Factors that influence the mortality of critically ill burn victims: An integrative review

https://doi.org/10.56238/sevened2024.012-013

Carolina Sesnick Lavagnoli[1], Caroline Sala[2], Thamires Fernandes Cardoso da Silva Rodrigues[3], Ivi Ribeiro Back[4], Aline Zulin[5], Ezra Cristina Pereira Goldoni[6], Elis Fausto Carvalho[7], Jorseli Angela Henriques Coimbra[8], Cremilde Aparecida Trindade Radovanovic[9], Larissa Carolina Segantini Felipin[10], Nelly Lopes de Moraes Gil[11] and Roberta Tognollo Borotta Uema[12]

ABSTRACT

Objective: To identify in the literature factors that influence the mortality of critically ill burn patients. Method: This is an integrative literature review. To create the guiding question, the PICo strategy was used, in which the population was established as "burn patient", interest in "factors associated with mortality" and as context "critical condition", formulating the following research question: What are the factors that influence the mortality of critically ill burn victims? The search was conducted in two selected databases: Virtual Health Library and PubMed, from August to October 2023. As this is an integrative review, the study does not require approval by the research ethics committee. Results: A total of 3077 scientific studies were identified in the initial search of the selected databases. After applying the selection criteria, 17 studies remained to compose the final sample. Among the findings, the main factors that influenced mortality were advanced age, greater burned surface area and body depth, presence of smoke inhalation, thermal burn due to direct flames, comorbidities, especially cardiovascular and renal diseases, and hypoalbuminemia. Conclusion: it was possible to identify that the main factors that influence the mortality of burn patients who are in serious condition, described in the literature are: advanced age, extent of the burned area, smoke inhalation, comorbidities and low amount of albumin in the body. It is important to know these factors in order to be able to offer comprehensive care and minimize risks in order to reduce deaths caused by the event.

Keywords: Burns, Critical Care and Mortality.

[1] Nurse. State University of Maringá (UEM). Maringá, PR, Brazil.
E-mail: pg606093@uem.br
[2] Nurse. State University of Maringá (UEM). Maringá, PR, Brazil.
E-mail: carolinesala7@gmail.com
[3] Nurse. Dr. in Nursing. State University of Maringá (UEM). Maringá, PR, Brazil.
E-mail: tfcsrodrigues@gmail.com
[4] Post-Doctoral Nurse in Nursing. State University of Maringá (UEM). Maringá, PR, Brazil.
E-mail: irback2@uem.br
[5] Nurse. Dr. student in Nursing. State University of Maringá (UEM). Maringá, PR, Brazil.
E-mail: azulin2@uem.br
[6] Nursing Student. State University of Maringá (UEM). Maringá, PR, Brazil.
E-mail: ra123710@uem.br
[7] Nursing Student. State University of Maringá (UEM). Maringá, PR, Brazil.
E-mail: ra124825@uem.br
[8] Nurse. Dr. in Nursing. State University of Maringá (UEM). Maringá, PR, Brazil.
E-mail: jahcoimbra@uem.br
[9] Nurse. Dr. in Health Sciences. State University of Maringá (UEM). Maringá, PR, Brazil.
E-mail: catradovanovic@uem.br
[10] Nurse. Dr. in Nursing. State University of Maringá (UEM). Maringá, PR, Brazil.
E-mail: lcsfelipin2@uem.br
[11] Nurse. Dr. in Tropical Diseases. State University of Maringá (UEM). Maringá, PR, Brazil.
E-mail: nlmgil@uem.br
[12] Nurse. Post-Doctorate in Nursing. Collaborating Professor of the Nursing Department of UEM. Maringá, PR, Brazil.
E-mail: rtbuema2@uem.br

INTRODUCTION

A burn is a traumatic injury that affects the skin or other tissues and organs, causing tissue destruction, and can be caused by thermal, chemical, and electrical agents. In addition to local injury, burns can generate systemic damage, which can progress to more severe cases such as shock, sepsis, systemic inflammatory response syndrome, multiple organ dysfunction, and death (Franck, et al., 2020).

The burned victim may have varying severity based on the extent and depth of the affected tissue, and may have the integrity of the skin compromised, difficulty in maintaining homeostasis and its protective barrier against external agents, being exposed to the risk of loss of body temperature and infections (Miranda, 2021)

According to the Guidelines Project: Burns: Diagnosis and Differential Treatment of the Brazilian Society of Plastic Surgery (2008), victims with second-degree burns with affected body area greater than 15% in children under 12 years of age and greater than 20% in children over 12 years of age are considered to be severe burns or severe burns; third-degree burns with body area greater than 5% in children under 12 years of age, or greater than 10% in children over 12 years of age; second- or third-degree burns reaching the perineum at any age; third-degree burns affecting the hand or foot or face or neck or armpit, at any age and burns by electric current.

It is also considered to be of great severity when, regardless of the extent, the burn is associated with other events or pathologies, such as: inhalation injury, polytrauma, bone fracture, shock of any nature, heart failure, renal failure, among others (Brazilian Society of Plastic Surgery, 2008).

In Brazil, there are approximately 1 million burn accidents per year and about 2,500 of these progress to death, proving that burns are characterized as an important public health problem (Barcellos, 2018).

In a study conducted with 141 patients hospitalized for burns in the Intensive Care Units of the Mackenzie Evangelical University Hospital in Curitiba-PR, the presence of some factors that influence mortality was evidenced, such as age, percentage of body surface affected by burns, and comorbidities (Franck, et al., 2020).

Knowing the multiple challenges of caring for critically ill burn patients, it is necessary to know the factors that influence their mortality in order to provide proper care and increase their chance of survival. Thus, recognizing the epidemiological importance of burn accidents and their negative outcomes, the objective of this study was to identify in the literature which factors influence the mortality of critically ill burn victims.

METHOD

This is an integrative literature review, a method that consists of synthesizing existing knowledge on a given topic, combining data from the literature in order to incorporate feasibility and purposes (Ercole, et al. 2014). To create the guiding question, the PICo strategy (P: Population, I: Phenomenon of interest, and Co: Context) was used (Rathbone; et al 2017). As a population, "burn patient" was established, "factors associated with mortality" was interested, and "critical condition" was formulated, formulating the following research question: What are the factors that influence the mortality of critically ill burn victims?

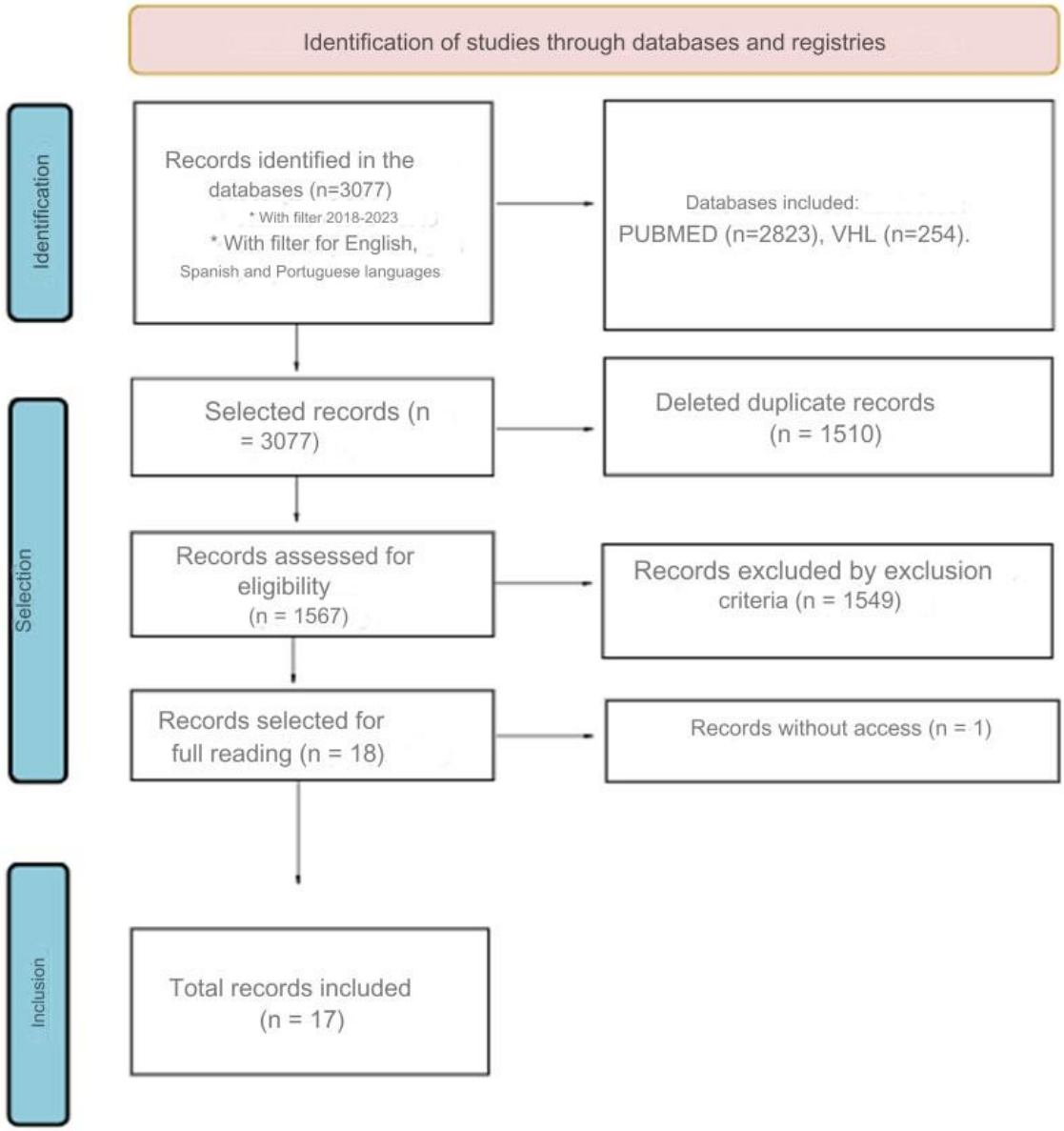
To ensure quality and methodological rigor in the development of the research, the construction of the manuscript will follow the guidelines contained in the *Preferred Reporting Items for Systematic Reviews and Meta-Analysis* (PRISMA) checklist (Galvão et al, 2015).

The search was carried out in the PudMed and Virtual Health Library (VHL) databases through the Portal of Journals of the Coordination for the Improvement of Higher Education Personnel (CAPES), through the access provided by the federated academic community of the State University of Maringá.

The descriptors were selected in accordance with the Health Sciences Descriptors (DECs) for the articles selected in Portuguese, namely: "burn", "critical care" and "mortality". For the search in foreign databases, the terms used were taken from the *Medical Subject Headings* (MeSH), namely: *"burns", "critical care" and "mortality"*. The Boolean operator AND was used between the descriptors during the searches. Data were collected between August and October 2023. To assist in the search and selection of articles, the Raayan® software was used.

The sample included articles that met the following criteria: articles published in Portuguese, English, and Spanish, in the period between 2018 and 2023 and that helped answer the guiding question. For the selection of articles, the titles and abstracts were read and if it answered the guiding question and achieved the objective of the research, it was read in full. The exclusion criteria were: review articles, editorials, duplicates, and articles not available in full.

The selection of articles can be seen in the flowchart below:



Source: the researchers, 2024.

As this was a study conducted with secondary data sources, the research did not require consideration by the research ethics committee, however, all authors were duly referenced.

RESULTS

A total of 3077 scientific studies were identified in the initial search of the selected databases. After applying the selection criteria, checking agreement with the review question and exclusion of duplicate manuscripts, 17 studies remained to compose the sample, 15 of which were in English and 02 in Portuguese. Of the studies that made up the review, it was observed that all publications related to the theme occurred from 2018 onwards, ending in 2022. Regarding the databases, it was found that there was a predominance of an American database (PUBMED).

Regarding the methodological design, a predominantly quantitative sample was observed. In order to achieve the objective proposed by the study, the following information was extracted to answer the research question, and Chart 1 was constructed.

Table 1. Characteristics of the selected studies, Maringá-PR, Brazil (2024):

REFERENCE	OBJECTIVE	METHOD	RESULTS
Article 1: Growth Differentiation Factor-15 Correlates with Mortality and Severity in Severe Burns. **PUBMED** ONISHI, Shinya et al. Growth Differentiation Factor-15 Correlates with Mortality and Severity in Severe Burns. **Shock: Injury, Inflammation, and Sepsis: Laboratory and Clinical Approaches**, v. 57, n. 6, p. 211-217, 2022.	Measure GDF-15 (cell growth and differentiation factor-15) in the blood at multiple points in the acute phase of severe burns to determine its association with mortality and severity.	*Retrospective, observational and single-center study. *The level of GDF-15 in the blood was measured and compared with clinical parameters, including prognosis. *The time points for sample collection were the day of the injury, 4 days after the injury and 1 week after the injury.	*Eighty-three patients were included in the study. At all time points, GDF-15 levels in the non-survivor group were significantly higher than those in the survivor group. *GDF-15 levels were positively correlated with the Sequential Organ Failure Assessment (SOFA) score, and the relationship became stronger with the passage of time of severe burn. * GDF-15 was a useful predictor of mortality in severe burns, regardless of age, and may also be associated with organ damage regardless of the burned area.
Article 2. Circulating dipeptidyl peptidase-3 at admission is associated with circulatory failure, acute kidney injury and death in severely ill burn patients. **PUBMED** DÉPRET, François et al. Circulating dipeptidyl peptidase-3 at admission is associated with circulatory failure, acute kidney injury and death in severely ill burn patients. **Critical care**, v. 24, p. 1-8, 2020.	To evaluate the association between DPP3 (dipeptidyl peptidase-3) at admission and on day three with 90-day mortality in severely burned patients. The secondary objective was to evaluate the association between PPD3 and organ dysfunction (circulatory failure and acute kidney injury).	*Prospective cohort study based on biomarker analysis *We included critically ill adult burn patients in two tertiary intensive care units for burns. *DPP3 was measured at admission and 3 days later.	* Patients with sustained elevated DPP3 enzyme had an increased risk of death compared to patients with elevated DPP3 on admission, but decreased levels on the third day. *Patients with circulatory insufficiency had the highest DPP3 at admission, as well as patients with acute kidney injury.
Article 3. Concept of Lethal Triad in Critical Care of Severe Burn Injury. **PUBMED** MUTHUKUMAR, Vamseedharan; KARKI, Durga; JATIN, Bhojani.	To study the occurrence and evolution of patients presenting the 'death triad' in the burned population.	A study that included 50 patients eligible for the study, admitted to a burns department. The population was divided into patients with (16) and without the triad (34) of death. The incidence of the triad was calculated and	*Mortality in the subgroup with the death triad was higher, representing 68.8% of the sample, compared to 17.6% in the subgroup without the lethal triad. *Acidosis, hypothermia, and coagulopathy on admission were independently associated with significantly increased mortality.

Concept of lethal triad in critical care of severe burn injury. **Indian journal of critical care medicine: peer-reviewed, official publication of Indian Society of Critical Care Medicine**, v. 23, n. 5, p. 206, 2019.		data were analyzed for any association between the triad of death and mortality.	*Trend analysis showed significantly reduced survival with 50% mortality already at eight days in the lethal triad subgroup.
Article 4. Early hypoalbuminemia is associated with 28-day mortality in severely burned patients: A retrospective cohort study. **PUBMED** DE TYMOWSKI, Christian et al. Early hypoalbuminemia is associated with 28-day mortality in severely burned patients: A retrospective cohort study. **Burns**, v. 46, n. 3, p. 630-638, 2020.	To evaluate the association between very early plasma albumin concentrations (within the first six hours after hospital admission) and outcome, including 28-day mortality.	*Retrospective cohort study *We investigated the relationship between hypoalbuminemia up to 6 hours after admission and clinical outcome in 73 patients admitted to a health institution between 2012-2017.	* The main findings of this study are that initial plasma albumin concentrations, i.e., within 6 hours of admission, are associated with 28-day mortality in critically ill patients with burns. *When observing different time points in the first 24 hours, low albuminemia at 4 hours (with a threshold value of 23 g/l) was the most strongly associated with mortality, independent of TBSA (Total Body Surface Area Burned) and inhalation injury. *Albumin at low concentrations at 4 hours after admission (<23 g/l) has been associated with mortality and organ dysfunction, leading to the use of norepinephrine, AKI (acute kidney injury), and SDMO (Multiple Organ Dysfunction Syndrome). *In addition to its oncotic effect, albumin has transport properties and anti-inflammatory and antioxidant activities in humans that may be useful in severely burned patients
Article 5. Risk Factors for Mortality and Prolonged Hospitalization in Electric Burn Injuries. **PUBMED** SCHWEIZER, Riccardo et al. Risk factors for mortality and prolonged hospitalization in electric burn injuries. **Journal of Burn Care & Research**, v. 42, n. 3, p. 505-512, 2021.	To investigate the characteristics and management of electrical lesions and predisposing factors for mortality and prolonged hospital stay.	*Retrospective analysis of medical records (89) that were retrospectively reviewed to identify patients admitted with electrical injuries at the Zurich Burns Center (2005-2019). *Patient characteristics, management, outcome, and risk factors for mortality and prolonged hospitalization were analyzed	*Mortality was 18% in high-voltage patients, especially after multi-organ dysfunction syndrome, but voltage alone was not a factor that significantly influenced mortality. *A higher total burned body surface area (SAT), renal failure and cardiovascular complications, limb amputation, were risk factors for increased length of ICU stay and mortality.
Article 6. Age-dependent influence of premorbid underweight status on	To examine the associations between premorbid nutritional status and in-hospital mortality in	*Retrospective study. *Data from 14,345 patients aged 18 to 84 years admitted for	*In patients aged 18 to 74 years, low weight (BMI < 18.5) significantly decreased mortality.

mortality in severe burn patients: An administrative database study. **PUBMED** MATSUO, Mizue et al. Age-dependent influence of premorbid underweight status on mortality in severe burn patients: an administrative database study. **Burns**, v. 47, n. 6, p. 1314-1321, 2021.	patients with severe burns according to age in Japan.	burns from April 1, 2014 to March 31, 2018, using the Japanese Diagnosis Procedure Combination database.	*Patients aged 75 to 84 years, underweight significantly increased mortality * Overweight (BMI >25) increased mortality in both age groups, but not significantly.
Article 7. Factors affecting the mortality at patients with burns: Single centre results. **PUBMED** TEMIZ, Ayetullah et al. Factors affecting the mortality at patients with burns: Single centre results. **Ulusal travma ve acil cerrahi dergisi= Turkish journal of trauma & emergency surgery: TJTES**, v. 26, n. 5, 2020.	To investigate the factors that affect burn mortality.	In this study, we examined the files of 133 patients hospitalized for burns in a burn center between September 2008 and December 2016. Of these, they were divided into two subgroups, one containing surviving patients (109) and the other deceased patients (24).	*The advanced age of patients was related to increased mortality. *The increase in mortality was parallel to the increase in the degree of burns, with these burns being deeper. *Of 96 patients with a burn percentage of 15 to 30%, only five died, while of the 37 patients with a burn percentage higher than 30%, 19 were part of the subgroup of deceased people, making it possible to compare the increase in mortality with the greater body surface area burned. *Late admission to the health facility after the occurrence of the event was also associated with increased mortality. *The highest mortality rate occurred from flame burns and then from scald burns.

Article 8. Mortality analysis of adult burn patients in Uruguay. **PUBMED** ANGULO, Martín et al. Mortality analysis of adult burn patients in Uruguay. **Revista Brasileira de Terapia Intensiva**, v. 32, p. 43-48, 2020.	To determine the independent risk factors associated with mortality in burn adult patients.	This was a retrospective and observational study that included demographic data, burn profiles, length of hospital stay, duration of mechanical ventilation, and in-hospital mortality.	*The mortality rate was higher in female patients than in male patients. *Self-harm (35.2%) and assault (23.1%) had a higher mortality rate than accidental burns. *The analysis found that female gender, older age, suicide attempts, mechanical ventilation, high abbreviated burn severity index (ABSI), large burned body surface area (BSA), and extensive third-degree injuries are the risk factors associated with increased ICU mortality. *In the analysis, the need for mechanical ventilation, advanced age, burnt BSA, and the extent of third-degree burns remained independent risk factors for mortality.
Article 9. The role of concomitant alcohol and drug use in increased risk for burn mortality outcomes. **PUBMED** GOVENDER, Rajen et al. The role of concomitant alcohol and drug use in increased risk for burn mortality outcomes. **Burns**, v. 46, n. 1, p. 58-64, 2020.	To examine the role of different burn characteristics, patient demographics, treatment variables, and the presence of alcohol and other substance abuse in differentiating mortality risk from morbidity.	*This study used a national dataset on burns requiring hospitalisation in South Africa to explore mortality risk in relation to morbidity.	*The results indicate that burn victims with full and partial thickness burn degrees and more than 30% of TBSA had a significantly increased risk of mortality. *The risk of mortality increased tenfold when they were assimilated with the use of alcohol and concomitant drugs compared to cases in which these were absent.
Article 10. Factors that influence mortality in severe burns. FRANCK, Claudio Luciano et al. Factors influencing mortality in severe burns. **Rev. bras. burns**, p. 50-57, 2020. **VHL**	Highlight factors that may influence mortality or the chance of surviving severe burns. To analyze epidemiological data, such as age, sex and causal agent, characteristics of burns as an agent, regions, depth and extent of burned body surface area (BSA), comorbidities and lifestyle habits, as well as the presence of organ dysfunctions and sepsis.	*Retrospective quantitative, analytical, and observational study that collected 141 electronic medical records of severe burns under intensive care between June 2013 and June 2018.	*The sample was divided into two groups according to the final outcome - 61 patients died (43%) and 80 patients were discharged (56%). *Advanced age was related to increased mortality, with the median age of patients who died being 46 years and the median age of surviving patients being 34 years. *The mortality found in electrical burns was 16.7%, in burns by fire 46.7%, and by hot liquids 50%, indicating a higher chance of death in burns from the latter cause. *The median of the group that died had a 50% BSA impairment, while the median BSA impairment in the

			discharged group was 40%, which suggests a direct relationship between mortality and the extent of skin affected. *The presence of 3rd degree burns denotes a higher prevalence of death. *The presence or absence of burns on the back represents the largest difference in outcomes between the groups compared to any other burned body area. 38.5% of the patients who did not have burns on the back were discharged and 56.8% died. *In the group that died, sepsis was detected in 50.82% of the cases, while in the group that survived, it was detected in 27.5%, evidencing its relationship with mortality.
Article 11. Early hypothermia as risk factor in severely burned patients: A retrospective outcome study. **PUBMED** ZIEGLER, Benjamin et al. Early hypothermia as risk factor in severely burned patients: a retrospective outcome study. **Burns**, v. 45, n. 8, p. 1895-1900, 2019.	Distinguish the impact of hypothermia from other known risk factors in the burn patient.	This was a retrospective, single-center study that reviewed preclinical service protocols and medical records of 141 patients who suffered burns with total body surface area.	*The total extent of the burn, the presence of full-thickness burns, the presence of inhalation injury, preclinical mechanical ventilation, and the administration of sedative drugs were risk factors for the development of hypothermia. *Incidental hypothermia of burn patients is associated with increased mortality.
Article 12. Trends and risk factors for mortality in elderly burns patients: A retrospective review. **PUBMED** HARATS, Moti et al. Trends and risk factors for mortality in elderly burns patients: a retrospective review. **Burns**, v. 45, n. 6, p. 1342-1349, 2019.	Identify trends and risk factors for mortality in elderly burn patients	Epidemiological study that reviewed records of all hospitalized elderly burn patients collected from five burn facilities in Israel between 1997-2016.	*Mortality rates for elderly patients increased with total body surface area burned (TBSA) and increased with age. * The most common cause of injury in the elderly population was fire, with a higher mortality rate from this cause. *Mortality increased when smoke inhalation was present for TBSA <20% *The need for surgery is correlated with high mortality rates.
Article 13. Rising mortality in patients with combined burn and trauma.	Identify the main factors impacting mortality of the patient who was a victim of trauma and associated burns.	*A retrospective analysis. *Patients with trauma, burn, and burn-trauma	*An increase in the percentage of total body surface area burned is associated with a gradual increase in mortality for all patients combined with burn and trauma.

PUBMED GRIGORIAN, Areg et al. Rising mortality in patients with combined burn and trauma. **Burns**, v. 44, n. 8, p. 1989-1996, 2018.		combined in the National Trauma Data Bank was conducted by comparing the years 2007 to 2015 with the years 1994 to 2002.	
Article 14. Burn mortality in hospitalized patients in Manzanillo-Cuba in 2015-2017. **VHL** MACHADO, Carlos Manuel Collado Hernández et al. Burn mortality in hospitalized patients in Manzanillo-Cuba in 2015-2017. **Brazilian Journal of Burns**, v. 17, n. 2, p. 76-80, 2018.	To describe the characteristics of patients hospitalized for burns who died.	*This is a descriptive, cross-sectional and retrospective study in the Department of Plastic Surgery and Burns of the Celia Sánchez Manduley Clinical Surgical State Hospital in Manzanillo, Granma, Cuba, from January 2015 to December 2017. Records of 19 burn patients who died during hospitalization were included.	*Females had the highest frequency of deceased patients, with 78.98%, and among them the age group of 60 to 74 years, with 31.58%. *The frequency of mortality was higher in patients with intentional burns, with 63.16%. *The highest number of burn deaths was in the group with 81-90% of body surface area burned (BSA), with 31.58%. *The main causes of death were related to burn shock, with 63.16% *Older age (especially 60 years or older) and percentage of BSA above 40 increase the possibility of complications and death in burn patients
Article 15. Determination of risk factors for burn mortality based on a regional population study in Taiwan. **PUBMED** YEN, Cheng-I. et al. Determination of risk factors for burn mortality based on a regional population study in Taiwan. **Burns**, v. 44, n. 6, p. 1591-1601, 2018.	To determine the epidemiological characteristics, trends, and risk factors for nationwide mortality of patients hospitalized with burns in Taiwan.	*A nationwide population-based study evaluated data retrieved from Taiwan's National Health Insurance database. Patients hospitalized for burns between 2003 and 2013 were identified from hospitalization records.	*Male gender, older age, higher Charlson comorbidity index (severity classification based on comorbidities), presence of inhalation injury, large total burned surface area (TBSA), and higher revised Baux score (score used to predict burn mortality chnace) were significant predictors of mortality.
Article 16. Burn injury mortality in patients with preexisting and new onset renal disease. **PUBMED** KNOWLIN, Laquanda T. et al. Burn injury mortality in patients with preexisting and new onset renal disease. **The American Journal of Surgery**,	To examine the impact of pre-existing and new-onset kidney disease on burn mortality.	Retrospective analysis of 7640 patients admitted to a regional burn center from 2002 to 2012. The variables analyzed included demographic data, burn mechanism, inhalation injury status, and % TBSA.	*The adjusted risk of in-hospital mortality at 60 days in patients with pre-existing renal disease PRD was 3-fold higher compared to patients without pre-existing renal disease.

v. 215, n. 6, p. 1011-1015, 2018.			
Article 17. Hyperphosphatemia is associated with high mortality in severe burns. **PUBMED** KUO, George et al. Hyperphosphatemia is associated with high mortality in severe burns. **PloS one**, v. 13, n. 1, p. e0190978, 2018.	To assess whether hyperphosphatemia, one of the signs of severe tissue injury or kidney injury, will be associated with mortality in patients with severe burns.	The study was a post hoc analysis of prospectively collected data from 301 patients admitted to the burn unit between September 2006 and December 2011.	*90-day mortality was higher in the hyperphosphatemic group than in the normal group. *90-day mortality was higher in the hypophosphatemic group than in the normophosphatemic group. *Risk factors for mortality included burn TBSA, hyperphosphatemia, reduced urine output, and APACHE II score (disease severity rating score).

Source: the authors.

It was possible to observe the prevalence of similar factors that influence the mortality of severe burn victims in all the studies present. According to the studies, an association with age, burned body extension, smoke inhalation, comorbidities, especially renal and cardiovascular diseases, hypoalbuminemia, and hyperphosphatemia, as factors influencing mortality, was confirmed.

DISCUSSION

When analyzing the data, the direct relationship between the greater extent and depth of the burned body surface area and the increase in mortality is often noted. Of 17 articles, 11 studies identified this relationship. A study that presents the characteristics of 87 burn victims who died in a Burn Treatment Center in the region of the state of Pará shows that most of the deceased patients had 3rd degree burns (74.71%) and a burned body surface greater than 50% (71.26%), confirming the data found in this study (Rocha, 2016).

In addition, the etiologic agent can be assimilated as another factor associated with increased mortality. Burns caused by flames are a situation with a worse prognosis, as found in the literature. In a study carried out in a burn unit in Goiânia, a higher prevalence of hospitalization due to direct flame was identified, since of the 130 patients, 77 patients were admitted for this reason, followed by hot liquid (two) and explosion (two). Of the 77, seven died (Arruda, 2017)

Advanced age was also a predominant factor, being cited as an important reason in six of the 17 articles. When compared with other studies, it is possible to evidence a relationship of agreement in a study that studies the epidemiological profile of burn accident victims in a city in the state of Tocantins. Adults accounted for the highest percentage of hospitalizations, accounting for 198 of 335 patients. Of these, eight died, seven of them were adult patients (Silva, 2023). It is also possible to assimilate advanced age with a higher predominance of preexisting diseases, thus contributing to increased mortality.

Regarding the gender of the patients, there is no superiority among the findings of this study. One of the articles suggests a higher mortality rate among female patients (Angulo, 2020), and another brings a higher number of deaths among males (Yen, 2018). In other studies, it is found that males prevail in the need for hospitalization and progression to death, a fact that can be justified by the risk behavior predominantly found in the class, both in their work activities and in their daily routine (Meschial, 2020).

Among the comorbidities that aggravate the health condition of burn patients, the main ones are cardiovascular and renal diseases, in the latter in particular, it is possible to identify the high rate of evolution to acute renal failure due to the pathophysiology of the burn. In a study carried out in Amazonas with 647 adult patients, the result was that 57.1% of the cases progressed to renal complications. (Vogel, 2021). This data reinforces the need to monitor renal function in critically ill burn patients, considering the risk of death caused by acute renal failure.

Another important factor found in this study is the association between hypoalbuminemia and increased mortality in burn patients. Albumin is a plasma protein that can be used as a prognosis for increased mortality due to its action on colloid osmotic pressure, which prevents the loss of plasma through blood capillaries. Therefore, the lower the level of albumin in the blood, the greater the complications related to the increase in extravascular fluids, such as edema, difficulties in the healing process, lung lesions, and greater susceptibility to sepsis (Bandeira, 2019).

Other important uses of albumin are its anti-inflammatory, antioxidant, and lipid transport properties, situations that favor recovery in the treatment process of severe burns, reinforcing the need to maintain adequate levels of protein in the body (Bandeira, 2019).

In addition to the functionality of albumin in healthy organisms and burn patients, the serum creatinine/albumin ratio can also be used as a prognostic factor for nortality in critically ill patients who have suffered burns. A study that evaluated this association showed that high levels of these markers were associated with increased burn mortality 28 days after the event (Chen, et al; 2023).

A limitation of the study is that the search was carried out in only two databases, a fact that makes it impossible to generalize the results found. There is a need for field and even observational studies in order to visualize the presence of such factors found in this review in practice, in order to reduce the mortality rates of burn patients and improve their survival.

CONCLUSION

The present review made it possible to identify the main factors that influence the mortality of burn patients who are in severe condition, namely: advanced age, extent of the burned area, smoke inhalation, comorbidities, and low amount of albumin in the body. It is important to know these

factors to be able to offer comprehensive care and minimize risks to reduce deaths caused by the event.

From the moment the risk factors are known, care becomes more systematized and, in addition to being based on scientific evidence, enables the application of specific care that helps to ensure a better prognosis and consequent better survival.

REFERENCES

1. Angulo, M., et al. (2020). Mortality analysis of adult burn patients in Uruguay. *Revista Brasileira de Terapia Intensiva, 32*, 43-48.

2. Arruda, F. C. F., et al. (2017). Comparação de escores de gravidade para previsão de mortalidade e tempo de internação em unidade de queimados. *Revista Brasileira de Queimaduras, 16*(3), 142-149.

3. Bandeira, N. G. (2019). Níveis séricos de albumina como preditores de morbimortalidade em vítimas de queimaduras. Dissertação de mestrado. Salvador-BA, 72f.

4. Barcellos, L. G., Silva, A. P. P. da, Piva, J. P., Rech, L., & Brondani, T. G. (2018). Características e evolução de pacientes queimados admitidos em unidade de terapia intensiva pediátrica. *Revista Brasileira de Terapia Intensiva, 30*(3), 333–7.

5. Chen, W., et al. (2023). Association of creatinine-albumin ratio with 28-day mortality in major burned patients: A retrospective cohort study. *Burns, 49*(7). Disponível em: https://doi.org/10.1016/j.burns.2023.04.002.

6. Dépret, F., et al. (2020). Circulating dipeptidyl peptidase-3 at admission is associated with circulatory failure, acute kidney injury and death in severely ill burn patients. *Critical care, 24*, 1-8.

7. Ercole, F. F., Melo, L. S., & Alcoforado, C. L. G. C. (2014). Revisão integrativa versus revisão sistemática. *Revista Mineira de Enfermagem, 18*(1), 1-260.

8. Franck, C. L., Figueredo, F. C. M., Melo, R. J., Silva, L. M., & Matioli, R. M. (2020). Fatores que influenciam na mortalidade em queimaduras graves. *Revista Brasileira de Queimaduras, 19*(1), 50-57.

9. Galvão, T. F., Pansani, T. S. A., & Harrad, D. (2015). Principais itens para relatar Revisões Sistemáticas e Meta-análises: a recomendação PRISMA. *Epidemiologia e Serviços de Saúde, 24*(2), 335-342.

10. Govender, R., et al. (2020). The role of concomitant alcohol and drug use in increased risk for burn mortality outcomes. *Burns, 46*(1), 58-64.

11. Grigorian, A., et al. (2018). Rising mortality in patients with combined burn and trauma. *Burns, 44*(8), 1989-1996.

12. Harats, M., et al. (2019). Trends and risk factors for mortality in elderly burns patients: a retrospective review. *Burns, 45*(6), 1342-1349.

13. Kuo, G., et al. (2018). Hyperphosphatemia is associated with high mortality in severe burns. *PloS one, 13*(1), e0190978.

14. Machado, C. M. C., et al. (2018). Mortalidade por queimaduras em pacientes hospitalizados em Manzanillo-Cuba em 2015-2017. *Revista Brasileira de Queimaduras, 17*(2), 76-80.

15. Matuso, M., et al. (2021). Age-dependent influence of premorbid underweight status on mortality in severe burn patients: an administrative database study. *Burns, 47*(6), 1314-1321.

16. Meschial, W. C., et al. (2020). Internação e mortalidade hospitalar de vítimas de queimaduras no Brasil. *Revista Enfermagem Atual In Derme, 93*(31).

17. Miranda, H. P. F., Camargo, I. N., & Cunha, I. A. (2021). Queimaduras: fisiopatologia das complicações sistêmicas e manejo clínico Burns: pathophysiology of systemic complications and clinical management. *Brazilian journal of development, 7*(6), 64377-64393.

18. Muthukumar, V., et al. (2019). Concept of lethal triad in critical care of severe burn injury. *Indian journal of critical care medicine: peer-reviewed, official publication of Indian Society of Critical Care Medicine, 23*(5), 206.

19. Onishi, S., et al. (2022). Growth Differentiation Factor-15 Correlates with Mortality and Severity in Severe Burns. *Shock: Injury, Inflammation, and Sepsis: Laboratory and Clinical Approaches, 57*(6), 211-217.

20. Rathbone, J., et al. (2017). Expeditin citation screening using PICo-based title-only screening for identifying studies in scoping searches and rapid rewiews. *Systematic reviews, 6*(233).

21. Rocha, G. S. B., et al. (2016). Características clínicas e fatores associados aos óbitos de indivíduos queimados em um Centro de Referência de Ananindeua-PA. *Revista Brasileira de Queimaduras, 15*(2), 104-109.

22. Silva, K. W. R., et al. (2023). Perfil epidemiológico dos pacientes vítimas de queimaduras no município de Araguaína-TO no período de 2012 a 2021. *Facit Business and Technology Journal, 3*(40).

23. Schweizer, R., et al. (2021). Risk factors for mortality and prolonged hospitalization in electric burn injuries. *Journal of Burn Care & Research, 42*(3), 505-512.

24. Temiz, A., et al. (2020). Factors affecting the mortality at patients with burns: Single centre results. *Ulusal travma ve acil cerrahi dergisi= Turkish journal of trauma & emergency surgery: TJTES, 26*(5).

25. Tymowski, C., et al. (2020). Early hypoalbuminemia is associated with 28-day mortality in severely burned patients: A retrospective cohort study. *Burns, 46*(3), 630-638.

26. Vogel, L. L., Negrello, D., & Lindemann, I. L. (2021). Perfil epidemiológico de pacientes com queimaduras admitidos em hospital terciário. *Revista Brasileira de Queimaduras, 20*(1), 29-34.

27. Ziegler, B., et al. (2019). Early hypothermia as risk factor in severely burned patients: a retrospective outcome study. *Burns, 45*(8), 1895-1900.

28. Yen, C. I., et al. (2018). Determination of risk factors for burn mortality based on a regional population study in Taiwan. *Burns, 44*(6), 1591-1601.