MANAGEMENT OF MEDICAL RESOURCES IN MULTIPLE VICTIM INCIDENTS

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Abstract: *Multiple victim incidents are becoming more and more frequent nowadays. Industrialization and improved infrastructure have not only contributed to more modern, easily accessible resources and opportunities, but have also enabled the increase of tragedies, especially multiple victim casualties like terrorist incidents, explosions and natural phenomenon. Therefore, the healthcare system is confronted with a new challenge, to manage and find protocols for incidents that demand great resources and that involve multiple victims. Considered by some authors to be the most important aspect of healthcare management, the management of health care resources is a complex problem, in a continuous dynamic. In times of difficulty, knowing what to do and having everything you need in order to save the victims life is crucial for medical personnel. Providing medical services remains, in spite of technological advances specific to the modern age, a mission accomplished by people for the benefit of other people.*

INTRODUCTION

Healthcare management is a continuous challenge that has the role of managing existing medical resources to facilitate the best possible performance of the medical act. Located at the intersection of medical culture with an approach that puts the patient at the heart of the medical act, and the management where the entire chain involved in providing health care is made up of elements that can be adjusted to target the most efficient use of the resources available in order to meet the needs of as many patients as possible, health management requires a number of features to be fair and efficient. Through anonymous questionnaires addressed to several healthcare managers, which were later analyzed psychologically, one study highlighted the multiple qualities required for a healthcare manager to be excellent. For example, there is the ability to search for and process new information, communication skills and interpersonal relationships, planning skills and setting goals, as well as skills to take action. (1)

PURPOSE

The purpose of this study is to cumulate the information available about multiple victim incidents and to raise awareness of the importance of guidelines and protocols in order to optimize medical resources during casualties. One additional purpose of this assessment is to determine the practical applicability of the studies which are available worldwide, the aim being to reduce the waste of resources involved in studies which do not result in useful measures for general medical practice.

MATERIALS AND METHODS

We studied and analysed the newest materials concerning multiple victim incidents available online. We gathered the most recent and comprehensive information in order to create a global view over the current status of medical resources and how they are distributed and managed during multiple victim casualties. The search was conducted using internationally recognized medical databases.

RESULTS

Considered by some authors to be the most important aspect of healthcare management, the management of health care resources is a complex problem, in a continuous dynamic. The important aspects revealed by a global study that analysed the situation in the United States, Canada and Germany show that the successful outcome of any medical system depends directly on the success of managing people with medical training involved in providing services to patients. The factors identified by this study are the quality of medical staff, the number of personnel, and the representation rate of different specialties. The quality of medical staff must be ensured through specific training as well as through continuous medical education and updating of information about the progress in the field. The number of specialized medical staff assigned must be accordingly with the needs. An analysis of the situations where, although they were not understaffed, certain health units functioned poorly, it was important to establish a correct balance between different specialties in order for the medical act to be carried out in optimum conditions. This is explained by the fact that many cases require a multidisciplinary approach involving several different specialists. A numerical imbalance between the specialties may lead to poor overall medical conduct.(3)

The importance of medical staff management was highlighted by a comprehensive study by British researchers. In this study, they launched the hypothesis of the need to implement individual management strategies for every physician, using human resource management techniques specific to non-medical companies. The goal of individual

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physicians' management is to constantly increase the quality of services they provide to patients. Together with the general factors of observing all rights and optimizing effective working time, two specific concepts have been identified to improve medical activity: external, independent, periodic evaluations to ensure compliance with standards, and involvement of the staff in the organizational sphere of the medical institution, in order to increase the physicians' degree of involvement in daily activities by stimulating the sense of belonging. (4)

Providing medical services remains, in spite of technological advances specific to the modern age, a mission accomplished by people for the benefit of other people. Starting from this premise, diversity is promoted among medical staff. From the point of view of ethnicity, some authors promote the recruitment of medical staff at all levels, and moreover from different minorities that have representatives in the society in which the medical staff is destined to practice. The argument is that the degree of addressability has been increased among patients in the respective minority. In fact, this is a statement of the civilized world, the concept of "unity in diversity" being applied in any microclimate, including within a medical system.(5)

Trauma pathology is a matter of current public health issue. In parallel with the progress of modern medicine, translated by a continuous decrease in morbidity and mortality due to the most common pathologies, such as cardiovascular disease or neoplasia, an increase in the share of traumatic disability and death is forecasted. In the field of various pathologies, the results in research on prophylaxis and treatment have constantly changed the perspective on the diagnosis and treatment. A particular approach is needed in terms of traumatology, since the disease-specific principles apply only to a small extent to admissions due to physical injuries. As a definition, trauma is a particular category of diseases produced by the action of exogenous factors materialized by injury to tissues and / or organs of the human body. These results in the need to have a specialized medical resource management that takes into account the particularities of the patient with traumatic injuries. The applicable principles for good management of traumatized patients are the development and implementation of a competent and well-equipped network of hospital units capable of managing such cases.(6)

Managing multiple-casualty situations has been a recurrent problem along the path of medical care. The term "triage", is frequently used, which means prioritizing patients approaching medical services simultaneously if they cannot all be admitted at the same time. The criteria of the triage were initially established with reference to various values of vital function stability, such as breathing, pulse, oxygen saturation, pupil reactivity, skin colour, and blood pressure. The main drawbacks of this triage system are the time to determine all these parameters for all victims, time that could have been used to provide advanced healthcare to the patient that requires it as a priority. Also, the saviour's subjectivity in determining when a case is in or out of therapeutic resources with consecutive death is a delaying factor in receiving medical care.(7)

Subsequently, multiple techniques have been developed to assess the severity of a case with traumatic injuries, consistent with the findings of modern medicine in paraclinical investigations. Traumatic lesions with early life-threatening potential are brain damage and damage to blood vessels susceptible to causing internal and / or external haemorrhage. The Glasgow Coma Scale (GCS) is still the tool of choice to assess the severity of brain lesions. To determine the immediate death potential of a haemorrhage, the Advanced Trauma Life Support was introduced. This takes into account the parameters of systolic blood pressure, blood pressure, pulse rate and respiratory rate. For greater utility and for reducing the time needed to perform the initial triage evaluation, these two entities have been reunited in the Revised Trauma Score (RTS), which takes into account the GCS score, systolic blood pressure and respiratory rate.(8)

The individual response of each member of the rescue team at the intervention site is variable and sometimes unpredictable according to studies conducted in this direction. Pre-established protocols are of a general nature, and different emotional responses can alter the generally accepted medical response. One study assessed the impact of empathy on the response of the medical staff involved at the site of the intervention. The results have shown that empathy influences health care. The conclusions of the study set out the recommendation that medical staff should have an individual approach to each patient in the multiple victims group. It is also useful to have periodically assessments and psychological counselling for staff working in primary care of multiple victims.(9)

Advanced planning of healthcare management models is a trademark of a developed society, and it comes in anticipation of potential multi-victim events. Obviously, this solution is preferable to the detriment of the initial improvisation at the site of tragedies. In 2009, a study by Swiss researchers highlighted the urgent need for an action plan in the case of multiple victims. Its opportunity was justified by examples from other countries, which illustrate the wide variety of circumstances in which multiple burn victims may occur. This plan, developed by Swiss researchers, targets both the necessary medical care to be given take-over by the emergency medical crew, and then the hospitalization in the hospital environment. Moreover, it is emphasized the need for extra training for doctors specialized in such cases. The problem highlighted by this study was the very high costs, which raises debates about the benefit of massive investment in such a system. The proposed solution was to develop a joint action plan for several smaller, neighbouring countries. In the case of an incident in any of the participating countries, they will be specialized and they will have the capacity to intervene.(10)

The need for a specific pre-hospital care in patients with traumatic injuries was highlighted by a retrospective study on a group of 11,200 patients. The study was conducted in a country member of the European Union. The lot was divided into two categories, the including criteria being the number of traumatic injuries. The categories were composed of patients with single traumatic lesions and patients with multiple traumatic injuries. The considered factors were the number and type of medical manoeuvres required in the pre-hospital for each case. Statistically significant differences were found for all types of manoeuvres analysed in the study, these being more common in patients with multiple traumatic injuries than in patients with a single traumatic lesion, with particular emphasis on the need for advanced vital support more frequently in patients with multiple traumatic injuries. Another conclusion of the study was that most of the traumatic injuries suffered occurred through road traffic accidents and aggressions.(11)

In the developing countries, one of the main issues when managing multiple-life situations is patient stabilization and transport. The limited medical resources, the deficiency of pre-hospital medical care and the poor infrastructure that leads to a prolonged transport time are causes of preventable deaths, according to a study conducted in a country that meets the above-mentioned characteristics. Of a total of 2778 patients with traumatic injuries requiring stabilization and transport to the hospital, 625 experienced superficial traumatic lesions, 273 had

burns, 942 had limb lesions, 672 had head, neck and thorax lesions, considered critical by the authors of the study, and 266 had multiple associated lesions of critical and limb areas. There were also 238 cases where the injuries found by the emergency medical crew were incompatible with life, as well as 38 deaths during medical assistance. It has been found that providing patients with pre-hospital care trauma by specialized health professionals, with the implementation of internationally agreed protocols, contributes to reducing mortality. The authors of the study also suggest that the establishment of new trauma management centres, especially in difficult-to-reach areas, from which the transport of victims to a specialized unit requires too long, could improve the survival rate of poly-traumatized patients.(12)

Decreasing mortality after traumatic injuries should be a desideratum for any medical system providing medical care. Only by analysing cases of post-traumatic admittance we can identify the actions that need to be taken to prevent deaths whenever possible. This continuous assessment of the quality of services offered is all the more useful in developing countries, as the number of potentially preventable post-traumatic deaths is higher. A study led in an African country assessed 231 post-traumatic in-hospital deaths. In 84 cases the authors established that they had sufficient medical data to make a meaningful assessment of the evolution of the patients. It was found that in 23% of cases deaths could most likely be prevented, in 37% of cases deaths were potentially avoidable, and in 40% of cases the death of the patient was inevitable. Therefore, there is a 60% rate of the medical measures given to the patients that could be of higher quality. The main aspects that can be positively adjusted are the time interval for transport from the event venue to the medical unit, as well as the delay in giving treatment and in particular the hydration and blood loss replacement treatment.(13)

Poor resource management is the main problem in multiple-life situations, especially if they are directed to the same hospital or to a small number of hospitals. Given that there are certain individual variables, such as the distribution of the patients weight or the percentage of each blood group, as well as the quantification of the necessary medical resources, a study was made to elaborate a mathematical model to supplement or re-route victims to medical units in the event of a tragedy involving multiple patients with burns. It has been established that the first resources that are consumed are the emergency room units, followed by the beds on the ward. Depending on the regimen and stocks, the order in which drugs are used up has been established.(14)

Different age categories have particular characteristics with regard to the predisposition to develop different pathologies. A group of American researchers has studied the epidemiology of traumatic pathology at the third age. The aim of the study was to improve the prognosis of these patients as well as to determine whether prophylactic measures specific to the third age are required. The study concluded that the etiology of traumatic injuries presented by the elderly was variable depending on their age; the younger ones were more often victims of aggression, and in the older age the main cause of injuries were accidents of different types. A pattern of lesions has been identified, establishing that the characteristic traumatic lesions for the elderly are craniofacial and cerebral ones.(15)

The global issue of management of the polytraumatized patients is certified by the studies conducted in this respect field on several continents. Through various epidemiological studies, there is an attempt to identify factors and / or associations of factors, in order to optimize the health care provided to polytraumatized patients. These studies provide interesting information for the present research. Thus, an epidemiological study on road accidents carried out in an Asian country has discovered particularities regarding predominant injuries in road accidents. It is worth mentioning that, due to local particularities, the majority of road accident victims in this study were motorcycle bikers, followed by pedestrians. A statistically significant association was established between the victims of motorcycle accidents and the traumatic injuries located in the lower limbs and the cephalic extremity. The increased frequency of cranio-cerebral lesions was in relation to the deficiency in education manifested by the low percentage of motorcyclists wearing a helmet.(16)

In some situations, measures to provide healthcare are accompanied by efforts to take the victim out of the danger area. In these cases, it is necessary to standardize the necessary measures in order to reduce as much intervention time as possible, as well as to efficiently use the resources in the potential situation of multiple victims. Accordingly, the lesions of avalanche victims were studied, as well as the frequency of immediate life-threatening complications, mainly asphyxia and hypothermia. Of the 105 patients participating in the study, 33 died of asphyxia, 20 had limb lesions and 18 had lesions in a thoracic trauma. Depending on the injuries presented, as well as on the presence and values of the monitoring of vital functions, an evacuation protocol was developed and directions to medical units of a certain rank where made.(17)

There are situations where the frequency of a certain type of traumatic injury is very high in relation to a particular type of traumatic event. In these cases, it was hypothesized that the traumatic lesion considered pathognomonic for a particular circumstance can be quickly evaluated, thus constituting a criterion for screening the severity of polytraumatisms in general. This relationship was established between the tympanic rupture and explosions. Barotrauma in such cases is susceptible to induce tympanic lesions in a very large number of cases. A study on this issue, compiling a large number of patients, partially negated this hypothesis. The explanation for this is that, in the case of seriously polytraumatized patients, the examination of the tympanic membrane has not been performed. The priority was stabilization measures and advanced life support.(18)

A retrospective evaluation of traumatic lesions known to be produced in events with multiple victims compared to similar lesions produced in single situations, highlights the usefulness of the subsequent management of catastrophic disasters with multiple poly-traumatized patients. A study was conducted in this direction. Two groups of patients were formed, both of which had limb fractures. One group was composed of patients who suffered the fractures in the same earthquake and the other was formed of patients with fractures suffered in single traumatic events. There were statistically significant differences in the number of fractures, in the sense that earthquake victims experienced significantly more multiple fractures. From the morphological aspect of the fractures, the patients from the earthquake showed significantly more cominutive fractures. The purpose of this study was to identify the necessary resources for a comprehensive approach to a potential similar situation involving multiple victims.(19)

The casuistry of specialized hospitals may be an excellent source of relevant data for conducting studies on patients with specific traumatic injuries. A study on traumatology in a military hospital specialized in managing cases from the battle front provides a revealing picture behind the specific lesions to this socio-professional category. The cases considered for the study were also traumatic injuries suffered in direct relation to the work performed, as well as

traumatic events suffered in other circumstances, such as falls of different etiologies, road accidents, sports accidents and others. In over 50% of the cases where the lesions are related to military activity, they were produced by explosions. It is noted the frequent association of traumatic injuries with multiple localizations, respectively injuries of lower limbs in 63.5% of cases, upper limb lesions in 55.8% of cases and facial injuries in 32% of cases.(20)

The existence of a management system of medical resources in trauma cases is stated in various forms in the vast majority of countries of the world. A group of authors supports the opportunity of existence of such a system in Iran. At the conceptual level, the constitutive elements of this system are individualized, these being represented by the emergency medical system, the patient transport system, the triage procedure, the related communication system, the general and specialized trauma centres, the integrated information system, prophylactic measures, the legislative framework, the training of qualified medical personnel, as well as public education.(21) It is noted the lack from the study of specific quotations of situations with multiple victims.

DISCUSSIONS

Unfortunately, the worldwide status of research when it comes to managing medical resources in disastrous circumstances is very shallow. There are not many protocols, and often medical personnel are put in a situation where they have to improvise in order to save as many lives as possible during a casualty. The global issue of management of the polytraumatized patients is certified by the studies conducted in this respect field on several continents. Through various epidemiological studies, there is an attempt to identify factors and / or associations of factors, in order to optimize the health care provided to polytraumatized patients.

The need for guidelines is more visible in life threatening situations where doctors and additional medical workers are obliged to act quickly and precisely in order to minimize the loss of human lives but also to optimize the costs of medical resources. Hereby, although there are limitations concerning differences in locations where casualties occur, differences in the resources available in every country, a guideline, even a national one would be of utmost importance. In order for medical doctors to realize the vital need for these protocols, the first step is to assess the global position and knowledge concerning this topic.

This research has an impact in almost all medical specialties, changing almost completely the protocols, or the lack of protocols, existing currently in emergency medicine. But not only would emergency medicine benefit from a national guideline, but also laboratory medicine, intensive care and not the least, legal medicine.

Possible implications of this study are related to military field, especially because if the research can identify different types of lesions positively correlated to a specific war area, or a specific kind of accidents, infrastructure could be improved in order to completely or partially avoid tragedies.

Optimizing the costs, training specialists in different fields, finding the best medical resources as in to have a good “know-how” in the most critical times can be beneficial for both the patient, but also for the doctor, avoiding subjective influential factors like working under pressure and stress.

CONCLUSIONS

At present, there is an upward trend in carrying medical studies, therefore the number of articles published in scientific journals that are constantly growing. Also the consistently material, financial and human resources which are invested in this range of activities show the importance of this subject. The benefit is represented by the increased amount of information obtained, both useful by their applicability in current medical practice, and by the base these studies and articles provide for further research. A group of researchers suggests the need to evaluate medical studies beyond the initial scientific and academic rigor.

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