

Emergency Medicine and Trauma Care Journal

Research Article

Sesar M and Franjić S Emerg Med Trauma. EMTCJ-100027

Burn Emergency

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Citation: Sesar M and Franjić S (2020) Burn Emergency. Emerg Med Trauma. EMTCJ-100027

Received date: 11 February, 2020; Accepted date: 17 February, 2020; Published date: 24 February, 2020

Abstract

A burn is a type of skin or subcutaneous tissue injury caused by heat, electrical shock, chemicals, friction or radiation. Burns that affect only the superficial part of the skin are called superficial or first degree burns. In case the damage penetrates the lower layers of the skin, it is a second degree burn, while the third degree burns affect all layers of the skin. Burns that penetrate so deep that besides the skin, subcutaneous tissues are also affected as muscles and bones as fourth degree burns.

Keywords: Burns; Emergency; Healthcare; Patient; Skin

Introduction

An emergency is commonly defined as any condition perceived by the prudent layperson-or someone on his or her behalf-as requiring immediate medical or surgical evaluation and treatment [1]. On the basis of this definition, the American College of Emergency Physicians states that the practice of emergency medicine has the primary mission of evaluating, managing, and providing treatment to these patients with unexpected injury and illness.

So what does an emergency physician (EP) do? He or she routinely provides care and makes medical treatment decisions based on real-time evaluation of a patient's history; physical findings; and many diagnostic studies, including multiple imaging modalities, laboratory tests, and electrocardiograms. The EP needs an amalgam of skills to treat a wide variety of injuries and illnesses, ranging from the diagnosis of an upper respiratory infection or dermatologic condition to resuscitation and stabilization of the multiple trauma patient. Furthermore, these physicians must be able to practice emergency medicine on patients of all ages. It has been said that EPs are masters and mistresses of negotiation, creativity, and disposition. Clinical emergency medicine may be practiced in emergency departments (EDs), both rural and urban; urgent care clinics; and other settings such as at mass gathering incidents, through emergency medical services (EMS), and in hazardous material and bioterrorism situations.

In healthcare delivery, we attempt to meet the health and medical needs of the community by providing a place for individuals to seek preventative medicine, care for chronic medical conditions, emergency medical treatment, and rehabilitation from injury or illness [2]. While a healthcare institution serves the community, this responsibility occurs at the level of the individual. Each individual expects a thorough assessment and treatment if needed, regardless of the needs of others. This approach is different than that practiced by emergency managers, whose goal is to assist the largest number of people with the limited resources that are available. As such, emergency management principles are focused on the needs of the population rather than the individual.

When either planning for a disaster or operating in a disaster response mode, the hospital should be prepared at some point to change its focus from the individual to the community it serves and to begin weighing the needs of any individual patient versus the most good for the most patients with scarce resources. Moving from the notion of doing the most for each individual to doing the best for the many is a critical shift in thinking for healthcare institutions considering a program of comprehensive emergency management. While the initial planning for emergencies by hospitals is focused on maintaining operations and handling the care needs of actual or potential increased numbers of patients and/ or different presentations of illness or injury than is traditionally seen, there is also the need to recognize that at some point during a disaster, act of terrorism, or public health emergency there may be an imbalance of need versus available resources. At this point the approach to delivering healthcare will need to switch from a



focus on the individual to a focus on the population. This paradigm shift is one of the core unique aspects of hospital emergency management that allows the hospital to prepare to maximize resources in disasters and then to know when to switch to a pure disaster mode of utilizing its limited and often scant resources to help the most people with the greatest chance of survival.

The healthcare delivery system is vast and comprised of multiple entry points at primary care providers, clinics, urgent care centers, hospitals, rehabilitation facilities, and long-term care facilities. The point of entry for many individuals into the acute healthcare system is through the emergency department (ED). Since the late 1970s, the emergency medical services (EMS) system has allowed victims of acute illness and injury to receive initial stabilization of life-threatening medical conditions on the way to the emergency department. Among the many strengths of the ED is the ability to integrate two major components of the healthcare system: prehospital and definitive care. The emergency department maintains constant communications with the EMS system and serves as the direct point of entry for prehospital providers into the hospital or trauma center. Emergency physicians represent a critical link in this process by anticipating the resources that ill and injured patients will need upon arrival at the ED, and initiating appropriate life-saving medical care until specialty resources become available. In this context, the healthcare system is an emergency response entity.

Patient Condition

In most emergencies there is no time to disclose the necessary information for an informed consent [3]. Here the providers simply act according to what they think will be in the best interests of the patient. These situations frequently happen in hospital emergency rooms and when emergency medical personnel arrive on the scene of an accident or sudden illness.

The emergency exception to informed consent is often quite obvious, but this is not always so. It does not apply, for example, when personnel taking care of somebody in an emergency happen to know what the patient wants. In such a situation they would not do what they think is best for the patient but what they know the patient wants.

It is important to note that the emergency exception that allows physicians to do what they think is best for the patient without obtaining informed consent from the patient or proxy has one major restriction; namely, they cannot do what they think is best if it is otherwise than what they know the patient or proxy wants.

Sometimes, for example, emergency department personnel might know from previous admissions that a particular patient from a local nursing home desires only palliative care. If that patient arrives by ambulance at the same emergency department, it is hard to see how it would be morally reasonable for physicians to take aggressive measures to keep the patient alive when, even though there is no time to obtain consent for orders not to attempt resuscitation or not to intubate, they know he or she or a proxy has decided not to have aggressive life-sustaining measures performed.

Patients accessing emergency care services can present with

complaints that are extremely diverse, and the way doctors, nurses and paramedics elicit information from patients predominantly focusses on obtaining biomedical details [4]. In some cases, this approach is warranted, as the urgent need to identify signs and symptoms of life-threatening illness or injury is paramount. Yet, 90% of patients accessing emergency services are not critically ill or injured but seek help and advice. In addition to seeking advice. patients may also be anxious, frightened, intoxicated, misusing drugs or have unhealthy lifestyles. They may have psychosocial reaction to physical disease or vice versa-physical illness such as irritable bowel syndrome, asthma, tension headache can be triggered by psychosocial factors. The effects and interpretation of illness will trigger a different response to the individual depending on their view and experiences. All these factors will have different needs and concerns and it is important to elicit these concerns within a consultation. However, it has been found that nurses working in emergency care disregard the potential for anxiety and the need for support and reassurance in patients who are not severely ill or injured. In addition, where communication skills of junior doctors working in emergency departments have been researched, they are found to use approaches considered to be more physician/illness orientated than patient-centred. By way of similarities of patient presentations in the pre-hospital setting, this could equally be assumed for paramedic practice.

Burn

Over 440 000 children receive medical attention for burn injuries each year in the US [5]. Children younger than 14 years of age account for nearly half of all emergency departmenttreated thermal burns. With approximately 1100 children dying of burn-related injuries in the United States every year severe burns represent the third most common cause of death in the pediatric patient population and account for a significant number of hospital admissions in the United States. The devastating consequences of burns have been recognized by the medical community and significant amounts of resources and research have been dedicated, successfully improving these dismal statistics: Recent reports revealed a dramatic decline in burn-related deaths and hospital admissions in the USA over the last 20 years; mainly due to effective prevention strategies, decreasing the number and severity of burns. Advances in therapy strategies, based on improved understanding of resuscitation, more appropriate infection control and improved treatment of inhalation injury, enhanced wound coverage and better support of hypermetabolic response to injury, have further improved the clinical outcome of this unique patient population over the past years.

In general, initial management of the burned child should be the same as for any other burn or trauma patient, with special attention directed to the airway, breathing, circulation and cervical spine immobilization according to the guidelines of the American College of Surgeons Committee on Trauma and the Advanced Trauma Live Support Center. The algorithms for trauma evaluation should be diligently applied to the burn patient and the primary survey begins with the ABCs (airway, breathing, circulation) and the establishment of an adequate airway. Note worth to mention is to provide adequate pain control and relieve the patient from pain and stress. Pain medications should be carefully administered not to overdose and induce adverse side effects. In addition, the





amount of pain medication should be reasonable and be based on the burn size and subjective pain of the patient. Dosing of pain medication needs to be according to pediatric guidelines.

Skin

Burn injuries represent a specific wound entity with unique clinical features which range from the difficulty of initial assessment to the long-term tendency to develop pathologic scars [6]. For long time considered as acute wounds, burns are in fact wounds showing a long term evolution transforming them into chronic wounds, if inadequately managed. The pathophysiological changes in the burn wound are characterized by effects caused by heat per se and complex superimposed local as well as systemic alterations. Due to profound disturbances of the immunostatus in general burn wounds are highly susceptible to infections upon completed keratinization. A common consensus among burn specialists emerges considering that a burn wound has to be covered within a period of two to three weeks, justifying a dogma of rapid excision and grafting, a surgical approach popularized by surgeons since the 70's. In fact, burn wounds which remained unhealed for several weeks or months, either due to skin graft infection or by accumulation of the high level of proteases included the wound after 3 to 4 weeks of non-healing.

The skin is supposed to be the largest organ realizing multiple functions. It maintains not only a physical but also an immunological protective barrier conserving the organism against physical abrasion, bacterial invasion, dehydration, and ultraviolet radiation. Body temperature is kept constant by adaptation of the blood flow in the dermal plexus in conjunction with the tight regulation of fluid homeostasis via the sweet glands (thermoregulation). The skin contains abundant nerve endings and receptors that detect stimuli related to temperature, touch, pressure, and pain (sensation). Finally it defines also the personal features of the social appearance. Exogenous aggressors such as burns result in either the loss or disruption of some or all of these functions.

Degrees

The depth and severity of the burn are also determined by the ability of the contact material to transfer heat, a factor referred to as the specific heat [7]. This is especially important in scald and contact burns. The knowledge about the material type allows for a more accurate estimate of tissue damage. Burn depth is determined by the time of exposure, the temperature at which the burn occurred, and the caloric equivalent of the burn media.

Another determinant of the severity of burn is the location of the burn wound and the age of the burned patient. The thickness of the skin layers increases from the age of 5 up to the age of 50. In elderly patients, the thickness starts to decrease at the age of 65. The epidermis can vary by location from 0.03 up to 0.4 mm. Clinically, the severity of burn injury can be categorized by the differences in the tissue damage and is determined by the depth of the burn.

(a) I degree: Superficial burn of the epidermis.

First-degree burns are painful, erythematous, and blanch to the touch with an intact epidermal barrier. Examples include sunburn or a minor scald from a kitchen accident. These burns do not result

in scarring, and treatment is aimed at comfort with the use of topical soothing salves with or without aloe and oral nonsteroidal anti-inflammatory agents.

- (b) **Ha degree:** Burn including epidermis and superficial dermis.
- (c) IIb degree: Burn including epidermis and deep dermis.

Second-degree burns are divided into two types: superficial and deep. All second-degree burns have some degree of dermal damage, by definition, and the division is based on the depth of injury into the dermis. Superficial dermal burns are erythematous, painful, blanch to touch, and often blister. Examples include scald injuries from overheated bathtub water and flash flame burns. These wounds spontaneously re-epithelialize from retained epidermal structures in the rete ridges, hair follicles, and sweat glands in 1-2 weeks. After healing, these burns may have some slight skin discoloration over the long term. Deep dermal burns into the reticular dermis appear more pale and mottled, do not blanch to touch, but remain painful to pinprick. These burns heal in 2–5 weeks by reepithelialization from hair follicles and sweat gland keratinocytes, often with severe scarring as a result of the loss of dermis.

(d) III degree: Burn including epidermis and dermis and subcuticular layer.

Third-degree burns are full thickness through the epidermis and dermis and are characterized by a hard, leathery eschar that is painless and black, white, or cherry red. No epidermal or dermal appendages remain; thus, these wounds must heal by reepithelialization from the wound edges. Deep dermal and fullthickness burns require excision with skin grafting from the patient to heal the wounds in a timely fashion.

(e) IV degree: All dermal layers including fascia, muscles, and/ or bones.

Fourth-degree burns involve other organs beneath the skin, such as muscle, bone, and brain. Nonaccidental trauma is an important consideration to help prevent future injury or death [8]. It is estimated that up to 20% of burn injuries are the result of child abuse or neglect, with highest incidence among young children (0-4 years of age). The likelihood of death is 4 times greater among those with suspected abuse. The anatomic location of the injury is affecting unreliable in differentiating nonaccidental and accidental burns; however, burns on both legs convey a 3 times greater likelihood of being abusive injury.

Emergency physicians are mandatory reporters and do not need to definitively diagnose abuse but rather to reasonable cause to suspect abuse. Obtaining collateral information from social workers is beneficial because previous child protective services involvement is documented in 15% to 90% of reported nonaccidental burn cases. If there is any suspicion of nonaccidental trauma, the child should be admitted so that collateral information can be obtained while the child is safe.

Physical Examination should include observation of the parent-child interaction, evidence of neglect, assessment of growth and development, systems examination and a careful search for any skin marks or other injuries [9]. It is also important to check for signs of infection either localised to the burn itself or septicaemia.



Accurate documentation of the burn or scald marks on body maps with good quality images is essential. All notes must be signed and and date stamped.

The individual injury should be described and diagnosed with careful consideration of other causes for skin lesions that may appear as burns. If a burn or scald is confidently diagnosed, each injury should be considered individually and an opinion reached as to whether it is accidental or inflicted. It is equally important to take an overview of all injuries observed, as well as other concerning features including evidence for neglect and emotional abuse.

Advances in trauma and critical care have resulted in important improvements in burn management, improved survival, and reduced morbidityfrom major burns [10]. Myriad physiological changes occur following thermal trauma, including fluid and electrolyte imbalances (systemic losses and shifts of water, sodium, albumin, and blood cells), metabolic disturbances (hypermetabolism, catabolism, and malnutrition), bacterial contamination of tissues and infection, complications in vital organs, and respiratory complication with or without the presence of inhalation injury.

Emergency treatment focuses on stabilization of patients, treatment of associated injuries, fluid resuscitation, initial respiratory support, and emergency treatment of the burn wound. Soon after stabilization and resuscitation, a formal discharge plan (treatment plan, rehabilitation plan, and social support) is established.

Responsibility of the Physicians

The aim is to provide excellence in emergency department (ED) care by cultivating the following desirable habits [11]:

- Listen to the patient.
- Exclude the differential diagnoses ('rule out') and refine the possible diagnosis ('rule in') when assessing any patient, starting with potentially the most life-or limb-threatening conditions, and never trivializing.
- Seek advice and avoid getting out of depth by asking for help.
- Treat all patients with dignity and compassion.
- Make sure the patient and relatives know at all times what is happening and why, and what any apparent waits are for.
- Maintain a collective sense of teamwork, by considering all ED colleagues as equals whether medical, nursing, allied health, administrative or support services.
- Consistently make exemplary ED medical records.
- Communicate whenever possible with the general practitioner (GP).
- Know how to break bad news with empathy.
- Adopt effective risk management techniques.

The duty of care is a physician's obligation to provide treatment according to an accepted standard of care [12]. This obligation usually exists in the context of a physician– patient relationship but can extend beyond it in some circumstances. The physician-patient relationship clearly arises when a patient requests treatment and the physician agrees to provide it. However, creation of this relationship does not necessarily require mutual assent. An unconscious patient presenting to the ED is presumed to request care and the physician assessing such a patient is bound by a duty of care. The Emergency Medical Treatment and Active Labor Act (EMTALA) requires ED physicians to assess and stabilize patients coming to the ED before transferring or discharging them. Such an assessment presumably creates the requisite physician-patient relationship.

When caring for a patient, a physician is obligated to provide treatment with the knowledge, skill, and care ordinarily used by reasonably well-qualified physicians practicing in similar circumstances. In some jurisdictions, these similar circumstances include the peculiarities of the locality in which the physician practices. This locality rule was developed to protect the rural practitioner who was sometimes deemed to have less access to the amenities of urban practices or education centers. However, the locality rule is being replaced by a national standard of care in recognition of improved information exchange, ease of transportation, and the more widespread use of sophisticated equipment and technology.

Establishing the standard of care in a given case requires the testimony of medical experts in most circumstances, unless the breach alleged is sufficiently egregious to be self-evident to the lay jury member for example, amputating the wrong limb or leaving surgical implements in the operative field. A physician specializing in a given field will be held to the standard of other specialists in the same field, rather than to the standard of nonspecialists.

To be eligible to receive federal funds such as Medicare and Medicaid, hospitals with an emergency department must offer emergency and stabilizing treatment services to the public without bias or discrimination [13]. The Emergency Medical Treatment and Active Labor Act is a comprehensive federal law that obligates hospitals offering emergency services to do so without consideration of a patient's ability to pay. It's important to note that this obligation does not apply to inpatients or nonemergent conditions. The absence of bias in the delivery of care should not be misunderstood to suggest all hospitals must provide all medical services, but rather the services they choose to offer must be delivered without bias to the individual patient.

A hospital and its entire staff owe a duty of care to patients admitted for treatment. Following an emergency call, the ambulance service has a duty to respond and provide care. Accident & Emergency (A&E) departments have a duty of care to treat anyone who present themselves and are liable for negligence if they send them away untreated. Hospitals without an A&E facility will display signs stating the location of the nearest A&E department. This ensures that the hospital could not be held negligent if a patient presented and required emergency treatment as the hospital or its staff had never assumed a duty of care. Once a patient is handed over, a duty of care is created between the patient and the practitioner and this cannot be terminated unless the patient no longer requires the care or the carer is replaced by another equally qualified, competent person. It is therefore extremely important that practitioners are aware of their local policies, professional



standards and their scope of practice to avoid becoming liable for litigation by putting a patient at risk, delivering ineffective care or breaching their duty of care.

Conclusion

Burns are injuries caused by high fever affecting the skin and deeper tissue sections. They can be caused by hot liquids, flames, hot solid objects and overheated gases. Similar changes can be caused by very low temperatures (frostbite), chemicals, electricity, various radiation, including sun rays. Although severe and widespread burns are often fatal, advances in therapy since the 1960s to date have significantly improved the prognosis of the disease, especially in children and young adults. Each year, 11 million people go to a medical facility for treatment in the world, and 300,000 die of burns a year. Long-term prognosis is mainly related to the area of the body affected by the burn and the patient's age.

References

- Stone CK and Humphries RL (2011) Current Diagnosis And Treatment Emergency Medicine, 7th ed. The McGraw-Hill Companies, New York, USA. Pp: 1.
- Reilly MJ and Markenson D (2011) Health Care Emergency Management-Principles and Practice. Jones & Bartlett Learning, Sudbury, USA. Pp: 5-6.
- Devettere RJ (2010) Practical Decision Making in Health Care Ethics-Cases and Concepts, 3rd ed, Georgetown University Press, Washington, USA. Pp: 83-84.

- 4. Nixon V (2013) Professional Practice in Paramedic, Emergency and Urgent Care. John Wiley & Sons, Ltd, Chichester, UK. Pp: 23.
- Jeschke, MG, Kamolz LP, Sjöberg F, Wolf SE (2012) Handbook of Burns Volume 1- Acute Burn Care. Springer-Verlag Wien, Wien, Austria. 1: 241.
- Kamolz LP, Jeschke MG, Horch RE, Küntscher M, Brychta P (2012) Handbook of Burns - Reconstruction and Rehabilitation, Volume 2. Springer-Verlag Wien, Wien, Austria. Pp: 47.
- 7. Jeschke MG, Kamolz LP, Shahrokhi S (2013) Burn Care and Treatment - A Practical Guide. Springer-Verlag, Wien, Austria. Pp: 13-15.
- 8. Strobel AM and Fey R(2018) Emergency Care of Pediatric Burns. Emerg Med Clin North Am 36: 441-458.
- Robinson DL (2017) Pediatric Forensic Evidence-A Guide for Doctors, Lawyers and Other Professionals. Springer International Publishing Switzerland, Cham, Switzerland. Pp: 98.
- Barret-Nerín JP and Herndon DN (2005) Principles and Practice of Burn Surgery. Marcel Dekker, New York, USA. Pp: 33.
- Brown AFT and Cadogan MD (2011) Emergency Medicine-Diagnosis and Management, 6th ed. Hodder Arnold, London, UK. Pp: 446.
- Stone CK and Humphries RL (2007) Current Diagnosis And Treatment Emergency Medicine, 7th ed. The McGraw-Hill Companies, New York, USA. Pp: 45.
- Solheim J (2016) Emergency Nursing-The Profession, The Pathway, The Practice. Sigma Theta Tau International, Indianapolis, USA. Pp: 162.

