Rwanda Medical Journal RMJ

ORIGINAL ARTICLE Open Access

Assessing the trauma burden at Rwanda Military Referral and Teaching Hospital: a comprehensive analysis

Authors: E. Sindikubwabo[1,*]; S. Musoni Inyange[2]; Xavier F. Rutayisire[1]; F Karuhanga[3]; A. Muderevu[3]; E. Rudakemwa[3]; J. Rickard[1,4]; Espoir M. Ngabo[1]; P. Munyemana[3]; C. Furaha[3]; Emmy A. Nkusi[3].

Affiliations: *[1]University of Rwanda, Kigali, Rwanda; [2]Kigali University Teaching Hospital (CHUK), Kigali, Rwanda; [3]Rwanda Military Referral and Teaching Hospital, Kigali, Rwanda; [4]University of Minnesota, Minnesota, USA*

ABSTRACT

INTRODUCTION: The Rwanda Military Referral and Teaching Hospital (RMRTH), located in Kigali, is a tertiary care institution for patients from diverse areas, focusing on the Eastern Province. Because it does not have a specialized trauma center, it runs through an emergency department to provide initial stabilization for surgical patients.

METHODS: This was a retrospective analysis utilizing the medical records of trauma patients admitted to the RMRTH between March 2022 and March 2023. Data from the electronic system, admission registries, and patient files, whether electronic or hard copies, were utilized. The data were analyzed using R version 4.3.1 (2023-06-16), and ggplot2-tidyverse was used as a package to create graphics.

RESULTS: A retrospective review spanning March 2022 to March 2023 involving 965 trauma patients revealed a male predominance (81.2%) and a significant contribution of road traffic accidents (56.9%) to overall trauma cases. Districts within Kigali, notably Kicukiro, accounted for a substantial proportion of admissions (15.85%). Orthopedics (37.2%), neurosurgery (32.6%), and plastic and reconstructive surgery (10.05%) were the primary treating specialties compared to other departments. Adherence to scoring systems such as the Glasgow Coma Scale (GCS) and mSATS were moderate, highlighting areas for improvement in standardized assessment protocols. There was an association between old age and injury severity (p value=0.003), as well as between male sex and road traffic accidents (p value=0.002).

CONCLUSION: The study reveals a significant trauma burden at RMRTH, predominantly involving male patients and road traffic accidents. It highlights the need for dedicated trauma centers and the use of standardized scoring systems like GCS and mSATS for better patient management. Implementing data-driven approaches and rigorous documentation are essential for enhancing care quality and outcomes in LMICs.

Keywords: Rwanda Military Referral and Teaching Hospital (RMRTH), trauma burden, orthopedic trauma, neurosurgery, plastic and reconstructive surgery, trauma management, low- and middle-income countries (LMICs).

***Corresponding author:** Eugene Sindikubwabo, Email: dreugenesindikubwabo@gmail.com, University of Rwanda, Kigali, Rwanda; **Potential Conflicts of Interest (CoI):** All authors: no potential conflicts of interest disclosed; **Funding:** All authors: No funding was sought for this study; **Academic Integrity.** All authors confirm that they have made substantial academic contributions to this manuscript as defined by the ICMJE; **Ethics of human subject participation:** The study was approved by the local Institutional Review Board. Informed consent was sought and gained where applicable; **Originality:** All authors: this manuscript is original has not been published elsewhere; **Review:** This manuscript was peer-reviewed by three reviewers in a double-blind review process; **Type-editor:** King (USA).

Received: 25th May 2024; **Initial decision given:** 29th May 2024; **Revised manuscript received:** 16th July 2024; **Accepted:** 15th November 2024.

 Publisher: Rwanda Biomedical Centre (RBC)/Rwanda Health Communication Center, P. O. Box 4586, Kigali. ISSN: 2079-097X (print); 2410-8626 (online)

Citation for this article: E. Sindikubwabo; S. Musoni Inyange; Xavier F. Rutayisire, et al. Assessing the trauma burden at Rwanda Military Referral and Teaching Hospital: a comprehensive analysis. Rwanda Medical Journal, Vol. 81, no. 4, p. 55-62, 2024. https://dx.doi.org/10.4314/rmj.v81i4.8

INTRODUCTION

Each year, trauma results in the loss of millions of lives across the globe, with approximately 90% of these fatalities occurring in low- and middle-income countries (LMICs), including some countries in Africa. Rwanda, alongside other low-income countries, faces challenges associated with high rates of mortality and morbidity resulting from trauma incidents [1]. In contrast to high-income nations, LMICs often lack a well-established emergency system to provide care for injuries and gather reliable data on injury epidemiology and outcomes [2].

Rwanda is a low-income country with a well-structured healthcare system, from the level of the community, where we have community health workers, to level 4 hospitals. At each level, patients receive different healthcare packages based on the expertise of healthcare workers [1]. In Rwanda, approximately 11% of the total annual fatalities can be attributed to trauma [2]. Service d' Aide Médicale d' Urgence (SAMU) is an ambulance service that primarily serves the greater Kigali area and was initiated in 2007 by the Ministry of Health with the aim of delivering urgent medical assistance to individuals afflicted by accidents and severe illnesses in Rwanda. Most of the Rwandan population have health insurance, with the greatest percentage having a government-sponsored community-based health insurance program [3].

The Rwanda Military Referral and Teaching Hospital (RMRTH) is a tertiary healthcare facility situated within the Kicukiro district of Kigali city that operates within a diverse interdisciplinary setting. RMH serves both military and civilian patients as needed, mainly patients from the eastern province and the city of Kigali. The hospital has a capacity of 400 beds, with 5 operating rooms (ORs) and 12 intensive care unit (ICU) beds. RMH facilitates the transfer of patients to various surgical specialties, including orthopedic surgery, general surgery, neurosurgery, urology, plastic and reconstructive surgery, oral and maxillofacial surgery, and pediatric surgery. The World Health Organization's trauma registry has been utilized since September 2019.

To date, there has been no dedicated trauma service at the RMRTH. The aim of this study was to establish a foundational understanding of trauma cases at RMH, including demographic aspects, injury mechanisms, and clinical characteristics. These baseline data will serve as a crucial resource for informing the development of a dedicated trauma center at RMH, as well as similar institutions in Rwanda and other regions.

METHODS

Study design: This study utilized a retrospective review design to analyze the trauma burden at the RMRTH over a one-year period from March 2022 to March 2023. The RMRTH serves both military and civilian populations, with a capacity of 400 beds, 5 operating rooms, and 12 Intensive care Unit (ICU) beds. Data were retrieved from existing medical records, including patient demographics, injury types, and mechanisms.

Population: Inclusion criteria consist of all trauma patients admitted to the accident and emergency department of RMRTH between March 2022 and March 2023 and with complete medical records. Exclusion criteria consisted of patients admitted for non-trauma-related conditions and with incomplete medical documentation. All eligible patients were included, resulting in a total of 965 patients.

Data collection: Data were extracted from medical records (electronic and hard copies), admission registries, and patient files using a questionnaire adapted to the local context from the WHO standardized clinical form. Variables collected included demographic details (age, sex), mechanism of injury, location of the accident, consulting services, and injury scoring (Glasgow Coma Scale and modified South African Triage Score).

Data analysis: Data were analyzed using R version 4.3.1(2023-06-16). The ggplot2-tidyverse package was employed to create graphics for visual representation. Descriptive statistics were used to summarize demographic and clinical characteristics. Inferential statistics, including chi-square tests, were utilized to examine associations between variables, such as age, sex, mechanism of injury and injury severity.

Ethical approval for the study was obtained from the RMRTH ethics committee (REF299/RMH/COMDT/2024). All patient's data were anonymized to ensure confidentiality. The study adhered

to the principles of the Declaration of Helsinki, guaranteeing the protection of patients' rights and privacy. Given the retrospective nature of the study, informed consent was not required, but data handling procedures strictly followed institutional guidelines to maintain ethical standards.

RESULTS

A total of 965 patients were included in this research; patients with missing demographic data were excluded from the analysis; therefore, 11 patients were excluded from this study.

Males constituted the majority, with 784 patients representing 81.2% of the total, while females accounted for 181 patients, contributing to 18.8% of the total. Road traffic accidents accounted for the majority of the accidents, with 56.9%. Falls were the second most common, accounting for 20.7%, followed by physical assault with 14.09%. Occupational accidents accounted for 5.6%, while burns accounted for 1.97%. This distribution is

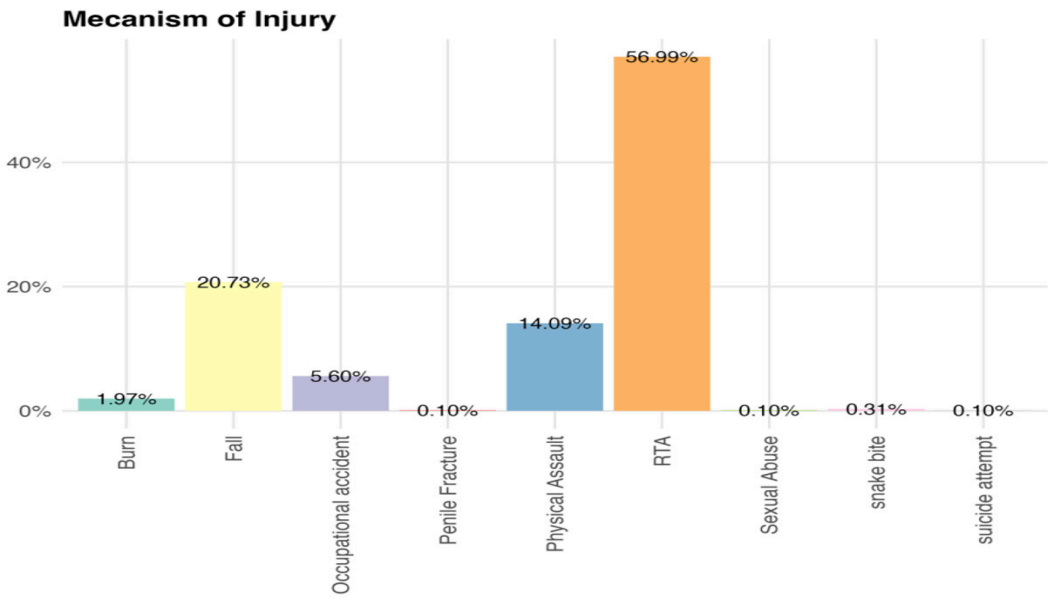

Figure 1: Mechanism of injuryi

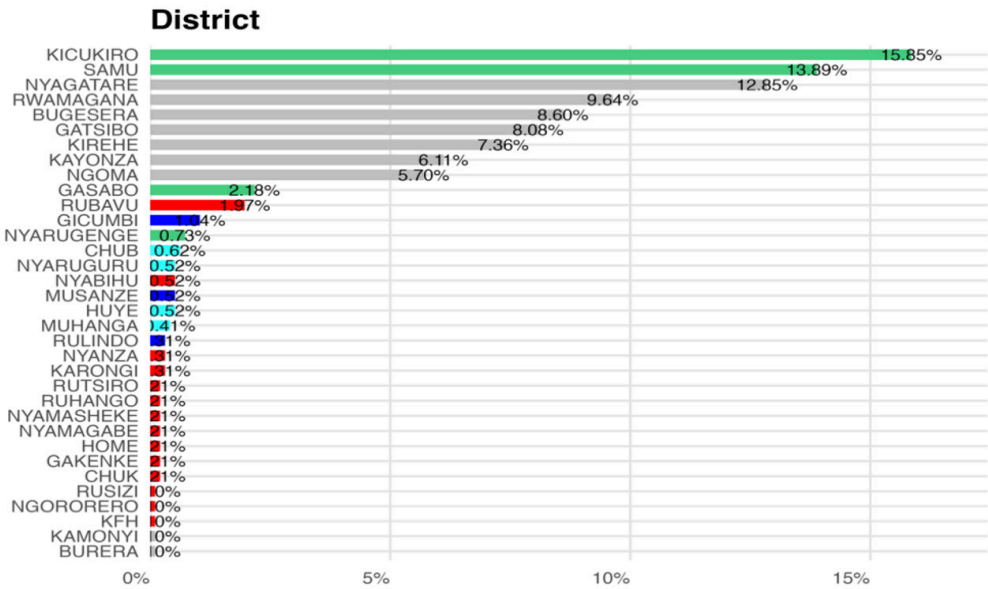

Figure 2: Distribution of accidents by location

illustrated in Figure 1.

Considering the area of accidents and the district where accidents occurred, Kigali city districts had a significant number of accidents. Kicukiro District contributed to 15.85% of all cases, and 13.89% were brought by SAMU, where patients brought by Services d'Aide Médicale Urgente (SAMU) are predominantly from Kigali city, not exactly their district of origin (Figure 2). Other districts that contributed significantly more to the total area were mainly districts in the Eastern Province, which is the RMRTH catchment area.

Overall, 37.2% of all patients were treated by orthopedic surgery, 32.6% were treated by neurosurgery, 10.05% were treated by plastic

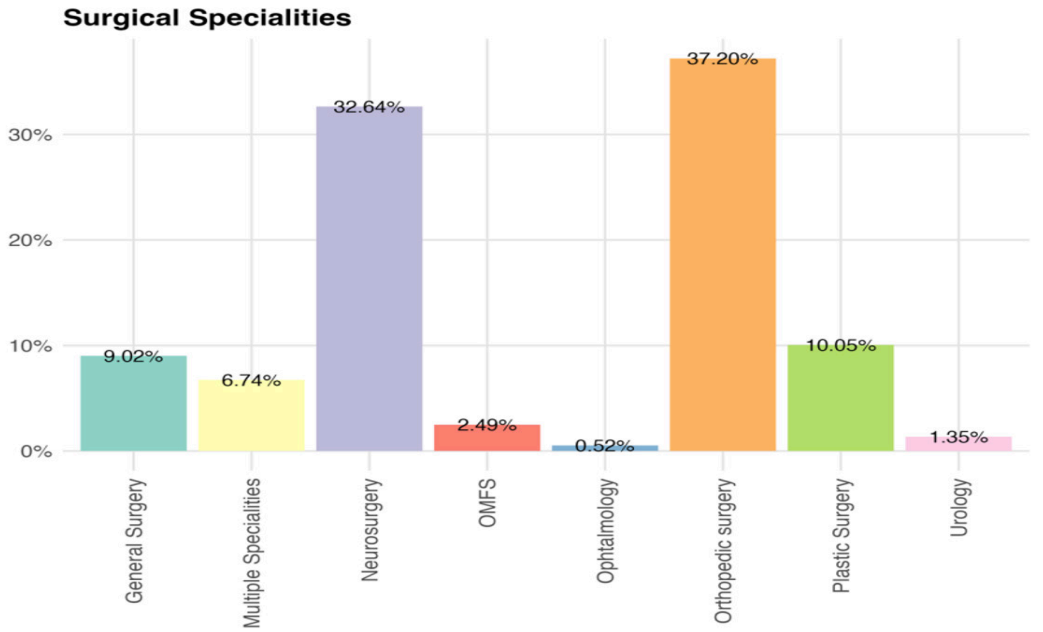

Figure 3: Surgical Specialties

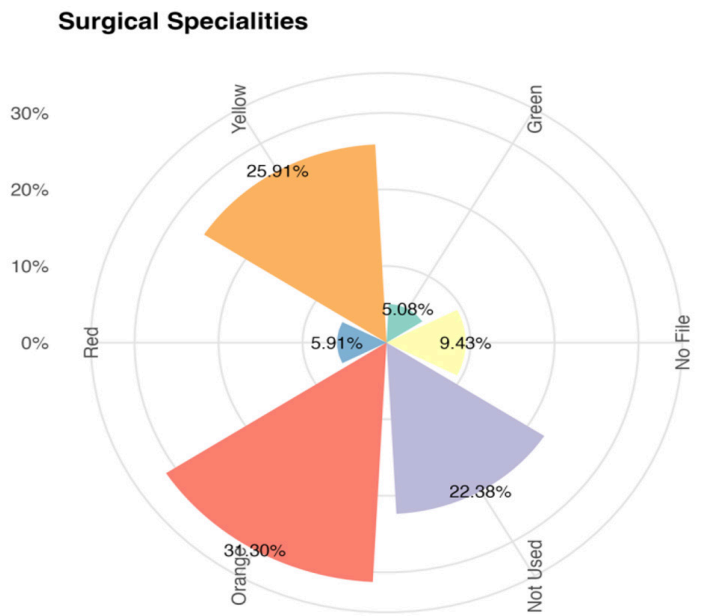

Figure 4: mSATS Scoring System in Triage

Table 1. Glasgow Coma Scale for patients

GCS	N(number)	Percentage(%)
yes	679	70.4
No	196	20.3
N/A	71	7.35
No File	19	1.97

GCS: Glasgow Coma Scale, N/A: not applicable

Table 2: Severity of Injury

Severity of injury	N(number)	Percentage(%)
Moderate	713	73.9
Severe	195	20.2
Mild	57	5.91

surgery, 9.02% were treated by general surgery, 6.74% were treated by multiple specialties, 2.49% were treated by oral and maxillofacial surgery, 1.35% were treated by urology, and 0.52% were treated by ophthalmology (Figure 3). Overall, 658 (68.19%) patients had modified South African Triage Scale (mSATS) scores (Figure 4). Those categorized as yellow were 25.91%, orange 31.30%, red 5.91%, and green 5.08%. In 31.83% of cases, it was not used. The Glasgow Coma Scale score was recorded for 679 patients (78.4%), and it was not used for 20.2% of patients (Table 1).

Our study revealed that 20.2% of patients had severe injuries, 73.9% had moderate injuries, and 5.91% had mild injuries (Table 2).

Among the patients who received treatment, 891 (92.3%) were effectively managed and discharged, whereas 74 (7.67%) unfortunately passed away. The chi-square test of the age group with reference to the severity of injury showed a significant relationship between age and trauma severity (p=0.003) (Table 3).

DISCUSSION

This study captured the demographics, injury mechanisms, and clinical characteristics of trauma patients who presented to a tertiary referral hospital in Kigali, Rwanda, over a one-year period. These data serve as an important resource for the development of a trauma center at RMH. Similar to global studies, we found that trauma patients are predominantly young men and that RTAs are the most common mechanism for trauma. According to the Global Burden of Disease Study in 2019, there were 1.49 million deaths globally among individuals aged 10 to 24 years. The primary causes of adolescent deaths were transport injuries, unintentional injuries, interpersonal violence, and conflict, which collectively accounted for 32.7% of fatalities [4].

In our study, RTAs were the primary mechanism of injury in 57% of the patients. These findings underscore the consistency of trends across different studies regarding the impact of RTAs on emergency department presentations [2]. In Saudi Arabia, motor vehicles are the primary mode of

Table 3: Age group vs severity of injury

Age group	Mild	Moderate	severe
Old aged adult	7(12.28 %)	172(24.12 %)	45 (23.08 %)
child	9(15.79 %)	107(15.01 %)	18 (9.23 %)
Middle-aged adult	12(21.05 %)	210(29.45 %)	75 (38.46 %)
Young adult	29(50.88 %)	224 (31.42 %)	57 (29.23 %)

p-value = 0.003

transportation, similar to many other countries globally. From 1971 to 1997, a significant number of road traffic accidents resulted in 564,722 fatalities or injuries, accounting for approximately 3.5% of Saudi Arabia's total population during that period [5]. Multiple factors contribute to RTA as a leading cause of injury. Driver behavior in riding that contributes greatly to RTAs needs to be addressed by various regulatory bodies to decrease this health burden [6]. Fisa et al. emphasized the behavioral change of drivers as a key factor in preventing and decreasing RTAs [7]. Since 2001, several road safety measures have been implemented in Rwanda to reduce the trauma burden, and new regulations regarding road safety have been stringently enforced. These measures include compulsory seatbelt usage, adherence to speed limits with the use of speed governors in transportation vehicles, the use of speed monitoring cameras on roads, regular vehicle inspections to maintain roadworthiness standards, and restrictions on blood alcohol levels [8].

The availability and quality of care delivered by prehospital providers are important for trauma care. We observed that SAMU played a significant role in the admissions of patients at the RMRTH, accounting for approximately 12.85% of trauma admissions. Patients brought in by emergency medical services are more likely to require hospital admission, highlighting the severity of their injuries. This underscores the importance of equipping their personnel with the necessary skills for managing trauma cases effectively. Newberry et al. (2019) reported that emergency medical service (EMS) providers transporting burn patients in India had a swift response time, transporting 94% of patients to the hospital within 2 hours of their call, which significantly decreased mortality [9]. This emphasizes the importance of rapid medical care and critical services to decrease burn mortality rates in India, which can be useful for other centers in Africa and globally [9]. Similarly, implementing triage protocols for trauma patients, not solely focusing on non-communicable diseases (NCDs), is crucial for enhancing the overall effectiveness of the healthcare system in Rwanda [10].

Similarly, our study revealed that trauma was more common in males (81.2%). This aligns with findings from a study conducted by Enumah et al., where 76.5% of their study population was male. Additionally, studies have shown a sex difference, with male patients being more affected by trauma and injury than their female counterparts [2]. According to a systematic analysis conducted for the Global Burden of Disease Study in 2019, there were 1.49 million deaths globally among individuals aged 10 to 24 years, with 61% occurring in males [2]. Accidents or trauma affect both sexes differently. While males are much more involved in RTAs, females may be more affected by posttraumatic stress disorder (PTSD) after an accident than males are [11].

In our study, we identified only two scoring systems currently in use at RMH, namely, the mSATS and GCS. To enhance the predictive capability of mortality and ensure comprehensive assessment, it is imperative to supplement these existing scoring systems. Multiple scoring systems are available, such as the Trauma and Injury Severity Score (TRISS), the Life Threat Index (LTI), the Injury Severity Score (ISS), and the Abbreviated Injury Score (AIS). The LTI is more sensitive than other scoring systems for predicting mortality, highlighting its significance in clinical practice [12]. ISS has gained considerable attention in research circles and has emerged as one of the most prevalent assessment tools. However, its predictive capacity has been observed to be comparatively inferior to that of other methods, such as the new injury severity score (NISS) and TRISS. Both the ISS and AIS exhibit limitations in mortality prediction. Consequently, alternative methodologies have been devised. Among these, the Trauma Mortality Prediction Model (TMPM) utilizes anatomical assessments, while the Revised Trauma Score (RTS), a physiological metric comprising GCS, systolic blood pressure, and respiratory rate, has been introduced. RTS is constrained by the absence of an anatomical component. The TRISS, a composite of the RTS, ISS, and age index, has emerged as a superior assessment tool compared to those reliant solely on individual anatomical or physiological parameters. The Kampala Trauma Score (KTS) developed by Kobusingye and Lett incorporates five components: age, systolic blood pressure, respiratory rate, and AVPU (Alert, Voice, Pain, Unresponsive) score. This was subsequently modified to the M-KTS, which translates AVPU to the GCS. Although useful for quality improvement and research endeavors, KTS and M-KTS do not surpass TRISS and have been noted to overestimate loss of consciousness [13]. Multiple scoring systems are being used in the WHO trauma registry for scoring

trauma patients, including RTS, sex, age, physiology (GAP), mechanism, Glasgow Coma Scale, age, and arterial pressure (MGAP, KTS), but some of them are used for other clinical diseases. Given that there is no ideal trauma scoring system, the TRISS can be used in the RMRTH context because of its superiority compared to other scoring systems.

The development of trauma centers is an important step in addressing the burden of trauma in LMICs. As seen in a systematic review conducted by Whitaker et al., they emphasized the role of trauma care systems, and a lack of trauma care could be a contributing factor to delays in assessment and management. Therefore, the establishment of trauma centers in Rwanda and other African countries with hospitals without trauma centers is much more important [14]. African health systems can learn from other centers and the installation of their trauma centers [15]. Whitaker J. et al. suggested that a more thorough evaluation of trauma systems in LMICs is needed to enhance the prospects of recovery for those who have sustained injuries [16]. Establishing trauma centers is crucial for the effective management of trauma patients.

There is a need to establish national trauma registries in various countries in Africa [15]. Maintenance of a trauma registry is an important step in trauma system development to allow for tracking trauma metrics and performing quality improvement projects. A prospective trauma registry was established in Rwanda from May 2011 to July 2015, primarily operating within two hospitals, namely, Kigali University Teaching Hospital (CHUK) and Butare University Teaching Hospital (BUTH). The RMRTH started the use of the WHO trauma registry in September 2019. Since its implementation at RMH, several difficulties have been experienced, including inadequate control over the data input into the trauma registry, limited accessibility to the registry, and difficulty in maintaining accurate records within the WHO trauma registry [17]. Maintaining comprehensive records and utilizing data analysis tools are essential for improving management practices based on stored data without encountering difficulties. This approach not only facilitates collaboration with other trauma centers but also fosters integration into the global trauma system for shared learning purposes [18].

This study has several limitations that merit scrutiny. First, this study was limited to a single-center setting, potentially constraining the generalizability of the findings to wider populations. The use of retrospective data collection methods introduces inherent biases and potential inaccuracies. Given its reliance on previously recorded information that may lack systematic documentation, this study also did not capture data on management, outcomes or specific injuries, and no trauma scoring system was routinely used, and data from the trauma registry was not used. Furthermore, the existence of incomplete files exacerbates this limitation, potentially resulting in data gaps and an incomplete comprehension of the investigated phenomenon.

Despite these constraints, endeavors were undertaken to mitigate biases and uphold the rigor of the analysis within the confines of the accessible data.

CONCLUSION

In assessing trauma patients, it is crucial to adhere to physiological and anatomical scoring systems such as the Glasgow Coma Scale (GCS) or the modified South African Triage Score (mSATS). Moreover, integrating other scoring systems that offer more comprehensive outcome information is essential. The establishment of well-structured trauma centers plays a pivotal role in the effective management of trauma patients. Furthermore, utilizing data-driven practices, which encompass both international and locally generated data, alongside maintaining meticulous documentation, is paramount for enhancing the quality of care and positively impacting patient outcomes.

REFERENCES

1. Alharbi, R.J.; Lewis, V.; Mosley, I.; Miller, C. Current Trauma Care System in Saudi Arabia: A Scoping Literature Review. Accid. Anal. Prev. 2020, 144, 105653, doi:10.1016/j.aap.2020.105653.

2. Enumah, S.; Scott, J.W.; Maine, R.; Uwitonze, E.; D'Arc Nyinawankusi, J.; Riviello, R.; Byiringiro, J.C.; Kabagema, I.; Jayaraman, S. Rwanda's Model Prehospital Emergency Care Service: A Two-Year Review of Patient Demographics and Injury Patterns in Kigali. Prehospital Disaster Med. 2016, 31, 614–620, doi:10.1017/S1049023X16000807.

3. Enumah, S.; Scott, J.W.; Maine, R.; Uwitonze, E.; D'Arc Nyinawankusi, J.; Riviello, R.; Byiringiro, J.C.; Kabagema, I.; Jayaraman, S. Rwanda's Model

Prehospital Emergency Care Service: A Two-Year Review of Patient Demographics and Injury Patterns in Kigali. Prehospital Disaster Med. 2016, 31, 614–620, doi:10.1017/S1049023X16000807.
4. Ward, J.L.; Azzopardi, P.S.; Francis, K.L.; Santelli, J.S.; Skirbekk, V.; Sawyer, S.M.; Kassebaum, N.J.; Mokdad, A.H.; Hay, S.I.; Abd-Allah, F.; et al. Global, Regional, and National Mortality among Young People Aged 10–24 Years, 1950–2019: A Systematic Analysis for the Global Burden of Disease Study 2019. The Lancet 2021, 398, 1593–1618, doi:10.1016/S0140-6736(21)01546-4.
5. Ansari, S.; Akhdar, F.; Mandoorah, M.; Moutaery, K. Causes and Effects of Road Traffic Accidents in Saudi Arabia. Public Health 2000, 114, 37–39, doi:10.1038/sj.ph.1900610.
6. Konlan, K.D.; Hayford, L. Factors Associated with Motorcycle-Related Road Traffic Crashes in Africa, a Scoping Review from 2016 to 2022. BMC Public Health 2022, 22, 1–13, doi:10.1186/s12889-022-13075-2.
7. Fisa, R.; Musukuma, M.; Sampa, M.; Musonda, P.; Young, T. Effects of Interventions for Preventing Road Traffic Crashes: An Overview of Systematic Reviews. BMC Public Health 2022, 22, 1–18, doi:10.1186/s12889-021-12253-y.
8. Brown, H. Rwanda's Road-Safety Transformation. Bull. World Health Organ. 2007, 85, 425–426, doi:10.2471/blt.07.010607.
9. Newberry, J.A.; Bills, C.B.; Pirrotta, E.A.; Barry, M.; Ramana Rao, G.V.; Mahadevan, S. V.; Strehlow, M.C. Timely Access to Care for Patients with Critical Burns in India: A Prehospital Prospective Observational Study. Emerg. Med. J. 2019, 36, 176–182, doi:10.1136/emermed-2018-207900.
10. Shustak, A.; Uwitonze, J.M.; Kabagema, J.; Wojick, M.; Asay, B.; Louka, A.; Wolfe, L.; Dushime, T.; Jayaraman, S. Managing Medical Emergencies: Sustainable Pre-Hospital Medical Education in Rwanda. Rwanda Med. J. 2023, 80, 34–41, doi:10.4314/rmj.v80i3.5.
11. Hasselberg, M.; Kirsebom, M.; Bäckström, J.; Berg, H.Y.; Rissanen, R. I Did NOT Feel like This at All before the Accident: Do Men and Women Report Different Health and Life Consequences of a Road Traffic Injury? Inj. Prev. 2019, 25, 307–312, doi:10.1136/injuryprev-2017-042673.
12. Jojczuk, M.; Nogalski, A.; Krakowski, P.; Prystupa, A. Mortality Prediction by 'Life Threat Index' Compared to Widely Used Trauma Scoring Systems. Ann. Agric. Environ. Med. 2022, 29, 258–263, doi:10.26444/aaem/142182.
13. Akay, S.; Ozturk, A.M.; Akay, H. Comparison of Modified Kampala Trauma Score with Trauma Mortality Prediction Model and Trauma-Injury Severity Score: A National Trauma Data Bank Study. Am. J. Emerg. Med. 2017, 35, 1056–1059, doi:10.1016/j.ajem.2017.02.035.
14. Whitaker, J.; O'Donohoe, N.; Denning, M.; Poenaru, D.; Guadagno, E.; Leather, A.J.M.; Davies, J.I. Assessing Trauma Care Systems in Low-Income and Middle-Income Countries: A Systematic Review and Evidence Synthesis Mapping the Three Delays Framework to Injury Health System Assessments. BMJ Glob. Health 2021, 6, 1–15, doi:10.1136/bmjgh-2020-004324.
15. Zhou, J.; Wang, T.; Belenkiy, I.; Hardcastle, T.C.; Rouby, J.J.; Jiang, B.; Demetriades, D.; Oestern, H.J.; Iwase, H.; Zhang, M.; et al. Management of Severe Trauma Worldwide: Implementation of Trauma Systems in Emerging Countries: China, Russia and South Africa. Crit. Care 2021, 25, 1–10, doi:10.1186/s13054-021-03681-8.
16. Uwamahoro, C.; Aluisio, A.R.; Chu, E.; Reibling, E.; Mutabazi, Z.; Karim, N.; Byiringiro, J.C.; Levine, A.C.; Guptill, M. Evaluation of a Modified South African Triage Score as a Predictor of Patient Disposition at a Tertiary Hospital in Rwanda. Afr. J. Emerg. Med. 2020, 10, 17–22, doi:10.1016/j.afjem.2019.10.001.
17. Petroze, R.T.; Martin, A.N.; Ntaganda, E.; Kyamanywa, P.; St-Louis, E.; Rasmussen, S.K.; Calland, J.F.; Byiringiro, J.C. Epidemiology of Paediatric Injuries in Rwanda Using a Prospective Trauma Registry. BJS Open 2020, 4, 78–85, doi:10.1002/bjs5.50222.
18. Zargaran, E.; Adolph, L.; Schuurman, N.; Roux, L.; Ramsey, D.; Simons, R.; Spence, R.; Nicol, A.J.; Navsaria, P.; Puyana, J.C.; et al. A Global Agenda for Electronic Injury Surveillance: Consensus Statement from the Trauma Association of Canada, the Trauma Society of South Africa, and the Panamerican Trauma Society. J. Trauma Acute Care Surg. 2016, 80, 168–170, doi:10.1097/TA.0000000000000880.