended, and responses outside the specified timeframe (see supplementary figure S1). Participants represented a diverse range of international humanitarian responders, spanning 22 NGOs worldwide. The sample comprised 47 physicians or consultants (60%), 16 residents (21%), and 15 nurses (19%) (table 1). More than half (n=51, 65%) had previous experience of working in an active conflict zone. Respondents were mainly from the US and Canada (n=26, 33%), followed by 16 participants from the UK (21%) and 16 from European Union member states (21%). Most of the respondents worked in trauma surgery, emergency medicine, or critical care and anaesthesia, although several came from specialties such as internal medicine and paediatrics. Eight respondents were deployed across North Gaza (10%), 11 in Gaza City (14%), 18 in the Middle Area (23%), 32 in Khan Younis (41%), and 7 in Rafah (9%). The median number of responses from healthcare workers across all domains was 53.0 (interquartile range (IQR) 51.0-59.5), and the median duration of deployment was 3.7 (IQR 2-6, range 2-12) weeks, contributing to a total of 322 healthcare worker weeks of frontline clinical care.

Anatomical distribution of trauma injuries

Overall, the 78 healthcare workers reported 23 726 traumatic injuries during deployment in Gaza, reflecting multisystem trauma (fig 1, fig 2). A median of 49 respondents (IQR 47.0-61.0) contributed data for each injury category. The most frequently affected regions were the lower limbs (n=4258, 17.9%) and upper limbs (n=3534, 14.9%), with 67 (86%) and 62 (79%) healthcare workers, respectively, reporting injuries (table 2). Common injuries included fractures of the tibia or fibula (29.7% of lower limb injuries), fractures of the radius or ulnar (19.6% of upper limb injuries), and crush injuries affecting both the upper and the lower limbs (see supplementary tables S2.09-2.10). Head trauma (n=2303, 9.7%) was reported by 57 healthcare workers (73%), including



Top 3 most common traumatic injury types by location

Head	Face	Eye	Neck
392 Diffuse brain injury	**673** Local infection of skin	**222** Foreign body in orbit	**195** Penetrating neck trauma
368 Penetrating head injury	**256** Penetrating facial trauma	**167** Blunt orbital trauma	**139** Blunt neck trauma
253 Focal brain injury	**229** Fracture of malar/maxillary bones	**135** Penetrating orbital trauma	**14** Emergency surgical airway

Pulmonary	Cardiac	Abdominal	Urogenital	Vascular
940 Traumatic pneumothorax	**415** Cardiac arrhythmia	**416** Bowel injury	**102** Kidney injury	**315** Lower limb
425 Pneumonia	**121** Penetrating heart trauma	**149** Liver injury	**19** Ureteric injury	**157** Upper limb
403 Open wound of the thorax	**77** Cardiac tamponade	**110** Splenic injury	**12** Bladder injury	**157** Limb ischaemia

Upper Limb	Lower Limb	Obstetrics and gynaecology	Psychological
707 Fracture of radius and ulna	**1277** Fracture of tibia and fibula	**141** Miscarriage	**629** Depression
459 Crushing injury of wrist and hand	**596** Crushing injury of lower limb	**134** Sepsis	**537** Acute stress reaction
353 Fracture of shaft of humerus	**383** Fracture of foot	**119** Emergency caesarean	**199** Suicidal ideations

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Fig 1 | Body atlas of trauma injuries in Gaza, including distribution of trauma injuries across anatomical regions. Absolute counts are presented, and represented by circle sizes, using area based calculations. The top three injury subtypes per body region are presented. Burns are further subdivided by severity: first degree burns involve only the epidermis (superficial), second degree burns involve the epidermis and a portion of the dermis (partial thickness), third degree burns involve the entire epidermis and dermis (full thickness), and fourth degree burns are full thickness, extending into underlying muscle, tendon, ligament, or bone

diffuse (17.4%) and penetrating (15.9%) brain injuries. Neck injuries (n=348, 1.5%) were reported by 50 healthcare workers (64.1%) and were mostly penetrating. Pulmonary injuries (n=2237, 9.4%) were reported by 48 healthcare workers (62%), with traumatic pneumothorax most common (41.8%); penetrating cardiac injuries accounted for 18.6% of all trauma related cardiac conditions. Abdominal trauma (n=785, 3.3%) was reported by 47 healthcare workers (60%), including bowel (53.1%), liver (19.2%), and splenic (14.1%) injuries. Vascular injuries (n=715, 3.0%) were reported by 61 healthcare workers (78%), predominantly affecting the legs (n=313, 43.8%). Urogenital injuries (n=145, 0.6%) were reported by 45 healthcare workers (58%), mainly kidney trauma. Overall, 742 (3.1%) obstetric related traumas were reported by 36 healthcare workers (46%), of which 269 (36.3%) involved mortality of the fetus or the mother, or both. Psychological trauma (n=1533, 6.5%) was reported by 47 healthcare workers (60%), with depression (40.8%), acute stress reactions (35.2%), and suicidal ideation (12.7%) being most common (see supplementary tables S2.01-2.13).

Healthcare workers often encountered patients with polytraumas (≥2 anatomical regions affected); more than 70% reported managing people with injuries across two or more anatomical regions. Additionally, experience of mass casualties was widespread, with 77% and 18% of healthcare workers reporting managing 5-10 and >10 patients with trauma simultaneously, respectively (fig 3).

Burn injury characteristics and distribution

Burns were the most common trauma related injury, with 55 healthcare workers (71%) reporting 4348 cases (18.3%). These injuries mainly affected the head or neck (n=1004, 23.1%), upper limbs (n=1102, 25.3%), or lower limbs (n=1198, 27.6%) (fig 1; also see supplementary table S2.14). Burns affecting only the epidermis (n=1315, 30.2%) were frequently seen, whereas partial thickness burns affecting the dermis (n=1398, 32.2%) were the most common. Full thickness burns involving the entire dermis (n=1173, 27.0%) were also notable, with the most severe injuries extended into muscle or bone (n=462, 10.6%).

Weapon related injury patterns

Weapon related trauma mainly involved high energy explosives and firearms, with a total of 6960 documented injuries (fig 2). Explosive injuries made up two thirds (n=4635, 66.6%) of weapon related injuries, whereas firearms injuries accounted for 2325 (33.4%). Explosive injuries occurred across various anatomical regions: head (n=1289, 27.8%), chest (n=650, 14.0%), abdomen (n=675, 14.6%), upper limb (n=663, 14.3%), and lower limb (n=777, 16.8%), reported by 62-66 healthcare workers depending on the anatomical site. Although fewer in number, firearm injuries mainly affected critical areas: head (n=230, 9.9%), chest (n=237, 10.2%), abdomen (n=256, 11.0%), lower limb (n=526, 22.6%), and upper limb (n=363, 15.6%). Polytrauma constituted 12.5% of explosive related (n=581) and 9.8% of firearm related (n=227) injuries (see supplementary tables S2.15-2.16).

General medical, infectious, and chronic disease presentations

Healthcare workers reported a total of 5405 general medical and infectious disease presentations. The most common general medical conditions were malnutrition (n=1002, 18.5%) and dehydration (n=865, 16.0%), reported by 59 (76%) and 54 healthcare workers (69%), respectively. Fifty four healthcare workers (69%) recorded sepsis in 631 patients with injury (11.7%), and 47 (60%) recorded gastroenteritis in 986 (18.2%). Healthcare workers reported 4188 people presenting to hospitals with chronic disease requiring long term treatment (see supplementary tables S2.17 and 2.18).

Free text responses

Sixty four of the respondents (82%) provided free text responses that offered additional context to the quantitative findings. They frequently described injuries as unusually severe, including multi-limb trauma, degloving wounds, open skull fractures, and extensive visceral or vascular injuries. One surgeon recounted the blast injury of a "10-year-old with shattered pelvis and femur, ruptured bladder, avulsed ureter, rectal injury, and torn femoral and external iliac arteries, who died hours later in pain." Severe burns were also emphasised, particularly in children. Respondents with previous experience of deployment in other conflict zones commented that the severity and scale of injuries encountered in Gaza were greater than those they had previously managed.

Malnutrition was repeatedly cited as worsening outcomes, with delayed wound healing and preventable deaths from otherwise treatable conditions. One respondent noted: "Hepatitis cases worsened due to malnutrition; several developed encephalopathy." Other reflections described neonatal deaths owing to the absence of continuous positive airway pressure, and the breakdown in chronic disease management, with patients presenting in crisis from uncontrolled hypertension. As another respondent wrote: "Access to cancer treatment was unobtainable and regarded as a luxury."

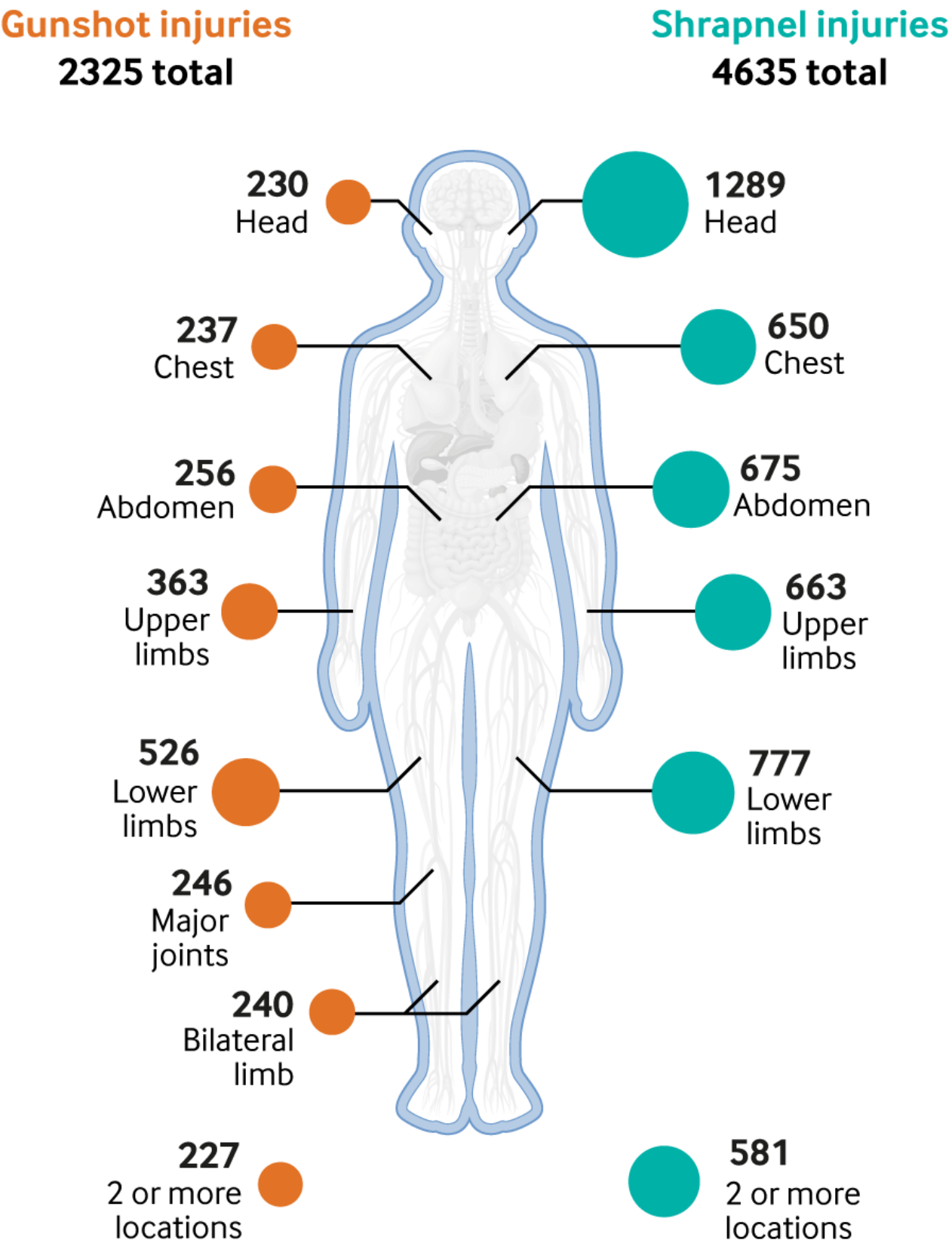

Fig 2 | Mechanisms of trauma by anatomical region. Total injury counts and distribution between firearm and explosive injuries are presented. The injury counts are also represented by circle sizes, using area based calculations

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Table 2 | Proportion of healthcare workers reporting within each trauma category during deployment in Gaza

Trauma category	No (%) of respondents (n=78)
Head	57 (73)
Psychological	47 (60)
Eye	52 (67)
Face	52 (67)
Neck	50 (64)
Pulmonary	48 (62)
Cardiac	47 (60)
Abdominal	47 (60)
Urogenital	45 (58)
Upper limb	69 (88)
Lower limb	67 (86)
Vascular	61 (78)
Obstetrics and gynaecology	36 (46)
Burns	55 (71)

Respondents reported working with minimal laboratory support, imaging, or monitoring. Improvisation was constantly required, with accounts of "operating on emergency room floors without anaesthesia or sterile tools," and of "care rationed to those most likely to survive."

Many respondents described profound psychological trauma among patients, including children expressing suicidal intent after witnessing deaths of family members. As one physician recalled: "The worst part was mothers begging us to save their already-dead children."

Discussion

This survey study documents the spectrum of clinical presentations encountered in Gaza during the current war. The participants, 78 returning international healthcare workers with a cumulative 322 healthcare worker weeks of frontline deployment, reported on a total of 23 726 traumatic injuries and 9593 non-traumatic acute medical presentations. This study records injury data from a period marked by attacks on hospital infrastructure, where the loss of paper records and disruption to digital connectivity have obscured the true clinical situation.[9] A detailed schematic of the body illustrates the anatomical distribution of trauma across major regions, with ICD-10 coded diagnoses, frequency of injuries, and mechanisms of harm. The figure provides a comprehensive visual of the extent of injuries in Gaza's population, offering an anatomical overview of war related injuries based on frontline clinical data. Importantly, our data reflect survivors who reached healthcare facilities and were clinically evaluated, rather than a complete census of all people affected. These findings provide critical insights into the injuries and conditions most relevant to immediate management, rehabilitation, and long term health planning.

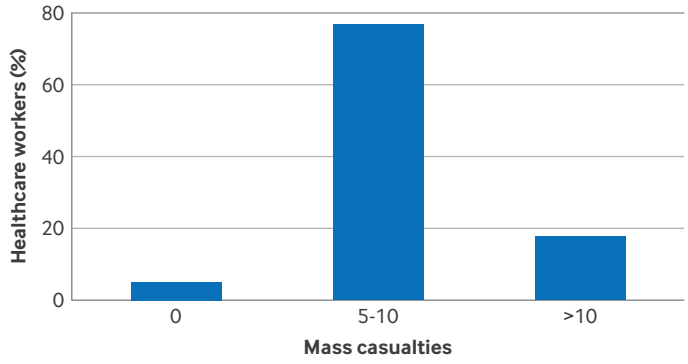

Fig 3 | Distribution of mass casualties reported by healthcare workers deployed to Gaza. Mass casualties defined as ≥10 patients with trauma presenting simultaneously

Comparison with other studies

The pattern of injuries in Gaza reflects an extreme form of high energy trauma rarely observed in civilian populations. Extensive burns, polytrauma, and severe injuries from both explosives and firearms were prevalent. The distribution of injuries aligns with the use of thermobaric, incendiary, and area effect munitions designed for maximum tissue destruction. Explosive injuries predominantly occurred in the head, neck, and limbs, where wounds are difficult to treat owing to complex anatomy and limited soft tissue coverage. These findings are supported by outpatient data from Médecins Sans Frontières, which reported that 83% of consultations for wounds due to violent trauma were related to bombs and shells, reinforcing the view that explosive weapons are the main cause of injury, as evidenced in our study.[17] In contrast, firearm injuries disproportionately affected the limbs, often involving major vascular territories, where, in the absence of surgical resources, amputation was often the only viable solution.[18]

Compared to previous conflicts, explosive injuries made up 67% of the cases in our cohort, aligning with US military data from Iraq and Afghanistan, and more than double the 31% of explosive injuries reported among civilian populations in contemporary conflicts.[19-21] The resulting injury profiles resembled those reported in combat settings among trained military personnel, highlighting the burden of trauma among civilians in Gaza. Explosive weapons, designed for open battlefields, are increasingly being deployed in densely populated urban areas.[22] Documenting these specific injury patterns contributes to the evidence base for humanitarian analysis of the health consequences of modern urban conflict.[23] We found that 18.3% of trauma presentations were related to burns, higher than the ≤11% reported in previous other conflicts.[5] Notably, more than 30% of burns involved the full thickness of the dermis and extended into muscle and bone, resulting in complex, high morbidity wounds with limited options for definitive care, consistent with the use of incendiary and fuel-air munitions. Firearm injuries accounted for about 30% of war related trauma in our study, similar to reports from the Syrian conflict.[24]

Beyond traumatic injuries, our findings highlight a critical and often underestimated public health crisis caused by widespread general medical, infectious, and chronic diseases. More than 5400 acute presentations, with malnutrition alone accounting for almost 20%,

aligns with humanitarian reports and emphasises the lack of basic survival needs in Gaza.[25] The large number of chronic disease presentations highlights the profound indirect morbidity and mortality resulting from the systemic collapse of healthcare due to the blockade, fractured pathways, and loss of facilities.[26]

Strengths and limitations of this study

This study's free text reflections provide important qualitative context on the complex and interconnected challenges the healthcare system in Gaza faces. Respondents' narratives describe severe resource intensive injuries and conditions that require long term rehabilitation, underscoring the lasting effects for all aspects of healthcare and population wellbeing for years, if not decades, to come.[11] These reflections broaden our understanding of the human and systemic costs inherent to prolonged humanitarian crises.

Despite the strength of this international healthcare worker sample, several limitations must be acknowledged. Despite entry restrictions preventing many healthcare workers from deployment, responses were obtained from 78 clinicians, ensuring a robust and diverse dataset under challenging access conditions.[27] Firstly, our data are prone to recall bias. Respondents were required to use contemporaneous logbooks, shift records, or case notes to complete the survey, but reliance on retrospective reporting inevitably introduces uncertainty. During periods of large influxes of injured people, recording may have been incomplete, contributing to possible underestimation or imprecision. This limitation was unavoidable given the destruction of Gaza's electronic and paper medical records. To mitigate these risks, we restricted the recall period to three months, employed structured categorical ranges, and conservatively coded the lower bound of each reported range. As a result, our figures likely underestimate the true clinical burden. Notably, the frequency of injuries was broadly consistent in order of magnitude with WHO surveillance data, which reported 33 000 injuries over the same period.[28] Secondly, duplicated reporting is a possible risk. To address this, we examined deployment periods and hospital locations. Fifty six respondents (72%) worked during non-overlapping time periods. Among the remaining 22 respondents, only four overlapping deployments occurred at the same hospital, contributing to 4.3% of all data. Although duplication cannot be entirely excluded, we highlight this as a clear limitation of the study. Nevertheless, the overlap was small, and our data indicate that its impact on overall estimates was minimal. Importantly, Palestinian healthcare workers were not included in this study. The perspectives of international responders were used as a feasible interim proxy given the operational, communication, and genuine safety concerns that local healthcare workers face.

The implications of these findings need urgent attention. Firstly, the extent of polytrauma observed across several anatomical regions in our cohort, reflecting the impact of indiscriminate aerial and heavy explosive bombardment in civilian areas, underscores the need for preparedness in managing complex, resource intensive injuries that exceed those typically reported in conflicts elsewhere. Secondly, humanitarian missions must be equipped not only for trauma care but also for reconstruction after burns, critical care, and rehabilitation, including long term psychological support.[17 29] Many UK surgeons deployed to Gaza, including several of the authors of this study, had undertaken hostile environment surgical training, which proved vital in preparing clinicians to practise in such areas.[30] Thirdly, chronic disease management and antenatal care must be central to the humanitarian response. Finally, that this study required retrospective survey methods highlights critical gaps in clinical documentation. Although a global standard exists in the WHO Emergency Medical Team minimal dataset, its use in Gaza was partial and inconsistent, hampered by communication blackouts and destruction of facilities.[13 29] Strengthening the resilience of such systems and ensuring their pre-positioning in future crises would enable more accurate real time surveillance and better allocation of resources. The absence of systematic clinical data in Gaza hampers humanitarian responses and limits global understanding of the true scale and nature of suffering among civilians.

Conclusions

This international healthcare worker reported survey highlights the scale and complexity of traumatic injuries and medical conditions in Gaza during the ongoing conflict. The volume, distribution, and military grade severity of injuries, indicate patterns of harm that exceed those reported in previous modern-day conflicts. These findings highlight the urgent need for resilient, context specific surveillance systems, designed to function amid sustained hostilities, resource scarcity, and intermittent telecommunications, to inform tailored surgical, medical, psychological, and rehabilitation interventions.

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We honour the extraordinary courage of local healthcare workers who continue to serve amid active conflict, delivering care to the most vulnerable while risking their own lives. Their unwavering commitment in the face of danger embodies the highest ideals of humanitarian medicine. This work is dedicated to those enduring hunger, displacement, and unimaginable loss, and to the memory of those who did not survive.

Supplementary appendix A provides a full list of the International Medical Responders for Gaza collaborators.

Contributors: OET and AA contributed equally as first authors and were involved in the conceptualisation, methodology, data curation, formal analysis, project administration, utilisation of resources, writing the draft, and reviewing and editing the manuscript. OA and AG assisted with data curation, methodology, project administration, and resource utilisation to complete the projection. AJo worked alongside to conduct formal analysis, and visualisation of results and review. MJS helped to conceptualise the project and development of the original draft and writing. BI and AJa conducted a literature search, in addition to reviewing and editing the manuscript. MQ, AJe, AD, AM, MM, VR, NMam, SK, NMay, and DN all assisted in providing resources, validation of results, and review and editing of the manuscript. ASC provided resources, validation review and editing, and supervision. OET and ASC are the guarantors. International medical responders for Gaza collaborators (26 authors) were survey respondents who contributed primary data from their clinical work in Gaza. OET attests that all listed authors meet authorship criteria and that no others meeting the criteria have been omitted.

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Competing interests: All authors have completed the ICMJE uniform disclosure form at www.icmje.org/disclosure-of-interest/ and declare: no support from any organisation for the submitted work; no financial relationships with any organisations that might have an interest in the submitted work in the previous three years; OA cofounded OxPal 2.0, an initiative supporting medical education in Palestine in partnership with consultants from the University of Oxford, Oxford, UK and other medical schools in the UK and USA. MQ is head of Emergency Medicine at Nasser Medical Complex, Gaza. AD is medical director of the David Nott Foundation, a British non-governmental organisation (NGO). DN is cofounder of the David Nott Foundation, a British NGO. AM previously served as head of Plastic and Reconstructive Surgery at Al Shifaa Hospital, Gaza. SK is founder and director of Mobile International Surgical Teams Foundation, a UK NGO. NMay is chairman of Medical Aid for Palestinians. ASC is an honorary patron of Medical Aid for Palestinians, a British NGO. OET, AG, MJS, AJe, AD, MM, VR, NMam, SK, NMay, DN, and ASC have volunteered on multiple medical missions worldwide, including in Gaza, with various NGOs. All authors declare no other competing interests.

Ethical approval: This study was approved by the local Helsinki Committee in Gaza, and all participants provided electronic informed consent.

Data sharing: Data supporting the findings of this study are available upon reasonable request. Interested parties may contact the corresponding author (omar.el-taji@nhs.net).

Transparency: OET affirms that the manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as originally planned (and, if relevant, registered) have been explained.

Dissemination to participants and related patient and public communities: Results have been shared with all co-authors, including participating healthcare workers. The wider public will have access through open access publication and planned media coverage. In addition, findings will be shared with relevant humanitarian agencies (eg, non-governmental organisations, UN bodies, and the World Health Organization) to inform operational planning and advocacy.

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Web appendix: Tables S1. Delphi process and study questionnaire

Web appendix: Figure S1: Study response flow (STROBE)

Web appendix: Tables S2. Survey results

Web appendix: Appendix A: International Medical Responders for Gaza collaborators