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Clinical Characteristics and Outcomes of Adult Patients Presenting to the Emergency Department After Hanging: An Eight-Year Retrospective Study

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Research Article

Keywords: hanging, near-hanging, suicide attempt, emergency department, in-hospital mortality, Glasgow Coma Scale, cardiac arrest

Posted Date: July 20th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-10332375/v1

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Additional Declarations: No competing interests reported.

Abstract

Background

Hanging-related injuries are uncommon but potentially fatal emergencies. This study aimed to describe the demographic, clinical, laboratory, and imaging characteristics of adults presenting to the emergency department following hanging and to identify factors associated with in-hospital mortality.

Methods

This retrospective, observational, single-center study included adult patients presenting to the emergency department of a tertiary care hospital between January 2018 and December 2025. Patients were identified using the International Classification of Diseases, 10th Revision codes X70 and Y20, and eligibility was confirmed through medical record review. Survivors and non-survivors were compared using the independent-samples Student's t-test or Mann–Whitney U test for continuous variables and the Pearson chi-square or Fisher's exact test for categorical variables, as appropriate.

Results

A total of 99 patients were included, of whom 78.8% were male. The median age was 30 years (interquartile range, 21–40.5), and in-hospital mortality was 12.1% (12/99). Cardiac arrest on presentation occurred in 91.7% of non-survivors but in none of the survivors ($p < 0.001$). Complete suspension was observed in all non-survivors compared with 11.5% of survivors ($p < 0.001$). Non-survivors had significantly lower Glasgow Coma Scale scores (median, 3 vs. 15; $p < 0.001$), more severe metabolic acidosis and base deficit, and higher lactate and several other biochemical marker levels (all $p < 0.05$). Cerebral edema was detected in 50.0% of non-survivors but in none of the survivors ($p < 0.001$).

Conclusions

Cardiac arrest on presentation, complete suspension, severe neurological impairment, metabolic derangement, and cerebral edema were associated with in-hospital mortality following hanging. These findings may support early risk stratification in the emergency department. Larger multicenter studies are required to identify independent predictors of mortality and determine the safety of selective imaging strategies.

Background

Suicide attempts by hanging are a significant public health issue worldwide and one of the leading causes of mortality. Suicide by hanging is one of the most commonly chosen methods of suicide due to both its accessibility and high fatality rate. Serious clinical conditions associated with this method—

including cardiac arrest, hypoxic-ischemic injury, cerebral edema, and multiple organ dysfunction—are key factors determining patient prognosis.

Death by hanging is a form of asphyxiation resulting from compression of the neck caused by a tight ligature, as the entire body or a part of it remains suspended in the air due to the force of gravity, ultimately leading to death [1]. In 2018, it was reported that 3,148 deaths—accounting for 57.6% of all suicides—were accomplished by hanging [2]. Suicide by hanging ranks as the second most common method of suicide and accounts for more than 50% of the increase in suicide rates per head of population [3]. Additionally, recent studies indicate that suicide rates by hanging are progressively increasing and accounted for more than half of all suicides in 2021 [2].

Patients who can be resuscitated in the early phase following a suicide attempt arrive at emergency departments, and the management of these patients requires a multidisciplinary approach. The clinical presentation is relatively variable; while most patients present with minimal symptoms, a small group may present with deep coma, respiratory failure, or cardiac arrest. Therefore, identifying clinical, laboratory, and imaging findings that can determine the prognosis in the early stages at the emergency department is of critical importance.

The primary assessment of patients who have survived an attempted hanging should be conducted using the XABCDE approach, as is the case with trauma patients. Careful intubation is recommended for patients with signs of airway injury (such as a hoarse voice, stridor, or subcutaneous emphysema) and altered consciousness [4]. The possibility of cervical spine injury must be considered during intubation. In the secondary assessment, ligature marks on the neck and petechial hemorrhages on the face may be observed [5]. Additionally, other accompanying traumas or alternative suicide methods must be thoroughly investigated to assess the complexity of the suicide attempt [6].

Imaging techniques play a significant role in the evaluation of injuries, particularly those involving the neck region. In these patients, evaluation of the neck’s vascular structures using CT (computed tomography) angiography is often recommended [7].

Although there are studies in the literature on factors affecting mortality and neurological outcomes following a hanging attempt, there are limited studies that consider emergency department presentation characteristics, early-phase clinical parameters, and variables associated with mortality in combination. In particular, the association of cardiac arrest, the Glasgow Coma Scale (GCS), metabolic acidosis, lactate levels, and imaging findings with predictors of prognosis is remarkable.

The aim of this study was to retrospectively evaluate the demographic, clinical, laboratory, and imaging findings of patients presenting to the emergency department following a hanging attempt and to identify factors associated with in-hospital mortality. Additionally, the study aimed to identify early-stage parameters that would predict mortality.

Methods

Study design and setting

This study is a single-center, retrospective, observational study designed to evaluate the clinical characteristics and outcomes of patients who presented to the Emergency Department of Adana city training and research hospital with a history of hanging from January 1, 2018 to December 31, 2025. The study was approved by the local institutional ethics committee (approval details omitted for blinded review).

Study population

Patients to be included in the study were screened using ICD-10 diagnosis codes via the hospital automation system. Patients recorded in the hospital automation system with codes X70 (Intentional self-harm by hanging, strangulation, and suffocation) and Y20 (Hanging, strangulation and suffocation, undetermined intent) were evaluated. All cases identified by ICD-10 coding were subsequently re-evaluated through detailed file review, and actual hanging cases were confirmed. This ensured that patients who had been assigned the diagnosis code by mistake were excluded from the study.

The initial ICD-10 screening identified 116 patients. Of these, 13 patients under the age of 18, 1 patient for whom medical records were unavailable, and 3 patients for whom the ICD-10 code was believed to have been assigned in error following a detailed review of their records were excluded from the study. Consequently, our study was conducted on 99 adult patients.

Patient data were obtained by reviewing electronic medical records and archived admission files. The following patient characteristics were analyzed: age, gender, history of psychiatric illness, prison status, length of stay in the emergency department, Glasgow Coma Scale (GCS) at the initial admission, presentation to the emergency department with cardiac arrest, type of hanging (complete or partial), need for endotracheal intubation, whether cardiopulmonary resuscitation (CPR) was performed, need for mechanical ventilation, and the presence of ligature mark—the most common physical examination finding—were recorded.

Laboratory parameters were also evaluated at the time of the initial visit. Troponin, glucose, urea, creatinine, alanine aminotransferase (ALT), aspartate aminotransferase (AST), sodium, potassium, calcium, and hemoglobin levels were recorded. Additionally, venous blood gas parameters—including pH, pCO2, HCO3, lactate, and base deficit—were recorded at the time of the initial visit.

For the purposes of radiological evaluation, imaging studies were recorded for all cases except those in which patients arrived at the emergency department in cardiac arrest and subsequently died. Accordingly, the requested brain CT, cervical CT, thoracic CT, lumbar CT, chest CT, abdominal CT, and cervical angiography studies were reviewed, and findings such as cerebral edema, cervical fractures, and other pathological findings were documented in the available imaging studies.

In addition, the consultation processes for patients who underwent initial evaluation in the emergency department were examined, and based on these evaluations, decisions were made to discharge patients from the emergency department, admit them to a service, or admit them to the intensive care unit. For patients admitted to the intensive care unit, data on discharge following their stay in the intensive care unit or in-hospital mortality were recorded.

Statistical Analysis

Statistical analyses were performed using IBM SPSS Statistics for Windows, version 27.0 (IBM Corp., Armonk, NY, USA) Continuous variables were tested for normality using the Kolmogorov–Smirnov and Shapiro–Wilk tests. Variables with normal distribution were presented as mean ± standard deviation (SD), whereas non-normally distributed variables were expressed as median and interquartile range (IQR).

Comparisons between survivors and non-survivors were performed using the independent samples Student's t-test for normally distributed continuous variables and the Mann–Whitney U test for non-normally distributed variables.

Categorical variables were expressed as number and percentage (n, %) and were compared using the Pearson chi-square test. When the expected cell count was less than 5, the Fisher's exact test was applied.

A two-tailed p value < 0.05 was considered statistically significant.

Results

A total of 99 patients were included in the study. The majority of the patients were male (78.8%), while 21.2% were female. A history of psychiatric treatment was present in 54.5% of the patients, and 38.4% were prisoners. Cardiac arrest at admission was observed in 11.1% of the cases, and feet off the ground was present in 22.2% of the patients. Endotracheal intubation was performed in 20.2%, cardiopulmonary resuscitation (CPR) in 12.1%, and mechanical ventilation was required in 20.2% of the patients. A ligature mark was detected in 77.8% of the cases, whereas hoarseness was observed in 3.5%. Emergency department mortality occurred in 6.1% of the patients, while the overall in-hospital mortality was 12.1%, with 87.9% of patients being discharged. Regarding emergency department disposition, 41.4% of the patients were admitted to the psychiatry ward, 17.2% to the intensive care unit, 15.2% were discharged from the emergency department, 20.2% left against medical advice, and 6.1% died in the emergency department. The median age of the patients was 30 years (IQR: 21–40.5), and the mean length of stay in the emergency department was 12.5 ± 6.99 hours.(Table 1)

Table 1
Demographic and Clinical Characteristics (n = 99)

Characteristic	n	%
Sex		
Male	78	78,8
Female	21	21,2
History of psychiatric treatment		
Yes	54	54,5
No	45	45,5
Prisoner status		
Yes	38	38,4
No	61	61,6
Presentation with cardiac arrest		
Yes	11	11,1
No	88	88,9
Complete suspension		
Yes	22	22,2
No	77	77,8
Intubation		
Yes	20	20,2
No	79	79,8
Cardiopulmonary resuscitation		
Performed	12	12,1
Not performed	87	87,9
Mechanical ventilation		
Yes	20	20,2
No	79	79,8
Ligature mark		
Yes	77	77,8

Characteristic	n	%
Sex		
No	22	22,2
Hoarseness		
Present	3	3,5
Absent	82	96,5
Emergency department mortality		
Yes	6	6,1
No	93	93,9
In-hospital mortality		
Exitus	12	12,1
Discharged	87	87,9
Emergency department disposition	**n**	**%**
Admission to psychiatry ward	41	41,4
Admission to intensive care unit	17	17,2
Discharged from the emergency department	15	15,2
Left against medical advice	20	20,2
Death in the emergency department	6	6,1
Age(IQR)	30 (IQR: 21–40,5) year	
Length of stay in the emergency department (hours)	12,5 ± 6,99	

A total of 87 patients survived and 12 patients died. There was no significant difference in sex distribution between survivors and non-survivors ($p = 0.732$). However, cardiac arrest at admission was significantly associated with mortality, occurring in 91.7% of non-survivors and none of the survivors ($p < 0.001$). Similarly, feet off the ground was present in all non-survivors (100%) compared with 11.5% of survivors ($p < 0.001$). Endotracheal intubation and mechanical ventilation were also significantly more frequent among non-survivors (100% vs 9.2%, both $p < 0.001$). Cardiopulmonary resuscitation (CPR) was performed in 91.7% of non-survivors compared with 1.1% of survivors ($p < 0.001$). The presence of a ligature mark was significantly higher in non-survivors (100% vs 74.7%, $p = 0.048$). In contrast, hoarseness was not associated with mortality ($p = 0.784$). Regarding imaging findings, cervical CT was performed in 92.0% of survivors but only 50.0% of non-survivors ($p < 0.001$). Cervical fracture was rare and not significantly associated with mortality ($p = 0.097$). However, cerebral edema was observed in

50.0% of non-survivors and in none of the survivors, showing a significant association with mortality ($p < 0.001$).(Table 2)

Table 2
Association Between Categorical Variables and Mortality

Variable	Survived n (%)	Died n (%)	p
Sex			0.732
Male	69 (79.3)	9 (75.0)	
Female	18 (20.7)	3 (25.0)	
Cardiac arrest			< 0.001*
Yes	0 (0)	11 (91.7)	
No	87 (100)	1 (8.3)	
Feet off the ground			< 0.001*
Yes	10 (11.5)	12 (100)	
No	77 (88.5)	0 (0)	
Intubation			< 0.001*
Yes	8 (9.2)	12 (100)	
No	79 (90.8)	0 (0)	
Cardiopulmonary resuscitation			< 0.001*
Yes	1 (1.1)	11 (91.7)	
No	86 (98.9)	1 (8.3)	
Mechanical ventilation			< 0.001*
Yes	8 (9.2)	12 (100)	
No	79 (90.8)	0 (0)	
Ligature mark			0.048*
Yes	65 (74.7)	12 (100)	
No	22 (25.3)	0 (0)	
Hoarseness			0.784*
Yes	3 (3.6)	0 (0)	
No	80 (96.4)	2 (100)	
Cervical CT performed			< 0.001*
Yes	80 (92.0)	6 (50.0)	

Variable	Survived n (%)	Died n (%)	p
No	7 (8.0)	6 (50.0)	
Cervical fracture			0.097
Yes	1 (1.1)	1 (8.3)	
No	86 (98.9)	11 (91.7)	
Cerebral edema			< 0.001*
Yes	0 (0)	6 (50.0)	
No	87 (100)	6 (50.0)	
Incarceration status			0.312
Yes	35 (40.2)	3 (25)	
No	52 (59.8)	9 (75)	

A comparison of laboratory and clinical parameters between survivors and non-survivors is shown in Table 3. The mean emergency department length of stay was 6.24 ± 5.41 hours in survivors and 4.67 ± 6.14 hours in non-survivors, with no significant difference ($p = 0.354$). However, glucose levels were significantly higher in non-survivors compared with survivors (343.6 ± 141.1 vs 113.6 ± 48.8, $p < 0.001$). Similarly, creatinine levels were significantly elevated in non-survivors (1.14 ± 0.15 vs 0.79 ± 0.20, $p < 0.001$). Potassium levels were also significantly higher among non-survivors (6.13 ± 2.28 vs 4.13 ± 0.38, $p = 0.011$), as were PCO_2 levels (65.68 ± 32.72 vs 42.92 ± 5.90, $p = 0.035$). In contrast, sodium, calcium, hemoglobin, and age did not differ significantly between the groups ($p > 0.05$).(Table 3)

Table 3
Comparison of Continuous Variables Between Survivors and Non-Survivors

Variable	Survived (n = 87)	Died (n = 12)	p
Emergency department stay (h)	6.24 ± 5.41	4.67 ± 6.14	0.354
Glucose	113.6 ± 48.8	343.6 ± 141.1	< 0.001
Creatinine	0.79 ± 0.20	1.14 ± 0.15	< 0.001
Sodium	139.2 ± 2.40	140.7 ± 4.64	0.079
Potassium	4.13 ± 0.38	6.13 ± 2.28	0.011
Calcium	9.50 ± 0.50	9.39 ± 1.27	0.587
Hemoglobin	14.14 ± 1.60	14.93 ± 2.06	0.126
PCO_2	42.92 ± 5.90	65.68 ± 32.72	0.035
Age (years)	31 (25–42)	29 (23–39)	0.592
GCS	15 (14–15)	3 (3–6)	< 0.001
Troponin (0 h)	3 (2–8)	1500 (50–9400)	< 0.001
Troponin (3 h)	4 (3–30)	5200 (400–25358)	0.036
Urea	25 (21–32)	33 (24–69)	0.134
ALT	17 (12–25)	140 (40–913)	< 0.001
AST	21 (18–30)	160 (70–896)	< 0.001
pH	7.40 (7.36–7.44)	7.15 (6.87–7.30)	< 0.001
HCO_3	24.8 (22–26)	14 (8.9–21)	< 0.001
Lactate	12 (8–25)	90 (35–160)	< 0.001
Base deficit	0 (-3–2)	-12 (-22 – -5)	< 0.001

Among non-normally distributed variables, the median Glasgow Coma Scale (GCS) score was markedly lower in non-survivors (3 [3–6]) compared with survivors (15 [14–15], $p < 0.001$). Troponin levels at both 0 and 3 hours were significantly higher in non-survivors ($p < 0.001$ and $p = 0.036$, respectively). In addition, ALT and AST levels were significantly elevated in non-survivors ($p < 0.001$ for both). Blood gas analysis demonstrated significantly worse metabolic parameters in non-survivors, including lower pH (7.15 vs 7.40, $p < 0.001$), lower bicarbonate levels (14 vs 24.8, $p < 0.001$), higher lactate levels (90 vs 12, $p < 0.001$), and a more pronounced base deficit (-12 vs 0, $p < 0.001$). Urea levels did not differ significantly between the groups ($p = 0.134$). (Table 3)

Imaging studies and consultations were also compared between survivors and non-survivors. Cervical CT was performed significantly more frequently in survivors than in non-survivors (80 vs 6), whereas it was not performed in 7 survivors and 6 non-survivors ($p = 0.001$). In contrast, neck CT, CT angiography, thorax CT, thoracic CT, lumbar CT, and abdominal CT showed no significant differences between the two groups ($p > 0.05$ for all). However, brain CT was performed significantly more often in survivors compared with non-survivors (78 vs 6), while it was not performed in 9 survivors and 6 non-survivors ($p = 0.002$).(Table 4)

Table 4
Imaging Findings and Consultations According to Hospital Mortality

Variable	Performed	Survived (n = 87)	Died (n = 12)
Cervical CT	No	7	6
	Yes	80	6
Neck CT	No	55	7
	Yes	32	5
CT angiography	No	63	7
	Yes	24	5
Brain CT	No	9	6
	Yes	78	6
Thorax CT	No	26	6
	Yes	61	6
Thoracic CT	No	57	9
	Yes	30	3
Lumbar CT	No	58	9
	Yes	29	3
Abdominal CT	No	58	10
	Yes	29	2
Neurosurgery consultation	No	16	7
	Yes	71	5
ENT consultation	No	48	9
	Yes	39	3
Psychiatry consultation	No	30	12
	Yes	57	0
Anesthesia consultation	No	76	6
	Yes	11	6
Obstetrics consultation	No	86	12
	Yes	1	0

Regarding consultations, neurosurgery consultation was significantly more common among survivors (71 vs 5) compared with non-survivors (16 vs 7, p = 0.006). Similarly, psychiatry consultation was performed in 57 survivors but in none of the non-survivors (p < 0.001). Anesthesia consultation was significantly more frequent in non-survivors compared with survivors (6 vs 11 survivors; p = 0.005). In contrast, ENT consultation and obstetrics consultation were not significantly associated with mortality (p = 0.193 and p = 1.000, respectively).(Table 4)

Discussion

The mechanisms of death in hanging attempts depend on whether the hanging is complete or partial. While rapid death may occur due to cervical fractures or dislocation following a complete hanging or a fall from a height, in partial hangings, mechanisms such as injury to the neck vessels, tracheal compression, and vagal inhibition caused by pressure on the carotid sinus are the main causes [8].

One of the most important findings of our study is that patients admitted to the emergency department with cardiac arrest represent one of the most critical predictors of prognosis. The literature reports that mortality in patients who experience cardiac arrest can reach as high as 95% [9]. In our study as well, the fact that the majority of patients presenting with cardiac arrest did not survive confirms this strong association.

Similarly, the finding that the need for intubation, mechanical ventilation, and cardiopulmonary resuscitation is significantly associated with mortality can be interpreted as an indicator of severe hypoxic injury and the resulting cardiac damage in these patients. The literature also reports a marked increase in mortality among patients requiring intensive care [10].

There are studies in the literature estimating that the mortality rate for suicide attempts by hanging is 85% [11]; however, this rate applies to all cases of hanging, whereas the 12.1% mortality rate in our study refers to suicide attempts where the individual was in a condition to be brought to the emergency department. The literature reports that suicide attempts by hanging are most commonly observed in young men [7, 12]. In our study as well, the fact that 78.8% of the patients were male and the median age was 30 years was found to be consistent with the literature. The high prevalence of a history of psychiatric illness also parallels previous studies [9, 10].

In our study, 25% of the patients who died were prisoners. When comparing mortality rates to the number of cases, the mortality rate among non-prisoners is nearly twice that of prisoners (8% vs. 15%). We believe this is because prisoner patients are under constant supervision, allowing for earlier detection. However, although there was a mathematical difference between the two groups, this difference was not statistically significant.

It is known that injuries to the cervical spine and neck vessels are less common than expected in attempted hangings. The incidence of cervical spine fractures has been reported in the literature to range between 2% and 6% [7, 12], and some studies have indicated that this rate is around 5% [13].

Similarly, the fact that no significant association was found between cervical fractures and mortality in our study is consistent with these findings. The primary reason for this is that in most suicide by hanging cases, the noose is positioned posteriorly, and death typically results from hypoxia [4].

Anoxic brain injury is one of the most significant predictors of mortality in hanging attempts. In the literature, this rate ranges from 8% to 35.7% [7], and the presence of cerebral edema, particularly as detected by imaging, has been shown to be associated with a poor prognosis [13]. In our study, the fact that cerebral edema was observed only in deceased patients and showed a significant association with mortality supports these findings. In previous studies, ligature marks on the neck were observed in nearly all patients who died by hanging [14]. Consistent with the literature, ligature marks were present in all 12 deceased patients in our study.

Analysis of laboratory findings revealed that glucose, creatinine, potassium, and PCO_2 levels were significantly higher in deceased patients in our study. Additionally, a low GCS score, elevated lactate levels, metabolic acidosis, and increased base deficit were found to be strongly associated with mortality. These findings are consistent with hypoxic-ischemic injury and metabolic impairment, which are defined in the literature as indicators of poor prognosis [13].

From an imaging perspective, it is interesting to note that cervical CT and brain CT were performed more frequently in surviving patients. The fact that 6 of the non-survivors in our study died without undergoing imaging suggests that mortality was significantly lower among patients who underwent cervical CT. This suggests that imaging was not performed in patients with severe clinical conditions before they were lost to follow-up. Although neck injuries are rare in the literature, low-dose CT imaging is recommended, particularly for the evaluation of vascular structures [8, 15].

Hangings that result in anoxic brain injury should also be evaluated for injuries to the vertebral and carotid arteries. Studies recommend performing brain and neck CT angiography on patients presenting with hanging-related injuries [7, 16]. The findings identified in our study were detected on brain and neck CT angiography, while no findings were observed in the CT scans of other regions (thoracic, lumbar, thoracic, and abdominal). This suggests that CT scans performed on patients with no findings other than those related to hanging in their history and physical examination, aside from brain and neck CT angiography, may be unnecessary.

The fact that psychiatric consultations were conducted only among surviving patients is an expected finding, and it is known that the majority of these patients have underlying psychiatric disorders [9, 10]. In our study as well, the fact that most of the patients referred for psychiatric consultation were hospitalized in the psychiatric ward supports this. In contrast, the finding that anesthesiology consultations were associated with mortality suggests that these patients presented with more severe clinical conditions.

Limitations

Our study has several limitations. The fact that it is a retrospective, single-center study is among the main limitations. The relatively small sample size has limited the statistical power for subgroup analyses. The exact timing of the hanging incident or the duration until rescue could not be fully determined and was therefore not included in the analysis. Additionally, our study evaluated only in-hospital mortality and did not assess post-ICU discharge or long-term neurological outcomes. Future studies should include neurological outcome measures and longer follow-up periods. The absence of a standardized protocol for imaging may have introduced selection bias in the analysis, as decisions were made on a case-by-case clinical basis. The patient population may not fully represent all hanging cases, and results should be interpreted within the context of the local emergency department setting.

Conclusion

Our study demonstrates that post-resuscitation mortality is strongly associated with cardiac arrest, low GCS, metabolic acidosis, and cerebral edema. These findings highlight the importance of early risk stratification and appropriate patient management in the emergency department. Although comprehensive imaging is frequently performed, our findings suggest that brain and cervical CT angiography may be sufficient in selected patients without additional trauma findings, potentially reducing unnecessary imaging and resource utilization.

Abbreviations

ALT
Alanineaminotransferase
AST
Aspartate aminotransferase
CPR
Cardiopulmonary resuscitation
CT
Computed tomography
ED
Emergency department
ENT
Entubation
GCS
Glasgow Coma Scale
HCO_3^-
Bicarbonate
ICD-10
International Classification of Diseases, Tenth Revision
ICU

Intensive care unit
IQR
Interquartile range
pCO_2
Partial pressure of carbon dioxide
SD
Standard deviation

Declarations

Ethics approval and consent to participate

This study was approved by the Clinical Research Ethics Committee of the University of Health Sciences, Adana City Training and Research Hospital on 19 February 2026 (Approval No. 22/141). The requirement for informed consent was waived by the ethics committee because of the retrospective nature of the study. All methods were performed in accordance with the relevant institutional guidelines and regulations and the principles of the Declaration of Helsinki.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

Generative AI declaration statement

The authors did not use a generative artificial intelligence (AI) tool or service to assist with preparation or editing of this work. The author (s) take full responsibility for the content of this publication.

Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Author Contribution

A.B.U. contributed to the conceptualization, methodology, formal analysis, investigation, data curation, writing of the original draft, and review and editing of the manuscript. M.O.T. contributed to the

conceptualization, methodology, formal analysis, investigation, data curation, and writing of the original draft. A.A. contributed to the conceptualization, methodology, formal analysis, investigation, data curation, writing of the original draft, visualization, and supervision. All authors read and approved the final manuscript.

Acknowledgements

Not applicable.

Availability of data and materials

The datasets generated and/or analysed during the current study are not publicly available because they contain potentially identifiable patient information but are available from the corresponding author on reasonable request and subject to institutional and ethical approval.

References

1. Sauvageau A, Boghossian E. Classification of asphyxia: the need for standardization. J Forensic Sci. 2010;55(5):1259–67. 10.1111/j.1556-4029.2010.01459.x.
2. Office for National Statistics. Recent trends in suicide: death occurrences in England and Wales between 2001 and 2018. [URL]. Accessed 31 Mar 2026.
3. Baker SP, Hu G, Wilcox HC, Baker TD. Increase in suicide by hanging/suffocation in the U.S., 2000–2010. Am J Prev Med. 2013;44(2):146–9. 10.1016/j.amepre.2012.10.010.
4. Dorfman JD. Near Hanging: Evaluation and Management. Chest. 2022;163(4):855. 10.1016/j.chest.2022.11.004.
5. Hua A, Shah KH, Garg M, Legome E, Ufberg J. A Hanging and Its Complications. J Emerg Med. 2016;51(6):691–6. 10.1016/j.jemermed.2016.07.016.
6. Töro K, Pollak S. Complex suicide versus complicated suicide. Forensic Sci Int. 2009;184(1–3):6–9. 10.1016/j.forsciint.2008.10.020.
7. Berke DM, Helmer SD, Reyes J, Haan JM. Injury Patterns in Near-Hanging Patients: How Much Workup Is Really Needed? Am Surg. 2019;85(5):549–55. 10.1177/000313481908500534.
8. Coombs AE, Ashton-Cleary D. Hanging and near-hanging. BJA Educ. 2023;23(9):358. 10.1016/j.bjae.2023.05.002.
9. Gantois G, Parmentier-Decrucq E, Duburcq T, Favory R, Mathieu D, Poissy J. Prognosis at 6 and 12 months after self-attempted hanging. Am J Emerg Med. 2017;35(11):1672–6. 10.1016/j.ajem.2017.05.037.
10. de Charentenay L, Schnell G, Pichon N, Schenck M, Cronier P, Perbet S, et al. Outcomes in 886 Critically Ill Patients After Near-Hanging Injury. Chest. 2020;158(6):2404–13.

10.1016/j.chest.2020.07.064.

11. Cai Z, Junus A, Chang Q, Yip PSF. The lethality of suicide methods: A systematic review and meta-analysis. J Affect Disord. 2022;300:121–9. 10.1016/j.jad.2021.12.054.
12. Hsu CH, Haac BE, Drake M, Bernard AC, Aiolfi A, Inaba K, et al. EAST Multicenter Trial on Targeted Temperature Management for Hanging-Induced Cardiac Arrest. J Trauma Acute Care Surg. 2018;85(1):37. 10.1097/TA.0000000000001945.
13. Salim A, Martin M, Sangthong B, Brown C, Rhee P, Demetriades D. Near-hanging injuries: A 10-year experience. Injury. 2006;37(5):435–9. 10.1016/j.injury.2005.12.013.
14. Samarasekera A, Cooke C. The pathology of hanging deaths in Western Australia. Pathology. 1996;28(4):334–8. 10.1080/00313029600169294.
15. Schellenberg M, Inaba K, Warriner Z, Alfson D, Roman J, Van Velsen V, et al. Near hangings: Epidemiology, injuries, and investigations. J Trauma Acute Care Surg. 2019;86(3):454–7. 10.1097/TA.0000000000002134.
16. Ribaute C, Darcourt J, Patsoura S, Ferrier M, Meluchova Z, Gramada R, et al. Should CT angiography of the supra-aortic arteries be performed systematically following attempted suicide by hanging? J Neuroradiol. 2021;48(4):271–6. 10.1016/j.neurad.2019.04.001.