International Clinical and Medical Case Reports
2023 Volume 2, Issue 1
DOI: 10.59657/2837-5998.brs.23.008

BioRes Scientia
Value your Research

Research Article

Open Access

Demographics and Patterns of Injury in Patients with Sharp Penetrating Trauma admitted to a Greater Manchester Major Trauma Centre: A Retrospective Five-Year Study

Namara John[1]*, Brkljac Milos[2], Satyadas Thomas[3]

[1]*Buckinghamshire Hospitals NHS Trust. Department of Trauma and Orthopaedics. Buckinghamshire, UK.*
[2]*Imperial College Healthcare NHS Trust. Department of Trauma and Orthopaedics. London, UK.*
[3]*Manchester University NHS Foundation Trust. Hepato-Pancreato-Biliary (HPB) Unit, UK.*
**Corresponding Author: Namara John.*

Abstract

Background: Sharp penetrating trauma represents 4.1%-6.9% of all major trauma cases in the UK. The incidence of Sharp penetrating trauma is rising, with 47,000 offences in England and Wales in 2019. There has been limited published data on the victims of sharp penetrating trauma.

Methods: We performed a single centre retrospective case note review of patients admitted to an urban major trauma centre following an assault with a sharp object from 1st January 2014 to the 31st December 2018. Data was collected on demographics, injury pattern, management, and outcome.

Results: In total, 686 patients were included in the study. There was a year-on-year increase of admissions with sharp penetrating trauma from 100 admissions in 2014, to 194 in 2018. The majority of patients were male, with a mean age of 31, and 73% of our patients were of Caucasian ethnicity. Patients presented most frequently on weekends (53%). The length of stay increased over the study period from 2.3 days in 2014 to 4.0 days in 2018. The thorax was the most commonly injured body region, involved in 29% of presentations, followed by the abdomino-pelvis (21%). 51% of patients presented with multiple injuries, and the average number of stab wounds per patient increased from 1.95 in 2014 to 2.40 in 2018.

Conclusion: Our study has demonstrated the incidence and severity of sharp penetrating trauma is increasing in central Manchester. The authors advocate the creation of a national knife crime database to further the implementation of prevention strategies.

Keywords: demographics; knife; sharp; penetrating; trauma; epidemiology; public health

Introduction

Knife crime and the resulting penetrating injuries pose a major threat to public health in the United Kingdom (UK). Sharp penetrating trauma (SPT) represents 4.1% - 6.9% of all major trauma cases in the UK, which is defined as an injury or a combination of injuries that may require lifesaving interventions [1, 2]. In the year ending March 2019 there were 47,000 offences in England and Wales involving a sharp object, the highest number since 2011 [3]. This included 285 homicides from SPT reported by the Office of National Statistics (ONS), an increase of a third from the previous year [4]. This increasing trend has been felt in the public domain as knife crime is a frequent feature in mainstream media. There were over 5,000 offences requiring a hospital admission in 2019, the average cost of which has been estimated at £7983 per patient [5]. The wider cost of multi-agency service provision for a single episode of knife violence with injury has been estimated to be £14,050 [6]. These high costs are in part, due, to the wide range and severe nature of traumatic injuries sustained when skin is penetrated. Multiple body regions are often involved, frequently requiring emergent surgical management and high dependency care.

The drivers of interpersonal violence using knives are multi-faceted. Young males are the predominant

perpetrators and victims, comprising 80% of deaths related to violent crime [7]. Income inequality and absolute material deprivation have been implicated in regional prevalence of homicide and assault [8]. Individuals in the most deprived quintile are over 30 times more likely to die following an assault with a sharp object than those in the least deprived quintile [9]. Alcohol and drug use have long been associated with violence. Teenagers who self-report binge drinking are almost five times more likely to carry a weapon than those who do not [10]. Likewise, teenagers who report drug use are three times more likely to have carried a weapon compared to those who do not [7]. Similarly, gang involvement, homelessness, community trust and childhood trauma have all been implicated as causative factors in criminal activity [7, 8].

Interpersonal violence has historically been regarded as an issue of criminal justice, though, now acknowledged a major public health concern. The UK Government passed The Offensive Weapons Act in 2019 and mobilised over £10 million to counter the rise of violence involving knives [11]. "Knife crime" is widely reported by media outlets in the UK but the true scale of violent crimes using sharp objects is not well described in medical literature.

Stabbings featured in the media are commonly reported from major urban centres, in particular, attention has been given to London. However, less is known about centres outside of the capital. Greater Manchester has one of the highest rates of offences involving a sharp object with 3,620 offenses recorded by Greater Manchester police in 2019 (129 offences per 100,000 population) [4, 12]. There is limited published data on SPT in the North West of England despite knife crime being prevalent. We present the first study from a large central Manchester cohort using both hospital inpatient records and trauma and audit research network (TARN) data. We believe this data will contribute to furthering the understanding of the size of the problem and the implications on healthcare. Ultimately, grasping the epidemiological characteristics will provide valuable data which can be used for preventative strategies.

Our objectives were to describe to demographics, day of arrival in ED, patterns of injury, interventions, length of hospital stay, and mortality of patients admitted to a Manchester Major Trauma Centre (MTC) for SPT over a five-year period.

Methods

We performed a single centre retrospective case note review of patients admitted to a Manchester Major Trauma Centre (MTC) from 1st January 2014 to the 31st December 2018. Our centre is part of a split site major trauma collaborative, which covers the population of Greater Manchester.

Inclusion Criteria: We included patients who were admitted to hospital following an assault with a sharp object, defined as any object modified or designed to be able to cause injury to another person [13]. Accidental injuries and those attributed to self-harm were also excluded.

Patients were identified using two methods. The first using Hospital Episode Statistics (HES) informatics code: ICD-10-CM X99; assault with a sharp object [14]. The second using prospectively gathered data from TARN. TARN eligible patients were those who triggered the trauma team activation protocol for a sharp stabbing injury. The data was collected by the local TARN audit coordinator and included patients who either died in the ED, were admitted to hospital for more than 72 hours or were admitted to the intensive care unit (ICU). TARN patients were matched with those identified using the HES code. These were then further analysed to ensure the series was consecutive and the inclusion criteria was applied.

Data was collected on demographics, injury pattern, discharge location (within the hospital), length of stay and mortality. Data on whether Computed Tomography (CT) was performed and whether the patient underwent surgery or embolization was also collected. Data on ethnicity was collected from the Patient Administration System (PAS), and were then further categorised into groups as used in the 2011 census [12]. We received local institutional ethical approval to conduct the study.

Statistical Analysis

Data was analysed using RStudio: Integrated Development for R (RStudio, Inc., Boston, MA 2019). The relationship between the length of stay across the study years was assessed using the Kruskal-Wallace test. The relationship between the length of stay and the number of wounds, was assessed by Spearman's rank correlation and unadjusted linear regression models. The correlation between the number of wounds and CT scan, embolisation,

operation and ICU admission were assessed using unadjusted binomial logistic regression models. The association between death and being in ICU was obtained using Pearson's Chi-squared test with Yates' continuity correction. The relationship between death and pre-op and post-op CC admission was assessed using Pearson's Chi-squared test with Yates' continuity correction.

Results

A total of 708 patients assaulted with a sharp object were identified using the HES coding from 1st January 2014 to 31st December 2018. Following application of the inclusion criteria, 623 were included in the study. 334 were identified using the TARN dataset during the same period. 71 of which were excluded. Following the removal of duplicates 686 were included in the study, demonstrated in figure 1.

Demographics

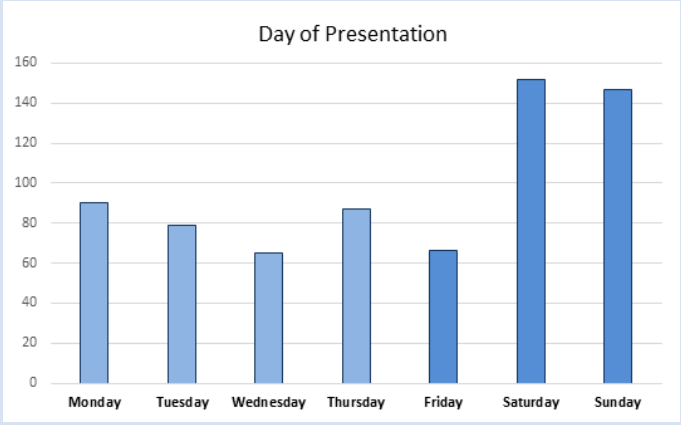
Table 1: Demographics.

		Year					
		2014	**2015**	**2016**	**2017**	**2018**	**Overall**
	Age (mean)	32	32	32	31	30	31
Gender	Male	95(95)	93(91)	119(94)	152(93)	180(93)	639
	Female	5 (5)	9 (9)	7 (6)	12 (7)	14 (7)	47
	Totals	100	102	126	164	194	686
	(%)						
Ethnicity	Caucasian	51(76)	56(69)	81(76)	79(72)	115(70)	382(72)
	Black	5(7)	13(16)	7(7)	10(9)	17(10)	52(10)
	Middle Eastern	0(0)	0(0)	0(0)	4(4)	1(1)	5(1)
	South Asian	0(0)	0(0)	5(5)	2(2)	7(4)	16(3)
	East Asian	0(0)	0(0)	0(0)	0(0)	1(1)	1(0.2)
	Mixed race	1(1)	4(5)	4(4)	5(5)	6(4)	20(4)
	Other	10(5)	8(10)	10(9)	9(8)	17(10)	54(10)
	No data	33	19	19	34	30	156
	(%)						
ED	Home	1(1)	2(2)	2(2)	4(3)	1(1)	10(2)
Discharge	Ambulatory care	13(14)	9(9)	9(7)	22(15)	20(11)	74(11)
Location	Ward	63(66)	63(64)	63(52)	76(48)	123(65)	388(59)
	Critical Care	5(5)	7(7)	23(19)	31(20)	16(9)	82(12)
	Theatre	14(14)	17(17)	24(20)	24(15)	28(15)	107(16)
	(%)						
Length of stay	(Mean days)	2.3	4.7	3.3	4.1	4.0	3.7
Presentation	Weekend	54(54)	60(59)	69(55)	86(52)	96(49)	365(53)
	Weekday	46(46)	42(41)	57(45)	78(48)	98(51)	321(47)

We saw a 94% rise in the number of admissions for SPT from 2014 to 2018. There was a year-on-year increase from 100 admissions in the year 2014, to 194 in 2018. The majority of patients were male, which remained constant over the time period. The mean age was 31 (range 13-79 years), this remained comparable across the study dates, seen in table 1. Our study does not include data from the Children's hospital associated with the main hospital site, however, children were occasionally seen in the adult ED. Most of our patients were of Caucasian ethnicity, comprising a total of 73% of those for which data was available. The remaining ethnicity distribution is demonstrated in table 1. Data was not available for 146 patients.

Discharge Location: Patients were most commonly transferred to an inpatient ward from the ED (59%). 11% were moved to the ambulatory area in the ED. 16% went directly to theatre and 12% were taken to the ICU. The length of stay increased gradually over the study period with an overall average of 3.7 days spent in hospital. A Kruskal-Wallis test confirmed the statistical significance of this increase ($p<0.05$).

Day of Presentation: Patients presented most frequently on either Friday, Saturday or Sunday (53%). This remained consistent over the study dates. The distribution of days in represented in graph 1.



Graph: 1

Injuries: The thorax was the most commonly injured body region, involved in 29% of presentations. The second most common injury was to the abdomino-pelvis (21%), this included genital injuries. The range of regions injured varied across the study period; visible in table 2.

Table 2: The distribution of injuries and subsequent management.

	Year					
(%)	2014	2015	2016	2017	2018	Overall
Injuries						
Single wound	60 (60)	63(62)	63 (50)	63 (38)	85 (44)	335 (49)
Multiple wounds	40 (40)	39 (38)	63 (50)	101 (62)	109 (56)	350 (51)
Number (mean)	1.95	2.15	2.18	2.89	2.49	2.40
Wound Location						
Head	12 (12)	13(13)	11 (9)	22 (13)	24 (12)	82 (8)
Neck	11 (12)	14 (14)	13 (10)	17 (10)	14 (7)	69 (6)
Thorax	37 (37)	35 (34)	50 (40)	95 (58)	95 (48)	310 (29)
Abdo-Pelvis	38 (38)	33 (32)	51 (40)	50 (30)	54 (28)	226 (21)
Upper Limb	21 (21)	23 (23)	23 (18)	41 (25)	50 (26)	158 (15)
Hands	7 (7)	10 (10)	8 (6)	15 (9)	14 (7)	54 (5)
Lower Limb	17 (17)	17 (17)	27 (21)	44 (27)	58 (30)	163 (15)
Intervention/Investigation						
CT scan	75 (75)	72 (71)	94 (75)	137 (84)	156 (80)	534 (78)
Embolisation	0 (0)	1 (1)	4 (3)	1 (1)	5 (3)	11 (2)
Operation	41 (43)	48 (49)	55 (45)	63 (40)	90 (48)	301 (44)
Critical Care						
Admissions	11 (11)	16 (16)	34 (28)	40 (25)	31 (16)	132 (20)
Postoperative admission	6 (55)	9 (56)	11 (32)	8 (21)	15 (48)	49 (37)
Preoperative admission	2 (18)	1 (6)	7 (21)	5 (13)	5 (16)	20 (15)
Average length of stay (days)	3.3	3.0	2.4	2.7	2.4	2.6
Average organs supported	0.8	1.0	0.8	0.7	0.6	0.7
Mortality						
Emergency Department	2	3	3	2	0	10
Total	2 (2)	4 (4)	6 (5)	4 (2)	1 (1)	17 (2)

The number of stab wounds per patient increased across the five years. In 2014 the mean number was 1.95, rising to 2.40 in 2018. Of the 686 admissions with penetrating trauma, 350 (51%) were admitted with more than a single wound. The proportion of patients presenting with more than one stab wound increased over the five-year period. The effect of the number of stab wounds on length of stay was only

shown as weakly positive (Rho estimate (rs)=0.161; p value<0.05) when Spearman's rank correlation was used. Generalised linear modelling was utilised to demonstrate that you were more likely to require a CT scan (95% CI:1.05 to 1.32; p value <0.05), we are 95% confident that for each additional unit wound we will obtain between a (1.05,1.32) fold increase in odds for a CT scan. Embolization (95% CI:1.07 to 1.37; p value <0.05) and an operation (95% CI:1.06 to 1.22; p value <0.05) if you had more wounds. The number of wounds was not a significant predictor of ICU admission (95% CI:0.99 to 1.14; p value =0.07).

Computed Tomography: The number of computed tomography (CT) scans performed increased yearly across the study dates from 75 in 2014 to a total of 156 in 2018, which is in line with the increase in admissions. The proportion undergoing CT scanning remained relatively constant, at around 75% of patients.

Interventions: The number of patients requiring operative intervention increased yearly from 41 in 2014 to 90 in 2018. The percentage of admissions requiring an operation gradually increased from 41% in 2014, reaching 48% in 2018. Embolization was rarely performed with only 2% overall undergoing the procedure.

Critical Care Admissions: 132 patients (20%) required admission to Critical Care (CC) with an average length of stay of 2.6 days. The number of patients requiring CC admission showed an increasing trend across the study dates from 11 (11%) in 2014 to 31 (16%) in 2018. 52% of all CC admissions were in the perioperative phase. Average length of stay in CC showed a decreasing trend across the study dates from 3.3 days in 2014 to 2.6 days in 2018. The requirement for organ support remained consistent with an average of 0.7. A Pearson's Chi-squared with Yate' continuity correction did not demonstrate a link between being admitted to CC and mortality (p=0.16). Equally, no statistical significance was demonstrated when comparing CC admission pre-op (p=0.14) and post-op (p=0.22) with mortality.

Mortality: A total of 17 patients died across the study dates, giving a mortality of 2%. All but one was identified by the TARN database. Chest injury was implicated as the most severe in 11 patients with the remaining six suffering injuries to their neck.

Discussion

Our study has demonstrated a significant rise in the number of admissions from SPT across a five-year period. The overall mortality was low; however, we have shown an increase in the severity of injuries. This is evident by the greater number of injuries per patient, the increasing number of CC admissions and a greater number of interventions proportionally. This data is consistent with research from other centres and adds to the growing body of evidence which supports the creation of a national registry for SPT.

Gender and Age: Young males are most likely to be victim of violent crimes involving knives according to the majority of published data [15-27]. A 2017 systematic review by Whittaker et Al. reviewing all penetrating injuries found 11 articles for analysis, which reported that 84.7% to 91.9% of SPT victims were male [18]. This is comparable to our data (93.3% males). The median age for our cohort was 31. Our study collected data from an adult centre and thus, paediatric admissions are not well represented. This slightly older than reported group is consistent with data from nearby Liverpool where those under 16 were excluded [19]. To truly understand the demographics of those affected by SPT future studies must include data from paediatric centres.

Ethnicity: Currently available data very rarely reports on the ethnicities affected by SPT. Whittaker et Al. found a single article on ethnicity [18]. They report that 50% of patients were of Black or Black British heritage. By contrast, our study has shown the vast majority of patients identify as White or White British (72%), with 10% of our patient population identifying as Black or Black British. The link between ethnicity and level of deprivation is likely to be regional. Government data has shown that ethnic minorities are more likely to live in deprived areas, with Black and Asian communities most affected [20]. Deprivation had been linked to the incidence of SPT and thus, knife crime was thought to affect ethnic minorities disproportionately. However, recent data published by Haylock et Al. refutes this

link when factors such as socio-economic status are controlled for [21]. Further analysis looking at patient backgrounds in more detail may reveal information vital to preventative strategies.

Weekday: Our data shows that weekend violence is disproportionately represented compared to weekdays. Studies which only included adults support these findings [22]. Whether this data identified specific subsets of individuals is difficult to confirm and the influence of illicit drugs, whether through consumption or distribution is difficult to quantify. If additional information is gathered, such as: employment status, previous criminal history, incident location and drug usage the factors leading the SPT in these instances can be understood further and prevention strategies can be more targeted.

Critical Care Data: Our data shows that one in five patients with SPT required CC input, which is comparable to the 25% quoted by Malik et Al [22]. To date, our study is the first to look in detail at CC admissions. Over half of those admitted were perioperative with the majority requiring admission post-operatively. CC incurs a considerable financial burden, which is amplified by longer lengths of stay and multiple organ support.

The timing of CC admissions perioperatively is based on multiple clinical factors such as: haemodynamic stability, CT and intra-operative findings. To inform the decision-making process this additional clinical data must be collected in future studies in an attempt to reduce mortality and morbidity.

Term Standardisation: There is significant heterogeneity in the published data on SPT in the UK [18, 22, 23]. This is in part due to an absence of standard definitions, which types of weapons and injuries should be included. Some papers only report injuries involving knives, and others accept a broader definition of "sharp object". Similarly, there is a lack of clarity with inclusion criteria when defining a penetrating or non-superficial injury. We believe all injuries using a knife requiring medical assessment which are non-accidental and unrelated to self-harm should be included in future studies. It may be necessary for a clinician to assess if the injury is likely to be accidental, as there is a significant portion of patients who claim injuries are an accident to avoid police involvement [24]. Our study suffered from a similar lack of standardisation of terms, however, we believe a future registry should hold a consensus on such terms.

Data Source: The source of data collected varies greatly across current literature. Patients have been identified using data from the London Helicopter Emergency Medical Service (HEMS) [16], local electronic records [24], ambulance data [25], TARN, and even blood banks [22].

TARN currently captures a small number of SPT patients [26]. In order to obtain a more complete dataset which truly represents the incidence of SPT we advocate the creation of a national database. It is key that this database captures ambulance and hospital patients, whether they were admitted or not. Unless the full spectrum of data is obtained it will be difficult to truly understand the issues related to this national health problem. This data should be collected at both MTCs and district general hospitals. The incidence of SPT outside of central urban areas is becoming more recognised. Gavrilovski et Al. [27] have demonstrated that violence involving knives is increasing outside of urban centres and may be linked to the creation of so called "county lines" [28]. This implicates that SPT is frequently drug related, either through distribution or consumption.

Societal impact: Violent crimes with the use of knives have been increasing in recent years attracting significant media attention [3]. Multiple agencies are attempting to reduce knife crime and the Government has proposed £10M in funds to tackle knife crime [11]. However, without comprehensive understanding of the nature and distribution of crime involving knives, public health interventions are less likely to be successful. Methods of preventing knife crime need to be targeted, such as those which successfully stemmed rising knife related violence in Scotland [29].

SPT has a significant impact on patient's physical and mental wellbeing [30-32]. Recent studies have called for more information to be published on the mental health of populations affected [18, 23]. Mental health disorders are as common in the perpetrator as in the victim [33]. Mental health after major trauma is one of the strongest predictors of recovery regardless of the extent of injuries. emphasising the importance of

early intervention and psychological follow up to aid recovery [34].

Study Limitations: The major limitation was the lack of Injury Severity Score (ISS) as this could not be calculated due to lack of documentation in the TARN database. We were also unable to confirm the geographical locations, types of weapons used or circumstances of the stab injuries for every patient included in the study. Additional data such as employment, mental health status, criminal history as well as drug use may further identify the at-risk groups. There will be selection bias in this study as only patients sufficiently injured to require admission to hospital were included.

Conclusion

The incidence and severity of SPT is increasing in central Manchester. Whilst mortality remains low these injuries comprise a significant and costly portion of the workload at our major trauma centre. More data is required to adequately describe the patient demographic most affected by interpersonal violence using knives. The authors advocate the creation of a national knife crime database to identify factors related to the incidence and further the implementation of prevention strategies.

Funding: No funding declared from any agency.

Acknowledgements: We would like to thank Gareth Jones, Helen Shackleton and Cathie Forrest in their roles supporting the project.

References

1. (2016). Excellence NIfHaC. Major trauma: service delivery. NICE Guideline NG40. Major trauma services: Service delivery for major trauma. London: *NICE*.
2. Moran CG, Lecky F, Bouamra O, Lawrence T, Edwards A et al. (2018). Changing the System - Major Trauma Patients and Their Outcomes in the NHS (England) 2008-17. *E Clinical Medicine*. 2-3:13-21.
3. Allen G AL, Loft P, Bellis A. (2019). Briefing paper: Knife crime in England and Wales. In: Library. Hoc, editor. United Kingdom. 1-29.
4. Statistics OfN. (2019). Crime in England and Wales: year ending March 2019.
5. Christensen MC, Nielsen TG, Ridley S, Lecky FE, Morris S. (2008). Outcomes and costs of penetrating trauma injury in England and Wales. Injury. 39(9):1013-1025.
6. Heeks M RS, Tafsiri M and Prince S. (2018). The economic and social costs of crime. In: Office H, editor. 2 ed, 132(1):229-236.
7. Sethi D, Hughes, K., Bellis, M., Mitis, F. and Racioppi. (2010). European report on preventing violence and knife crime among young people. In: Europe WHO, editor.
8. Grimshaw R FM. (2018). Young people, violence and knives - revisiting the evidence and policy discussions. *UK Justice Policy Review Focus*.
9. Leyland AH, Dundas R. (2010). The social patterning of deaths due to assault in Scotland, 1980-2005: population-based study. *J Epidemiol Community Health*. 64(5):432-439.
10. Molcho M HYaLA. (2006). Daring, Substance Use and Involvement in Violence Among School Children: Exploring a Path Model. *Journal of School Violence*. 5(3).
11. HMGovernment. (2018). Serious Violence Strategy. In: Office H, editor.
12. (2012). government U. 2011 Census: Population and Household Estimates for England and Wales, March 2011. In: statistics OoN, editor.
13. (1953). Service TCP. Prevention of Crime Act 1953.
14. (2004). ICD-10: international statistical classification of diseases and related health problems: tenth revision, *World Health Organization*.
15. Johannesdottir U, Jonsdottir GM, Johannesdottir BK, Heimisdottir AA, Eythorsson E, et al. (2019). Penetrating stab injuries in Iceland: a whole-nation study on incidence and outcome in patients hospitalized for penetrating stab injuries. *Scand J Trauma Resusc Emerg Med*. 27(1):7.
16. Crewdson K, Lockey D, Weaver A, Davies GE. (2009). Is the prevalence of deliberate penetrating trauma increasing in London? Experiences of an urban pre-hospital trauma service. Injury. 40(5):560-563.
17. Apps JR, Williams C, McGuinness A, Gabbie S, Sutcliffe AG. (2013). Stabbing and safeguarding in children and young people: a Pan-London

service evaluation and audit. JRSM Short Rep. 4(7):1-7.
18. Whittaker G, Norton J, Densley J, Bew D. (2017). Epidemiology of penetrating injuries in the United Kingdom: A systematic review. Int J Surg. 41:65-69.
19. Jennifer English VM, Simon J Mercer. (2019). An analysis of the exposure of anaesthetic trainees to knife injuries in a Major Trauma Centre. *London Trauma Conference*; London.
20. Statistics OfN. (2019). People living in deprived neighbourhoods. In: Office C, editor.: Ministry of Housing, Communities and Local Government.
21. Haylock S, Boshari T, Alexander E, Kumar A, Manikam L et al. (2020). Risk factors associated with knife-crime in United Kingdom among young people aged 10-24 years: A systematic review.
22. Malik NS, Munoz B, de Courcey C, Imran R, Lee KC et al. (2020). Violence-related knife injuries in a UK city; epidemiology and impact on secondary care resources. *EClinicalMedicine*. 20:100296.
23. Vulliamy P, Faulkner M, Kirkwood G, West A, O'Neill B et al. (2018). Temporal and geographic patterns of stab injuries in young people: a retrospective cohort study from a UK major trauma centre. *BMJ Open*. 8(10): e023114.
24. Pallett JR, Sutherland E, Glucksman E, Tunnicliff M, Keep JW. (2014). A cross-sectional study of knife injuries at a London major trauma centre. *Ann R Coll Surg Engl*. 96(1):23-26.
25. Gray J, Walker A. (2009). "At the sharp end": does ambulance dispatch data from south Yorkshire support the picture of increased weapon-related violence in the UK? Emergency medicine journal. 26(10):741-742.
26. Wright A, Mercer SJ, Morton B. (2020). The impact of 'unofficial trauma'on a Major Trauma Centre: A service evaluation of accident and emergency department trauma team activations. Trauma. 1460408619895677.
27. M. Gavrilovski JG, R. Lyon, C. Leahy. (2019). Geographic pattern of stab injuries presenting to a semi-rural air ambulance service: is there a link with county lines? London Trauma Conference; London.
28. McLean R, Robinson G, Densley J. (2019). County lines: Criminal networks and evolving drug markets in Britain: Springer.
29. O'Hare P. (2019). How Scotland stemmed the tide of knife crime.
30. Holbrook TL, Hoyt DB, Anderson JP. (2001). The impact of major in-hospital complications on functional outcome and quality of life after trauma. *J Trauma*. 50(1):91-95.
31. Holbrook TL, Hoyt DB. (2004). The impact of major trauma: quality-of-life outcomes are worse in women than in men, independent of mechanism and injury severity. J Trauma. 56(2):284-290.
32. Flannery DJ, Singer MI, Wester K. (2001). Violence exposure, psychological trauma, and suicide risk in a community sample of dangerously violent adolescents. J Am Acad Child Adolesc Psychiatry. 40(4):435-442.
33. Wood JL, Kallis C, Coid JW. (2017). Differentiating Gang Members, Gang Affiliates, and Violent Men on Their Psychiatric Morbidity and Traumatic Experiences. *Psychiatry*. 80(3):221-235.
34. Michaels AJ, Michaels CE, Moon CH, Smith JS, Zimmerman MA et al. (1999). posttraumatic stress disorder after injury: impact on general health outcome and early risk assessment. *J Trauma*. 47(3):460-466.

Cite this article: M John, B Milos, S Thomas (2023). Demographics and Patterns of Injury in Patients with Sharp Penetrating Trauma admitted to a Greater Manchester Major Trauma Centre: A Retrospective Five-Year Study. *International Clinical and Medical Case Reports*, BRS Publishers. 2(1); DOI: 10.59657/2837-5998.brs.23.008

Article History **Received:** November 25, 2022|**Accepted:** January 18, 2023|**Published:** January 25, 2023