Analysis of emergency centre recidivism for interpersonal violence in a district-level hospital in Cape Town, South Africa

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Background. Interpersonal violence is a major cause of morbidity and mortality in low- and upper-middle-income countries. It is postulated that a significant portion of these patients have repeated presentations to an already overburdened healthcare system. Data describing the burden of interpersonal violence recidivism are poor.
Objective. To determine and describe the burden of emergency centre recidivism for interpersonal violent injury presenting to Khayelitsha Hospital, Cape Town, over a 2-year period.
Methods. An analysis of a prospectively collected observational database combined with a retrospective chart review was conducted of all trauma patients who presented to Khayelitsha Hospital from 1 October 2020 to 30 September 2022. All patients (aged ≥14 years) with ≥2 presentations for interpersonal violence-related injuries were included. Cases were limited to the inclusion of mechanisms of injury attributable to stab wounds, blunt assault, firearm injury and gender-based violence. Recidivist cases were identified by repeat hospital number on the electronic hospital patient system. Repeat cases were manually reviewed for inclusion. Summary statistics are used to describe all variables.
Results. In total, 10 218 interpersonal violence presentations were identified over the study period, and 1 125 (11.0%) were attributed to recidivists (522 patients). The mean (standard deviation) age was 30 (7.7) years, and most were male (*n*=463, 88.7%). Stab wounds (*n*=583, 51.8%) and blunt assault injuries (*n*=456, 40.5%) were the main mechanisms of injury. Repeat presentation occurred within a median of 198 (25th - 75th percentile, 81.5 - 373.9) days. A total of 337 (64.6%) patients presented with higher acuity at one of their subsequent visits.
Conclusion. Recidivist presentations represent a significant proportion of interpersonally violently injured patients, and are likely to be under-documented. Recidivism poses a measurable burden, and further research is needed to facilitate the identification of at-risk individuals, and specific secondary prevention strategies should be developed to prevent or reduce escalating patterns of injury associated with interpersonal violence.

Keywords: interpersonal violence, recidivism, emergency medicine, injury

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Interpersonal violence is a serious global health concern, with an estimated 475 000 deaths attributed to it during 2019. Upper-middle-income countries (UMICs) account disproportionately for almost half the deaths, although they only comprise 37.7% of the world population.[1]

Interpersonal violence involves the deliberate use of physical force or power against another person, and includes physical, sexual and emotional violence.[2] It can be categorised into community violence, where violence occurs between unrelated individuals outside of the home, and family and intimate partner violence.[3]

South Africa (SA) ranks among the countries with the highest incidence of interpersonal violence worldwide. Its death rate due to interpersonal violence is almost six times the global average, and >4 times the average of its UMIC peers (per 100 000, SA 35.9, global average 6.2 and UMICs 8.0).[1] It is estimated that in 2019, in the age group 15 - 59 years, interpersonal violence accounted for 36.4% of injury-related deaths in the country, more than double the global average of 17.7%.[1] The burden of interpersonal violence in the Western Cape Province of SA is also substantial. In 2021 - 2022, Cape Town, the regional capital, was ranked the 11th most dangerous city worldwide, with firearm injury the most common cause of homicide and attempted homicide.[4] Six of the 10 police stations serving the most dangerous areas in SA are in the Western Cape, with Khayelitsha police station ranked 8th for murder and 15th for all contact crime.[5] In the 2020 - 2021 reporting cycle, the Khayelitsha police precinct had the highest number of homicides in the region, a 5.6% increase on the previous cycle,[5] and reported 4.3% and 6.5% increases in common assault and assault with the intent to inflict grievous bodily harm, respectively.[6]

Multiple studies in SA consistently show young males to be at a greater risk to cause and suffer injury, with >70% of those violently injured males <40 years old.[7-11] The effects of violence in households may result in future violent behaviour, with children who witness interpersonal violence statistically more likely to become perpetrators of violence in adulthood,[12] and victims of violence are at a higher risk of developing psychological illness and physical disease in later life.[13-17] Estimates are that interpersonal violence-related injuries accounted for 1.12 million disability-adjusted life-years in SA in 2019,[1] and that the 2024 economic cost of violence in SA was around 15% of its gross domestic product (GDP), ranking it the 12th highest by GDP worldwide.[18]

There are few to no data regarding recidivism for trauma or interpersonal violence in SA,[19] and with its high burden of violent injury,[10,20,21] it is likely that the recidivist figure is substantial, with consequences for the individual and an already overburdened health system. This study aims to determine and describe the burden of emergency centre recidivism for interpersonal violent injuries presenting to Khayelitsha Hospital, Cape Town, over a 2-year period.

Methods

An analysis of a prospectively collected observational database, combined with a retrospective chart review to include additional variables, was conducted. The study was approved by the Stellenbosch University Health Research Ethics committee (ref. no. S22/10/202).

Khayelitsha Hospital is a district-level hospital that serves one of SA's largest and fastest growing informal settlements.[19] The 300-bed hospital is situated about 35 km from Cape Town, and provides emergency care and inpatient services, including general surgery, internal medicine, paediatrics and obstetrics and gynaecology. The emergency centre is 30% larger than that of a standard district hospital emergency centre,[22] and sees ~40 000 patients per year. There is no high care or intensive care unit within the hospital, and no advanced radiology after hours or at weekends. There is a significant burden of disease related to HIV, tuberculosis and violence in the community.[23,24]

All patients aged ≥14 years with ≥2 presentations to Khayelitsha Hospital relating to an interpersonal violent event from 1 October 2020 to 30 September 2022 were included.

Eligible participants were identified by scrutinising the hospital's electronic patient tracking and registration database, which was implemented in 2020. Routine clinical data are collected for each patient who enters the emergency centre, and include patient demographics, process times, triage categories, diagnoses and dispositions. Data are electronically stored in an off-site database (Oracle) that is automatically backed up daily. Access is for authorised users via individual login and password.

The mechanism of injury descriptor was used to separate cases of interpersonal violence from cases related to other forms of injury. The mechanism of injury descriptor was based on the health provider's opinion, and for the purpose of this study was limited to the inclusion of mechanisms of injury attributable to stab wounds, blunt assault, firearm injury and gender-based violence (GBV). Patients with other forms of injury, such as burns, motor vehicle crashes, pedestrian-vehicle accidents, self-harm, falls, and accidental and sports-related injuries were excluded as non-violent injury. Patients' hospital numbers were used to identify potential recidivist cases, with those repeating over the 2-year period manually reviewed for inclusion into the final recidivist dataset using the hospital's electronic patient records. Participants were also excluded if they were down-referred from a higher-level centre, a re-presentation for a complication of the initial injury or if the patient returned for further workup for the same injury. Patient-specific data included demographics, mechanism of injury, date and time of initial presentation, date and time of re-presentation and triage classification. Triage data were collected in terms of the triage early warning score (TEWS) of the SA Triage Scale (SATS).[25] The TEWS is a composite score of physiological parameters measured on arrival at the hospital. It forms part of the SATS, which categorises patients as non-urgent (green), urgent (yellow), very urgent (orange) and emergency (red).

Within the interpersonal violence recidivist dataset, data were grouped by presentation episode (initial presentation v. second, third or subsequent presentation), mechanism of injury, triage category and patient disposition (discharge directly from the emergency centre v. in-hospital team referral) at each presentation. Data were studied in three different ways to determine whether recidivist cases worsened clinically at repeat presentations. First, we evaluated each patient's triage category change from one visit to the next, assessing for escalating triage category at subsequent presentations, regardless of mechanism of injury. Second, we determined the triage category for recidivist cases at the initial and each subsequent visit, and organised these by mechanism of injury. Lastly, we reviewed whether a patient was deemed well enough for discharge directly from the emergency centre at the initial and for all repeat presentations of violent injury. Data were also reviewed as to movement between injury categories from the first to subsequent presentations.

Summary statistics were used to describe all variables. Where data are presented relating to repeat presentations, SATS or injury profile, the denominator is the total presentations. Where they relate to recidivists or a rate, the denominator is the number of recidivist patients. Categorical data were summarised using frequency counts or percentages. Medians or means were used as the measures of central tendency for ordinal and continuous responses, and standard deviation (SD) or percentiles as indicators of spread. Analysis was done using Excel (Microsoft, USA) or SPSS Statistics for Windows, version 28.0 (IBM Corp., USA).

Results

A total of 17 679 trauma-related presentations were managed at Khayelitsha Hospital's emergency centre during the 2-year study period. In patients ≥14 years old, 10 218 (65.0%) presentations were a result of interpersonal violence, and of these, 1 125 presentations were attributable to recidivists (11.0% of all violence-related trauma, 7.2% of all adult trauma) (Fig. 1). The recidivist presentations could be attributed to 522 individual patients (presented twice n=454, presented ≥3 times n=10, maximum number n=6) for 603 repeat presentations. The interpersonal violence recidivist rate for the 2-year period was 5.6% (522 out of a total of 9 364 patients ≥14 years old). The recidivist rate for all trauma was 7.4% (1 069 out of 14 443 patients ≥14 years old).

Most interpersonal violently injured recidivist patients were male (n=463, 88.7%), with a mean (SD) age for both males and females of 30 (7.7) years. The highest number of these recidivist patients was observed in the 18 - 25-year age group (n=150, 28.74%), followed by the 26 - 30-year group (n=149, 28.5%). The highest incidence of recidivism in females was in the 31 - 35-year age group (n=18, 30.5%), and for males in the 18 - 25-year group (143, 30.9%) (Table 1).

The timing of arrival for interpersonal violent injury showed a significant proportion arriving over the weekend, with Saturday and Sunday accounting for 54% (n=5 519) of all interpersonal violent presentations and for 49% of all trauma that presented to the hospital (Fig. 2). There was a median (25th - 75th percentile) of 198 (81.5 - 373.9) days between consecutive visits for all patients, 189 (81 - 371.5) for males and 229 (104.9 - 412.5) days for females.

Stab wounds accounted for most recidivist interpersonal violent presentations (n=583, 51.8%), but the mechanism of injury differed between males and females and between different age groups (appendix 1: https://www.samedical.org/file/2285). Blunt assault made up a greater proportion of the recidivist injury profile v. the profile for all interpersonal violent injury (41% v. 35%) (Fig. 3).

A total of 337 (64.6%) patients had a higher triage category at one of their subsequent presentations (appendix 2: https://www.samedical.org/file/2285). An escalation in acuity (i.e. triage category) was observed in participants with blunt assault and gunshot wounds (GSW). Within the blunt injury cohort, combining the red and

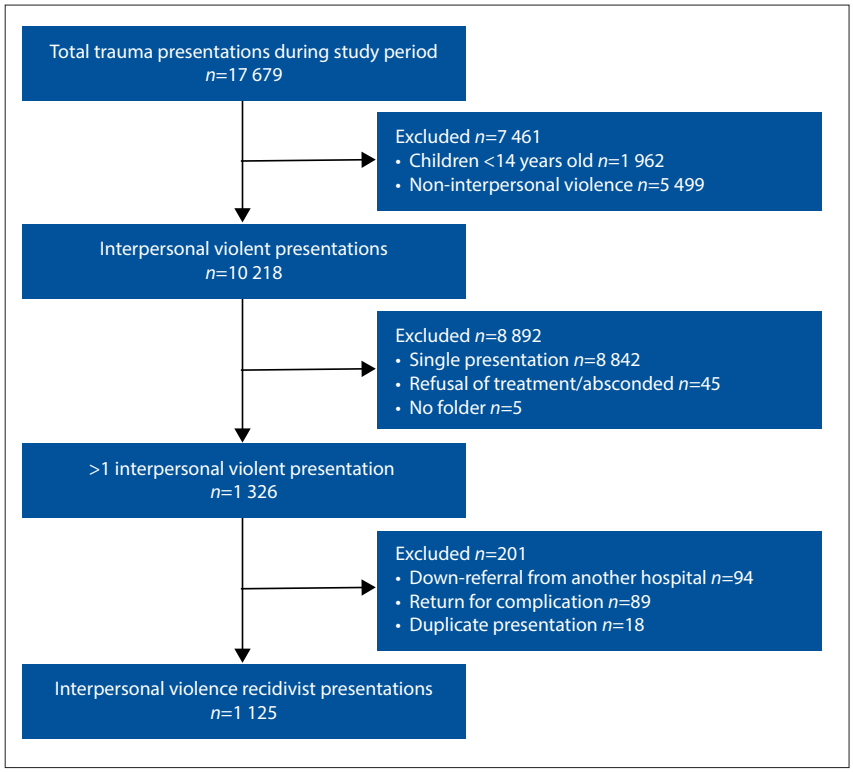

Fig. 1. Flowchart of study population with interpersonal violence recidivism presenting at Khayelitsha Hospital over a 2-year period.

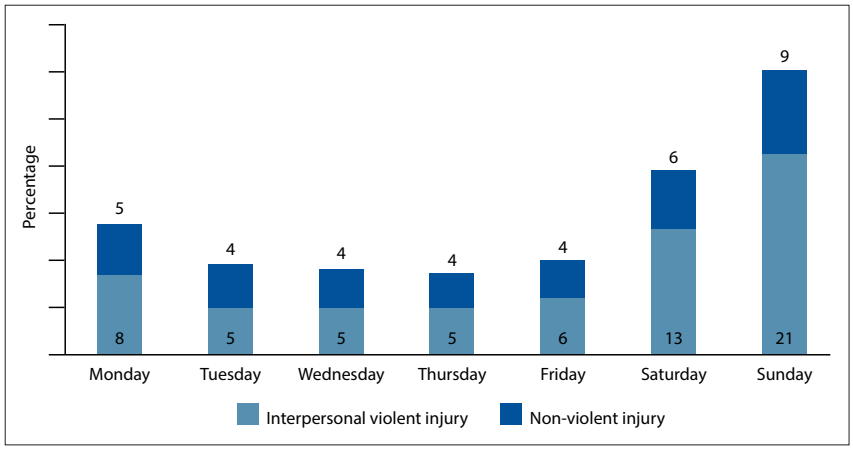

Fig. 2. Interpersonal violence (n=10 218) and non-violent injury (n=5 499) by day of the week as a percentage of the total trauma presentations for the 2-year period. (GBV = gender-based violence; GSW = gunshot wound.)

orange triage categories as a measure of high acuity, and green and yellow as low acuity, showed a 6% increase in the higher acuity group at subsequent presentations (Fig. 4).

The percentage of participants discharged directly home from the emergency centre remained the same for subsequent presentations for all types of injury except for injury by firearm, where a second presentation was more likely to result in a patient being admitted to the hospital (appendix 3: https://www.samedical.org/file/2285).

The Sankey diagram (Fig. 5) shows recidivist first and second presentation for each patient (*n*=522) during the period, and movement between the injury categories (appendix 4: https://www.samedical.org/file/2285).

Discussion

A large proportion (65%) of adult trauma patients who presented to Khayelitsha Hospital's emergency centre were victims of violent injury. One in 10 presentations was attributable to a recidivist, and 5.43% of patients were recidivist for interpersonal violent injury over the 2-year period. Most violently injured recidivist patients were male (88.7%) and between 18 and 25 years old (30%). More than half (51.8%) of recidivist presentations were attributed to stab wounds.

These traumatic and violent events are not random occurrences, but complex events influenced by individual and community characteristics and sociopolitical factors.[14,26,27] SA has a long history of physical and structural violence, particularly under apartheid,[12,28] and a consequence of inadequate post-apartheid spatial planning and economic policies has not remediated significant inequality, with far fewer opportunities in impoverished areas[29] such as Khayelitsha. In a society with endemic violence, violence may be the first response to conflict,[12] particularly where a lack of

Table 1. Demographics of recidivist patients and categorisation of recidivist presentations by age (*N*=1 125)

Age group, years	Patient			Presentation				
	Male	Female	Total	Blunt assault	GSW	Stab	GBV	Total
14 - 17	14	0	14	8	3	16	0	27
18 - 25	143	7	150	115	24	188	2	329
26 - 30	133	16	149	129	24	165	6	324
31 - 35	88	18	106	97	8	113	4	222
36 - 40	52	8	60	59	4	64	4	131
41 - 50	26	7	33	39	1	31	1	72
51 - 60	7	2	9	9	4	4	1	18
>60	0	1	1	0	0	2	0	2
Total	463	59	522	456	68	583	18	1 125

GSW = gunshot wound; GBV = gender-based violence.

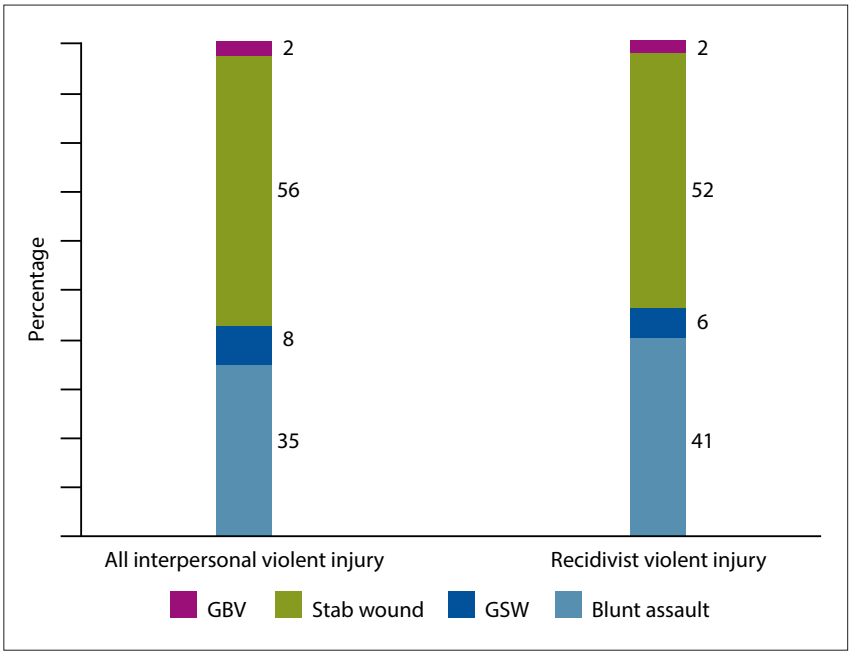

Fig. 3. All interpersonal violent (n=*10 218) and recidivist violent* (n=*1 025) presentations categorised by injury profile as a percentage. (GBV = gender-based violence; GSW = gunshot wound.)*

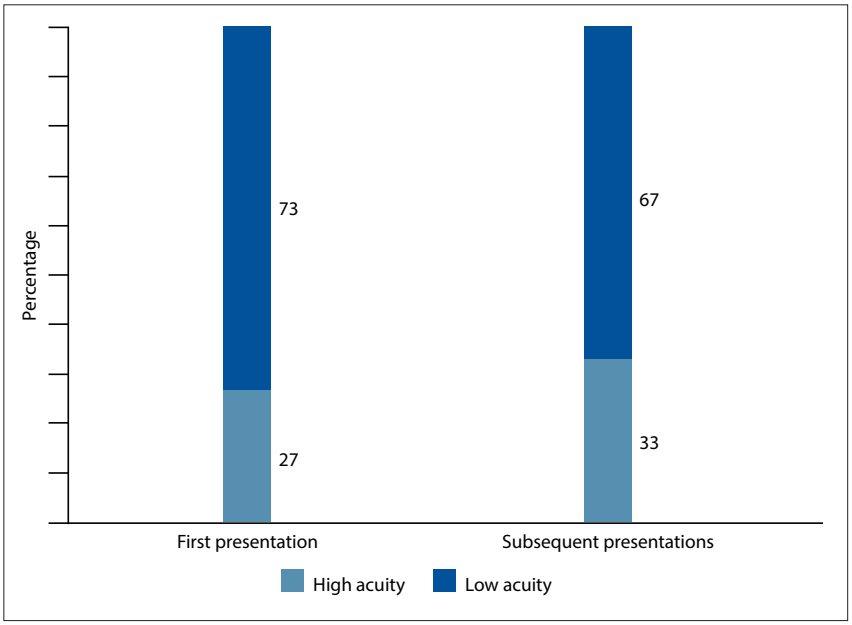

Fig. 4. Recidivist blunt assault high acuity (red/orange triage) v. low acuity (green/yellow triage) as a percentage of the first (n=*202) and all subsequent presentations for blunt assault* (n=*254).*

intellectual and social fulfilment leads to feelings of anger and nihilism that may contribute to the expression of violence.[29]

The all-trauma recidivism rate was found to be 7.40%. This is 3.5 times higher than the rate of trauma recidivism seen at multiple hospitals in the state of Nevada (USA) over a 5-year period.[30] The interpersonal violence recidivist rate of 5.43% is in line with US data that ranges from 4% to 16%, but with data collected over a period of >10 years.[31] The higher rate of trauma and interpersonal violence recidivism in our study is likely a result of Khayelitsha having some of the highest rates of violent and interpersonal crimes in SA.[5] It is likely that a similar study over a 5- or 10-year period would find an even higher rate, particularly if it included other healthcare facilities within Khayelitsha, its referral centre and mortuary.

Data collected at Khayelitsha Hospital, a nearby community health centre and the forensic mortuary between 2016 and 2018 revealed a 14% recidivist rate for interpersonal violence in young adults aged 14 - 24 years.[19] Our data reflected an 8.9% return rate for violent-injured patients in the same age group, and refines the data further, as the initial study was done via convenience sampling only over weekends. Despite these differences, the study highlights that injury recidivism is a long-standing and persistent problem in the affected community.

The direct healthcare costs and individual consequences for the 51% (*n*=575) admitted (appendix 3: https://www.samedical.org/file/2285) are likely substantial. Although not directly comparable, as Khayelitsha Hospital is a district hospital with surgical services, a SA tertiary facility estimated a minimum of ZAR58 928 (USD3 222) per patient admitted for a violent injury in 2013.[21] Escalated at consumer price inflation for the period, this equates to ZAR102 380 (USD5 597) per patient admitted today. Violent injury and admission to hospital, for those youth who are economically active and for those looking for employment, may jeopardise an already precarious employment position, when in the first quarter of 2024, 45.5% of SA youth (aged 15 - 34 years) are unemployed.[32]

Although few studies examine the direct link between crime and unemployment in the youth, it is postulated that dissatisfaction and unemployment contribute to increased levels of violence.[33-35] There is also an association of alcohol use with violent injury,[9,10,36-39] mortality[40] and the timing of trauma and interpersonal violence over weekends.[9-11] Although these factors were not specifically examined in this study, the high rates of violent injury and escalation from weekdays into weekends, as seen in Fig. 2, suggest a similar association.

Interventions aimed at secondary prevention may well reduce morbidity and mortality. The median of 198 days for a repeat presentation is similar to that found over a 16-year period reviewing interpersonal violent injury, where within 180 days of a prior admission for an interpersonal violent injury, >70% were readmitted, and almost all of those who died because of an interpersonal violent injury died within 180 days of that prior presentation.[31]

The Sankey visualisation (Fig. 5) reveals that there is substantial movement between injury categories, with 46.4% presenting with a different mechanism at their second presentation. This contrasts with the international literature that suggests the majority (~70%) re-present with the same mechanism of injury.[31,41,42]

Victims of repeat community assault,[43] where suspected perpetrators of crime are assaulted as a form of mob justice or retaliation, may explain the greater

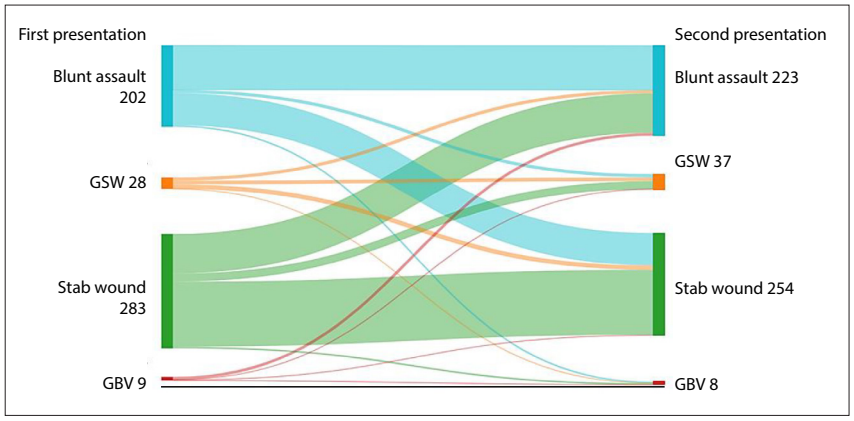

Fig. 5. Sankey flow diagram for recidivist first and second presentation during the study period (n=522). (GSW = gunshot wound; GBV = gender-based violence.)

proportion of blunt injury seen in the recidivist injury profile. These community-assault victims frequently present with features of traumatic rhabdomyolysis due to the extent of their blunt force injuries.[44] This may also explain part of the escalation in acuity by TEWS in our data that demonstrates an escalation for both blunt assault (Fig. 4) and firearm injury (appendix 2: https://www.samedical.org/file/2285). The international evidence indicates an increase in severity only with repeat firearm injury,[30] but uses the injury severity score to make this assessment.

The use of GBV as a mechanism of interpersonal violence within the dataset limits it accuracy in identifying all cases of GBV within this cohort. Cases identified as GBV were predominantly sexual assault, whereas by definition GBV also includes any verbal, physical and psychological abuse. It is likely that there are cases included within the categories of blunt assault, firearm injury and stabbing that should also be attributed to GBV. It may be worth refining the definitions of interpersonal violence, particularly GBV and intimate partner violence (IPV), and perhaps where GBV or IPV are identified as part of the injury profile, they should be captured separately in the future to better identify their frequency.

Limitations

This study was conducted over a short period, while most international recidivism studies cover a much longer period. Should the data be reviewed over a longer period (5 - 10 years) and include other healthcare facilities within Khayelitsha, the tertiary referral centre and mortuary, the rate of recidivist interpersonal violent injury is likely to be significantly higher. Primary care facilities are often the first point of contact for patients, and our study does not account for recidivist cases at these facilities, unless referred to Khayelitsha Hospital.

The categorisation of GBV is problematic as it only included sexual assault. As such, the number of GBV/sexual assault cases that presented to the hospital is a poor representation, as these cases are directed to dedicated facilities that specialise in the care and treatment of victims. They are only referred to an emergency centre if the injuries sustained require intervention. Therefore, the true number of victims of repeated sexual assault and GBV (properly defined) is likely significantly higher than that captured in our data.

We did not attempt to quantify any potential misclassifications and subsequent bias that could have resulted. Nonetheless, we are confident that the results represent the reality of interpersonal violence and recidivist violent injury over a 2-year time frame. The study was performed in a single district-level facility. The results do not reflect the burden and characteristics of patients presenting to other healthcare facilities, and care must be taken in generalising the results.

Future directions and recommendations

The data show that even over a short period of time, trauma and violent trauma recidivism are a concern. Further research into potential interventions, specifically primary[45,46] and secondary preventive strategies, aimed at addressing recidivist violent injury, may reduce its frequency and the escalation of possible severity, and have an impact on reducing morbidity and mortality.

Refining the definitions of GBV will assist in capturing data that are more accurate and reflective of the frequency of GBV. This may assist in measuring the impact of interventions that specifically attempt to address GBV.

Conclusion

Recidivist patients represent a noteworthy proportion of injured patients, and violence remains a large contributor to the high caseload of trauma within the study setting. Recidivism poses a measurable burden, and further research is needed to facilitate the identification of at-risk individuals, and secondary prevention strategies need to be developed to prevent or reduce escalating patterns of injury associated with interpersonal violence.

Data availability. Data are available on request from the corresponding author.

Declaration. This work was submitted for JJH's MMed (Emergency Medicine) degree through Stellenbosch University.

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Author contributions. All authors contributed to the conception of the work. Ethical approval, data collection, folder review, initial analysis and first draft for submission for the MMed was done by JJH. LB assisted in the original data collection and further edited the original submission with additional data analysis and data visualisation for this article. DJvH supervised and contributed to the original submission and the final draft of this article. All authors approved the version to be published, and agreed to be accountable for all aspects of the work.

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