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EMERGENCY CARE AND CRITICAL MANAGEMENT OF MASS CASUALTIES: THE KOČANI NIGHTCLUB DISASTER

HITNA POMOĆ I KRITIČKO ZBRINJAVANJE MASOVNIH ŽRTAVA: KATASTROFA U NOĆNOM KLUBU U KOČANIMA

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Summary: The catastrophic nightclub fire in Kocani, North Macedonia, on March 16, 2025, represented one of the most severe mass casualty incidents in the country's recent history, rapidly overwhelming healthcare capacities and requiring immediate multidisciplinary coordination. The disaster resulted in a large number of patients presenting with extensive burns, inhalation trauma, toxic smoke exposure, respiratory compromise, and associated traumatic injuries.

Emergency disaster protocols were activated immediately, including mobilization of emergency departments, intensive care units, surgical services, anesthesiology teams, nursing personnel, governmental crisis coordination systems, and international evacuation mechanisms. Structured triage protocols based on the START system and ABCDE approach were implemented upon patient arrival, allowing rapid categorization according to injury severity and urgency for intervention.

The majority of critically injured patients demonstrated severe respiratory compromise and signs of inhalation injury, requiring urgent airway management and advanced intensive care support. Special emphasis was placed on the role of emergency, anesthesia, and intensive care nursing staff, whose continuous bedside monitoring enabled early recognition of clinical deterioration and timely intervention.

The Kocani nightclub fire highlighted the importance of disaster preparedness, coordinated triage systems, institutional adaptability, multidisciplinary teamwork, and international collaboration in the management of large-scale burn and inhalation disasters.

Keywords: critical care; Emergency medicine; inhalation injury; mass casualty incident; Kocani

INTRODUCTION

Mass casualty incidents caused by fires in enclosed spaces represent one of the greatest challenges for modern healthcare systems because of the rapid influx of critically injured patients and the simultaneous need for emergency stabilization, surgical treatment, airway management, and intensive care support [1-4]. Such incidents are commonly associated with extensive burns, inhalation trauma, toxic gas exposure, and multisystem injuries that require rapid decision-making and a highly coordinated multidisciplinary response [2,5-7].

The severity of these events is further amplified by limited preparation time, sudden exhaustion of healthcare resources, and the necessity for immediate institutional and governmental coordination [1,3,8]. Inhalation injuries are particularly dangerous because airway edema may progress rapidly despite initially stable clinical presentation, potentially leading to life-threatening respiratory obstruction if not recognized early [2,6,7,9].

The nightclub fire in Kocani on March 16, 2025, rapidly evolved into a national medical emergency requiring activation of disaster response systems across multiple healthcare institutions. This paper presents the organizational and clinical experience of the University Emergency and Critical Care Center during the initial management of victims from the disaster, with emphasis on triage organization, respiratory management, critical care support, and multidisciplinary coordination during the first phase of treatment.

MATERIALS AND METHODS

A retrospective descriptive analysis was conducted based on data collected during the initial management of patients injured in the Kocani nightclub fire disaster. Clinical and organizational data were obtained from emergency department documentation, intensive care records, institutional reports, triage documentation, and hospital coordination protocols from the University Clinical Center "Mother Teresa" in Skopje.

Collected data included demographic characteristics of patients, the type and severity of injuries, the presence of inhalation trauma, respiratory status on admission, need for airway intervention and mechanical ventilation, burn extent according to TBSA estimation, hemodynamic status, transfer requirements, and intensive care utilization. Additional organizational parameters related to triage systems, interdepartmental coordination, redistribution strategies, and international evacuation mechanisms were also analyzed.

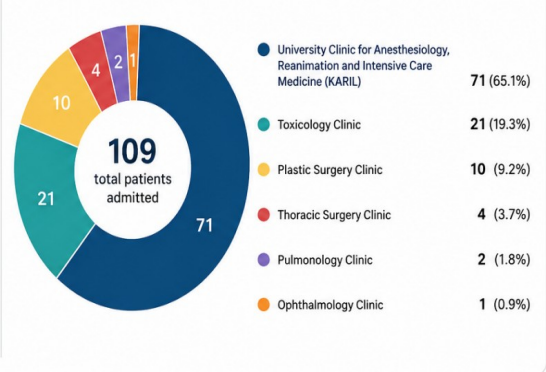
Patients were initially categorized according to structured mass casualty triage principles using the START triage system and ABCDE assessment protocol. Clinical findings suggestive of inhalation injury, including soot deposition, facial burns, hoarseness, stridor, respiratory insufficiency, and progressive hypoxemia, were specifically evaluated [10,11]. Data were analyzed descriptively with emphasis on emergency response organization, respiratory management, burn resuscitation strategies, critical care requirements, and the role of multidisciplinary emergency and intensive care teams during the first phase of treatment.

RESULTS

In a relatively short period of time, the initial patient surge placed an unprecedented burden on emergency and critical care facilities. At approximately 4:30 AM, the first critically injured patients arrived at the Emergency Surgical Center, many presenting with extensive burns, inhalation injuries, shock, and associated traumatic lesions. A total of 109 patients were admitted to the University Clinical Center, while 71 patients were subsequently transferred abroad through coordinated international medical evacuation systems. Of the admitted patients, 71 were treated at the University Clinic for

Southeast European Journal
of Emergency and Disaster Medicine
Vol. XII, year 2026, No. 1

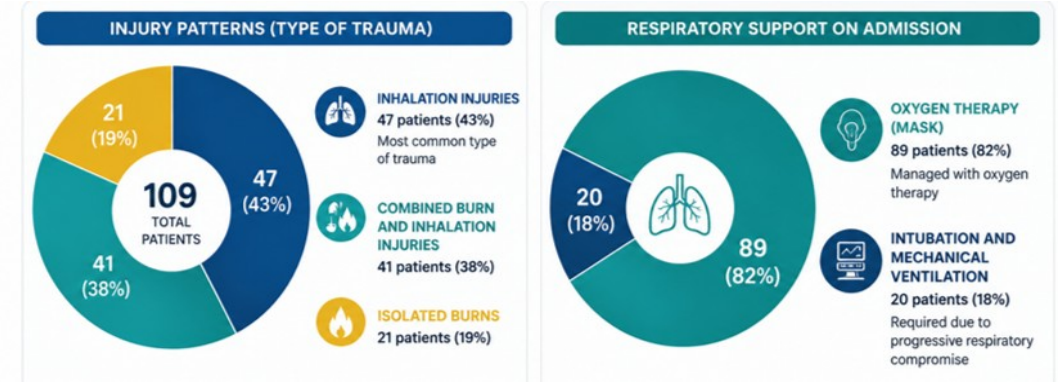
Anesthesiology, Reanimation and Intensive Care Medicine, 21 at the Toxicology Clinic, 10 at the Plastic Surgery Clinic, 4 at the Thoracic Surgery Clinic, 2 at the Pulmonology Clinic, and 1 at the Ophthalmology Clinic.



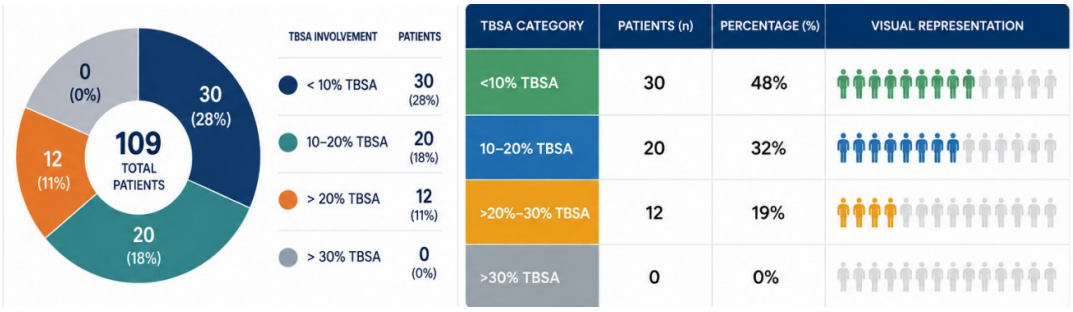
Graph 1. Distribution of patients by clinic

Analysis of injury patterns demonstrated that inhalation injuries were the most common type of trauma, present in 47 patients (43%), followed by combined burn and inhalation injuries in 41 patients (38%), while isolated burns were identified in 21 patients (19%). Respiratory support was required in the majority of patients, with 89 patients managed with oxygen therapy and 20 patients requiring endotracheal intubation and mechanical ventilation due to progressive respiratory compromise.

Assessment of burn severity according to total body surface area (TBSA) demonstrated that 30 patients had burns involving less than 10% TBSA, 20 patients had burns involving 10–20% TBSA, and 12 patients had burns exceeding 20% TBSA. No patients with burns greater than 30% TBSA were admitted, likely reflecting prehospital mortality and the severity of inhalation-associated injuries.



Graph 2. Injury patterns and respiratory support



Graph 3. Burns severity assessment

A significant proportion of patients demonstrated clinical findings strongly suggestive of inhalation injury, including soot deposition in the oral and nasal cavities, facial burns, hoarseness, stridor, tachypnea, progressive hypoxemia, and altered respiratory mechanics. One of the greatest clinical challenges was the rapid progression of airway edema, particularly in patients who initially appeared clinically stable. Therefore, early recognition of airway compromise and timely airway protection represented crucial determinants of survival.

Preventive endotracheal intubation, continuous respiratory monitoring, oxygen therapy, repeated airway toileting, bronchoscopy-assisted clearance of secretions and soot particles, and mechanical ventilation frequently formed the cornerstone of respiratory management. Several patients experienced rapid respiratory deterioration during the first hours after admission due to worsening airway obstruction and systemic inflammatory response. Extensive burn injuries required aggressive but carefully controlled fluid resuscitation guided by TBSA estimation and Parkland-based protocols. Continuous monitoring of urine output, electrolyte balance, peripheral perfusion, and hemodynamic parameters was essential to minimize complications associated with under- or over-resuscitation. Simultaneously, infection prevention strategies, sterile wound care, analgesia and sedation protocols, and multidisciplinary surgical planning were implemented.

The disaster additionally emphasized the indispensable role of emergency, anesthesia, and intensive care nursing personnel. Their continuous bedside surveillance enabled early recognition of subtle clinical deterioration, including desaturation, agitation, worsening ventilatory parameters, and hemodynamic instability. Beyond respiratory and hemodynamic monitoring, nursing staff played a central role in airway care, infection prevention, sedation management, coordination of care, and rapid escalation of therapeutic interventions.

DISCUSSION

Nightclub fires remain among the most difficult mass casualty scenarios because of confined spaces, limited evacuation routes, overcrowding, and delayed recognition of danger. Historical incidents, such as the Crans-Montana Bar fire, alongside more recent global venue disasters, illustrate that mortality rates are frequently driven as much by smoke inhalation and crowd-induced trauma as they are by thermal burns.

These events repeatedly expose weaknesses in emergency preparedness, communication systems, and institutional coordination. The absence of standardized international protocols for emergency medical deployment during mass gathering disasters further complicates response efforts, particularly in countries with limited critical care capacities.

The Kocani fire demonstrated how rapidly a local incident can escalate into a national healthcare emergency. Within a very short time frame, hospitals were required to transition from routine operations into disaster response mode, while emergency medical teams faced the simultaneous challenge of triage, stabilization, analgesia, transportation, and coordination of critically injured patients.

The disaster also draws attention to the necessity of flexible organizational structures capable of adapting to rapidly changing clinical and logistical conditions. Effective cooperation between emergency medicine physicians, anesthesiologists, surgeons, intensivists, pulmonologists, toxicologists, nurses, transport services and governmental authorities proved essential for maintaining continuity of care during the first critical hours.

Emergency Medical System Response

The institutional and the systemic response at the University Clinical Centre “Mother Teresa” in Skopje was an organized, multi-tiered escalation after the first incident. The pre-hospital reaction started at 02:48 AM with the initial emergency call to the Emergency Medical Services (EMS / 194). The first direct

Southeast European Journal
of Emergency and Disaster Medicine
Vol. XII, year 2026, No. 1

notification to the Emergency Surgical Center (ESC) was then made at 03:20 AM, announcing the anticipated arrival of large casualties.

Following these alerts, command structures were quickly set into action. A dedicated crisis management committee was established at 03:45 AM, immediately followed by full EMS escalation and full staff mobilization at 03:50 AM. This led to the activation of the comprehensive emergency disaster response plan throughout the university hospital complex. Emergency operational mode was launched in emergency departments, intensive care units, operating rooms, anesthesiology services, pulmonology and toxicology teams, and diagnostic departments, and all available medical, technical and nursing professionals were mobilised.

The arrival of patients was in separate waves, a common phenomenon in mass casualty events. The first casualties reached the site by private automobiles at 04:00 AM. Shortly after, the first seriously injured patients arrived via organized EMS transport, many with shock, major burns, inhalational injuries, acute pain and accompanying traumatic lesions. The quick flood of high acuity casualties overwhelmed emergency and critical care resources within a very short period of time.

Coordination groups were created in collaboration with the Ministry of Health, emergency medical transport services and national crisis management institutions to deal with the increasing clinical demand. At the same time, communication channels were developed between regional hospitals to coordinate strategic patient allocation based on the available capacities and levels of required care.

The scope of the tragedy was well beyond local and national capacities, triggering wider international response procedures. Formal cooperation with the European Emergency Response cooperation Centre (ERCC) was established at 11:00 AM and the first international patient evacuation to Greece occurred at 12:30 PM. Later that afternoon, the international relief and resource structure was progressively consolidated resulting in the official activation of the European Union Civil Protection Mechanism at 15:31 PM to handle ongoing evacuation and multi-national assistance systems. [12].

Triage and Initial Patient Management

Patient arrival and triage were organized according to the principles of mass casualty management through the START triage system and ABCDE assessment methodology. Quick assessment of airway impairment, respiratory insufficiency, hemodynamic instability, neurological state, concomitant traumatic injuries and severity of burns. Dynamic evolution of inhalation damage and burn-related physiological deterioration warranted continuous re-evaluation.

Many patients had clinical features strongly suggestive of inhalation injury such as soot in the oral and nasal cavities, face burns, hoarseness, stridor, tachypnoea, increasing hypoxemia and changes in respiratory mechanics. A major clinical problem was the rapid advancement of the airway oedema, especially in patients who were initially clinically stable.

Early diagnosis of airway impairment and prophylactic airway preservation were thus critical factors of survival. Respiratory support often required prophylactic endotracheal intubation, oxygen administration, continuous respiratory monitoring, frequent airway toileting, bronchoscopy, and mechanical ventilation. Pulmonologists were involved in respiratory assessment and bronchoscopy-assisted airway treatment; toxicologists in the assessment and management of toxic smoke exposure and probable carbon monoxide poisoning.

Large extent burn injuries also necessitated intensive but carefully managed fluid resuscitation based on TBSA calculation and Parkland-based techniques. Continuous monitoring of urine output, electrolyte balance, peripheral perfusion and hemodynamic parameters was required to prevent problems associated with inadequate or excessive fluid delivery.

The control of pain was another big problem in the first period of treatment. Many patients reported with substantial burns and traumatic

injuries that caused severe pain that required quick beginning of multimodal analgesia measures involving intravenous opioids, sedatives and supportive care. Adequate analgesia was important not only for patient comfort, but also optimization of respiratory function, hemodynamic stability and tolerance of necessary procedures. [13].

Role of Emergency and Intensive Care Teams

The Kocani disaster demonstrated the importance of multidisciplinary teamwork during mass casualty incidents. Emergency physicians, anesthesiologists, surgeons, intensivists, pulmonologists, toxicologists, nurses, respiratory therapists, and technical personnel worked simultaneously under extreme pressure to stabilize critically injured patients and maintain operational functionality.

Particular emphasis was placed on the roles of emergency, anesthesia, and intensive care nursing personnel. Their continuous bedside surveillance enabled early identification of subtle clinical deterioration, including desaturation, agitation, worsening ventilatory parameters, uncontrolled pain, and hemodynamic instability. Beyond respiratory and hemodynamic monitoring, nursing staff played a major role in airway care, infection prevention, sedation management, wound care, analgesia administration, coordination of care, and rapid escalation of therapeutic interventions.

The experience demonstrated that nursing personnel are not only technical assistants during disaster response but also essential clinical observers and active participants in emergency decision-making processes. [14].

Transportation and International Redistribution

More than 200 injured patients were admitted to hospitals across North Macedonia during the first 24 hours following the disaster. As national intensive care capacities became progressively limited, coordinated redistribution strategies and international evacuation systems were initiated to ensure continuity of specialized critical care treatment.

Ultimately, 115 patients were transferred to 34 hospitals in 14 countries through coordinated international medical evacuation systems upon activation of the European Union Civil Protection Mechanism. The redistribution process required continuous communication between emergency medical services, governmental institutions, military and civilian transport structures, foreign medical teams, and receiving hospitals. The rapid activation of international support mechanisms played a crucial role in preventing the collapse of the national healthcare system and ensured access to specialized burn and critical care treatment for severely injured patients. [15]

CONCLUSION

The Kocani nightclub fire demonstrated that successful management of large-scale burn and inhalation disasters depends not only on clinical expertise but also on disaster preparedness, rapid organizational adaptation, coordinated triage systems, and effective multidisciplinary collaboration. Early airway recognition, structured critical care support, continuous reassessment, and timely redistribution of patients represented key determinants of stabilization and survival. The experience particularly highlighted the essential role of emergency, anesthesia, and intensive care nursing personnel in the early detection of clinical deterioration and rapid implementation of lifesaving interventions. This disaster further emphasized the importance of structured hospital emergency protocols, interinstitutional communication, continuous professional training, and international support mechanisms in the management of mass casualty incidents involving severe burns and inhalation trauma.

Southeast European Journal
of Emergency and Disaster Medicine
Vol. XII, year 2026, No. 1

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Sažetak: Katastrofalni požar u noćnom klubu u Kočanima, Severna Makedonija, 16. marta 2025. godine, predstavljao je jedan od najtežih incidenata sa masovnim žrtvama u skorijoj istoriji zemlje, brzo preopterećujući zdravstvene kapacitete i zahtevajući hitnu multidisciplinarnu koordinaciju. Katastrofa je rezultirala velikim brojem pacijenata sa opsežnim opekotinama, inhalacionim traumama, izlaganjem toksičnom dimu, respiratornim kompromitujućim i povezanim traumatskim povredama.
Protokoli za hitne slučajeve u katastrofama su odmah aktivirani, uključujući mobilizaciju odeljenja za hitne slučajeve, jedinica intenzivne nege, hirurških službi, anesteziooloških timova, medicinskog osoblja, vladinih sistema za koordinaciju kriza i međunarodnih mehanizama za evakuaciju. Strukturirani protokoli trijaže zasnovani na START sistemu i ABCDE pristupu su primenjeni po dolasku pacijenata, što je omogućilo brzu kategorizaciju prema težini povrede i hitnosti intervencije.
Većina kritično povređenih pacijenata pokazala je teško respiratorno kompromitovanje i znake inhalacionih povreda koje su zahtevale hitno zbrinjavanje disajnih puteva i naprednu podršku intenzivne nege. Poseban naglasak je stavljen na ulogu medicinskog osoblja hitne pomoći, anestezije i intenzivne nege, čije je kontinuirano praćenje pored kreveta omogućilo rano prepoznavanje kliničkog pogoršanja i blagovremenu intervenciju.
Požar u noćnom klubu u Kočanima istakao je važnost pripremljenosti za katastrofe, koordinisanih sistema trijaže, institucionalne prilagodljivosti, multidisciplinarnog timskog rada i međunarodne saradnje u upravljanju velikim katastrofama izazvanim opekotinama i inhalacijom.
Ključne reči: intenzivna nega; hitna medicina; povrede usled inhalacije; incident sa masovnim žrtvama; Kočani

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