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ORIGINAL ARTICLES

Construction Industry Causes of Injuries, Management of EMS and Its Impact on Public Health

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Abstract

***Introduction*:** Injuries in construction are not rare and cause a strain on the health care service. By having education on workplace hazards, trained first aiders, and an effective accident emergency response system, the occurrence of illness/injuries will reduce and hence the number of fatalities.

The purpose of this research is the evaluation, epidemiology, management, diagnosis, treatment, systematization, and the results obtained about the construction industry for injury in life-threatening cases with trauma, reducing morbidity, disability, and mortality while increasing survival and solving problems for severe traumas in the health system of Kosovo, such as with professional staff, doctors and nurses, dedicated spaces, medical equipment, drugs, consumables, poor diagnostics, non-decisional consultations, as well as their timely and timely delivery, seeks political health solutions to solve this problem.

Material and Methods: In this retrospective study, we researched and analyzed the data of patients with construction-related injuries in ED treated from January-December 2021

Results: During the study period, we analyzed 75,899 ED patients. Of these, 420 cases, or 0.06%, were injured. In the research, 420 cases of injuries were investigated, investigating all age groups arising from construction-related activities for 2021.

Conclusion: To reduce workplace injuries, an organization must carry out regular risk assessments, conduct physical assessments for demanding roles, provide safety and wellness training regularly, train and appoint first aid marshals, hire qualified workers, hire enough workers, keep workspaces clean and walkways clear, post proper signage, Provide adequate lighting, education, and training on staff emergency response systems via courses BLS-D BTLS, PHTLS ATLS.

Keywords: ED, injuries, Occupational Safety, Safety Training, Construction Industry, Safety Behaviors**,** CPR,

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Introduction

Injuries in construction are not rare and cause a strain on the health care service. Immediate care is required; 123 workers were killed in work-related accidents in 2021/22—fatal injuries to workers by primary industry (2021/22). Around a quarter of fatal injuries to workers in 2021/22 were in the Construction sector (30 deaths), with a further 18% in each of the agriculture, forestry, and fishing sectors and the Manufacturing sector (22 deaths in each). This is a similar profile of deaths by industry as seen in previous years [1].

The latest HSE report on British construction highlights critical health and safety issues: 69,000 workers with work-

related ill health, 45 fatal injuries, and 53,000 non-fatal injuries in 2022/23. Musculoskeletal disorders affect 54% of ill workers, with 16,000 experiencing work-related mental health issues and 4,000 suffering from lung problems. The economic impact is substantial, at £1.3 billion in 2021/22, with 2.6 million working days lost annually. These findings emphasize the ongoing need for enhanced safety and health standards in the construction sector [2].

"In 2018, we reported and treated 143 cases of workplace accidents. As a result of these accidents, 120 cases ended with injuries to workers at work and 23 cases of death at work. In 2019, 16 cases of workplace accidents have occurred so far. 13 accidents ended with injuries and three cases with the death of workers at the workplace" [3, 4]. The most common causes of workplace injuries in the construction industry are overexertion and tiredness, slips, trips and falls, distractions, messy work environments, and cutting corners.

This article aims to identify the causes of construction injuries (CIs), summarize them into categories, provide input in a concise form for reference, and recommend possible solutions. A medical emergency can happen in the blink of an eye. Emergencies are usually unexpected and require urgent decision-making. Because of their unpredictable nature, emergencies are usually stressful for all parties involved. Emergencies rarely occur with all the necessary personnel and equipment present, and there is often extra pressure to organize the proper resources and personnel quickly, adding extra pressure on staff responding to the emergency.

There are many steps employers can take to help prepare their workforce for an emergency. From risk management to ensuring the proper medical facilities are present, you can always prepare for an emergency. In addition, the Canadian Center of Occupational Health and Safety (CCOHS) recommends having an emergency plan to ensure staff know how to respond during these difficult situations. Some preventive measures to consider include. [5]:

Policies to prevent fatalities and injuries [15]

- Strategies to reduce damage to buildings, stock, and equipment
- Procedures to protect the environment and the community
- A plan to resume normal operations after an emergency

Epidemiology. The International Labor Organization (ILO) estimated that at least 60,000 fatal accidents occur each year on construction sites around the world, representing one fatal accident every 10 minutes. Construction accounts for one in every six fatal accidents recorded at work annually [6]. Further, the ILO estimates that the construction sector in industrialized countries employs between 6% and 10% of the workforce but accounts for between 25% and 40% of work-related deaths. Equally significant is the impact of work on the health of construction workers. The ILO estimates that 30% of construction workers in some countries suffer from back pain or other musculoskeletal disorders. [6].

These shocking statistics show the need for a determined and coordinated effort to develop, implement, and evaluate new approaches to address this intransigent problem [7]. The latest HSE report on British construction highlights critical health and safety issues: 69,000 workers with work-related ill health, 45 fatal injuries, and 53,000 non-fatal injuries in 2022/23. Musculoskeletal disorders affect 54% of ill workers, with 16,000 experiencing work-related mental health issues and 4,000 suffering from lung problems. The economic impact is substantial, at £1.3 billion in 2021/22, with 2.6 million working days lost annually. [8]

In Kosovo, "In 2018, we reported and treated 143 cases of workplace accidents. As a result of these accidents, 120 cases ended with injuries to workers at work and 23 cases of death at work. In 2019, 16 cases of workplace accidents have occurred so far. 13 accidents ended with injuries and three cases with the death of workers at the workplace" IKP [9, 10].

Causes. Falling, electrocution, ground collapse**,** machinery accidents**,** fires and explosions**,** vehicle accidents**,** caught between**,** struck-by objects**,** slips and trips**,** toxic exposure**,** cranes**,** falling objects**,** burns**,** defective ladders**,** elevator accidents**,** falls from height**,** lack of safety training for workers**,** repetitive strain injury**,** scaffold accidents**,** brain injuries**,** defective equipment**,** excavation accidents**,** fall after slipping over a spill**,** accidents involving moving vehicles. [9].

Specified injuries to workers

The list of 'specified injuries' in RIDDOR 2013 replaces the previous list of 'major injuries' in RIDDOR 1995. Specified injuries are (regulation 4)[11]:

- Fractures other than to fingers, thumbs, and toes
- Amputation of an arm, hand, finger, thumb, leg, foot, or toe
- Any injury likely to lead to permanent loss of sight or reduction in sight
- Any crush injury to the head or torso causing damage to the brain or internal organs
- Any severe burns (including scalding) which cover more than 10% of the body
- Any causes significant damage to the eyes, respiratory system, or other vital organs
- Any degree of scalping requiring hospital treatment
- Any loss of consciousness caused by head injury or asphyxia
- Any other injury arising from working in an enclosed space which:

  leads to hypothermia or heat-induced illness

  requires resuscitation or admittance to hospital for more than 24 hours

Figure 1 - Accident reporting

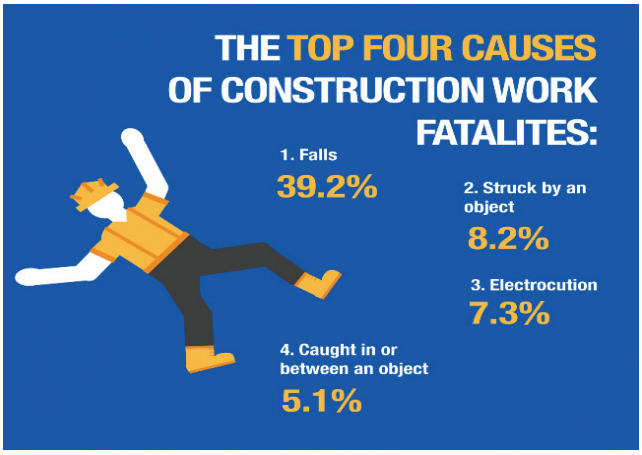

Figure 2. Causes of construction fatalities [12]

Risk assessment in construction industries. A typical construction site has lots of hazards with varying levels of risk/severity. Within the workplace, risk assessments must be conducted to protect the workforce. This is done using the risk assessment matrix, Figure 1, with the formula: *Likelihood* × *Severity* = *Risk*. Using the formula for each activity, the risk will fall into three ranges [13]:

- $1 < x < 6$, green zone, acceptable risk.
- $8 < x < 12$, yellow zone, mitigate risk.
- $15 < x < 25$, red zone, unacceptable risk.

Likelihood \ Severity	Negligible	Minor	Moderate	Major	Catastrophic
Almost certain	5	10	15	20	25
Likely	4	8	12	16	20
Possible	3	6	9	12	15
Unlikely	2	4	6	8	10
Rare	1	2	3	4	5

Figure 3 - Risk assessment matrix.

Incident. Cranes are machines used to lift heavy materials from one point of construction to another, and they are primarily used in large-scale construction. The crane operator was not well trained on how to operate the crane and had no idea about the loading limits of the crane. There was an overload on the crane, and in the process, the buckle and the boom collapsed and hit a fellow worker, leaving him with fractures on the head; unfortunately, there was no first aid trained personnel and first aid kit that could be used to help in dressing the wounds and stopping the bleeding before calling an ambulance. Due to excessive bleeding experienced by the patient, he died upon reaching the hospital. Report based on the incidents. [14].

Proposed Measures. Everyone has a responsibility to ensure that workplace safety is a priority to avoid accidents that could cost someone's life. Machine operators are to possess accredited training licenses and competency. First aid assessment will be conducted on every site to ensure sufficient first aid personnel and kits concerning the number of workers and risk of work activities. Frequent site inductions to new personnel and briefings by the site manager to the workforce to identify risks, control measures, and emergency response plans; see Figure 2 for an industry example.

First aid treatment and EMS: First aid refers to medical attention that is usually administered immediately after the injury occurs and at the location where it occurred. It often consists of a one-time, short-term treatment and requires training for administrators. [15].

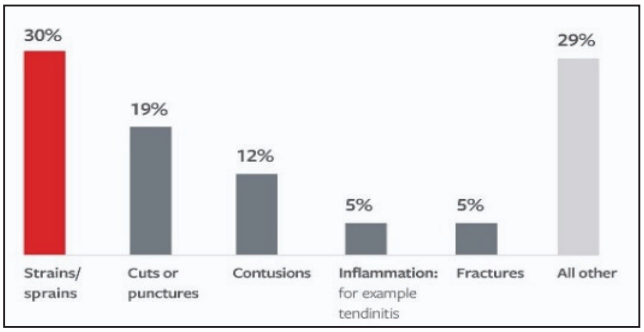

Figure 5 - Injury type statistics in the workplace [16]

Establish a Detailed Emergency Response Action Plan

An emergency response plan also demonstrates the organization's commitment to its workers' safety, helping enforce a safety culture. According to the Canadian Centre for Occupational Health & Safety (CCOHS), an emergency response plan should include the following [5]:

- All possible emergencies, consequences, required actions, written procedures, and available resources.
- Detailed lists of emergency response personnel, including their cell phone numbers, alternate contact details, and duties and responsibilities.

- Floor plans and worksite plans.
- Large-scale maps show evacuation routes and service conduits (gas and water lines).
- Once the emergency response plan is complete, emergency training must be conducted so employees know how to respond.

After providing primary care at the scene and transporting the patient to the hospital, management and emergency treatment, such as observation, monitoring, laboratory diagnostics, radiology, and medical consultations, will continue in the emergency department. The step-by-step procedure in a tertiary emergency medical institution is as follows [18, 19, 20]:

- **Step 1:** Initial assessment, monitoring, observation, diagnosis, and preparation of the treatment plan by emergency physicians in consultation with specialized surgical and trauma orthopedic branches.
- **Step 2:** After the initial evaluation, the emergency physician, after completing the diagnostic procedures and consultations, informs the surgeon of the surgical branches about the pathological findings

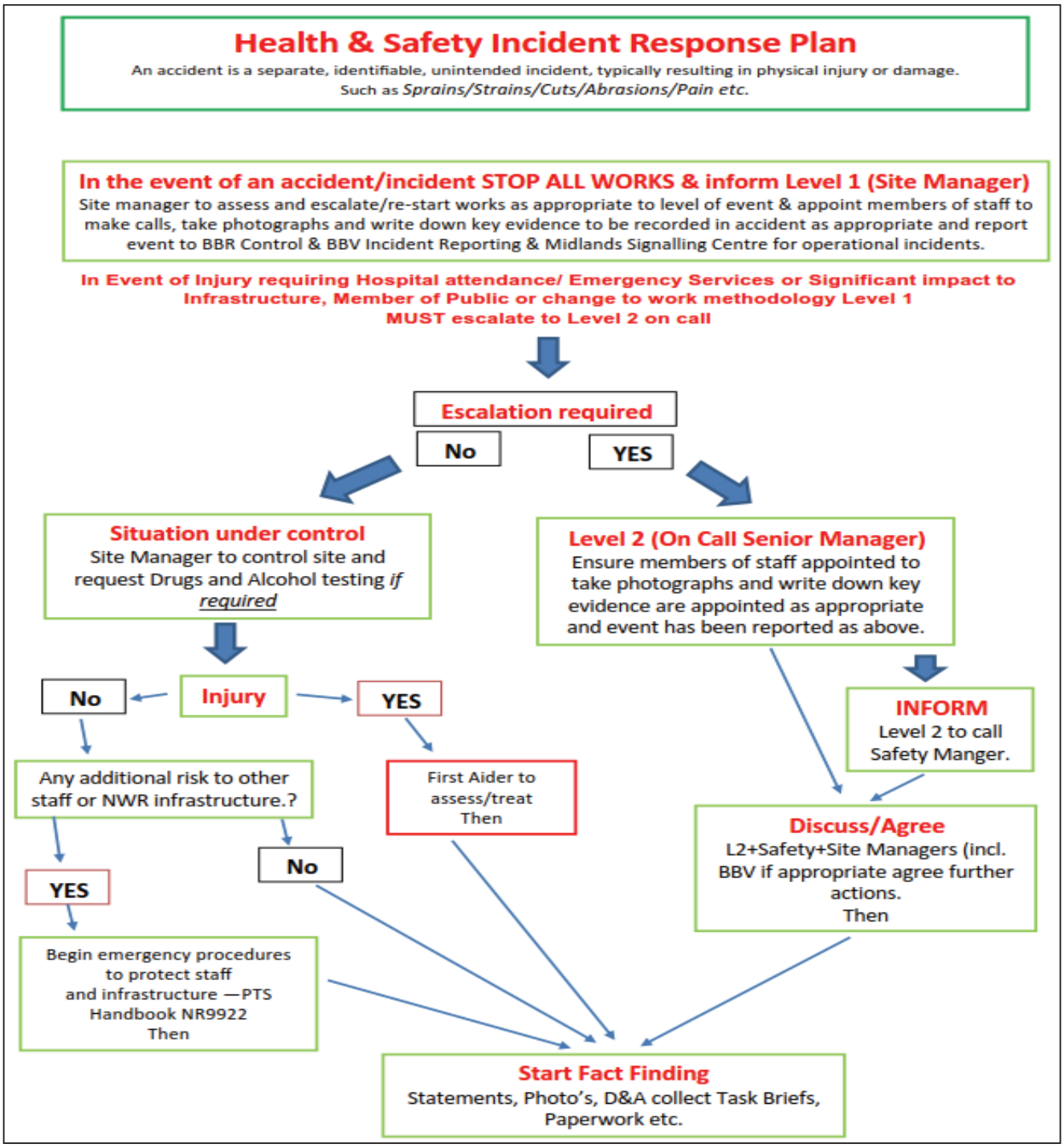

Figure 4 - Emergency response plan, industry example [17]

- **Step 3:** Evaluation by different specialties, calling on the phone.
- Step 4: Referral to specialties other than those planned initially, being treated in the EC by consulting and arranging interactions with consultancies with other specialties.
- **Step 5:** Referral of the injured to placement or systematization specialties.
- **Step 6:** Whose final responsibility/ownership belongs to polytrauma?

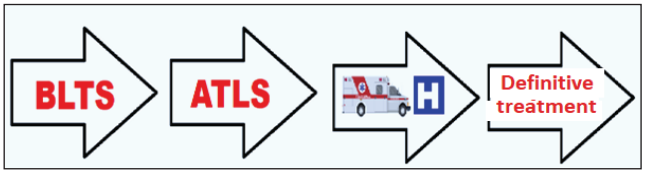

Figure 1. The chance of survival of a trauma victim is determined by the implementation of the "chain of survival."

Delay by any member of the emergency medical team and other specialties can lead to the death of the injured in the three emergency medical care settings.

To avoid any delay and to have better management in the initial examination of the trauma, creating triage areas is essential, based on the needs of the treatment and the available resources to ensure adequate treatment.[21,22,23]

What are the five general guidelines for the priorities of care for trauma patients? Once this has occurred, the primary survey can begin in a sequential set of steps, D.R.S.A.B.C.D, E.., with the most vital areas taking precedence: **D**anger, Response, **S**end, **A**irway, Breathing, **C**irculation, **D**isability, **E**xposure/ **E**nvironmental Control. [24]

The key areas in which advances are necessary to reduce the number of trauma deaths are the prevention of trauma, more rapid and skilled transport of injured victims, better early management of primary brain injuries, and more effective treatment of the late complications of sepsis and multiple organ failure.[25] The treatment and rehabilitation

Photography 1. The golden hour is the period immediately after a traumatic injury, with the highest likelihood of prompt medical and surgical.

Figure 2. For critically injured patients, initiate ABCDE.. transport to the closest appropriate facility within 10 minutes of arrival on scene.

of injured persons represent a large part of many national health budgets and Kosovo.

Purpose of the Work

The purpose of this research is the evaluation, epidemiology, management, diagnosis, treatment, systematization, and the results obtained about the construction industry for injury in life-threatening cases with trauma, reducing morbidity, disability, and mortality while increasing survival and solving problems for severe traumas in the health system of Kosovo, such as with professional staff, doctors and nurses, dedicated spaces, medical equipment, drugs, consumables, poor diagnostics, non-decisional consultations, as well as their timely and timely delivery, seeks political health solutions to solve this problem.

Material and Methods

In this retrospective study, we researched and analyzed the data of patients with construction-related injuries in ED treated from January-December 2021

a. Data collection methods and techniques

In the research, 420 cases of injuries were investigated, investigating all age groups arising from construction-related activities for 2021. The research was carried out based on data obtained from the evaluations of health care professionals based on anamnestic data, the status of vital parameters, monitoring, medical procedures, injuries at the systems level, type of health care delivery, and their system.

Protocols, updated interdisciplinary strategies, and data analysis can provide knowledge of organizational structures and sufficient levels of adequate medical staff to manage multiple incidents to minimize the loss of life. EMS access to pre-hospital and hospital emergency settings that provide rapid response and require a professional medical approach. Treatment procedures and actions that assist the process in all stages of treatment with a health system organized in the comprehensive plan.

b. Description of the sample. In the research, 420 cases of injuries in construction were investigated. The research was carried out based on anamnestic data, the status of vital parameters, monitoring, medical procedures, injuries at the level of systems, and the type of health care provision.

c. Description of data processing. *Data processing is described* through statistical parameters (worked Exel Word), structure index, arithmetic mean, and standard deviation. Statistical tests: X2-test and T-test. The tests were verified for the confidence level of 95% and 99%, respectively, for $p<0.01$ and $p<0.05$.

Results

During the study period, we analyzed 75,899 ED patients. Of these, 420 cases, or 0.06%, were injured.

Pathology	**No. cases**	**%**
Diseases	75,469	99.4
Constr. Injury	420	**0.6**
Total	**75,899**	**100%**

Table 1. Number of cases according to pathology.

Age	**No. cases**	**%**
18 years	34	8.1
19-30 years	208	49.2
31-45 years	123	29.2
46-60years	43	10.2
Over 60 years	14	3.3
Total	**420**	**100%**

Table 2. Number of cases by age group.

Injuries, according to the systems	**No. cases**	**%**
Neurosurgical	82	19.5
Orthopedic	188	44.7
Comprehensive surgery	55	13.0
Thoracic surgery	21	5
Plastic surgery	12	2.8
Vascular surgery	21	5
Maxillofacial surgery	17	4.0
Spinal surgeon	11	2.6
Urology surgery	13	3.0
Total	**420**	**100**

Table 3. Injuries, according to the systems

During our research, during the various steps in managing the injured with polytrauma, 156 cases, or 34.78%, appeared in phase III (Assessment by different specialties, by calling on the phone). In stage IV (Referral to different specialties, not coordination with the interactions with consultancies and other specialties). Seventy-eight cases, or 18.5%, need help with delays in sending information to relevant referred departments that are not mentioned in the treatment plan. In 40% or 170 cases, problems were also reported in Phase VI because no department was ready to admit the injured. Still, the injured were forced to stay in the emergency department longer without active treatment. However, no problem was observed in Phase II and Phase V. Injured were hospitalized in 70.7%, 6-9 days of MIQ treatment, and 17.21 days of hospital stay. Complications recorded were lung 23.0%, circulation 18.7%, liver 56%, kidney 2 %) and sepsis (14 %).

Discussion

The results from Table 1 show that 0.6% of patients within the year 2021 were due to construction-related injuries. When analyzing the age groups in Table 2, the 19-30 age group is the most impacted. This is expected as construction work is physically demanding; hence, there are more workers within that age group than the others.

Table 3 describes the injuries induced by construction activities. The most common injury is orthopedic, constituting 45% of the 420 sample.

Kosova's Labour Inspectorate reported that in the year 2021, there were five deaths, 81 accidents, and 45 reported severe injuries. The UK's Labour Force Survey reports 69,000 incidents of work-related Ill Health from 2020/21 to 2022/23. [10]

Conclusion

The objective of reducing injuries induced by construction-related activities is to improve the quality of life, sustain workers for the economy, and reduce strain on health services. Firstly, construction companies must respect the health and safety standards set by government agencies. Construction companies must allocate Health and Safety Supervisors/Advisors to each project to ensure compliance with standards. Construction Engineers/ Management must develop Risk Assessments Method Statements (RAMS) for work activities that categorize all risks associated with the work and implement control measures where required, following the principles in Figure 3. This must then be effectively communicated with regular briefings to the workforce at the point of work. Creating a 'Safety First' culture is essential, where workers are empowered to speak up and inform their supervisors of hazards and unsafe work procedures.

The site Health and Safety contact must be available to all workers if management does not respect workers' opinions on unsafe work practices. Similarly, site management must be proactive rather than reactive regarding risk management. This will involve having sufficient designated first aid trained personnel and kits located at the point of work concerning the number of workers. Method statements on high-risk activities such as heavy lifting or deep excavations must be approved by multiple professionals, including an Engineer, Health and Safety Advisor, and Works Manager, to ensure effective control measures and the works comply with the approved method statement. In addition, during high-risk activities, site management must ensure that those carrying out the work are competent and have the appropriate training. It is advised that the workers of high-risk activities have thorough health examinations and Drug & Alcohol testing to ensure they are fit to work. A site-specific Emergency Response Plan must be available at all times in the event of a fatal incident. This will detail the contact of local Emergency Health and Rescue services. In the event of an incident, a clear route must be provided for the emergency vehicles to reach the patient as quickly as possible after first aid has been provided.

The data obtained for the critically injured in the resuscitation room showed a high rate of morbidity, disability, and mortality, and immediate multidisciplinary comprehensive diagnostic and treatment emergency medical procedures should be implemented in the resuscitation room. Also, these critically injured require structured and well-organized care in the DE in the resuscitation room, with educated medical staff, nurses, and support staff trained with the mandatory BLS, BTLS, PHTLS, and ATLS courses, implementing and developing the algorithms standardized for structured care of the critically injured.

Recommendations

1. To institutionally support the advancement and strengthening of the health system at the primary, secondary, and tertiary levels, triage is an essential component in the management of accidental situations.
2. To design clinical guidelines, algorithms, and triage protocols at the three levels of health care.
3. All healthcare professionals should be educated and trained with continuing courses in triage, communication, and Basic Life Support -AED, ACLS, PHTLS, BTLS, and ATLS.

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