

تقنين النتائج حسب شدة الإصابة للإصابات المهنية والغير مهنية

رسالة مقدمة توطئة للحصول على درجة الدكتوراه فى طب المهن و البيئة من

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المدرس المساعد بقسم طب المجتمع و البيئة و طب الصناعات
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Severity Adjusted Outcomes of Occupational and Non-occupational Trauma

Thesis submitted for partial fulfillment of Doctorate Degree in
Occupational and Environmental Medicine

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INTRODUCTION

Trauma patients are often considered a separate entity in comparative medical reports, but in reality, a huge variety of different injury pattern are summarized under this heading, **(Lefering R., 2002)**

According to the CDC, injuries are classified into motor vehicle-related injuries, fall-related injuries, fire-related injuries, water-related injuries, pedestrian injury, needlesticks, poisoning, homicide, suicide and others, **(CDC, 2006)**

Trauma is the third highest cause of death in the developed world where there are established trauma care systems. According to the World Health Organization, by the year 2020, trauma will be the leading cause of years of life lost in both developed and developing countries, **(Jat et al, 2004)**

It is a leading cause of death for Americans of all ages, regardless of gender, race or economic status. But injury deaths are only part of the picture. Millions of Americans are injured each year and survive. For many of them, the injury causes temporary pain and inconvenience, but for some, the injury leads to disability, chronic pain, and a profound change in lifestyle, **(CDC, 2006)**

Notably, more than 90% of the deaths from injuries occur in low- and middle-income countries. The silence drama of injuries is in that for each death thousand survivors will have to live with permanent disabilities, **(WHO, 2005)**

The situation in developing countries is alarming due to lack of resources, organization and integration in trauma care, **(Jat et al, 2004)**. Injuries are the leading cause of hospitalization in Indonesia, **(Graitcer,1992)**. In India, for example, approximately 3.2 million people are injured in road traffic accidents every year. Of these, about 48,000 die, **(Jat et al, 2004)**.

In the U.S the total number of injuries/illnesses reported for 2003 was 3,402,200 and rate 2.5 (per 100 workers aged >15 years). The distribution of injury/illness diagnoses showed that 79% occurred in five diagnostic categories: sprains and strains (27%); lacerations, punctures, amputations, and avulsions (24%); contusions, abrasions, and hematomas (18%); dislocations and fractures (7%); and burns (3%), **(Marsh SM, Derk SJ, Jackson LL, 2006)**

In Egypt, injuries are a significant source of morbidity and mortality. They are the fifth leading cause of death and the leading cause of hospitalization, and account for at least one-quarter of all outpatient visits. The overall disability rate due to occupational injury was 7/100,000 for women and 150,000 for men during 1979-1984. **(Ministry of health, 1994)**.

For more than 30 years, several attempts to quantify severity of injuries on a numerical scale have been developed and applied. These score systems play an important role in research but also in comparative analyses in quality assessment, **(Lefering R., 2002)**. The Major Trauma Outcome Study (MTOS) is a retrospective descriptive study of injury severity and outcome coordinated through the American College of Surgeons' Committee on Trauma. From 1982 through 1987, 139 North American hospitals submitted demographic, etiologic, injury severity, and outcome

data for 80,544 trauma patients, (**Champion et al,1990**). It was created to establish national norms for trauma care, (**Glance et al, 2005**). The Trauma and Injury Severity Score (TRISS) methodology was developed to predict the probability of survival after trauma. Despite many criticisms, this methodology remains in common use, (**Bergeron, 2004**).

However, the use of survival as a measure of the effectiveness of trauma care may be too limited in scope because it fails to capture information regarding functional outcomes, (**Glance et al, 2004**). Among the various approaches to the study of trauma, analysis of the organization and quality of care has been frequently reported in the literature, (**Scarpelini et al, 2006**)

The purpose of auditing trauma care is to further reduce preventable morbidity and mortality associated with trauma, (**Jat et al, 2004**). The lack of trauma related data is a major impediment in recognition of deficiencies in care. Trauma database in the form of a registry can provide necessary information for monitoring and modifying trauma care, (**Zafar et al, 2002**)

Besides the Injury Severity Score which is by far the most frequently applied score, several more sophisticated approaches have been developed to better describe injury severity and to improve outcome prediction. Critical evaluation of outcome is a central point in quality assessment. Scores are not the key elements of quality improvement efforts, but without them, many approaches simply become impossible. Score systems thus can play an important role in quality assessment. If scores are used by many people, they become a “common language”, and

objectivity may increase when talking about trauma, **(Lefering R., 2002)**. A "unified" injury system is a necessary and crucial advance from the currently fragmented injury system situation, **(Garthe et al, 1999)**.

Trauma and Injury Severity Score (TRISS) has been adopted by several local or national trauma registries for assessment of trauma severity and for comparison of different institutions. For a group of patients, the average predicted mortality rate can be used as an external standard the actual outcome is compared with. These comparisons play a central role in many quality improvement programs, either for comparing different hospitals, for evaluating sequential phases of time, or for identifying problematic subgroups or conditions in trauma care, **(Lefering R., 2002)**. An institution's trauma survival rate can be compared with that predicted by TRISS using definitive outcome-based evaluation, **(Hollis et al, 1995)**

TRISS has been extensively studied and validated in the Western world, but its applicability in developing countries has been questioned, **(Jat et al, 2004)**. In developing countries both institution-bound factors and specific limitations in the TRISS methodology are responsible for the difference between predicted and observed mortality, indicating the need for a regional database, **(Joosse, 2001)**

Improved survival after injury has been demonstrated with trauma system implementation and designation of trauma centers, **(Simons et al, 2002)** . Education, resident training, guidelines, and evaluation are necessary to improve health care quality, **(Takayanagi, 2004)**

In **1998**, **Jukka Takala** as a reporter of ILO stated that Egypt represented reasonably large samples of the Middle Eastern Crescent region with Turkey. They showed fatality rate in agricultural work is higher than average. The overall absolute figure of fatalities in the region was 41,850 in 1994.

Objectives:

1. To describe pattern for occupational and non-occupational trauma cases attending Emergency room of El Demerdash Surgical Hospital.
2. To calculate severity adjusted outcome measures for occupational and non-occupational trauma management (mortality and length of stay).
3. To test application of these measures in monitoring performance of trauma management.

Subjects and Methods:

- **Study design:**

This work will include two types of study types:

- (I) Retrospective study: collecting the data needed from ER registry of El Demerdash Surgical Hospital.
- (II) Cross - sectional study of trauma cases attending emergency room of El Demerdash Surgical Hospital.

- **Study site:**

Emergency room and the surgical departments of of El Demerdash Surgical Hospital.

- **Study population:**

For retrospective study: All trauma cases included in ER registry of 2006 are legible to be included in the study

For cross sectional study: All traumatized patients attending the emergency room (ER) of Al Demerdash hospital are legible to be included in the study.

The study subjects will then be divided into occupational and non-occupational trauma cases. The trauma will be considered an occupational trauma according to the International Labour Organisation (ILO) definition; which states that Occupational accident is defined as a sudden and unintentional occurrence normally causing bodily harm or injury; it occurs during working hours on the direct way to or from work (***ILO, 2006***).

Exclusion criteria: (They will be applied only in the cross sectional study)

- 1- Patients transferred from other hospitals after performing any medical or surgical procedure.
- 2- Traumatized children (less than 18 years old).

- **Sample size:**

- (I) Retrospective study: To estimate the sample size, we used the following equation :

$$N = \frac{\alpha^2 pq}{d^2}$$

Where N is the estimated sample size, considering the margin of error is 5%, α equals 2 approximately, each of p and q equal 0.5 and d equals 0.05. Then the estimated sample size will be equal to 400 cases.

- (II) Cross - sectional study: Sample size is estimated to be 500 trauma cases using Power and Sample Size Program. Using α equals 0.05, power of 80%, Relative Risk equals 2 (i.e. to detect doubling of mortality rate) and assuming that mortality rate of trauma in the general population is 10 %; the estimated sample size of the occupational trauma is 158. Since the non-occupational trauma rate is estimated to be double that of the occupational, therefore the sample size of the non-occupational trauma is 316. Adding them together, the total sample size is 474. Considering incomplete or unreliable data in the questionnaires, the sample was enlarged to be 500 cases.

- **Sampling:**

- (I) Retrospective study: systematic random sampling considering 5% of all trauma cases

attending the ER during the previous year. The sampling will be carried out using the ER registry. Since El Demerdash ER receives around 50 trauma cases daily, thus 5% will ensure inclusion of the required sample or even more..

- (II) Cross - sectional study: All trauma cases attending the emergency room consequently will be included from the time of starting the study until completing the required sample size.

• **Study tools :**

Retrospective study: A data collection sheet will be prepared including the following items:

- 1- Hospital department and patient's file number.
- 2- Date of admission and date of discharge to calculate the patient's length of stay (LOS).
- 3- Timing of accident & timing of admission.
- 4- Referral from other hospital.
- 5- Mechanism and type of injury according to CDC classification, **(CDC, 2001)**.
- 6- Patient personal data: Age, Sex, Occupation and residence.
- 7- Patient's state on discharge.

- (II) Cross - sectional study: Another data collection sheet will be prepared including all the items required for calculating Trauma Injury Severity Score (TRISS) for traumatized patients and to diagnose occupational trauma. The sheet will include:

- 1- Hospital department and patient's file number.
- 2- Date of admission and date of discharge to calculate the patient's length of stay (LOS).
- 3- Timing of accident & timing of admission.
- 4- Referral from other hospital.

- 5- Mechanism and type of injury according to CDC classification, **(CDC, 2001)**.
- 6- Patient personal data: Age, Sex, Occupation and residence.
- 7- Patients' anatomical injury coded according to the Abbreviated Injury Scale (AIS).
- 8- Patient's physiological state after injury including systolic blood pressure, respiratory rate, and Glasgow Coma Scale (based on eye, verbal and motor response).
- 9- Associated complications e.g. embolism, infections or any other complications.
- 10- Associated co-morbidity e.g. common endocrinal, cardiovascular, neurological, immunological diseases or previous disability.
- 11- History of drug abuse.
- 12- Patient's state on discharge.

- **Methods:**

(I) Obtaining the required administrative approvals to carry out the study in the surgical department of Ain Shams University Hospital.

(II) A pilot study will be carried out to test the study tools.

(III) Training of the Emergency Room (ER) staff: the ER staff will be subjected to awareness session on objectives and rationale of the study followed by practical training session on the accurate way of filling data collection sheet for the cross sectional study.

(IV) Data collection:

1- The required data for the retrospective study will be collected using the data collection sheet (1) from the ER registry.

2-The required data for the cross-sectional study will be collected using the data collection sheet (2) for all new trauma cases attending ER 24 hours daily until fulfilment of sample size.

(V) Reviewing the accuracy and completeness of data (will be applied for the cross sectional part of the study): the investigator will check through concurrent field visit the completeness and accuracy of data. Any uncompleted data will be collected from the files, interviewing the patients and treating physicians. To test accuracy of data 10% of the sheet will be recollected by the investigator each visit (concurrently) and required correction will be done after discussion with the ER staff.

(VI) Calculating TRISS: using some of the collected data namely the Abbreviated Injury Scale, systolic blood pressure, respiratory rate, coma score and the age of the patient, the patient's probability of survival will be calculated according to the type of trauma whether blunt or penetrating trauma. The calculations will be carried out using a personal computer through a TRISS calculator.

(VII) Data management: The collected data will be coded, checked and introduced to a computer using statistical package for social sciences (SPSS). Descriptive analysis will be done for all trauma cases. The observed mortality will then be compared to the predicted mortality and adjusted outcomes will be calculated and compared for occupational and non-occupational trauma. In addition to mortality, TRISS Score will be used to adjust trauma performance

outcomes namely length of stay and presence of impairment on discharge from hospital. The adjusted data will then be used to develop control chart to monitor trauma management performance at ER.

(VIII) Interventional study: control charts will be applied for 6 months to monitor trauma management performance at ER.