Journal of Epidemiology and Public Health (2025), 10(02): 148-158
Masters Program in Public Health, Universitas Sebelas Maret

Research
Open Access

Integration of Indonesian National Trauma Guideline into the Emergency Room System (Cipto Code Trauma System)

Radi Muharris Mulyana[1,2], Ascobat Gani[2]

[1]Cipto Mangunkusumo Hospital, Jakarta, Indonesia
[2]Faculty of Public Health, Universitas Indonesia, Depok, Indonesia

Received: 29 April 2025; Accepted: 14 Mei 2025; Available online: 16 April 2025

ABSTRACT

Background: Indonesia has enacted the national trauma guideline since 2017 and Cipto Mangunkusumo Hospital (CMH) has applied it since 2019 through the establishment of Cipto Code Trauma. This study aimed to describe the compliance, system adherence, performance and outcome associated with the Cipto Code Trauma system.
Subjects and Method: This cross-sectional study was conducted at CMH Emergency Room (ER) using direct observations and data from electronic health records (EHRs). Observations were performed on 106 trauma cases by convenience sampling to map clinical and non-clinical components using a checklist. We compared the implemented ER components against the 2017 national trauma guidelines, assessing the system compliance. Total sampling from EHRs was performed on 4,317 trauma patients to assess performance and outcome of Cipto Code Trauma system. The data were analyzed descriptively.
Results: Observations from 106 trauma cases indicate that the Cipto Code Trauma meets all criteria from the national trauma guidelines. Performance indicators from 840 patients were achieved, including trauma team activation (87.6%), on-site multidisciplinary consultation (87.6%), time to physician assessment within five minutes (84.4%), except for length of stay under 4 hours (18.5%) and time to operating theatre within two hours (45.5%). Among the 4,317 trauma cases, the mortality rate for patients in the resuscitation category was 0.4%, while 39% of these patients were discharged directly from the ER.
Conclusion: The Cipto Code Trauma at CMH has successfully integrated the Indonesian national trauma guidelines, meeting all required standards. However, further improvements are needed to enhance system adherence and performance.

Keywords: adherence, emergency, guideline, trauma, performance

Correspondence:
Radi Muharris Mulyana, Cipto Mangunkusumo Hospital, Jalan Diponegoro No. 71, Central Jakarta 10430, DKI Jakarta, Indonesia. Email address: radi.muharris@gmail.com.

Cite this as:
Mulyana RM, Gani A (2025). Integration of Indonesian National Trauma Guideline into the Emergency Room System (Cipto Code Trauma System). J Epidemiol Public Health. 10(2): 148-158. https://doi.org/10.26911/-jepublichealth.2025.10.02.02.

BACKGROUND

Clinical guidelines for trauma have been developed since the era of the United States Civil War in the 18th century (Vavilala and Stansbury, 2020). After World War II, trauma system guidelines were developed for emergency rooms within hospitals and later expanded to prehospital areas (Choi et

al., 2021). Educational programs were also created to operate the trauma system, including the Advanced Trauma Life Support (ATLS) protocol developed in 1977. These trauma systems have been adopted worldwide and adapted according to various local settings (Mabrouk et al., 2024).

To maximize public health impact, the WHO recommended that trauma protocol should be integrated into the public health system (La Grone et al., 2016; WHO, 2019). In Indonesia, the ATLS protocol has been used widely since its introduction in 1995. However, integration into the hospital and prehospital system is still not known. In 2017, the Indonesian Ministry of Health released the national health service guidelines for trauma management (Indonesian national trauma guidelines) to improve clinical management and the trauma system (Kemenkes RI, 2017).

In Indonesia, trauma is still a major problem. The prevalence of trauma in Indonesia is 8.2%, mostly caused by road traffic accidents (47.7%) and falls (40,9%). Mortality due to trauma is 6.5%, the 4th highest after stroke, tuberculosis, and heart disease (Kemenkes RI, 2013). Trauma is also accountable for an estimated 1% of major disability and 9% of minor to moderate disability (Kemenkes RI, 2018).

Initial management of trauma is important in improving outcomes for trauma, especially in major injuries, in which the emergency room plays a pivotal role. An inclusive trauma system mandates that all acute care facilities be ables to provide care for trauma patients, with the more severe cases managed in a trauma referral center (Gauss et al., 2024). Emergency rooms in trauma referral centers are required to have established protocols to ensure the safety and outcomes of patients, especially severe and critical trauma patients (Baxter et al., 2022).

Cipto Mangunkusumo Hospital initiated Cipto Code Trauma in August 2018 as an effort to integrate the national trauma guidelines into the emergency room (ER) system of CMH. The Cipto Code Trauma system has been well established since 2019 with the enactment of standard operating procedures and incorporation within ER CMH service guidelines. To our knowledge, no study has described the integration of the Indonesian national trauma guidelines into the emergency room system in Indonesia.

This study aims to describe the integration of Indonesian national trauma guidelines into the emergency room system of ER CMH, by describing the compliance to requirements from the Indonesian national trauma guideline, system adherence and performance of the Cipto Code Trauma system, as well as the outcomes.

SUBJECTS AND METHOD

1. Study Design

This study was a single-center cross sectional study performed in a tertiary referral hospital in Jakarta, Indonesia. This study was conducted from December 2023 to January 2024. This study uses the Donabedian model to assess the structure, process, and outcomes of healthcare.

2. Population and Sample

Direct observation was performed on 106 trauma cases in December 2023 to describe the structure and assess compliance with requirements from the Indonesian national trauma guidelines. Observations were performed towards clinical management of the patients, as well as non-clinical components, such as registration, admission, and discharge. Observation was performed during work hours by the head nurse, who was guided and documented using a checklist of required components from the Indonesian national trauma guidelines. Convenient sampling was performed towards trauma

patients in each of the three triage categories currently used in CMH, as it may have different components. Retrospective data from all trauma patients admitted to ER CMH (4,317 trauma patients) were also retrieved from electronic health records (EHR) from January to December 2023. Total sampling was performed to assess the process and outcomes. Although Cipto Code Trauma was established in 2019, during the COVID pandemic in 2020-2022, there were many adjustments to the flow of services in ER CMH. Therefore, the observation and data collection were taken in the year 2023, in which the protocols are minimally affected by COVID.

3. Study Variables

The variable to assess structure in this study is the system compliance of ER CMH compared to the requirements from the 2017 Indonesian national trauma guidelines. The process variables are key clinical processes that describe system performances, which consist of trauma team activation, multidisciplinary on-site consultation, time to doctor <5', length of stay < 4 hours, and time to operating theatre < 2 hours. The outcome variables are discharged home, admitted to ward, ICU/HCU, deceased, or leave against medical advice.

4. Operational Definition of Variables

System compliance is defined by how many clinical and non-clinical components from national trauma guidelines are applied in ER CMH. Trauma team activation is a notification for emergency response from the trauma team. Multidisciplinary on-site consultation is determined by whether the multidisciplinary team is present during trauma team activation. Time to doctor is defined as how long the patients need to wait before being examined by the doctor. Length of stay is defined as how long the patient is being treated in the ER. Time to operating theatre is defined as how long the patient need to wait before transferred to operating theatrePerformance were assessed only for the resuscitation triage category (most severe and urgent). Outcomes of trauma patients were determined for all trauma patients at the end of ER CMH service, whether they were admitted, discharged, deceased, or left against medical advice. Outcomes were also categorized according to the triage category to differentiate between different spectrums of trauma cases. Payment schemes were also noted as a potential factor determining the outcome of the service.

5. Study Instrument

The observation was systematically conducted using a comprehensive checklist that included all the essential components outlined in the Indonesian National Trauma Guidelines. Requirements from the 2017 Indonesian national trauma guidelines are extracted and categorized as patient reception, initial assessment and treatment, definitive emergency management, and discharge components. Protocols and providers are also observed in every component. Other variables are measured by the percentage of performance achieved.

6. Data Analysis

The observation result is presented as a swim lane diagram. The system compliance is presented in a comparison table. System performance and outcomes are presented in the frequency table.

7. Research Ethics

This study received ethical approval from the Ethics Committee of the Faculty of Medicine, Universitas Indonesia (FMUI)-CMH and gained permission from the Research Working Group of CMH.

RESULTS

Observations were conducted throughout December 2023, involving a total of 106 trauma cases followed from the triage area until the patient was discharged from ER

CMH. From the observation, the general flow process in ER CMH was divided into four main steps: patient reception, initial assessment and treatment, definitive emergency management, and discharge.

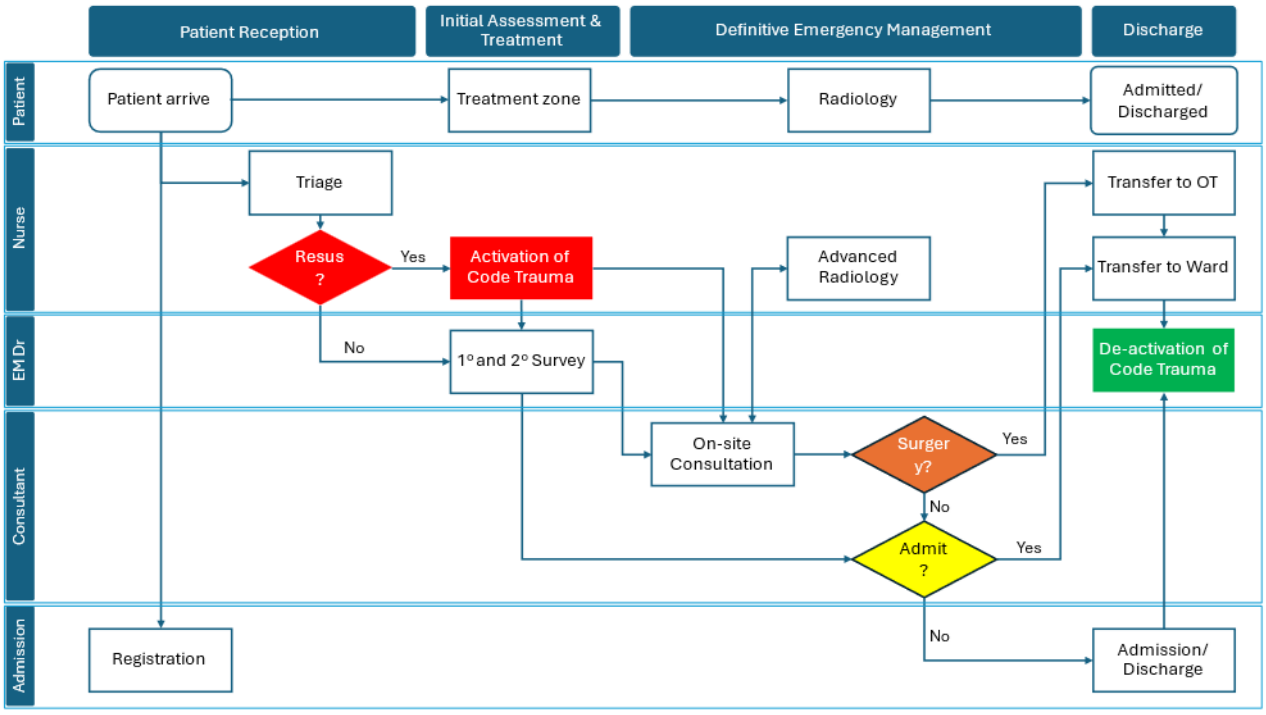

Figure 1. Process map of ER CMH for trauma patients as of December 2023

To classify different categories of trauma, CMH used the Cipto Triage Method (CTM) (Habib et al., 2020). CTM is a three-tiered triage protocol based on clinical severity and urgency developed from modification of the Australasian Triage Scale (ATS) (Australian Government Department of Health and Ageing., 2007). CTM triage categories are resuscitation (most severe or emergent), urgent, and non-urgent. Although, the naming scheme more closely resembles the Canadian Triage Acuity Scale (CTAS) (Emergency Health Services Branch Ministry of Health and Long-Term Care, 2016).

Among the trauma patients, there was a different flow process for the resuscitation category. There was a special protocol for trauma team activation that was termed "Activation of Code Trauma". This protocol was performed when the triage officer identified an acute trauma patient with high severity or urgency. Exclusion of activation was for referred patients with an already allocated critical care room in CMH, or non-acute multiple injured patients already treated in other hospitals. The activation of Code Trauma marks the start of the Cipto Code Trauma system, which manages patients in a multidisciplinary and interdisciplinary fashion. For urgent and non-urgent patients, the initial assessment and treatment will be done by the ER team and consulted to on-site consultants if surgery or further hospitalization was needed. Other non-urgent patients will be discharged by the EM consultant. As soon as the patient is discharged from the ER, the ER team will declare a "de-activation of Code Trauma" to mark the end of the Cipto Code Trauma system in ER CMH.

Requirements from national trauma guidelines for trauma services in tertiary

hospitals were damage control resuscitation, ability to perform emergency bedside surgery, 24-hour operating theatre, provision of Ambulance for pre-hospital and inter-hospital transfer, emergency physician team, multidisciplinary consultant team (trauma team), and emergency nursing team. Those requirements were compared to the observation result.

Table 1. Comparison of National Trauma Guidelines Requirement and Practice in ER CMH as of December 2023

Component	Sub-Component	National Trauma Guidelines	Cipto Mangunkusumo	Remarks
Patient Reception	Protocol	Prehospital Ambulance transfer	Prehospital Ambulance transfer, Triage (Cipto Triage Method), Trauma Team Activation (Cipto Code Trauma	Criteria met, with additional triage method and trauma team activation
Initial Assessment & Treatment	Protocol	Primary and Secondary surveys, Damage control resuscitation	Primary and Secondary surveys, Damage control resuscitation	Criteria met
	Provider	Emergency doctor on site, Emergency nurse team	Emergency Medical Officer (EMO), Emergency Medicine Consultant, Emergency nurse team	Criteria met, additional emergency medicine team on site
Definitive Emergency Management	Protocol	Multidiscipline on-site consultation, Bedside surgery, 24/7 emergency surgery, Clinical guidelines	Multidisciplinary on-site consultation (Cipto Code Trauma), Bedside surgery, 24/7 for emergency surgery, Clinical guidelines	Criteria met, established trauma team control
	Provider	On-site Consultant for trauma (Trauma Team), Emergency nurse team for trauma	On-site consultant for trauma (Trauma Team), Emergency nurse team for trauma	Criteria met
Discharge	Protocol	Inter hospital Ambulance transfer	Inter-hospital Ambulance transfer	Criteria met

Several key time intervals were also identified; they are time to doctor less than 5 minutes, length of stay in ER <4 hours, time to operating theatre <2 hours, and time to transfer <1 hour for non-surgery patients. These key time intervals will be used to determine the system's performance. Adherence, performance, and outcomes data were retrieved from the EHR. From January to December 2023, out of 28,538 admissions, there were 4,317 (15.1%) trauma patients. Most trauma patients are triaged as urgent (52.7%), followed by non-urgent (27.8%), and resuscitation (19.5%). Adherence of protocol data able to be retrieved from EHR was trauma team activation and multidisciplinary on-site consultation. System performance data available were time to doctor <5 minutes,

length of stay <4 hours, and time to operating theatre <2 hours.

Table 2. Performance of Cipto Code Trauma System in ER CMH from January to December 2023

Component	Frequency (n)	Performed (%)
Key Protocols (Resuscitation triage)		
Trauma Team Activation (Code Trauma)	736	87.6
Multidisciplinary on-site consultation	736	87.6
Performance (Resuscitation triage		
Time to doctor <5'	709	84.4
Length of stay <4 hours	155	18.5
Time to Operating theatre < 2 hours	61	45.5

Outcomes data were also retrieved from the EHR. Overall mortality of trauma patients was 17 out of 4,317 patients (0.4 %); all came from trauma with resuscitation category. The proportion of patients requiring critical care was also highest in the resuscitation category. Among the resuscitation category patients, 39% were discharged directly from the ER.

Table 3. Outcomes of emergency trauma services for every triage category in ER CMH from January to December 2023 (n=4,317)

Outcome	Triage Category					
	Frequency (n)	Resuscitation (%)	Frequency (n)	Urgent (%)	Frequency (n)	Non-Urgent (%)
Discharged home	328	39.0	1,491	65.5	1,116	93.0
Admitted to ward	191	22.7	519	22.8	25	2.1
Admitted to ICU/HCU	209	24.9	87	3.8	2	0.2
Deceased	17	2.0	0	0.0	0	0.0
Leave against medical advice	95	11.3	180	7.9	57	4.8

DISCUSSION

The general flow process of ER CMH was divided into four main processes. This is different from the general flow process in most ERs in the world, which usually comprises patient reception, emergency medical services, and discharge/disposition (Rovati et al., 2024). In ER CMH, the emergency medical services are divided into two steps because the initial assessment and treatment were attended by the emergency medicine physician, while the definitive emergency management were attended by one of the on-site consultants (internal medicine, surgery, pediatrics, obstetrics, or forensics consultant) without moving the patient to other treatment zone or ward.

The 2-step emergency medical services have some potential flaws; they have a longer completion time and may potentially miss critical information during the transition, especially in patients with critical conditions. Moreover, in patients with time sensitive cases requiring multidisciplinary management, there should be a protocol to ensure the response time of required medical services. In trauma cases, this protocol is called "trauma team activation" or TTA

(Waydhas et al., 2021; Bourgeois et al., 2024).

ER CMH established a protocol of trauma team activation called “Code Trauma activation” for trauma cases with resuscitation triage category. In trauma centers, TTA is usually present with different kinds of triggers. Most opted for physiologically unstable and anatomically severe traumas for triggering the TTA (Waydhas et al., 2021).

ER CMH uses a different trigger, which is all trauma patients with the resuscitation triage category. As mentioned before, the CTM was based on modification from ATS. The resuscitation category of CTM is a combination of ATS category I (immediately life-threatening) and category II (imminently life-threatening) (Habib et al., 2020; Australian Government Department of Health and Ageing, 2007). In ER CMH, trauma patients with imminent life-threatening conditions are translated into patients with relatively stable physiology but showing signs of severe injury in any organ or system organs, paired with high energy injury mechanism. Examples are patients with severe motor vehicle crashes, suffering from head injury although the GCS is still >13, or multiple injured patients due to falls from heights, although the vital signs are still stable during the first triage encounter. This trigger will potentially include patients' injuries, which will be excluded later from thorough physical and radiological examinations. This trigger was chosen due to the previous condition before the establishment of Code Trauma in 2018, that the identification and response time of multiple injured patients had a long response time and often missed some occult sign of severe injuries (Mulyana, 2022).

Cipto Code Trauma incorporates all the components required from the national trauma guidelines. Trauma team activation and multidisciplinary on-site consultation were recorded for every trauma case with resuscitation category. In this study, activation of Code Trauma was achieved in 87.6% of all traumas in the resuscitation category. The remaining were referred patients with burn injuries, in which the ambulance only docked for several minutes in front of ER triage for patient registration. Then, the ambulance went directly to the CMH burn unit located in a separate building. Several other cases were patients with multiple injuries referred to from other hospitals but already stabilized, and the injuries were already identified. Trauma centers with a more specific trigger for TTA will achieve 100% of TTA and on-site consultation (Waydhas et al., 2021; Bourgeois et al., 2024).

During the activation of Code Trauma, all the on-site team will manage the patient with the main attendant is the emergency physician. As soon as the injury problems are identified, the main attendant will be transferred to one of the surgeons with the most severe case. Communication between the doctors is maintained by the emergency physician. The nurse trauma team is also present throughout the process. The radiology and laboratory team, pharmacy team, ICU, and emergency operating theatre team are automatically notified due to the nature of the activation using the announcement heard within the ER CMH building. All the responses from Code Trauma activation were achieved through routine simulations and regular training of the new team. Response of TTA in ER CMH differed from other trauma centers, which usually have a dedicated smaller team.(Hagebusch et al., 2022) This is one of the fields of improvement possible for Cipto Code Trauma in the future.

The Indonesian national trauma guidelines also recommend performing trauma scoring and applying damage control resuscitation strategies, especially for severe trauma patients (Kemenkes RI, 2017). In

this study, we observed that the Injury Severity Score (ISS) was used in some patients. Damage control resuscitation strategies such as hemostatic resuscitation with blood products, massive transfusion protocol, administration of tranexamic acid and damage control surgery were present and used. Both the trauma scoring and utilization of damage control strategies in ER CMH were not well documented in EHR, unlike other trauma centers with established trauma registries (Riberio Juniot et al., 2024).

The first key interval for performance recorded in EHR of CMH is time to doctor <5 minutes, which is achieved in 84.4% of trauma patients with resuscitation categories. As this indicator reflects the completion of the triage process from patient reception to activation of Code Trauma, it needs to be improved. From the observation, in several patients with severe injuries, all the nurses and doctors focus on stabilizing the patients first, so the documentation is not recorded in real-time. However, further study is needed to confirm the reason and the impact.

Target length of stay was only achieved in 18.5% of trauma patients with the resuscitation category. Trauma patients with high severity or urgency will need to be admitted either to the critical care room or trauma ward. In ER CMH, the main problem for the length of stay was access block, in which there was no bed available for the patients to be admitted. Several trauma patients in ER CMH requiring emergency surgery need to wait before surgery or go back to the resuscitation zone after surgery due to lack of ICU beds. However, more study is required to know the precise number. Access block is common in busy hospitals around the world, although in trauma centers, there should be an allocation of beds for trauma patients and a supporting prehospital system to distribute patients to different hospitals according to the severity of the injuries (Møller et al., 2024).

Trauma patients requiring emergency surgery were taken straight to the operating theatre. In ER CMH, the key time interval for this is less than 2 hours, from the preparation until the patient arrives at the operating theatre. This indicator was achieved in 45.5% of all emergency operations. Delays to surgery in ER CMH were due to waiting for available operating theatre, no post-surgery critical care bed, and administrative problems. Strategies for improving hospital flow, especially for trauma patients, are needed to overcome these problems (Samadbeik et al., 2024).

The overall mortality rate of 0.4% is comparable to other trauma centers. However, further study is required to analyze the severity level of trauma patients in ER CMH, whether it is comparable to other major trauma centers (Alharbi et al., 2021; Reitano et al., 2022; Plurad et al., 2023).

Throughout 2023, there were 332 out of 4317 (7.7%) trauma patients who left against medical advice in ER CMH. These trauma patients did not continue definitive medical treatment, mostly due to administrative problems. Trauma patients in Indonesia have several types of available payment schemes with different procedures and coverages. First, for motor vehicle accidents on the road, the first payer is “Jasa Raharja” insurance and afterward, co-paid by the national health insurance (Badan Penyelenggara Jaminan Sosial Kesehatan – Social Security Agency for Health). Second, workers who have work-related accidents will be covered by the national insurance for workers (Badan Penyelenggara Jaminan Sosial Ketenagakerjaan – Social Security Agency for Employment). Some local governments also have their regional health insurance. All the different insurance providers have their own procedures, so this is a problem for

trauma patients as well as the hospitals to fulfill, especially in emergency situations. Also, there are patients who are not covered by insurance, for example, patients who allegedly violated the law. A more coordinated payment system and procedures might be needed to overcome this problem (Ndayishimiye, Tambor and Dubas-Jakóbczyk, 2023).

A limitation of this study is performed in a single-center tertiary hospital, so the description of integrating Indonesian national trauma guidelines might not be suitable for all hospitals in Indonesia. Further studies are needed to assess the integration of Indonesian national trauma guidelines in different types of hospitals and how to implement them in a practical way. A medium-to-long-term study is also needed to assess the outcome of trauma patients within the currently established trauma system in ER CMH.

In conclusion, the integration of Indonesian national trauma guidelines into the ER system in CMH is already achieved, with all requirements met. CMH has an established triage system (Cipto Triage Method) and trauma system (Cipto Code Trauma). There is a trauma team activation for resuscitation triage that is termed "Activation of Code Trauma" as an initiation of Cipto Code Trauma protocol in ER CMH. While the system has already been established, the compliance and performance still need improvement, notably the length of stay in the ER and the time to operating theatre. Provision of dedicated trauma wards, critical care rooms, and emergency operating theatre are needed to improve the flow of trauma patients. Mortality outcomes are comparable to other trauma centers, although further elaboration is required. A large proportion of patients in the resuscitation category who were directly discharged from the ER merit a re-exploration of the TTA criteria used in the ER CMH. A more coordinated payment system is also needed to prevent trauma patients from leaving against medical advice.

AUTHOR CONTRIBUTION

RMM and AG conceptualized and designed the study. RMM analyzes the results and writes the manuscript. AG reviewed, edited, and provided additional analysis and discussion. The authors read and approved the final manuscript. RMM = Radi Muharris Mulyana; AG = Ascobat Gani.

FINANCIAL SUPPORT AND SPONSORSHIP

None.

ACKNOWLEDGMENT

We would like to thank the Emergency Department Cipto Mangunkusumo Hospital for supporting this research.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

REFERENCE

Alharbi RJ, Shrestha S, Lewis V, Miller C (2021). The effectiveness of trauma care systems at different stages of development in reducing mortality: a systematic review and meta-analysis. World Journal of Emergency Surgery. 16(1): 38. doi:10.1186/s13017-021-00381-0.

Australian Government Department of Health and Ageing (2007). Emergency Triage Education Kit. Sydney, Department of Health and Ageing.

Baxter M, Crouch R, Bowyer R (2022). Adult Major Trauma Guidelines. Southampton, NHS Foundation Trust.

Bourgeois J, Clark G, Delaney S, Grushka J, Knopp-Sihota JA. (2024). Timing of Trauma Team Involvement and the Impact on the Length of Stay and Time

to Definitive Care in the Emergency Department: A Retrospective Administrative Data and Chart Review. Canadian Journal of Emergency Nursing. 47(1): 30–37. doi:10.29173/cjen195.

Choi J, Carlos G, Nassar AK, Knowlton LM, Spain DA (2021). The impact of trauma systems on patient outcomes. Current Problems in Surgery. 58(1): 100849.doi:10.1016/j.cpsurg.2020.100849.

Emergency Health Services Branch Ministry of Health and Long-Term Care. (2016). Prehospital Canadian Triage & Acuity Scale. Ontario, Ministry of Health.

Gauss T, de Jongh M, Maegele M, Cole E, Bouzat P (2024). Trauma systems in high socioeconomic index countries in 2050. Critical Care. 28(1): 84. doi:10.-1186/s13054-024-04863-w.

Habib H, Sulistio S, Albar IA, Mulyana RM, Yundiarto N (2020). Validation of the Cipto Triage Method: A Single-Centre Study from Indonesia. Open Access Emergency Medicine. Volume 12: 137–143. doi:10.2147/OAEM.S246598.

Hagebusch P, Faul P, Naujoks F, Klug A, Hoffmann R, Schweigkofler U (2022). Trauma-team-activation in Germany: how do emergency service professionals use the activation due to trauma mechanism? Results from a nationwide survey. European Journal of Trauma and Emergency Surgery. 48(1): 393–399. doi:10.1007/s00068-020-01425-x.

Kemenkes RI (2017). Keputusan Menteri Kesehatan Republik Indonesia Nomor HK.01.07/MENKES/132/2017 Tentang Pedoman Nasional Pelayanan Kedokteran Tatalaksana Trauma. Jakarta.

Kemenkes RI (2013). Riset Kesehatan Dasar (Riskesdas) 2013.

Kemenkes RI (2018). Riset Kesehatan Dasar (Riskesdas) DKI Jakarta 2018.

LaGrone L, Riggle K, Joshipura M, Quansah R, Reynolds T, Sherr K, Mock C. (2016). Uptake of the World Health Organization's trauma care guidelines: a systematic review. Bulletin of the World Health Organization. 94(8): 585-598C. doi:10.2471/BLT.15.162214.

Mabrouk OEA, Osman FMA, Awad MSA. (2024). Knowledge, Attidue and Practice of Advanced Trauma Life Support (ATLS) Protocol among House-Officers in Khartoum State Hospitals, Sudan, 2023. BMC Medical Education. 24(1): 670. doi:10.1186/s12909-024-05657-y.

Møller TP, Jensen JT, Medici RB, Rudolph SS, Andersen LB, Roed J, Blomberg SNF, et al., (2024). Survival of the fastest? A descriptive analysis of severely injured trauma patients primarily admitted or secondarily transferred to major trauma centers in a Danish inclusive trauma system. Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine. 32(1): 87. doi:10.1186/s13049-024-01265-3.

Mulyana RM. (2022). 11th Asian Conference on Emergency Medicine (ACEM) 2021 Conference proceedings P057 Profiles and Outcomes of High-Acuity Triage Trauma Patients in Emergency Department of a Tertiary Teaching Hospital in Jakarta, Indonesia. Hong Kong Journal of Emergency Medicine. 29(1). doi:10.1177/10249079221099636.

Ndayishimiye C, Tambor M, Dubas-Jakóbczyk K (2023). Barriers and Facilitators to Health-Care Provider Payment Reform – A Scoping Literature Review. Risk Management and Healthcare Policy. Volume 16: 1755–1779. doi:10.2147/RMHP.S420529.

Plurad DS, Geesman G, Sheets NW, Chawla-Kondal B, Ayutyanont N, Mahmoud A. (2023). A Contemporary Analysis of the Effect of Trauma Center Verification Level on Mortality in Severe Injury. The American SurgeonTM. 89(2): 286–292. doi:10.1177/000313482110-23437.

Reitano E, Bini R, Difino M, Chiara O, Cimbanassi S. (2022). Nine year in-hospital mortality trends in a high-flow level one trauma center in Italy. Updates in Surgery. 74(4): 1445–1451. doi:10.1007/s13304-022-01303-8.

Riberio Juniot MAF, Pacheco LS, Duchesne JC, Parreira JG, Mohseni S. (2024). Damage control resuscitation: how it's done and where we can improve. A view of the Brazilian reality according to trauma professionals. Revista do Colégio Brasileiro de Cirurgiões. 51. doi:10.1590/0100-6991e-20243785-en.

Rovati L, Privitera D, Finch AS, Litell JM, Brogan AM, Tekin A, Castillo Zambrano C, et al. (2024). Development of an Emergency Department Safety Checklist through a global consensus process. Internal and Emergency Medicine. doi:10.1007/s11739-024-03760-y.

Samadbeik M, Staib A, Boyle J, Khanna S, Bosley E, Bodnar D, Lind J, et al. (2024). Patient flow in emergency departments: a comprehensive umbrella review of solutions and challenges across the health system. BMC Health Services Research. 24(1): 274. doi:10.-1186/s12913-024-10725-6.

Vavilala MS, Stansbury LG. (2020). Pediatric trauma triage protocols: local context matters. The Lancet Child & Adolescent Health. 4(4): 255–256. doi:10.-1016/S2352-4642(20)30025-0.

Waydhas C, Trentzsch H, Hardcastle TC, Jensen KO, Abdelmotaleb KTY, Abi Saad G, Baacke M, et al. (2021). Survey on worldwide trauma team activation requirement. European Journal of Trauma and Emergency Surgery. 47-(5): 1569–1580. doi:10.1007/s00068-020-01334-z.

World Health Organization. (2019). World Health Organization. Emergency Care Systems for Universal Health Coverage: Ensuring Timely Care for the Acutely Ill and Injured.