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The impact of WHO triage on mortality rate in an emergency department in Erbil, Kurdistan region of Iraq

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Abstract

Background and objective: Triage is a process that includes categorizing patients according to the severity of their illnesses or injuries. This practice offers the potential to enhance the quality of healthcare and reduce the mortality rate. The Integrated Interagency Triage Tool (IITT) is a recently implemented triage system developed by the World Health Organization (WHO). The study aimed to examine the impacts of implementing the triage methods on the death rates of patients visiting the Rizgary Emergency Department.

Methods: This observational study includes the examination and comparing the mortality rate of any patient admitted to Rizgary emergency department in Erbil between January-June 2022, which was before implementing the triage system, and also during that period in 2023 in which the triage system was implemented. For each month, collected data included the number of deaths, admissions, and reasons for death. Cases related to cancer and major trauma were excluded from the study.

Results: Six months after the triage system was implemented, 26,015 patients were admitted, slightly more than the previous year (25,715 patients). The total number of deaths decreased by 41.7% after implementing the triage system. The mean mortality rate decreased from 6.80 deaths per 1,000 in 2022 to 3.94 deaths per 1,000 in 2023, which was statistically significant (P = 0.010).

Conclusion: Implementing the WHO triage system significantly reduced patient mortality in the emergency department by 41.7%, resulting from correct classification and optimal use of available time and resources.

Keywords: Mortality; Triage system; Emergency department.

Introduction

Based on the Emergency Care Systems Framework recommendations of the World Health Organization, WHO includes various parts, one of the most important of which is the triage system.[1] Triage includes the classification of patients referred to the emergency department (ED) based on the emergency of their clinical manifestations so that patients with more serious conditions are prioritized to receive critical care.[2] Around the world, different triage scales are considered in emergency departments, which vary in terms of the quantity of categories and evaluation criteria.[2,3] High-resource hospitals use five-tiered tools, while three-tiered triage systems are more logical and efficient in low-resource centers.[3]

The three-level triage system known as Integrated Interagency Triage Tools (IITT) was set up with collaborative effort by WHO, the International Committee of the Red Cross (ICRC), and Médecins Sans Frontières (MSF). Its main goal is to increase the quality of treatment in a setting with limited resources. The IITT separates patients into different colour groups, including categories one and two, depending on the presence of certain signs and symptoms, and category three, based on the absence of high-risk

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vital signs.[4] The tool was released in 2019 and focused on a three-tiered triage system that classifies patients in the high acuity resuscitations area (red zone), the clinical treatment area (yellow zone), the low acuity or waiting room (green zone) based on certain criteria.[5]

A recent study investigated the validity and reliability of this tool in a single-center study, which reported acceptable results of the implementation of this triage system. The mortality rate was 9.4% in the red zone, 2.4% in the yellow zone, and 0.1% in the green zone; the weighted κ was estimated as 0.81.[6] Another study that measured the performance of this tool during the COVID-19 pandemic also reported acceptable performance with a negative predictive value of 95.1% and 99.3% for hospitalization and death, respectively.[7]

Rizgary Emergency Department (previously known as Rojhalat Emergency Hospital) in Erbil was built in 2009. It became one of the three leading hospitals receiving emergency care patients. Providing 24-hour care by a multidisciplinary team (medicine, surgery, orthopedics, ear, nose and throat, eye, plastic surgery, neurosurgery and trauma departments) makes this emergency department the focus of the majority of the population, including the district areas from Koya, Shaqlawa, Khlifan, Soran, Harir and also many other places. However, despite the excellent service offered initially, it became obvious that the system could not accommodate the large number of patients, especially after the migration of people from Syria, Mousil, and the south of Iraq due to political issues. Therefore, with the revelation of the inefficiency of the system used in the emergency department, especially the high mortality rate, the necessity of using a triage system was raised, considered the system recommended by WHO. This was the first time this system was in Iraq, and there was no research to know the impact of this system on the improvement of emergency medical care. This study investigated the changes in the mortality rate of patients referred to Rizgary emergency department before and after implementing the triage system.

Methods

This study is an observational study in which all patients referred to Rizgary emergency department were included from a period between January to June 2022 and the same period in 2023. Before applying the triage system in 20222, all patients were admitted to the same ward and received management by the same doctors and nurses during a specific time of their duty. No distinction criteria were there to prioritize the management of more critical cases. After the construction of a hospital in 2023, the IITT system was applied as a triage system to classify patients according to the severity of their illnesses; a number of doctors and nurses were trained on how to apply this system. Patients with life-threatening features are admitted to the red zone, managed by emergency physicians and nurses. While patients who are less critical but still need admission are admitted in the yellow zone.

Hospital Data were collected from the Department of Statistics in the Rizgary emergency department. No limit was determined for sample size, and the whole number of patients during the mentioned period was included in the study. The files of patients who died during that period were collected and studied, including the age, cause of presentation, time of death, and the main cause of death (which was determined by the treating physician in the emergency department). Causes of death were categorized mainly as cardiac, stroke, respiratory, renal failure, sepsis and end-stage cancer. Deaths related to end-stage cancer and major trauma were excluded from the study.

The current study's focus was comparing the mortality rate of patients admitted to the ED after implementing the triage system (2023) to before (2022).

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The mortality rate was determined by dividing the number of deaths in a certain period by the total number of hospitalizations. To analyze the data, a Mann-Whitney statistical test was performed using SPSS version 22 statistical software at a significance level of 0.05.

Although authorities approved the data collection, because all the cases included in this observational study were anonymous, no consent needed to be obtained, and the data was not subject to ethical approval.

Results

In general, six months after the triage system was implemented, 26,015 patients were admitted to the Rizgary emergency department, which was slightly more than the previous year (25,715 patients). The average admission per month before and after the triage system was 4285.8 ± 107.5 patients and 4335.8 ± 159.3 patients, respectively, and there was a statistically non-significant difference (P = 0.522). According to Figure 1, in all months, the number of deaths before the installation of the triage system was higher than after.

The curve of changes in the death rate was also the same as the number of mortalities, which was expected due to the lack of significant differences in the number of monthly admissions (Figure 2).

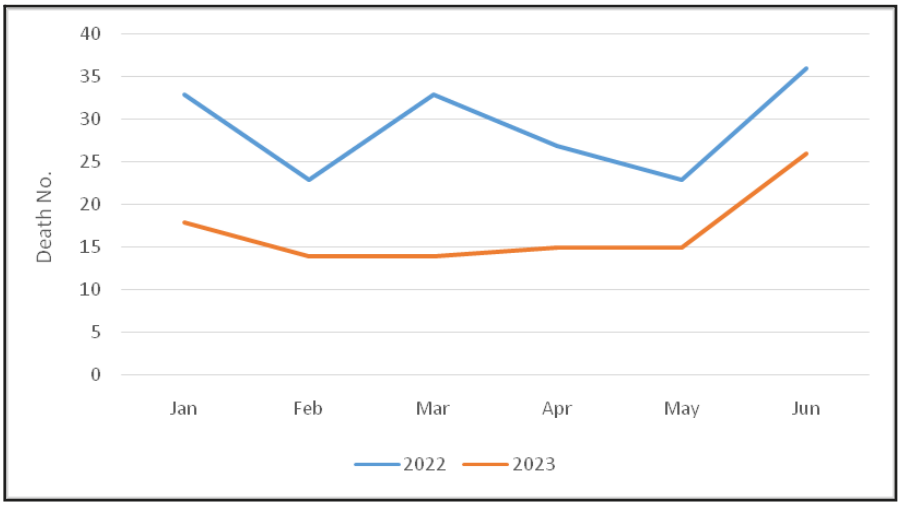

Figure 1 The number of deaths recorded in different months before and after triage system

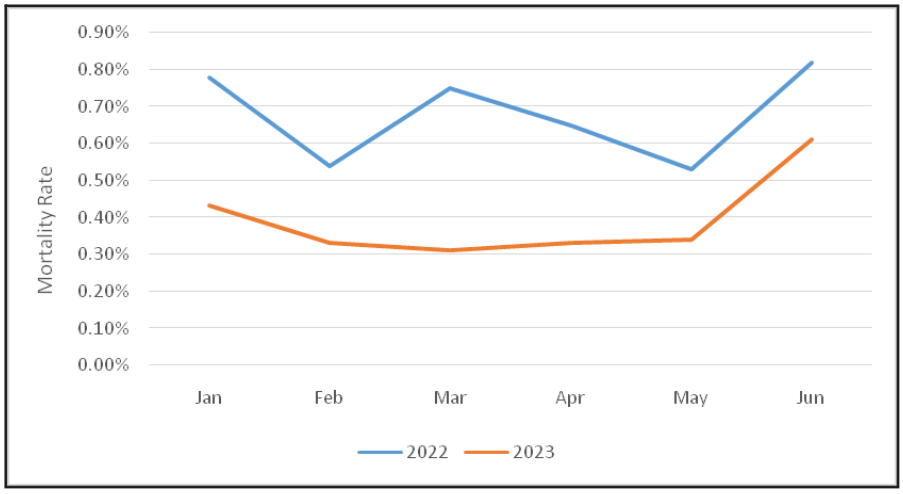

Figure 2 Mortality rates recorded in different months before and after triage system

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Death due to cardiac conditions and stroke were the most common causes of death in both periods. The total number of deaths decreased by 41.7% after introducing the triage system (Figure 3). The mean mortality rate decreased from 6.80 deaths per 1,000 in 2022 to 3.94 deaths per 1,000 in 2023, which was statistically significant (P = 0.010). The findings indicate that except for the cases of death following Acute kidney injury (P = 0.109), the death rate due to other causes has decreased significantly after using the triage system (P <0.05) (Table 1).

Table 1 Comparison of mortality rates with different causes before and after the triage system has been implemented

Cause of death	2022 (Death per 1000)		After triage 2023 (Death per 1000)		*P*-value
	Mean	SD	Mean	SD	
Cardiac	2.40	0.49	1.46	0.55	0.016
Stroke	1.44	0.30	0.85	0.26	0.010
Sepsis	1.17	0.29	0.47	0.40	0.025
Acute kidney injury	0.85	0.23	0.54	0.49	0.109
Respiratory	0.89	0.17	0.58	0.28	0.037
Total	6.80	1.23	3.94	1.16	0.010

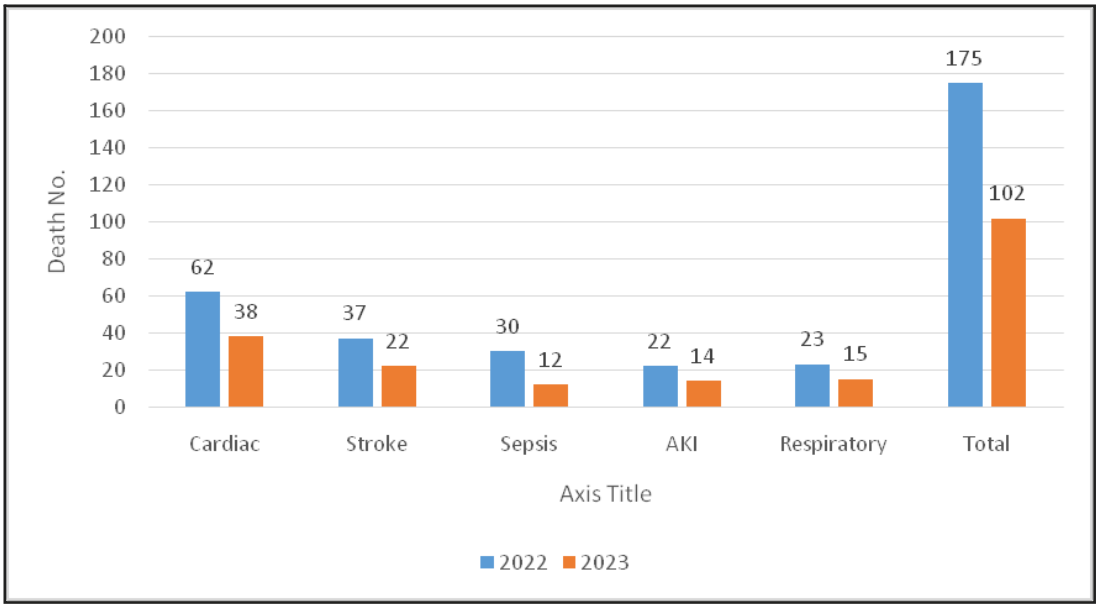

Figure 3 The number of deaths before and after the employment of the triage system based on the cause of death

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Discussion

The main purpose of designing triage systems is to control the crowding of patients visiting emergency departments and provide care according to the urgency of patients to prevent critical cases from being ignored and save more people's lives. It is important to assess the performance of triage systems to determine the efficiency of providing care and spending resources in the right direction [8]. Correct classification of high-urgency patients is related to patient safety; incorrectly classifying such patients as high urgency to low urgency as low urgency results in treatment delays and potentially fatal morbidity. Appropriate triage of low-urgency patients enhances the efficiency of ED flow and reduces wait times for urgent emergency follow-ups.[9] Therefore, one of the main criteria for evaluating the efficiency of a triage system is to evaluate changes in the death rate of patients in the emergency department.[10] In the current study, the mortality rate of patients hospitalized in an emergency department was investigated in two periods before and after the installation of the triage system. The current study's findings showed that following the use of the triage system approved by WHO, the mortality rate of patients decreased significantly. This was almost observed in all-cause deaths (it was not significant in the case of AKI).

The IITT a triage system, developed in collaboration with three manufacturers, including WHO, categorizes patients referred to the emergency department into three levels. Compared to a five-level triage system, IITT is easier to use. The reliability and validity of IITT were assessed and verified in recent research.[6,11] An investigation conducted at a medical facility in Liberia showed that emergency department personnel were nine times more likely to document repeated vital signs for patients presented with shock and twelve times more likely to give an antibiotic after IITT triage training. These results, according to the authors, may reduce sepsis-related morbidity and mortalities.[12] The current study found a significant reduction in the mortality rate of patients suffering from sepsis after introducing the triage method, which is equal to the findings of the prior studies.

Elbaih et al. (2022) conducted a study to evaluate mortality rates following the South African Triage Scale SATS installation at Suez Canal University Hospital in Egypt. Before the implementation of the triage system interventions, the death rate was around 15.7%. However, after the intervention, the mortality rate significantly declined to 10.7%.[13] The previous result was in line with the outcome of the current study.

In this study, the mortality rate decreased from 6.80/1000 to 3.94/1000 people, which shows a significant decrease in the mortality of patients referred to the Rizgary ED after implementing the triage system. Similarly, in a study, the implementation of Emergency Triage and Treatment Assessment (ETAT) in the ED of a hospital in north Mozambique resulted in a 45% reduction in hospital mortality.[14] These results were also equal with the present study; in our study, the number of deaths decreased by 41.7% after the installation of the triage system.

The nature of the present study was observational, so there were various limitations. Since there was no control over the study components in two time periods, various factors may have caused bias in the results. For example, the COVID-19 epidemic in 2022 was more intense than in 2023, which can impact the results of this study. Another limitation of the present study was the failure to assess mortality in each red, yellow, and green zone, which was impossible due to the lack of records. One of the strengths of this project was the evaluation of emergency department patients in the same 6-month period for two consecutive years.

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Conclusion

The implementation of the WHO triage system significantly reduces the mortality of patients in the Department of Emergency by 41.7% due to the correct classification and optimal use of available time and resources. In future studies, the mortality rate of patients in each triage category must be determined.

Competing interests

The author declares that he has no competing interests.

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