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Trauma Registry - A Necessity of Modern Clinical Practice

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Rezumat

Registrul de traumă – o necesitate a practicii clinice moderne

Introducere: Traumatismele reprezintă cauza a 10% din decesele din întreaga lume. Dezvoltarea cu succes a sistemelor de traumă, inclusiv utilizarea registrelor de traumă, a jucat un rol semnificativ în scăderea ratei mortalității și a dizabilităților datorate leziunilor prin traumatisme.

Metodă: Review al literaturii folosind căutarea computerizată în baza de date National Library of Medicine and the International Institutes of Health MEDLINE, folosind interfața PubMed. S-au selectat articolele ce abordau tema registrului de traumă din diferitele sisteme de traumă mondiale.

Rezultate: Registrele de traumă s-au dezvoltat odată cu introducerea acestora în centrele și sistemele de traumă din Statele Unite ale Americii, în anul 1970. Prima bază de date de traumă prelucrată cu ajutorul computerului a fost înființată în anul 1969 la Cook County Hospital, Chicago. Această bază a devenit prototipul registrului de traumă din Illinois, care a început să acumuleze date de la 50 de spitale desemnate centre de traumă din întregul stat în anul 1971. Țările cu resurse limitate au putut să-și întemeieze registre de traume folosite. Finanțarea continuă și personalul dedicat din interiorul echipei, reprezintă factori esențiali în succesul unui registru de traumă. Criteriul de includere folosit pe

scară largă în registrul de traume majore îl reprezintă scorul NISS (New Injury Severity Score) > de 15. Excluderea este reprezentată de pacienții internați la peste 24 de ore de la evenimentul lezional, cei declarați decedați înainte de sosirea la spital sau fără semne de viață la sosirea în spital. În plus, se recomandă ca asfixia, înecul și arsurile să fie excluse.

Concluzii: Îmbunătățirile în ceea ce privește îngrijirea poli-traumatizaților din țările în curs de dezvoltare depind de înființarea și funcționarea unor sisteme de traumă, unde registrul de traumă reprezintă parte din infrastructura acestor sisteme.

Cuvinte cheie: registrul de traumă, îngrijirea pacientului politraumatizat, performanță

Abstract

Introduction: Traumas represent the cause of 10 % of deaths in the entire world. The successful development of trauma systems, including the use of trauma registries, played a significant part in lowering the mortality and the disabilities due to injuries resulted from trauma.

Method: Review of the literature using computerized database of National Library of Medicine and the International Institutes of Health MEDLINE using PubMed interface. There were selected the articles that address the issue of trauma registry from the different world trauma systems.

Results: Trauma registries have developed once they were introduced in centers and trauma systems in the United States of America in 1970. First trauma database processed on computers was created in 1969 in Cook County Hospital in Chicago. This database became the prototype of trauma registry in Illinois which started gathering information from

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50 designated hospitals across the entire state in 1971. Countries with limited resources were able to start useful trauma registers. Continuous financing and dedicated personnel inside the team are two essential factors in the success of a trauma registry. NISS (New Injury Severity Score) higher than 15 is a widely used inclusion criteria in the trauma register. Exclusion is represented by patients admitted at over 24 hours after the accident, those declared dead before hospital arrival or with no signs of life on arrival in hospital. In addition, it is recommended that asphyxia, drowning and burns to be excluded.

Conclusion: The improvements regarding the treatment of multi-traumatized people in developing countries depend on establishing and performance of trauma systems, where trauma registry represents a part of these systems infrastructure.

Key words: trauma registry, patients care, performance.

Introduction

A registry of a disease represents a set of data which describes patients that meet different specific criteria, in which medical data, demographical or any other type of data are continuously and systematically registered with the purpose of serving the objectives that have been set (1).

Traumas represent the cause of 10 % of deaths in the entire world (2). The successful development of trauma systems, including the use of trauma registers, played a significant part in lowering the mortality and the disabilities due to injuries resulted from trauma. The predictions show that between 2000 and 2020, the deaths caused by road accidents will increase by 83% in less developed countries while in developed countries they will register a continuous decrease by 30% (3). The improvements regarding the treatment of multi-traumatized people in developing countries depend on establishing and functioning of trauma systems, where trauma registry represents a part of these systems infrastructure. A trauma registry offers a way of collecting and analyzing favorable epidemiological data, which can be used in improving the quality of treatments as well as in researches.

Trauma registries around the world

Trauma registries have developed once they were introduced in centers and trauma systems in the United States of America in 1970 (4). Their initial purpose was to highlight the epidemiological factor of the trauma (5).

First trauma database processed on computers was created in 1969 in Cook County Hospital in Chicago (6). This database became the prototype of trauma registry in Illinois which started collecting information from 50 designated hospitals across the entire state in 1971. In the United States of America there are 37 states with trauma data registers which include data regarding patients that are being treated in

specific centers. Recently, the Trauma Committee of American Surgeon College started National Trauma Data Bank (NTDB), a system that gathers prospective data from trauma registries of the centers and systems across United States. NTDB represents the biggest collection of trauma registries data and holds over one million entries gathered from 405 centers in the USA. Information from the database has become a powerful tool in developing areas like epidemiology, injuries control, research, education, acute care and resource allocations (7).

An analysis regarding the global mapping of trauma registries of 571 abstracts has revealed that most studies were published in the USA (288 articles) followed by Australia (45), Germany (32), Canada (27), UK (13), China (13), Israel (12); this study demonstrates that there is a substantial difference between the activities in trauma registers from country to country depending on the level of social-economical development in each country (8).

Most of the countries in the western Europe have trauma registers. In 1990 UK (Trauma Audit and Research Network-TARN) has registered its first patients, reaching 27000 patients in 2010, 175 hospitals have contributed with information for this registry. Germany (Trauma register of the German Trauma Society-TR-DGU) has registered its first patients in 1993 and has gathered data from 300 hospitals. It is important to know that a consort of 3 national/international groups with experience in what trauma registries mean like the ones in the UK, Germany and Scandinavia (SCANTEM-the Scandinavian Networking Group for Trauma and Emergency management) have started a trauma registry data for Europe (European trauma Registry Network) capable of evaluating different technical and organizational structures of assistance in the E.R. in Europe (members of UE or non-members), to adjust the quality of taking care of badly injured patients and to establish efficient structures for comparing the performances of different trauma centers including the ones in the USA and Australia. (Table 1)

In 2012 data of 28,805 patients from 573 actively participating hospitals have been documented in German trauma registry (TraumaRegister DGU). The total number of hospitals ever having participated in the registry was 614. Among them were 35 hospitals from outside Germany; 30 of them submitted data last year: Austria 16, Slovenia 5, the Netherlands 4, Switzerland 4, Luxembourg 2, Finland 1, Belgium 1, United Arab Emirates 1, and China 1. From German 543 hospitals actively participated in 2012.

Countries with limited resources were able to start useful trauma registers (9, 10). Continuous financing and dedicated personnel inside the team are two essential factors in the success of a trauma registry. Personnel orientation and training are very important processes and an essential contribution have also the computer experts in what concerns the development of the registry program and its data's analysis (11).

Some barriers that might come between the efficiency of trauma registry in the developing countries might be: deficiencies in pre-hospital care, inability of communicating, hospital matters regarding a patient transfer, the inability of evacuating and transporting a multi-traumatized patient, inadequate financing, unfavorable government health policies,

Table 1.

Country	Name of the trauma registry	Number of hospital submitting data	Number of patients	Time interval
Germany	TR-DGU® - German Society of Trauma Surgery, Cologne	573	122742	1993 – 2012
United Kingdom	Trauma Audit and Research Network (TARN)	175	27000	1990 – 2010
Netherlands	Dutch Trauma Audit	80	43726	2007 – 2010
Italy	Italian National Registry of Major Injuries (RITG)	26	6583	2007 – 2013
Denmark	Copenhagen University Hospital Rigshospitalet, Copenhagen (TARN) and Trauma Registry of Southern Denmark Odense	4	1678	1996 – 2010
Switzerland	TRAC - CHUV, Lausanne	2	315	2008-2010
Finland	Töölö Hospital Trauma Registry, Helsinki	1	400	2006 – 2010
Noway	Oslo University Hospital Ullevål Trauma Registry, Oslo	1	1415	2000 – 2010
Portugal	REGTRAUMA, Porto	1	152	2001 – 2010
Spain	Registre de Politrauma de Catalunya		400	2001 – 2010
Sweden	The Swedish Trauma Registry (SweTrau)			Not in use

lack of interest of the community and the limited capabilities of storing the data (10).

Inclusion/exclusion criteria

NISS (New Injury Severity Score) higher than 15 is a widely used inclusion criteria in the trauma register. NISS, proposed in 1997 is a modification of ISS (Injury Severity Score), score calculated by adding the sum of squares of AIS's (Abbreviated Injury Score) biggest values in three of the most affected parts of the body (head/throat, face, chest, belly, extremities and soft parts of the body). NISS is defined as the sum of squares of three AIS bad lesions no matter where the injured part is. Osler and his associates considered that NISS is an easier method and the one that produces better predictions than ISS concerning surviving (12). Lavoie et. al empower these ideas in a more recent study (13). The increase in the number of patients choosing NISS > 15 rather than ISS > 15 should be seen as a rise in sensibility without a loss of the ideal definition of major trauma. However, a review of the literature from 2008 shows that 19 studies comparing NISS with ISS does not reveal, any superiority of ISS (14).

Many experts have recommended the exclusion of patients that have been hospitalized on over 24 hours after the cause of lesions, those that are declared dead before arriving at the hospital or those that don't show any life signs (pupil response, spontaneous ventilation, presence of carotid pulse, blood pressure measurable movements of the extremities or cardiac electrical activity) (15) at their arrival to the hospital. Furthermore it is recommended that asphyxiation, drowning and burns should be excluded. A balance between "scoop and run" and "stay and play" is probably the best approach for trauma patients. The chosen approach should be made according to the mechanism of injury (blunt versus penetrating trauma), distance to the trauma center (urban versus rural) and the available resources (16).

Trauma registry utility

Trauma registry is an useful tool for collecting continuous

standardized data which help analyzing and improving the quality of taking care of traumas, provides that resources are allocated correctly and offers proof on the incidence of trauma (9). This offers viable information on risk factors regarding different types of lesions and ways to prevent them (17). Furthermore uniting data from the trauma register with other sources of information regarding the injured victims can produce a more descriptive resource (18).

Comparing trauma registers from the United States with the ones from France it has identified equivalent results concerning the patients that survived and arrived at the hospitals and also revealed that the costs of road accidents varies from 7500 dollars to 120.000 dollars per patient (19).

Trauma registers are valuable instruments that help identifying the regions where applying policies of improving the quality of taking care of the multi-traumatized patient are necessary, proving to be very useful in the progress of health systems (4). Trauma systems improve surviving rates of multi-traumatized patients and trauma registers represent an integral and essential part of these systems (20). Useful information can be obtained concerning risk factors for different lesions and also possible preventive methods. For example a German group used the trauma register to successfully study pre-hospital sorting and the survival of major trauma patients (21).

Details from the trauma registers were used to change the law that stipulates the minimum legal age necessary for purchasing alcohol, distributing alcohol as well as the sanctions for driving under its influence (22,23).

Deficiencies of trauma registries

Despite the advantages, trauma register has also disadvantages that limit its value as a mean to monitor the public health. Many people that have been injured from the developing countries either they simply don't survive enough to reach to the hospital either they don't benefit from formal behavior in the hospital and are not entered in the register. Another problem is that collecting and filling pre-hospital events is still a problem for trauma registers. The lack of coherence in filling some essential information like Glasgow Coma Score (GCS)

and the vital signs on the field are two holdbacks for the researchers that try to include these valuable information in their investigations (24). Many investigators consider the complications underestimated in the trauma registers. Rate of complications at NTDB (National Trauma Data Base) level is surprisingly low especially when compared with other databases like National Surgical Quality Improvement Program (NSQIP), a group of general surgery that represent a group of electively operated reference cases. For example, in NTDB, in 2008 only 3.954 from 627.684 cases had systemic sepsis. This case represents 0.6% of the total traumatized patients. Also NSQIP, the group of general surgery had a 3.1% rate of sepsis (25). Unfortunately most centers don't have the proper infrastructure for following the complications as they appear along the way. Underestimating the complications and the inability to calculate the risk are the two reasons that make the studies concerning new methods of therapy inaccurate and practically worthless. To conclude, the absence of important components regarding the taking care of traumatized patient, like the deaths in pre-hospital stage, the rate of complications as well as the failure in incorporating long term survival measures and functional results in the surviving patients clearly limit the utility of trauma registers in evaluating actual efficiency in taking care and testing new methods of therapy.

Conclusions

Trauma registry is an useful tool to aid in managing trauma load in a hospital and it is indispensable study tool which is of immense value to run an audit or research project. Although it is a new concept its benefits are many. It also gives a valuable feedback of performances which is crucial in recognize the limitation and improvement in clinical care.

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