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Characteristics and survival of hospitalized combat casualties during two major conflicts between Israel and Hamas: 2023 versus 2014

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Abstract

Background In the complex landscape of modern warfare, understanding combat-related injuries leading to hospitalization is crucial for optimizing injury treatment. This study aims to compare combat casualty characteristics and outcomes during the major conflicts between Israel and Hamas in 2023 and 2014 as a basis for understanding the effectiveness of trauma care practices for wounded soldiers.

Methods A cohort study of soldiers hospitalized due to combat injuries during two major wars between Israel and Hamas in 2023 and 2014, using data from the Israeli National Trauma Registry. This study did not include deaths before hospital arrival or casualties who were discharged from the Emergency Department.

Results Of the 1,198 study subjects, 67.8% belonged to the 2023 cohort and 32.2% to the 2014 cohort. The percentage of casualties with severe and critical injuries (Injury Severity Score [ISS] 16–75) was higher among the 2023 cohort (18.6% vs. 13.7%, $p=0.036$), as was the percentage of casualties with multiple severe injuries (≥ 2 regions with Abbreviated Injury Score ≥ 3: 11.5% vs. 7.5%, $p=0.035$) and firearm injuries (19.6% vs. 14.5%, $p=0.081$). Injuries to the torso and extremities were more frequent among the 2023 cohort. Among the critically injured casualties (ISS 25–75), the mortality rates were 17.3% vs. 28.6%, respectively, for the 2023 and 2014 cohorts ($p=0.351$); adjusted HR (95% CI): 0.56 (0.21–1.49). The 2023 cohort had higher rates for treatment in the trauma bay (61.5% vs. 47.9%, $p<0.001$), ICU utilization (admission: 16.3% vs 11.7%, $p=0.036$), surgical intervention (51.5% vs. 42.7%, $p=0.005$), longer duration from arrival to surgery (median [interquartile range]: 4.6 (1.2–18.5) vs. 2.6 (1.1–10.1) hours, $p=0.037$), and longer hospital stays (> 14 days: 15.5% vs. 8.8%, $p<0.001$).

Conclusions Our data demonstrated that more casualties who survived to hospital arrival were severely and multiply injured in the 2023 Israel-Hamas war as compared to the 2014 war. Despite the increased severity, in-hospital survival did not worsen though there was an increase in hospital resource utilization.

Keywords Combat, Soldier, Injuries, Survival, Resource utilization, Interventions

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Background

The Israel-Hamas conflict has included two wars during the last decade: the 2014 war and the war that began in October 2023. The war in 2014 started after Hamas abducted and murdered three Israeli teenagers. Israel's stated goal was destroying Hamas's network of underground tunnels used to store rockets. That war lasted 50 days and resulted in significant casualties on both sides [1, 2]. The war in 2023 began after Hamas unleashed the bloodiest single-day massacre of Jews since the Holocaust, killing over 1,200 Israelis and foreign nationals on October 7, 2023. This latter war has been conducted with greater intensity, resulting in more casualties and deaths on both sides [2, 3].

The goal of any trauma system is to reduce mortality and morbidity by ensuring optimal care for trauma patients. Prehospital casualty care strategies and protocols are continuously updated to incorporate the latest medical advances [4–11]. Over the last decade or so, the Israel Defense Forces Medical Corps has focused on rapid medical evacuation with only essential, life-saving field treatment [12]. Some of these strategies have included deploying more physicians and paramedics near combat zones to enhance point of injury care, and the prehospital administration of whole blood [13, 14]. Additionally, a mobile application was developed to streamline the transfer of casualty information from the battlefield to the hospital [15].

In-hospital care has also evolved over the last decade or so, for both physical and mental injuries. Some examples include: rapid tourniquet removal; specific antibiotic treatment and whole blood administration in the Emergency Department (ED); imaging protocols applying total body CT and angiographic interventions for hemorrhage control at an early stage; and the use of extracorporeal membrane oxygenation (ECMO) for patients suffering from severe lung injuries as a result of smoke inhalation, all of which have been increasingly performed during the current war. In addition, revised surgical approaches have been used. For example, vacuum assisted closure devices have been used extensively for open wounds following debridement instead of skin grafting, and nerve grafting has figured more prominently for nerve injuries. Psychological treatment is now proactively offered to all relevant casualties as soon as possible. Additionally, as a result of and during the current war, hospitals near war zones have been upgraded to level I trauma centers so they are better able to handle casualties arriving in serious and critical condition without needing to transfer them for higher levels of care [16].

This study aimed to examine the injury characteristics and outcomes among hospitalized combat casualties during the two major conflicts between Israel and Hamas in 2014 and 2023. We hypothesized that hospitalized combat casualties during the 2023 conflict may have benefited from new treatment protocols and strategies, both prehospital and in-hospital.

Methods

Data source

The Israel National Trauma Registry (INTR), which aggregates data from all seven level-I trauma centers (TCs) and 16 level-II TCs in Israel, was the data source for this study. The INTR is an extensive database of hospitalized trauma patients, providing broad geographic and demographic coverage throughout the country [17]. Included in the INTR are all trauma patients with an International Classification of Disease-Ninth Revision-Clinical Modification (ICD9-CM) diagnosis code 800–989.9, who were received by an ED and were either hospitalized, died in the ED, or transferred to or from another hospital. The registry does not include casualties who died at the scene or en route to the hospital, or who were hospitalized 72 h or more after the injury event. Injuries resulting from poisoning, drowning, or suffocation also are not included in the registry. Under the guidance of a trauma unit director or trauma coordinator, trained trauma registrars at each TC enter the data into an electronic file. These files are then transferred to the INTR where data quality checks are conducted. The data do not contain the names of the casualties or their national identification numbers. This study was approved by the Sheba Medical Center Institutional Review Board (IRB) (SMC 5138–18).

Measurements

Only Israeli soldiers hospitalized due to combat injuries during ground operations in the two major conflicts between Israel and Hamas were included in this study. The study population consisted of two groups: casualties from the 2014 war, known in Israel as Operation Protective Edge (OPE), and from the 2023 war, known as Swords of Iron (SOI). The ground operations in the 2014 conflict spanned from July 17, 2014 to August 26, 2014, inclusive. While the current conflict is still ongoing (as of May, 2023 when this paper was finalized), this study covers casualties from October 27, 2023 (when the Israeli ground offensive began) to December 31, 2023. These cohorts were considered comparable because they target similar populations (combat soldiers) and settings, minimizing some sources of potential bias.

The study included demographic factors (age and gender), injury characteristics (injury mechanism, injury type, injury severity, type and number of injured body regions), hospital resource utilization and intervention characteristics (undergoing intubation in ED, treatment

in trauma bay, intensive care unit (ICU) admission and length of stay, surgical interventions (all and by anatomic region) and time from arrival to performance of surgical procedures, hospital length of stay), and in-hospital mortality.

Injury mechanism was classified as firearm, explosive, both firearm and explosive, and other (which included struck by objects, stabbing/laceration, building collapse, fall, motor vehicle crash and burn). Injury type was categorized as penetrating and non-penetrating. Abbreviated Injury Scale (AIS) codes were used to identify injured body regions (head, face, neck, thorax, abdomen, spine, upper extremity, lower extremity, and external). A seriously injured body region was defined as an AIS severity code of ≥ 3. Injury severity was reported here using the Injury Severity Score (ISS) and was analyzed by four groups (1–8: minor, 9–14: moderate, 16–24: severe, and 25–75: critical). Note that the ISS cannot be 15. The INTR software calculates the ISS based on the reported AIS codes.

Statistical analysis

Descriptive data are reported using percentages and medians with interquartile ranges (IQR), as appropriate. Statistical testing included Chi-square test or Fisher's exact test as appropriate for categorical variables, and Student's t-test or Mann–Whitney test for continuous variables with and without normal distributions, respectively. A Kaplan–Meier-like curve was generated to identify visually differences in the timing of mortality during hospitalization between the two wars. Regression analyses were performed to assess residual differences between the wars on utilization of hospital resources (including ICU admission and stay, undergoing surgical intervention, and hospital length of stay) and mortality, after controlling for age and ISS. A p-value < 0.05 was considered statistically significant and confidence intervals (CI) are 95%. Statistical analysis was performed using SAS software version 9.4 (SAS Institute Inc., Cary, NC, USA).

The manuscript was composed in accordance with the Strengthening the reporting of observational studies in epidemiology (STROBE) statement [18].

Results

This study included a total of 1,198 soldiers who were hospitalized due to combat injuries: 812 (67.8%) from SOI in 2023 and 386 (32.2%) from OPE in 2014 (Table 1). The 2023 casualties were older (median 24 years [IQR 21–29]) than the 2014 casualties (21 [20–23]). Almost all casualties were male. There was one casualty in the 2023 cohort missing injury type, another casualty from the same cohort missing ISS, and a third casualty from the same cohort missing LOS and ICU stay data.

Though the percentage of casualties suffering from penetrating injuries was similar in the two groups, a higher percentage of the 2023 casualties were injured by firearm (19.6% vs. 14.5%) with a concomitantly lower percentage injured by explosion (Fig. 1A). The percentage of severely and critically injured casualties (ISS ≥ 16) was significantly higher in the 2023 cohort (18.6% vs. 13.7%).

Casualties in the 2023 cohort experienced relatively more thoracic, abdominal, spine, and upper extremity injuries (Table 1). Overall, the 2023 casualties had more serious (AIS ≥ 3) extremity injuries as compared to the 2014 group (20.6% vs. 15.0%, respectively), with a higher prevalence of fractures and vascular injuries (Table 1). The 2023 cohort was more often multiply injured (injuries to more than one body region) compared to the 2014 casualties (Table 1). The occurrence of multiple serious injuries, involving two or more body regions with AIS ≥ 3, was also more notable among the 2023 casualties (11.5% compared to 7.5% for the 2014 casualties) (Fig. 1B).

The 2023 cohort utilized more hospital resources and interventions compared to their 2014 counterparts (Table 2). These include more trauma bay use, more admissions to the ICU, more ICU stays > 7 days, and more hospital stays > 14 days. The 2023 cohort was also more likely to require surgery (51.5% vs 42.7%), with significantly more extremity (23.2% vs. 17.4%), abdominal (8.3% vs. 3.6%), and thoracic (7.8% vs 4.7%) surgeries performed (Table 2, Supplement Fig. 1). Exploratory laparotomy was required in 5.0% of the 2023 cohort compared to 1.8% in the 2014 cohort, and vascular surgeries were performed in 5.2% of the 2023 cohort compared to 3.9% in the 2014 cohort (Table 2). Notably, there was a lower percentage of ocular surgeries (2.3% vs 4.9%) among the 2023 cohort (Supplement Fig. 1). Among the 2023 combat casualties who underwent surgical procedures, the median duration from hospital arrival to initial surgery was 4.6 h (IQR 1.2–18.5), compared to 2.6 h (IQR 1.1–10.1) for the 2014 cohort. Table 3 shows adjusted estimates for utilization of hospital resources.

Among casualties hospitalized in the 2023 war, 14 (1.7%) died, versus 7 (1.8%) in the 2014 war. All deaths included in this study, except for one case in the 2023 cohort, occurred within 30 days of hospitalization. The age and ISS adjusted hazard ratio (HR) for death in 2023 vs 2014 was 0.56 (CI: 0.22–1.39). Of the 21 total deaths, 19 (90.5%) were among casualties with critical injuries (ISS ≥ 25). Among critically injured casualties, the mortality rates were 17.3% for the 2023 cohort and 28.6% for the 2014 cohort (Table 2). The age-adjusted HR for deaths among these critically injured casualties was 0.59 (CI: 0.22–1.57) for the 2023 cohort versus the

Table 1 Demographic and injury characteristics among combat casualties during the 2023 war versus 2014 war (%)

Variable		All (*N* = 1,198)	2023 war (*n* = 812, 67.8%)	2014 war (*n* = 386, 32.2%)	*p*-value
Age	18–23	58.0	49.6	75.7	< 0.001
	24–29	22.0	26.3	13.0	
	30–35	12.3	14.7	7.2	
	36 +	7.7	9.4	4.1	
	Median (IQR)	22 (20–28)	24 (21–29)	21 (20–23)	< 0.001
Gender	Male	99.1	98.9	99.5	0.518
Penetrating injury[a]		78.0	78.6	76.9	0.532
ISS[a]	1–8	63.2	61.4	66.9	0.097
	9–14	19.8	20.0	19.4	
	16–24	9.0	9.4	8.3	
	25–75	8.0	9.2	5.4	
	Median (IQR)	5 (3–10)	5 (4–10)	4 (2–9)	0.012
Body region injured	Head	17.0	16.0	19.2	0.174
	Face	25.7	25.1	26.9	0.501
	Neck	11.1	11.4	10.4	0.575
	Thorax	16.3	18.0	12.7	0.021
	Abdomen	18.8	20.9	14.2	0.006
	Spine	3.7	4.4	2.1	0.042
	Upper extremity	38.6	40.8	34.2	0.029
	Lower extremity	44.9	44.3	46.1	0.563
	External	8.3	8.7	7.2	0.381
	> = 2 body regions	49.7	51.9	45.1	0.029
Traumatic brain injury		5.3	5.1	6.0	0.513
Vascular injury (any)		7.3	8.9	3.9	0.002
Vascular injury on extremity		5.4	6.4	3.4	0.030
Bone fracture (any)		35.6	37.6	31.3	0.036
Skull fracture		8.3	7.1	10.9	0.029

Please note that casualties could sustain injuries to more than one body region, thus, the sum could be greater than 100%

Abbreviations: IQR interquartile range, *ISS* Injury Severity Score

[a] There was one casualty in the 2023 cohort missing Penetrating injury data, and another casualty from the same cohort missing ISS

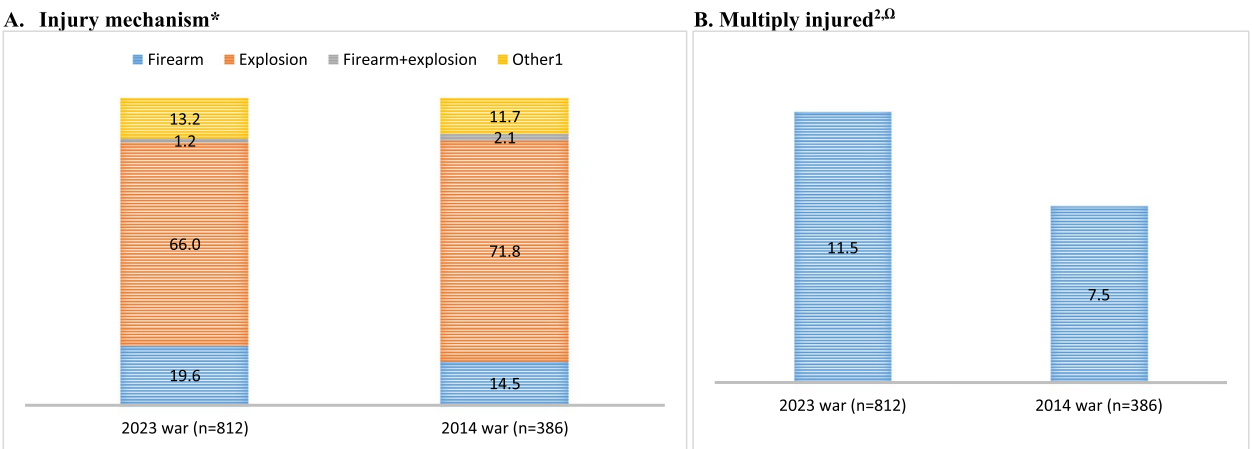

Fig. 1 Injury characteristics among combat casualties who were injured during the 2023 war versus 2014 war

Table 2 Hospitalization characteristics among combat casualties during the 2023 war versus 2014 war

Variable		All ($N=1,198$)	2023 war ($n=812$, 67.8%)	2014 war ($n=386$, 32.2%)	*p*-value
Intubation in ED (%)		6.1	5.8	6.7	0.522
Trauma bay treatment (%)		57.1	61.5	47.9	< 0.001
ICU[a]	Admission (%)	14.8	16.3	11.7	0.036
	LOS > 7 days (%)	4.3	5.2	2.6	0.040
	LOS median (IQR)	3 (1–10)	3 (1–11)	3 (1–6)	0.378
Underwent any surgery (%)		48.7	51.5	42.7	0.005
Exploratory laparotomy (%)		4.0	5.0	1.8	0.008
Vascular surgery (%)		4.8	5.2	3.9	0.331
Time from hospital arrival to 1st surgery (hours)	Median (IQR)	3.9 (1.2–16.4)	4.6 (1.2–18.5)	2.6 (1.1–10.1)	0.037
Underwent amputation (%)		3.7	4.6	1.8	0.016
Hospital LOS[a]	> 7 days (%)	23.5	26.0	18.1	0.003
	> 14 days (%)	13.4	15.5	8.8	0.001
	Median (IQR)	3 (1–7)	3 (1–8)	3 (1–6)	0.798
Mortality, overall (%)		1.7	1.7	1.8	0.912
Mortality among critically injured casualties[b] (%)		19.8	17.3	28.6	0.351

Abbreviations: *ED* emergency department, *ICU* intensive care unit, *LOS* length of stay, *IQR* interquartile range

[a] There was one missing value in the 2023 cohort for ICU and Hospital LOS

[b] Critically injured is defined as ISS 25–75; $n=96$. One casualty in the 2023 dataset was missing ISS

Table 3 Estimates for utilization of hospital resources among the 2023 combat casualties, compared to the 2014 counterparts ($N=1,198$)

Outcome	Odd Ratio (95% Confidence Interval)			
	Unadjusted[a]	*p*-value	Adjusted[a,b]	*p*-value
Hospital LOS (> 14 days)	1.97 (1.33–3.00)	0.002	1.73 (1.12–2.74)	0.016
ICU admission	1.48 (1.04–2.15)	0.033	1.22 (0.78–1.96)	0.401
ICU LOS (> 7 days)	2.29 (1.17–4.91)	0.045	1.61 (0.73–3.80)	0.256
Undergoing any surgery	1.42 (1.11–1.81)	0.005	1.35 (1.04–1.76)	0.027

Abreviations: *LOS* length of stay, *ICU* intensive care unit

[a] One observation in the 2023 cohort missing LOS and ICU data was excluded from those six models, and one additional observation from the 2023 cohort missing injury severity score was excluded from the four adjusted models. The unadjusted surgery model has no missing data

[b] Adjusted for age (continuous) and injury severity score (categorized into 1–8, 9–14, 16–24, 25–75)

2014 cohort. One observation was excluded from due to a missing value. The Kaplan Meier plot seems to be consistent with better survival in the 2023 cohort compared to the 2014 cohort (Fig. 2, Supplement Fig. 2). However, this difference did not achieve statistical significance presumably because of the small numbers of deaths.

Among the 14 casualties who died in 2023, the head, chest and lower extremities were the most frequently involved body regions (57.1% each), followed by the face (42.9%), abdomen (35.7%), and upper extremities (28.6%) (Supplement Table 1). A casualty could have more than one involved body region. Among the seven casualties who died in 2014, the most frequently involved body regions were the chest (57.1%), head (42.9%), and lower extremities (28.6%). With respect to multiply injured body regions, 85.7% of the 14 deaths among the 2023 cohort involved two or more seriously injured body regions (AIS ≥ 3), compared to 42.9% among the seven casualties in 2014 (Supplement Table 1). Finally, with respect to LOS at time of death, in the 2023 cohort 78.6% of the deaths occurred within the first three days of hospitalization compared to 57.1% in the 2014 cohort.

Discussion

The first months of the 2023 Israel-Hamas war resulted in both a higher hospitalized casualty count and a greater percentage of severely and critically injured hospitalized casualties as compared to the 2014 war. This study demonstrated that despite the increased injury severity among hospitalized casualties in the 2023 war, there was no significant difference in mortality between the two wars [2, 3].

During the 66 days of the 2023 war covered by this study, 812 combat casualties were hospitalized, as opposed to 386 casualties recorded during the 41 days of the 2014 war, reflecting a 30% increase in the average number of casualties hospitalized per day. Among the 2023 cohort, 151 casualties (18.6%) were classified as

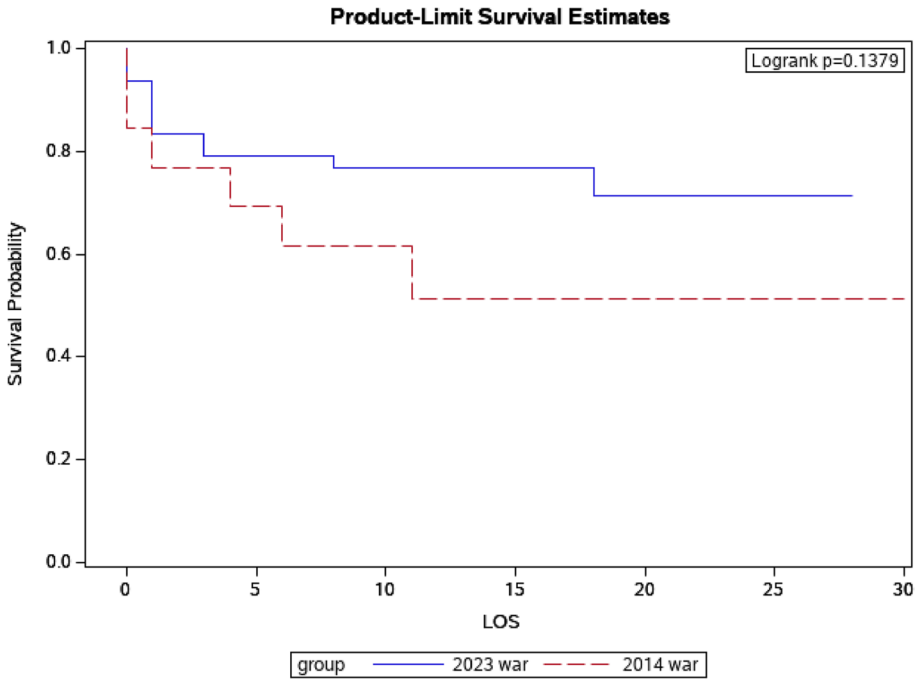

Fig. 2 Kaplan–Meier curves and survival table showing the cumulative survival probability among severe and critically injured combat casualties (ISS 25–75) during the 2023 war versus 2014 war

severe and critically injured (ISS 16–75), compared to 53 such cases (13.7%) in the 2014 cohort.

One of the important findings of this study was that mortality rate was not higher (and may even been lower) among critically injured casualties (ISS 25–75) within the 2023 cohort compared to their 2014 counterparts. This is noteworthy considering that the proportion of casualties with critical injuries was higher in the 2023 cohort compared to their 2014 counterparts, and that the majority of deaths (90.5%) occurred among these casualties. Another remarkable shift was that the cohort hospitalized in 2023 had a higher proportion of severe and critical injures (ISS 16–75) and were more often multiply injured. This suggests that more casualties within the 2023 cohort who might have otherwise succumbed to their injuries in the previous conflict [19] were able to survive to hospital admission.

Previous studies have reported improved survival rates among combat casualties in more recent conflicts [19, 20], supporting our observations. While this study was not designed to explore a cause-and-effect relationship, our findings could be attributed to advancements in prehospital and hospital trauma care [9–14, 19–21]. The Israel Defense Forces Medical Corps' continuous updates to trauma clinical practice guidelines, along with the incorporation of evidence-based impactful approaches, may have contributed to the improvement in casualty outcomes [9, 13, 14]. Combat casualties within the 2023 cohort benefited from improved prehospital tactical combat casualty care, short evacuation times accompanied by only necessary procedures, and better post-resuscitation care [10–14, 19, 22–24]. Some of the specific interventions have included: deploying more advanced life support providers, including forward surgical teams (FST) [15]; administering whole blood in the prehospital environment to casualties in hemorrhagic shock [14]; all this while continuing to focus on rapid evacuation to a hospital. The literature has reported the positive role of prehospital transfusion of fresh whole blood on the survival of combat casualties [13, 25, 26], as well as for FSTs [25]. In addition, an effective debriefing and research system was implemented from an early stage of the war that captured the treatment chain from the caregivers in the field, through the evacuation teams, to the medical team in the ED and enabled the distribution of lessons learned to adjacent forces. These lessons improved care and decisions made in the field. This is further supported by a preliminary report from a single level 1 trauma center and IDF report of the ongoing conflict casualties, indicating a reduction in mortality possibly due to quick evacuation and improved treatment [27, 28].

At the hospital level, updated surgical approaches and new treatment protocols have also been put into practice. Moreover, there was increased preparedness with the addition of personnel and resources to handle an anticipated surge in casualties during the current conflict [16,

22, 23]. We note the higher rate of exploratory laparotomy and vascular surgeries in the 2023 cohort as compared to the 2014 cohort.

The above notwithstanding, because our ISS groups are not perfect outcome predictors, we cannot discount the possibility that changes in IDF tactics, enemy weapons and tactics, force protection factors (protective gear and vehicle armor), and/or other factors may also help explain the relatively improved survival seen in 2023.

This study also revealed that injuries to the torso and extremities were more prevalent in the 2023 cohort when compared to their 2014 counterparts, consistent with findings from previous studies [29–34]. These differences in injury patterns were reflected in a greater need for surgical intervention among the 2023 casualties. The amputation rate was higher in the casualties during the current conflict than in their 2014 counterparts, which may also indicate improved field care with tourniquets, and improved damage control resuscitation and definitive treatment efforts that allowed these patients to survive their wounds, though other factors may also be involved as mentioned above. We note, however, that while the aggressive use of tourniquets on the battlefield may save lives, if they are applied too liberally, they may also lead to unnecessary complications. That said, given the relatively short evacuation times from these conflicts to a trauma center, we assume that severe untoward effects were minimal.

It is important to acknowledge that the apparent relatively improved survival observed among the 2023 cohort compared to their 2014 counterparts was associated with an increased utilization of hospital resources and interventions. Findings from this study reveal that the 2023 casualties required more trauma bay use, surgical procedures, ICU care and longer hospital stays, partly explained by injury severity differences. In other words, better prehospital care – which allows more severely and multiply injured casualties to survive to hospital arrival – necessitates more intensive hospital care. These findings underscore the need for effective medical emergency preparedness and resource allocation to enhance trauma outcomes among combat casualties [35].

Limitations

The nature of the INTR database omits trauma casualties who died at the scene or prior to arriving at the hospital, so that fatalities included are only those who died after arriving at a hospital (roughly equivalent to "died of wounds" in the military medical nomenclature) and none of those who died before arriving at a hospital (roughly equivalent to "killed in action"). Thus, we cannot provide or compare case fatality rates. In addition, this study did not include the casualties who were discharged from the ED or those with very minor injuries who did not arrive at a hospital. As mentioned earlier, various factors beyond medical care may have influenced which casualties survived to hospital arrival, and we emphasize that this study and its conclusions only apply to casualties who arrived alive at a hospital. Second, due to a lack of complete data, it was not possible to include factors such as prehospital time, means of evacuation, and utilization of personal protection equipment. These factors presumably evolved over time and may also influence the outcomes of casualties. Lastly, we assume that all care provided in-hospital in both conflicts was appropriate and necessary.

Conclusions

Our data demonstrated that more casualties who survived to hospital arrival were severely and multiply injured in the 2023 Israel-Hamas war as compared to the 2014 war. Despite the increased severity, in-hospital survival did not worsen. Improvements in prehospital and hospital care between the two wars likely contributed to this finding, though other factors are likely also involved. As expected, the more severely injured 2023 cohort required increased utilization of hospital resources and interventions. Further research will lead to even better emergency preparedness and care for combat casualties, though it should be expected that additional resources will be needed.

Abbreviations

AIS	Abbreviated Injury Scale
ED	Emergency Department
HR	Hazard Ratio
ICD-9-CM	International Classification of Diseases, Ninth Revision, Classification Modification
ICU	Intensive Care Unit
INTR	Israeli National Trauma Registry
IQR	Inter Quartile range
ISS	Injury Severity Score
OR	Odds ratio
STROBE	Strengthening the reporting of observational studies in epidemiology
VAC	Vacuum Assisted Closure
ECMO	Extra Corporeal Membrane Oxygenation

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12873-024-01149-w.

Supplementary Material 1.

Supplementary Material 2.

Supplementary Material 3.

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Authors' contributions

AT* contributed to the conception and design of the study, analysis and interpretation of the data, and drafting and writing the manuscript. AML* contributed to the interpretation of the data and writing the manuscript. SG contributed to the data analysis and reviewing the manuscript. AG and IR contributed to the conception and design of the study, data analysis and reviewing the manuscript. SS contributed to the conception of the study, interpretation of the data and reviewing the manuscript. GT, AB** and EK** contributed to the conception and design of the study, interpretation of the data, and reviewing the manuscript. ITG undertook their responsibility for the data integrity. All authors read and approved the final manuscript. *Equally shared first authorship, **Equally shared last authorship.

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Data availability

The datasets generated and analyzed during the current study are not publicly available due hospitalization privacy but are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

The research received the approval of the Sheba Medical Center's Institutional Review Board (SMC 5138–18). The research is based on anonymous registry; therefore, the need for consent to participate was waived by the Sheba Medical Center's Institutional Review Board.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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