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Comparing Disaster Medical Records: Insights from a Tabletop Exercise

Ari Prasetyadjati[1], Arifin[1], Nanik Setijowati[2], Suryanto Eko Agung Nugroho[1], Istan Irmansyah Irsan[1]

[1]Departement of Emergency Medicine, Faculty of Medicine, Universitas Brawijaya
Jl. Veteran, Malang 65145, East Java, Indonesia.
[2]Departement of Family Medicine, Faculty of Medicine, Universitas Brawijaya
Jl. Veteran, Malang 65145, East Java, Indonesia.

Corresponding Author : Arifin

Email: dr4rifin@student.ub.ac.id

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ABSTRACT

Background: Medical records are crucial for healthcare management during disasters. However, the World Health Organization's Emergency Medical Team Minimum Data Set (EMT-MDS) is a relatively new standard and remains unfamiliar to many practitioners. In Indonesia, its implementation is further challenged by language barriers, making evaluation against locally adapted documentation formats necessary.

Objectives: This study compares the effectiveness of EMT-MDS with a conventional medical record prototype adapted from Indonesian Ministry of Health guidelines.

Methods: A quantitative comparative study was conducted using a Table Top Exercise (TTX) simulation. Two simulation teams acting as Type 1 EMT managed 64 randomized cases using either the EMT-MDS or the conventional format.

Results: Statistical analysis using Mann-Whitney, McNemar, and Kappa tests showed no significant differences in completion time ($p = 0.642$) or data completeness ($p = 0.980$). Wilcoxon One-Sample tests indicated that both systems performed below ideal reference standards. However, EMT-MDS demonstrated better decision-making quality, with higher agreement with scenario keys for patient outcomes (Kappa = 0.848) and coordination assessments (Kappa = 0.968).

Conclusion: EMT-MDS better supports accurate decision-making. Therefore, it is recommended for adaptation into the Indonesian EMT documentation system, accompanied by language adjustments and enhanced training for medical personnel.

Keywords : Disaster; exercise; medical record

INTRODUCTION

Between 1900 and 2022, 5,830 natural disasters driven by various risks were documented globally. Notably, 25% of these events occurred within the last decade alone. In recent years, smaller-scale disasters linked to climate change have also begun to exert a significant impact on local economies and public health. (Shiroma *et al.*, 2024) In Indonesia approximately 90% or more of disasters are hydrometeorological in

nature, such as storms and floods. However, these events typically result in fewer fatalities compared to the devastation caused by geological events like earthquakes and tsunamis. Consequently, years devoid of significant seismic activity generally record lower mortality rates.(Ayuningtyas *et al.*, 2021)

A disaster is characterized as an event or situation with such a profound impact that it exceeds the local region's capacity to respond, thereby necessitating assistance from national or international levels.(Hamilton, Södergård and Liverani, 2022) Disaster threats can be broadly categorized into three types: (Center for Excellence in Disaster Management and Humanitarian Assistance, 2021).

1. Natural Disaster Threats : Floods, volcanic eruptions, earthquakes, tsunamis.
2. Non-Natural Disaster Threats : Industrial accidents, technological failures, pandemics.
3. Social Disaster Threats : Social conflict, terrorism.

The massive earthquake in Haiti and the floods in Pakistan in 2010 caused the collapse of national capacities in both nations, necessitating international aid, particularly in the health sector. This situation prompted many countries to deploy medical relief teams. Unfortunately, the absence of existing classification or minimum standardization made it difficult to assess whether the available teams matched the specific needs at the disaster sites.(Von Reding *et al.*, 2025)

This led experts to agree on establishing a guide for the classification and minimum standards of medical teams to aid disaster management. This guide was released in 2013 under the title *"Classification and Minimum Standards For Foreign Medical Teams In Sudden Onset Disasters"*.(Hamilton, Södergård and Liverani, 2022; Von Reding *et al.*, 2025)

Nearly a decade later, the WHO revised these guidelines and renamed them *Classification and Minimum Standards for Emergency Medical Teams*. This update was made to acknowledge local capacity (national medical teams) as a vital resource in disaster management. (World Health Organization, 2021) Emergency Medical Teams (EMTs) comprise professional medical staff—including physicians, nurses, paramedics, support personnel, and logistics experts—dedicated to treating patients affected by emergencies or disasters. EMTs are categorized into three levels: Type 1 (Mobile and Fixed) provides outpatient care; Type 2 offers inpatient and surgical services; and Type 3 delivers referral-level inpatient and surgical care, including intensive care facilities.(World Health Organization, 2021)

A critical component in the development of EMTs is research and data management. The collection and analysis of real-time patient data—including demographics and health events—is essential for determining rapid response needs, medical support, and decision-making.(Hamilton, Södergård and Liverani, 2022; Shiroma *et al.*, 2024) In 2017, the World Health Organization (WHO) established a reporting and medical record format for EMTs, known as the WHO Emergency Medical Team Minimum Data Set (EMT MDS). However, its adoption remains limited. To optimize its implementation, further evaluation of its strengths and weaknesses is required.(Kubo *et al.*, 2022).

Emergency Medical Teams (EMTs) are often the only entities capable of reporting broader medical needs to the emergency response command. Standardizing data reporting from EMTs to the EMT Coordination Cell (EMTCC) strengthens early warning systems for diseases and improves medical response coordination. EMTs act as sentinel reporting sites, providing real-time field health information. Standardizing medical records in disasters offers several advantages: (Kubo *et al.*, 2022).

a. Enables EMTs to function as monitors of the national health system during emergencies.

b. Improves data-driven coordination within the EMTCC, accelerating response times.

c. Increases health system capacity for future disasters through knowledge sharing and practice improvements.

The Regulation of the Minister of Health No. 24 of 2022 concerning medical records mandates that, at a minimum, medical records must contain: Patient identity; results of physical and supporting examinations; diagnosis, treatment, and follow-up care plans; and also the name and signature of the healthcare provider.(Kementerian Kesehatan RI, 2022) Conventional paper-based medical records present significant challenges, particularly regarding portability during high-volume patient influxes. Furthermore, physical files are susceptible to data loss and are increasingly obsolete in the modern era. Poor documentation can also adversely affect the quality of patient care, as it may fail to capture the full scope of practitioner findings. Consequently, Clinical Documentation Improvement (CDI) is essential for health facility management to ensure that generated information is both clear and concise.(Fadholi *et al.*, 2021)

In Indonesia, the Ministry of Health issued Decree No. HK.01.07/MENKES/1502/2023 regarding the National Guidelines for Health Crisis Management. These guidelines include Standard Operating Procedures (SOP) for Disaster Medical Teams' medical records, serving as a reference for medical personnel to document patient health information during disasters.(Kementerian Kesehatan, 2023)

Optimizing the clinical documentation process specifically by streamlining the completion of medical records facilitates a strategic reallocation of clinical resources. By minimizing administrative overhead, healthcare providers can expand the time available for direct patient care or reduce the aggregate service duration per encounter. Consequently, such efficiencies contribute to a systematic reduction in patient throughput times and subsequent waiting periods for incoming cases.(Albagmi, 2021; Murad *et al.*, 2024; Andriyani *et al.*, 2025)

The objective of filling out medical records is to ensure the availability of quality health data, characterized by:

a. Completeness

b. Accuracy (Truth)

c. Currency (Up-to-date)

One factor influencing the fulfillment of these indicators is the user interface of the medical record format.(Madandola *et al.*, 2023) Medical record completeness can be viewed through intrinsic and extrinsic dimensions. In the context of disaster victim management, the intrinsic need is to fulfill data requirements for the patient's healthcare, while the extrinsic need is to fulfill information requirements for disaster management.(Tarmansyah Iman *et al.*, 2024)

To prepare disaster medical teams providing accurate and reliable data via medical records and daily reporting systems, simulations are essential. Generally, simulations are used to identify and rectify problems before an actual emergency occurs. Simulations serve as training and quality assurance tools, providing evidence-based assessments for monitoring, testing, and strengthening operational readiness. (Gundran *et al.*, 2023; Mahdi *et al.*, 2023)

Although the WHO Emergency Medical Team Minimum Data Set (EMT MDS) was designed to standardize disaster reporting, its real-world application remains ineffective. Research published between 2019 and 2024 identifies ongoing obstacles to its use, including complex documentation, user unfamiliarity, poor integration with local infrastructure, and a lack of contextual flexibility. Consequently, essential health information is frequently delayed or fragmented during initial emergency responses, which directly impairs clinical care, inter-agency coordination, and disease surveillance. (Kubo *et al.*, 2022; Shiroma *et al.*, 2024; Von Reding *et al.*, 2025)

In high-stress disaster scenarios where resources are stretched and patient volumes are overwhelming cumbersome documentation tools only add to the workload. While local healthcare providers are comfortable with traditional medical records, these systems fail to offer the standardization and real-time data sharing required for a unified international response. Conversely, while the EMT MDS provides a standardized framework, it has not been adequately tested against local practices to prove its usability and efficiency in the field. Ultimately, a critical disconnect exists between global data standards and everyday field operations, which must be resolved to improve medical responses in disaster scenarios.

This research makes a unique contribution to the evolving field of disaster health data systems from 2019 to 2025. While earlier studies have largely concentrated on descriptive accounts of EMT MDS usage, simulation enhancements, or theoretical discussions on standardization, there remains a scarcity of empirical research directly comparing the EMT MDS against traditional medical records. Specifically, there is a distinct lack of data measuring operational metrics such as accuracy, completeness, and overall efficiency. (Kubo *et al.*, 2022; Shiroma *et al.*, 2024; Von Reding *et al.*, 2025)

Furthermore, while recent literature advocates for user-friendly, context-specific documentation, it fails to supply the comparative evidence necessary to guide national policy.(Von Reding *et al.*, 2025) This study actively fills these gaps by directly comparing the international EMT MDS standard with established local formats, assessing practical usability through applied simulations rather than relying on theoretical frameworks and also generating evidence relevant to low and middle income countries (LMICs), particularly

Indonesia, where adoption barriers are most pronounced and no official national standardized format currently exists.

METHODS

Study Design

This study utilized a comparative, simulation-based design within a Tabletop Exercise (TTX) framework to evaluate emergency medical documentation performance. The investigation contrasted the World Health Organization Emergency Medical Team Minimum Data Set (WHO EMT MDS) against a conventional medical record prototype developed based on Indonesian Ministry of Health guidelines. To isolate the inherent efficiency of these documentation structures, environmental variability and physical stressors were controlled through a standardized TTX environment.

Population and Sample

The study employed a total sampling approach, utilizing 64 clinical scenarios that constituted both the study population and the analytical sample. The scenarios were proportionally distributed across triage categories, comprising 18 green, 20 yellow, and 26 red cases. Research participants consisted of emergency medicine residents functioning as two Type 1 Emergency Medical Teams (EMTs), organized into simulation cohorts to perform standardized documentation assessments. Scenario allocation and documentation format assignment were conducted using a systematic random sampling method to minimize allocation bias, ensuring that each team had an equal opportunity to utilize both the EMT MDS and conventional documentation formats in balanced proportions throughout the simulation sessions.

Data Collection

Data were collected during the TTX using standardized extraction forms to ensure consistency. The independent variable was the medical record format, while the dependent variables included :

Completion Time: Measured in seconds using digital timers.

Record Completeness: Calculated as the percentage of required data fields successfully filled.

Accuracy: Verified through a double-check process comparing participant entries against validated clinical answer keys (ground truth). This assessed the precision of patient output (referrals vs. discharges) and the identification of coordination needs.

Additionally, the duration of participants' professional experience with the EMT MDS format was documented to provide context for the operational performance outcomes. All categorical data were reviewed against established standards to ensure validity for the final analysis.

Data Analysis

Statistical analysis was performed using SPSS version 22 for Windows, employing both descriptive and quantitative methods. Descriptive analysis was utilized to summarize sample characteristics and assess data distribution through univariate statistics, including measures of central tendency (mean, median, and range) and dispersion (standard deviation).

For the quantitative analysis, the independent t-test was used for comparisons of normally distributed numerical dependent variables, while the Mann–Whitney U test was applied to non-normally distributed data. McNemar's test was utilized via 2x2 contingency tables to compare nominal variables. Furthermore, Cohen's kappa coefficient was calculated to assess the level of agreement between the study measurements and the established reference standards beyond chance. All analyses were conducted with a 95% confidence interval and a significance level of $\alpha=0.05$; results with a p-value < 0.05 were considered statistically significant.

Ethical statement

This study adhered to the ethical principles for medical research involving human subjects. Ethical approval was obtained from Health Research Ethics Commision, dr. Saiful Anwar General Hospital, Malang (Reference No. 400/122/K.3/102.72025).

RESULT AND DISCUSSION

Descriptive analysis in this study indicates that the Emergency Medical Team Minimum Data Set (EMT MDS) yielded marginally superior operational and clinical outcomes compared to the conventional format. Specifically, in figure 1 the EMT MDS recorded a more efficient mean completion time of 162.98±44.16 seconds, whereas the conventional format averaged 165.28±58.54 seconds.

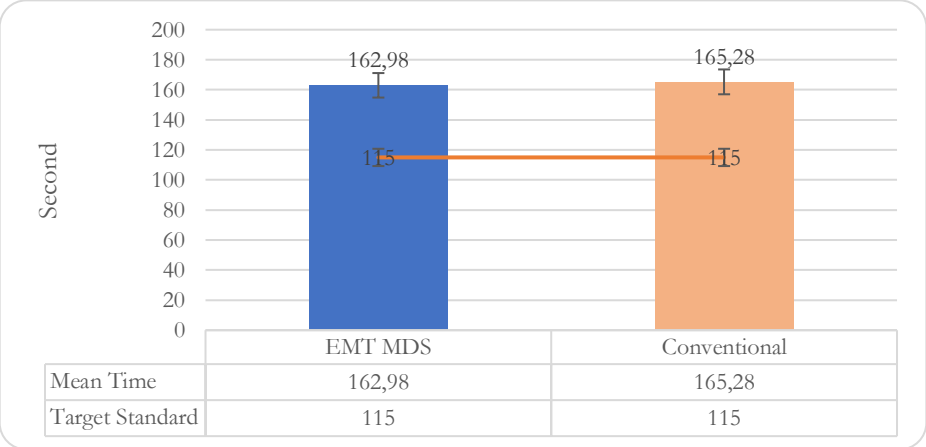

Figure.1 Medical record completion time

As illustrated in figure 2 , while both methods demonstrate high levels of completeness, with the conventional format (99.70%) marginally exceeding EMT MDS (99.64%), notable differences emerge in

accuracy-related indicators. The EMT MDS shows higher patient output accuracy 59/64 cases (92.20%) compared to the conventional format 58/64 cases (90.60%), a more pronounced gap is observed in coordination accuracy, where EMT MDS achieves 63/64 cases (98.40%) versus 61/64 cases (95.30%) in the conventional format.

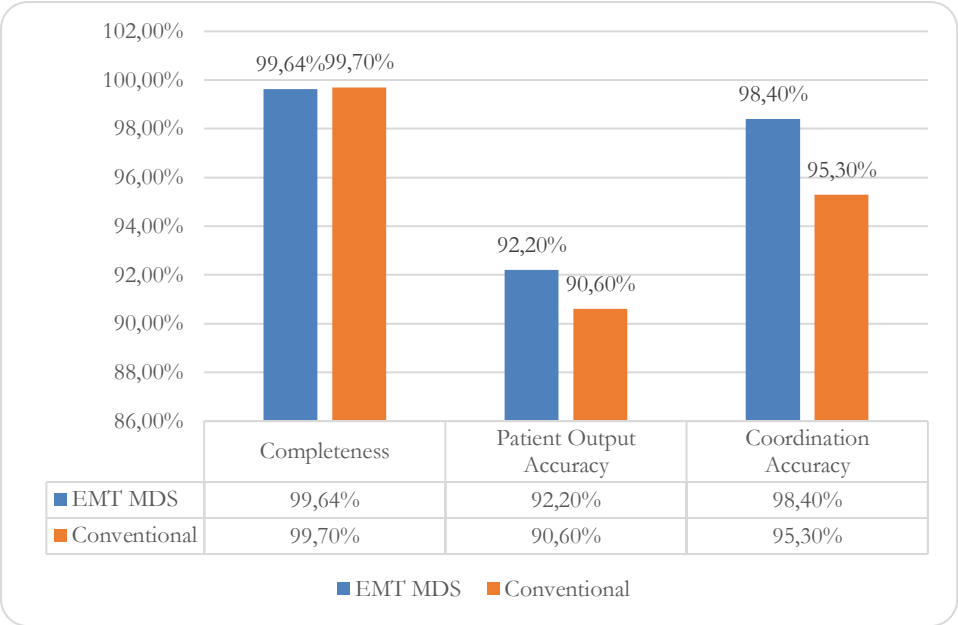

Figure.2 Medical record completeness and accuracy

A granular review of patient output in figure 3 reveals nuanced performance differences: although the conventional format achieved perfect accuracy in ambulance referral documentation 44/44 cases (100%), compared to 40/44 cases (90,9%) for the EMT MDS, the latter demonstrated a significant advantage in "Discharge without follow-up" cases, in this category, the EMT MDS achieved perfect consistency 14/14 cases (100%), whereas the conventional format correctly identified only 9/14 cases (64,3%)

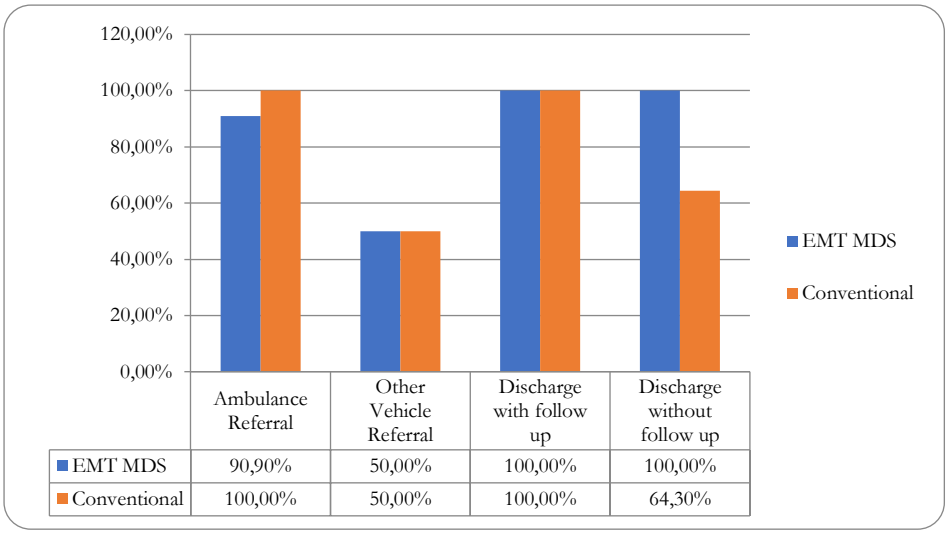

Figure.3 Granular patient output accuracy

These descriptively superior results for the EMT MDS potentially reinforced by the participants' extended experience and familiarity with the system suggest enhanced practical efficiency and accuracy, despite inferential testing indicating that these differences did not reach statistical significance.

Evaluations against formal performance benchmarks in table 1 indicate that both documentation formats significantly deviate from established clinical standards. A One-Sample Wilcoxon Test revealed that the 149-second median completion time shared by both formats was significantly longer than the target standard of 115 seconds ($p < 0.001$). Similarly, while documentation completeness was high, both systems remained significantly below the absolute 100% reference value, with $p = 0.038$ for the EMT MDS and $p = 0.034$ for the conventional format. Despite these gaps in speed and total completeness, both formats exhibited high levels of clinical agreement and coordination agreement. Cohen's Kappa analysis identified "Almost Perfect Agreement" for the EMT MDS in both patient output and coordination needs accuracy, while the conventional format demonstrated "Strong Agreement" for patient output and "Almost Perfect Agreement" for coordination needs.

Table 1. Agreement analysis and performance evaluation of documentation methods

Variable	Standard / Reference	EMT MDS Result	Conventional Result
Completion Time	115 seconds	Significantly Slower (p<0.001)	Significantly Slower (p<0.001)
Completeness	100%	Significantly Lower (p=0.038)	Significantly Lower (p=0.034)
Output Agreement	Answer Key	Almost Perfect (κ=0.848)	Strong Agreement (κ=0.807)
Coord. Agreement	Answer Key	Almost Perfect (κ=0.968)	Almost Perfect (κ=0.906)

Inferential statistical testing in table 2 suggests that the observed descriptive differences between the EMT MDS and conventional formats are not statistically significant. The Mann-Whitney U Test results for completion time ($p = 0.642$) and documentation completeness ($p = 0.980$) confirm that neither format holds a statistically significant advantage in these domains. Additionally, the McNemar Test results for patient output accuracy ($p = 1.000$) and coordination needs accuracy ($p = 0.625$) indicate no significant difference in the accuracy distribution between the two systems. These findings imply that while the EMT MDS presents a descriptively more efficient and accurate profile likely reinforced by extended user experience both systems function with comparable statistical efficacy in a clinical environment.

Table 2. Summary of statistical analysis comparison between format

Variable	Statistical Test	P-Value (Sig.)	Conclusion
Completion Time	Mann-Whitney U	642	No Significant Difference
Completeness	Mann-Whitney U	980	No Significant Difference
Output Accuracy	McNemar	1,000	No Significant Difference
Coordination Accuracy	McNemar	625	No Significant Difference

Comparative analysis indicates no statistically significant differences between the Emergency Medical Team Minimum Data Set (EMT MDS) and conventional medical record formats in terms of completion time, documentation completeness, patient output accuracy, or identification of coordination needs. Descriptively, however, the EMT MDS format demonstrated marginally superior operational outcomes, including a faster average completion time, a narrower range of time variation, and higher consistency in identifying both patient outputs and coordination needs. This descriptive advantage in speed and accuracy may be further attributed to the longer experience and greater familiarity users have with the EMT MDS system. Despite these practical strengths, both formats failed to meet established performance benchmarks; median completion times significantly exceeded the 115-second standard , and documentation completeness fell slightly—yet significantly—below the absolute 100% reference value. Consequently, while the EMT MDS presents a more efficient and accurate profile in practice, structural and procedural refinements remain necessary for both formats to achieve strict standards of operational efficiency and absolute record completeness.

The implementation of the Emergency Medical Team (EMT) Minimum Data Set (MDS) fundamentally enhances the efficacy of humanitarian disaster response by bridging the gap between immediate tactical coordination and long-term operational research. By establishing a standardized reporting framework, the MDS provides the EMT Coordination Cell (EMTCC) with real-time situational awareness, enabling the rapid aggregation of data to identify dominant health threats and optimize resource allocation.(World Health Organization, 2022) a capability effectively demonstrated during the 2019 Cyclone Idai response, where precise supply redirection was contingent upon standardized data.(Kubo *et al.*, 2022; World Health Organization, 2022) Simultaneously, the MDS transforms deployed units into sentinel surveillance sites during the critical window when local infrastructures often collapse; this daily reporting mechanism acts as an early warning system for notifiable diseases such as cholera, thereby facilitating rapid containment and vaccination interventions.(World Health Organization, 2024) Beyond immediate operations, the system institutionalizes accountability and professionalism within aid delivery, serving as a requisite for WHO verification and ensuring seamless patient handover to host government health authorities.(World Health Organization, 2024; Yeung *et al.*, 2026) Ultimately, the systematic collection of this data establishes a robust empirical foundation for retrospective research, allowing the global health community to critically evaluate team performance such as the observed disparity in data completeness between Type 1 and Type 2 EMTs and refine clinical protocols for future deployments.(Hamilton, Södergård and Liverani, 2022; Chimed-Ochir *et al.*, 2025)

While the Emergency Medical Team (EMT) Minimum Data Set (MDS) offers strategic value, its field implementation is frequently compromised by the high-pressure, resource-constrained environments of disaster zones. A primary barrier is the significant administrative burden placed on frontline clinicians; many of practitioners report being unable to conduct data entry during consultations, often due to a lack of dedicated data management personnel, which leads to error-prone retrospective reporting.(Kayano and Kubo, 2025) These logistical hurdles are exacerbated by infrastructural dependencies, where a lack of

internet connectivity and unreliable electricity undermine the "real-time" utility of the system, often delaying critical data transmission by days or weeks.(Chimed-Ochir *et al.*, 2025) Furthermore, the MDS exhibits a critical lack of diagnostic granularity, particularly in protracted crises or primary healthcare (PHC) settings. Designed primarily for sudden-onset trauma, the framework's rigidity often results in a high volume of "Other Diagnosis" entries in conflict zones like Ukraine thereby obscuring essential data on non-communicable diseases, mental health, and medication requirements.(Armitage and Afonso, 2022; Afonso, Bartolucci and Morelli, 2025; Parotto *et al.*, 2025) This "othering" of clinical data is compounded by a lack of interoperability with specialized systems like EWARS and a void in comprehensive evaluation frameworks that capture operational integration rather than just clinical outputs.(World Health Organization, 2022; Yeung *et al.*, 2026) Finally, the human element of language discordance remains a fundamental threat to data integrity; communication barriers between clinicians and patients can lead to misinterpreted symptoms, ensuring that even the most technologically advanced reporting remains only as accurate as the initial clinical encounter.(Khorshidi Organi, Nazarenia and Aghaee, 2024; Farhat *et al.*, 2025)

Within the context of mass casualty incidents (MCIs), practitioners must navigate a tripartite structure of cognitive demands: intrinsic load, dictated by the inherent complexity of life-saving medical interventions; extraneous load, generated by environmental stressors such as noise, interruptions, and sub-optimal tool design; and germane load, which facilitates the construction of cognitive schemas necessary for expert intuition. Cognitive overload manifests when the aggregate of intrinsic and extraneous loads surpasses an individual's working memory limits, precipitating psychological stress and significantly increasing the probability of medical errors.(Vella *et al.*, 2021)

The physical and environmental architecture of disaster zones and high-acuity clinical settings serves as a critical determinant of both operational efficacy and patient volume. Empirical evidence demonstrates that ambient noise within Intensive Care Units and Emergency Departments facilitates miscommunication and cognitive distractions, thereby increasing the susceptibility to medical errors.(Anesi and Kerlin, 2021) The advancement of disaster medicine is increasingly contingent upon the strategic deployment of autonomous systems and artificial intelligence decision support. By automating critical clinical assessments—such as augmented reality-assisted hemorrhage quantification, pediatric weight estimation, and real-time procedural auditing—these technologies establish a vital "digital safety net." This infrastructure is essential for intercepting medical errors that arise when the cognitive demands of crisis response exceed the neurobiological capacities of human providers.(Pasquariello *et al.*, 2025)

The transition from manual, paper-based records to a standardized digital framework within national health systems represents a transformative shift in disaster informatics, facilitating seamless, real-time interoperability across disparate healthcare providers and emergency response units. By establishing a unified data ecosystem, this integration significantly enhances clinical coordination and patient safety, ensuring that critical medical information remains accessible throughout the continuum of care.(Faisal and Nakayama, 2024) Furthermore, the alignment of disaster-related data with national services provides

decision-makers with high-quality health intelligence for more precise strategic planning. However, despite these advancements, the practical implementation remains a significant challenge, as it requires overcoming technical hurdles in data mapping, ensuring consistent field adoption by personnel under high-pressure conditions, and bridging persistent gaps in infrastructure to achieve truly universal interoperability.(Faisal and Nakayama, 2024)

The sustainment of comprehensive operational proficiency across the entire spectrum of medical services is fundamentally contingent upon the implementation of recurrent training regimens that authentically replicate the stochastic and high-pressure nature of real-world operational environments. Rather than limiting the scope to initial triage, this pedagogical approach must encompass the full continuum of disaster care. To address this need, high-fidelity simulation—specifically leveraging the capabilities of Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR)—has emerged as a vital instrument for enhancing cognitive flexibility and clinical acumen. By providing an immersive, standardized, and infinitely repeatable learning ecosystem, these extended reality (XR) modalities allow healthcare providers to systematically engage with complex clinical scenarios, thereby facilitating the deep internalization of broader disaster protocols and the development of the adaptive decision-making skills necessary to navigate the cognitive demands of mass casualty incidents.(García Ulerio *et al.*, 2025; Kim, Choi and Kim, 2025)

A key finding of this study is that the EMT Minimum Data Set (MDS) strengthens the linkage between documentation methods and performance outcomes through improved real-time coordination and standardization. However, based on discussion above as illustrated in the diagram (figure 4), its effectiveness remains contingent upon moderating factors, including operational constraints and cognitive load such as administrative burden, infrastructure limitations, and communication barriers which may undermine data quality and efficiency in real-world settings. Therefore, despite its favorable performance in controlled environments, the operational validity of the EMT MDS depends on its adaptability to complex field conditions and the integration of robust supporting systems.

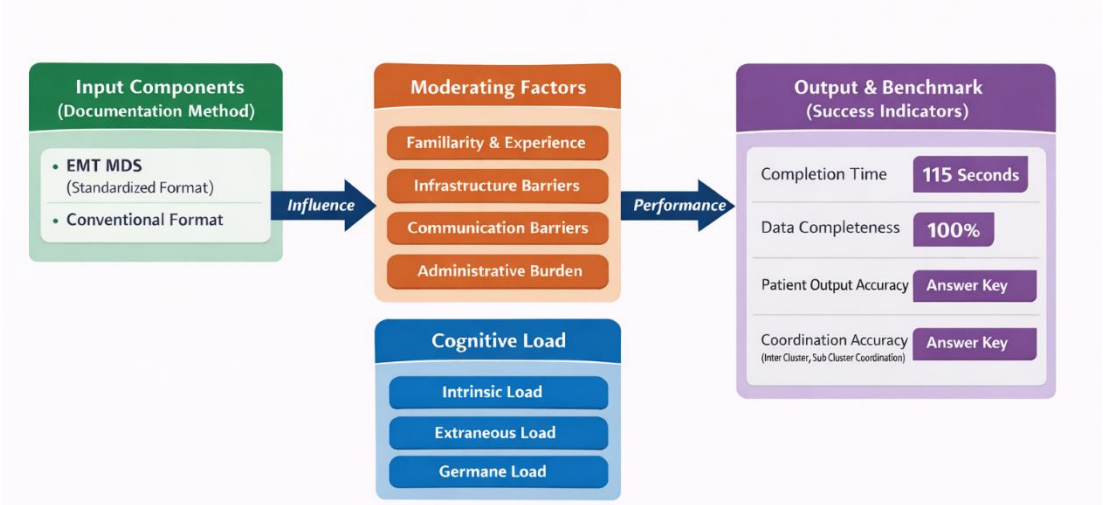

Figure 4. Factors influencing medical documentation outcomes

CONCLUSION

This study demonstrated no statistically significant differences between the Emergency Medical Team Minimum Data Set (EMT MDS) and conventional documentation formats across efficiency, completeness, and accuracy outcomes. However, descriptive trends suggest that EMT MDS offers modest operational advantages through greater consistency and slightly improved documentation efficiency, likely influenced by user familiarity and structured reporting design. Importantly, neither format achieved predefined performance benchmarks, highlighting the inherent difficulty of maintaining high-quality documentation within cognitively demanding, resource-limited disaster environments. These findings reinforce that documentation performance is shaped not only by form design but also by human factors, environmental stressors, infrastructural constraints, and workflow integration. While the EMT MDS remains essential for coordination, surveillance, accountability, and evidence generation in humanitarian response.

To ensure reliable data capture during mass casualty events, future implementation must prioritize cognitive load reduction, system interoperability, environmental adaptability, and simulation training. Subsequent research should address current limitations by utilizing larger, diverse samples to enhance generalizability. Furthermore, incorporating realistic field exercises, exploring user-centered digital documentation systems, and analyzing behavioral mechanisms such as stress induced decision-making will facilitate the development of resilient, context-adaptive frameworks.

REFERENCE

Afonso, A. T., Bartolucci, A. and Morelli, A. (2025) 'Medical data in humanitarian emergencies: does the WHO MDS need revision?', *Prehospital and Disaster Medicine*, 40(S1), p. S41. doi: 10.1017/S1049023X25001165.

Albagmi, S. (2021) 'The effectiveness of EMR implementation regarding reducing documentation errors and waiting time for patients in outpatient clinics: a systematic review', *F1000Research*, 10, p. 514. doi: 10.12688/f1000research.45039.2.

Andriyani, A. D. *et al.* (2025) 'Readiness Analysis of Electronic Medical Record Implementation at Raja Ampat District Hospital Using DOQ-IT', *Jurnal Saintika Medika*, 21(2), pp. 147–156. doi: https://doi.org/10.22219/sm.Vol21.SMUMM2.40491.

Anesi, G. L. and Kerlin, M. P. (2021) 'The impact of resource limitations on care delivery and outcomes: routine variation, the coronavirus disease 2019 pandemic, and persistent shortage', *Current Opinion in Critical Care*, 27(5), pp. 513–519. doi: 10.1097/MCC.0000000000000859.

Armitage, R. and Afonso, A. T. (2022) 'WHO EMT minimal data set in conflict-stricken Ukraine: comparative analysis of a new primary health care coding tool', *Prehospital and Disaster Medicine*, 37(S2), p. S57. doi: 10.1017/S1049023X2200156X.

Ayuningtyas, D. *et al.* (2021) 'Disaster preparedness and mitigation in Indonesia: a narrative review', *Iranian*

journal of public health, 50(8), pp. 1536–1546. doi: 10.18502/ijph.v50i8.6799.

Center for Excellence in Disaster Management and Humanitarian Assistance (2021) *Disaster Management Reference Handbook - Indonesia*. Honolulu: CFE-DMHA.

Chimed-Ochir, O. *et al.* (2025) 'Assessing data completeness in emergency medical team reports: analysis of the response to cyclone idai in Mozambique using the WHO minimum data set', *Archives of academic emergency medicine*, 13(1), p. e63. doi: 10.22037/aaemj.v13i1.2719.

Fadholi, A. *et al.* (2021) 'Perancangan rekam medis elektronik korban bencana berbasis web di Unit Gawat Darurat Puskesmas Puger Kabupaten Jember', *J-REMI*, 3(1). doi: 10.25047/j-remi.v3i1.2370.

Faisal, H. P. and Nakayama, M. (2024) 'Implementation of WHO MDS for SATUSEHAT using FHIR.', *JMIR Medical Informatics*, 12, p. e59651. doi: 10.2196/59651.

Farhat, H. *et al.* (2025) 'Assessing the experience and attitude of emergency medical services staff toward linguistic diversity challenges in a Middle Eastern EMS', *Qatar medical journal*, (1), p. 19. doi: 10.5339/qmj.2025.19.

García Ulerio, J. *et al.* (2025) 'Simulation technology use in disaster medicine education and training: a scoping review', *Frontiers in Disaster and Emergency Medicine*, 3. doi: 10.3389/femer.2025.1636285.

Gundran, C. P. D. *et al.* (2023) 'Simulation training needs assessment for disaster preparedness', *International Journal of Disaster Risk Reduction*, 94, p. 103824. doi: 10.1016/j.ijdrr.2023.103824.

Hamilton, A. R. L., Södergård, B. and Liverani, M. (2022) 'The role of emergency medical teams in disaster response: a summary of the literature', *Natural Hazards*, 110(3), pp. 1417–1426. doi: 10.1007/s11069-021-05031-x.

Kayano, R. and Kubo, T. (2025) 'Progress in health data collection and management during and after emergencies and disasters: increasing evidence by EMT minimum data set', *Prehospital and Disaster Medicine*, 40(S1), p. S41. doi: 10.1017/S1049023X25001153.

Kementerian Kesehatan (2023) *Pedoman Nasional Penanggulangan Krisis Kesehatan*. Edited by Sumarjaya et al. Jakarta: Kementerian Kesehatan. Available at: https://pusatkrisis.kemkes.go.id/pedoman-nasional-penanggulangan-krisis-kesehatan (Accessed: 24 July 2024).

Kementerian Kesehatan RI (2022) 'Peraturan Menteri Kesehatan Republik Indonesia Nomor 24 Tahun 2022 tentang Rekam Medis'. Jakarta. Available at: https://yankes.kemkes.go.id/unduhan/fileunduhan_1662611251_882318.pdf (Accessed: 15 July 2024).

Khorshidi Organi, Z., Nazarenia, M. and Aghaee, F. (2024) 'Understanding the challenges of language barriers in healthcare', *Interdisciplinary Studies in Society, Law, and Politics*, 3(3), pp. 28–35. doi: 10.61838/kman.isslp.3.3.5.

Kim, K.-J., Choi, M.-J. and Kim, M. (2025) 'Effects of virtual reality-based disaster simulation education on nursing students', *PLOS One*, 20(10), p. e0329563. doi: 10.1371/journal.pone.0329563.

Kubo, T. *et al.* (2022) 'First activation of the WHO emergency medical team minimum data set in the response to cyclone Idai', *Prehospital and Disaster Medicine*, 37(6), pp. 727–734. doi:

10.1017/S1049023X22001406.

Madandola, O. O. *et al.* (2023) 'The relationship between electronic health records user interface features and data quality of patient clinical information: an integrative review', *Journal of the American Medical Informatics Association*, 31(1), pp. 240–255. doi: 10.1093/jamia/ocad188.

Mahdi, S. S. *et al.* (2023) 'Systematic review on the current state of disaster preparation Simulation Exercises (SimEx)', *BMC Emergency Medicine*, 23(1), p. 52. doi: 10.1186/s12873-023-00824-8.

Murad, M. H. *et al.* (2024) 'Measuring documentation burden in healthcare.', *Journal of general internal medicine*, 39(14), pp. 2837–2848. doi: 10.1007/s11606-024-08956-8.

Parotto, E. *et al.* (2025) 'NCD Management during disasters and humanitarian emergencies: a review of the experiences by EMT', *Journal of personalized medicine*, 15(6). doi: 10.3390/jpm15060255.

Pasquariello, L. D. *et al.* (2025) 'Current and future applications of AI in EMS training: a scoping review', *Cureus*. doi: 10.7759/cureus.90469.

Von Reding, H. *et al.* (2025) 'Emergency medical teams deployments since the 2010 Haiti earthquake: a scoping review', *Prehospital and Disaster Medicine*, 40(S1), p. S34. doi: 10.1017/S1049023X25000998.

Shiroma, N. *et al.* (2024) 'Exploring the gender and age demographics of patients treated by emergency medical teams during disasters', *International journal of environmental research and public health*, 21(6), p. 696. doi: 10.3390/ijerph21060696.

Tarmansyah Iman, A. *et al.* (2024) 'Design and framework for developing disaster health information system: a systematic review', *Iranian Journal of Public Health*. doi: 10.18502/ijph.v53i4.15552.

Vella, K. M. *et al.* (2021) 'An exploratory investigation of the measurement of cognitive load on shift: Application of cognitive load theory in emergency medicine', *AEM Education and Training*, 5(4). doi: 10.1002/aet2.10634.

World Health Organization (2021) *Classification and minimum standards for emergency medical teams*. Geneva: World Health Organization.

World Health Organization (2022) *WHO guidance on research methods for health emergency and disaster risk management*. Geneva: World Health Organization.

World Health Organization (2024) *Minimum standards and recommendations for medical teams responding to highly infectious disease outbreaks*. Geneva: World Health Organization.

Yeung, T. *et al.* (2026) 'Stakeholder perspectives on evaluating emergency medical teams deployments', *Disaster Medicine and Public Health Preparedness*, 20, p. e12. doi: 10.1017/dmp.2025.10295.