

EAJEM

Eurasian Journal of Emergency Medicine

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Aims and Scope

Eurasian Journal of Emergency Medicine (Eurasian J Emerg Med) is the open access, scientific publication organ of the Emergency Medicine Physicians' Association of Turkey that is published in accordance with independent, unbiased, double blind peer review principles. The journal is published 4 times in a year in March, June, September and December.

The journal aims to publish scientifically high quality articles which can contribute to the literature and written in the emergency medicine field and other related fields. Review articles, case reports, editorial comments, letters to the editor, scientific letters, education articles, original images and articles on history and publication ethics which can contribute to readers and medical education are also published.

The journal's target audience includes Emergency Medicine experts, School members who conduct scientific studies and work in the Emergency Medicine field, researchers, experts, assistants, practicing physicians and other health sector professionals.

Editorial and publication processes of the journal are shaped in accordance with the guidelines of the international organizations such as the International Council of Medical Journal Editors (ICMJE), the World Association of Medical Editors (WAME), the Council of Science Editors (CSE), the Committee on Publication Ethics (COPE), the European Association of Science Editors (EASE). The journal is in conformity with Principles of Transparency and Best Practice in Scholarly Publishing (doaj.org/bestpractice).

Eurasian Journal of Emergency Medicine is indexed in Web of Science-Emerging Sources Citation Index, TUBITAK ULAKBIM TR Index, EMCare, DOAJ, EBSCO, CINAHL, GALE and ProQuest.

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Eurasian Journal of Emergency Medicine (Eurasian J Emerg Med), as a double-blind peer reviewed journal published by the Emergency Medicine Physicians' Association of Turkey, publishes original articles on clinical, experimental and basic sciences in the Emergency Medicine field, review articles covering basic and up-to-date subjects, case reports, short editorial manuscripts and manuscripts covering medicine history and publication and research ethics.

Editorial and publication processes of the journal are shaped in accordance with the guidelines of the international organizations such as the International Council of Medical Journal Editors (ICMJE), the World Association of Medical Editors (WAME), the Council of Science Editors (CSE), the Committee on Publication Ethics (COPE), the European Association of Science Editors (EASE). The journal is in conformity with Principles of Transparency and Best Practice in Scholarly Publishing (doaj.org/bestpractice).

Originality, high scientific quality and citation potential are the most important criteria for a manuscript to be accepted for publication. Manuscripts submitted for evaluation should not be previously presented or published in an electronic or a printed medium. Editorial Board should be informed of manuscripts that have been submitted to another journal for evaluation and rejected for publication. Submission of previous reviewer reports will expedite the evaluation process. Manuscripts that have been presented in a meeting should be submitted with detailed information on the organization including the name, date and location of the organization.

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An approval of research protocols by Ethics Committee in accordance with international agreements (World Medical Association Declaration of Helsinki "Ethical Principles for Medical Research Involving Human Subjects", amended in October 2013, www.wma.net) is required for experimental, clinical and drug studies and some case reports. If required, ethics committee reports or an equivalent official document may be requested from the authors. For manuscripts concerning experimental research on humans, a statement should be included that shows informed consent of patients and volunteers was obtained following a detailed explanation of the procedures that

they may undergo. For studies carried out on animals, the measures taken to prevent pain and suffering of the animals should be stated clearly. Information on patient consent, name of the ethics committee and the ethics committee approval number should also be stated in the materials and methods section of the manuscript. It is the authors' responsibility to carefully protect the patients' anonymity. For photographs that may reveal the identity of the patients, releases signed by the patient or their legal representative should be enclosed.

All submissions are screened by a similarity detection software (iThenticate by CrossCheck).

In the event of an alleged or suspected research misconduct, including plagiarism, citation manipulation, and data falsification/fabrication, among others, the Editorial Board will follow and act in accordance with COPE guidelines.

Each individual listed as an author should fulfill the authorship criteria recommended by the International Committee of Medical Journal Editors (ICMJE - www.icmje.org). The ICMJE recommends that authorship be based on the following 4 criteria:

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Review Articles: Reviews which are prepared by authors who have extensive knowledge on a particular field and whose scientific background has been translated into high volume of publication and higher citation potential are taken under review. The authors may be invited by the journal. Reviews should be describing, discussing and evaluating the current level of knowledge or topic used in the clinical practice and should guide future studies. Please check Table 1 for limitations for Review Articles.

Case Reports: There is limited space for case reports in the journal and reports on rare cases or conditions that constitute challenges in the diagnosis and treatment, those offering new therapies or revealing knowledge not included in the books, and interesting and educative case reports are accepted for publication. The text should include Introduction, Case Presentation, Discussion, Conclusion subheadings. Please check Table 1 for limitations for Case Reports.

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History: This type of manuscript explains events related to emergency and general medicine and presents information on the history of diagnosis and treatment of diseases. Historical findings should be a result of relevant research studies. Manuscript should not include sub-headings, should not exceed 900 words and total number of references should be limited to 10.

Publication ethics: This type of manuscript includes current information on research and publication ethics and presents cases of ethics infringement. Main text should not exceed 900 words and total number or references should be limited to 10.

Tables

Tables should be included in the main document, presented after the reference list and they should be numbered consecutively in the order they are referred to within the main text. A descriptive title must be placed above the tables. Abbreviations used in the tables should be defined below the tables by footnotes (even if they are defined within the main text). Tables should be created using the "insert table" command of the word processing software and they should be arranged clearly to provide an easy reading. Data presented in the tables should not be a repetition of the data presented within the main text but should be supporting the main text.

Table 1. Limitations for each manuscript type.

Type of manuscript	Word limit	Abstract word limit	Reference limit	Table limit	Figure limit
Original Article	5000 (Structured)	200	50	6	7 or total of 15 images
Review Article	5000	200	50	6	10 or total of 20 images
Case Report	1500	200	10	No tables	10 or total of 20 images
Letter to the Editor	500	N/A	5	No tables	No media
Scientific letter	900	N/A	10	No tables	2 or total of 4 images
Clinical Imaging/ Visual Diagnosis	400	N/A	5	No tables	3 or total of 6 images
History	900	N/A	10	No tables	3 or total of 6 images
Publication ethics	900	N/A	10	No tables	No media

Figures and Figure Legends

Figures, graphics and photographs should be submitted as separate files (in TIFF or JPEG format) through the submission system. The files should not be embedded in a Word document or the main document. When there are figure subunits, the subunits should not be merged to form a single image. Each subunit should be submitted separately through the submission system. Images should not be labelled (a, b, c, etc.) to indicate figure subunits. Thick and thin arrows, arrowheads, stars, asterisks and similar marks can be used on the images to support figure legends. Like the rest of the submission, the figures too should be blind. Any information within the images that may indicate an individual or institution should be blind. The minimum resolution of each submitted figure should be 300DPI. To prevent delays in the evaluation process all submitted figures should be clear in resolution and large in size (minimum dimensions 100x100 mm). Figure legends should be listed at the end of the main document.

All acronyms and abbreviations used in the manuscript should be defined at first use, both in the abstract and the main text. The abbreviation should be provided in parenthesis following the definition.

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including the name of the product, producer of the product, city of the company and the country of the company should be provided in parenthesis in the following format: "Discovery St PET/CT scanner (General Electric, Milwaukee, WI, USA)"

All references, tables and figures should be referred to within the main text and they should be numbered consecutively in the order they are referred to within the main text.

Limitations, drawbacks and shortcomings of original articles should be mentioned in the "Discussion" section before the conclusion paragraph.

References

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Book Section: Sherry S. Detection of thrombi. In: Strauss HE, Pitt B, James AE, editors. *Cardiovascular Medicine.* St Louis: Mosby; 1974.p.273-85.

Books with Single Author: Cohn PF. Silent myocardial ischemia and infarction. 3rd ed. New York: Marcel Dekker; 1993.

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Editorial

My Dear Colleagues,

It is our pleasure to welcome you in the 3rd issue of Eurasian Journal of Emergency Medicine in 2018 and I hope you find it interesting. In this issue, we present 8 original articles, 4 case report, 1 brief report, 1 image of interest and a letter to editor.

I am proud to announce you that Professor Dr. Luis Garcia Castrillo has agreed to join us as co-editor in our journal. I would like to thank him for their valuable contribution to our journal.

I hope that the Eurasian Journal of Emergency Medicine helps you through conveying your valuable experiences in the field of emergency medicine.

We kindly ask our readers to share their opinions for exploring new ways to make the journal more useful and practical.

Finally, I would like to thank all of our dear authors for submitting their articles. We wish to receive your continuing support and contributions.

Sincerely

Dr. Isa Kilicaslan
Editor in Chief.

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Acute Ischemic Stroke Management-The Updated 2018 Stroke Guidelines

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Cite this article as: Sogut O. Acute Ischemic Stroke Management-The Updated 2018 Stroke Guidelines. Eurasian J Emerg Med. 2018; 17 (3): 89.

Dear Editor,

Following publication of the 2013 Stroke Guidelines, revisions were made to the 2015 update after publication of randomized clinical studies with high levels of evidence. The 2018 guidelines on the early management of patients with ischemic stroke containing these revisions were provided online as an epub ahead of print on January 24, 2018, and were published in the March 2018 issue of Stroke (1). The DAWN (January 4, 2018) and DEFUSE-3 (February 22, 2018) studies published in The New England Journal of Medicine just before the release of the new guidelines prompted important revisions in the 2018 Stroke Guidelines (2, 3). In the DAWN study, among patients with acute stroke last known to be well 6-24 hours previously among patients with acute ischemic stroke who known to be well between 6 and 24 hours, and who had a discrepancy between the clinical deficit and infarct volume, the 90-day neurological outcomes were better in patients who underwent thrombectomy and were given standard care than in those who received standard care only (2).

As a novel recommendation, the updated guidelines have widened the time window (6-24 hours after stroke onset) and patient criteria for mechanical thrombectomy among patients with acute ischemic stroke (1). In the updated guidelines, mechanical thrombectomy is recommended for selected cases with acute ischemic stroke within 6-16 hours after symptom onset among patients with large-vessel occlusion in the anterior circulation who meet the other criteria specified in DAWN (discrepancy between clinical presentation and infarct volume) or DIFFUSE-3 (ischemic tissue volume/infarcted tissue volume ≥ 1.8 ; perfusion/diffusion mismatch ≥ 1.8) (Class I, Level of Evidence A) (1-3). The guidelines also state that for selected cases with acute ischemic stroke, it is reasonable to perform mechanical thrombectomy within 6-24 hours after symptom onset among patients with large-vessel occlusion in the anterior circulation who

meet the DAWN patient appropriateness criteria (Class IIa, Level of Evidence B) (1, 2).

In conclusion, the updated guidelines emphasize that effective stroke treatment be provided as soon as possible and measures to prevent stroke recurrence be taken. They stressed that stroke training programs should be provided for various racial, age, and gender groups. The updated guidelines also widened the time window (6-24 hours after stroke onset) for performing mechanical thrombectomy among selected patients. Like the older version, however, the guidelines recommend mechanical thrombectomy be performed in an experienced stroke center (1).

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Management Instruments in the Emergency Department

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Abstract

Different management techniques need to be used to solve the special problems and challenges faced in emergency departments (EDs). These include SWOT (strengths, weaknesses, opportunities, and threats) analysis, lean management, process management, change management, and syntegeation. A successful leader of an ED needs to use elements from industrial management techniques, especially those involving work that takes place in a constant flow and does not stop. A process of strategic reorganization may be needed.

Keywords: Emergency department, management, processes, lean management, leadership

Introduction

Different management techniques need to be used to solve the special problems and challenges faced in emergency departments (EDs). These include SWOT (strengths, weaknesses, opportunities, and threats) analysis, lean management, process management, change management, and syntegeation (1-6). A successful leader of an ED needs to use elements from industrial management techniques, especially those involving work that takes place in a constant flow and does not stop (7). A process of strategic reorganization may be needed.

The process should start with a SWOT analysis of the strengths, weaknesses, opportunities, and threats faced by the ED (1).

This should also include an analysis of the hospital itself. A common problem with the hospital structure is an inefficient "silo" or "island" command and control structure. This means that other specialty medical departments operate alone, focusing on their own work, ignoring the other departments, and not coordinating activities. These operational silos or islands can result in a huge loss of efficiency (6, 7).

A detailed examination must also be performed of ED strategic goals, current working practices, interfaces between the ED and other departments, staffing, and resources.

A common challenge expected is creating ED working systems in which work flows. This is important to prevent long waiting times and to deal with the large numbers of patients who need medical care. The science of creating a flow of work is a part of the management tool called lean management. This is a science that is used in manufacturing industries, including the automobile industry (8). Sometimes, doctors do not like being compared with workers from the automobile industry. But the leader of an ED must have an open mind and be ready to learn from even non-medical science.

As an example of lean management in EDs, I will describe the First View concept (5, 6) that I implemented in Germany.

The patient arrives and undergoes triage by a specially trained nurse. In the First View concept (7), a senior physician then makes an initial examination of the patient in a first view. After this provisional diagnosis of the patient, the senior physician then delegates systematic diagnostic and treatment work to junior physicians and laboratories, etc.

The initial treatment and diagnostics tasks are performed while the laboratory tests are ordered. When this process is completed, the senior physician then reviews the case and makes a decision about admitting the patient to an in-house medical department, transferring to intermediate care, or discharging home.

This study was presented in the 5th International Critical Care and Emergency Medicine Congress (EPAT), April 2018, Antalya.

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The key is that different types of work continue constantly and simultaneously on large numbers of patients. The goal is that working processes should not stop while another work is being carried out.

To deal with the large numbers of patients with minor illnesses or injuries, a Fast Track Unit was created. It comprised an experienced physician who was qualified to not only quickly treat small ailments but also identify patients with serious illnesses who were not recognized by the triage nurse.

Such processes must be supported by intelligent information technology to give an overview of the status of each patient and to reduce the time needed for administrative tasks to a minimum. IT systems are available that give an overview of where patients are, how long they have been waiting, and what processes they are waiting for or are undergoing (8, 6).

The ED is a very complex organization. But the leader needs to think in simple terms, using techniques from industry, especially automobile production, to assess resources (9).

In industry, these terms are hardware, software, peopleware, and brainware (6).

Hardware is the hard equipment and buildings that the ED possesses. Software is not computer software but the professional skills of the ED personnel.

Peopleware is naturally the doctors, nurses, and other support personnel.

Brainware is the benefit the department has created; it is the ED's expertise, capability, and experience that it has created by working together.

Probably, the tool of total quality management (10, 11) will also be needed to assess quality, to achieve mastery through perfection in detail, to achieve standards of care, and to recognize errors and create systems to avoid them.

Introducing a change is a management technique that is common in other industries. The ED leader must consider the expertise developed when other industries underwent changes; this is known as change management.

Announcing that a change will take place, either inside the ED or in the hospital itself, is often only of little use. There could be passive and active resistance to plans from an ED leader for a change, both inside the ED and in other hospital departments. Instead, change management is needed. This is the science of introducing a change including when change may be resisted.

The change management tool requires clear leadership. The playing field and rules must be clearly defined. A detailed analysis must be made of a working process and everyone and everything involved in it. A detailed plan must then be made of the change. The process must be systematic and not intuitive, like in the additional management technique of project management.

One or many projects should be created in detail to define and implement the change. Each stage of change implementation is made clear, and the role of every personnel involved is made transparent. The fear of change can be removed by understanding why and what change is needed and that many things in the department are changing.

A clear time schedule is also created for the preparation and implementation of the change process. This gives the ED leader a detailed overview of the change process: its progress, lack of progress, and causes of delays.

The goal should be to establish the ED as a center of excellence that ultimately helps the hospital to achieve its strategic goals.

Emergency departments and emergency physicians work on an orientation on function. This means faster work, with better organization than some other hospital departments that operate as silos or operational islands.

An answer to solve the problem of working with other departments is the management tool of syntegegration presented by Anthony Stafford Beer (1). Syntegegration means synergy and integration. This means creating a close link between the ED and other hospital departments by making use of networking, complexity, agility, communications, empowerment, self-reflection, and creative tensions.

An ED can create benefit for all involved in the hospital and for patients (9). It can become a center of excellence for the hospital, moving away from being purely regarded as a cost center to becoming a competence center that establishes the treatment patterns and helps steer the hospital to strategic success.

By implementing all these management tools, the ED as a corporate center of excellence can create added, shared value. The ED moves from being a cost center to being a profit and competence center inside the hospital network (6, 10, 12).

Conclusion

A mix of different management techniques must be used to solve the special problems and challenges faced in EDs. No single technique is enough. A successful leader of an ED needs to use elements from industrial management techniques, especially those involving work that takes place in a constant flow and does not stop. Techniques must also be used for change management and for Syntegegration with the aim of making the ED a centre of corporate excellence.

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Hospital-Wide Interprofessional Simulation-Based Training in Crisis Resource Management

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Abstract

Aim: Crisis resource management (CRM) refers to the set of non-technical skills such as leadership, task distribution, communication, anticipation, calling for help, and workload distribution required during crisis for effective teamwork. Currently, there is no formal training for healthcare workers at King Abdulaziz University Hospital (KAUH). The leaders of KAUH along with those of the Clinical Skills & Simulation Center sought to develop a simulation-based training program as a continuous effort to improve interprofessional training and patient safety.

Materials and Methods: In this quasi-experimental study, we developed a simulation-based program consisting of four phases: Needs assessment via mock codes, "Train the Trainer" course, CRM courses, and post-program evaluation via mock codes. Pre-tests and post-tests were performed in each course.

Results: Phase one: Twenty-five healthcare workers participated in four mock codes; using an internally developed checklist, the average score was 46% of checklist items. Phase two: Eighteen potential instructors attended the "Train the Trainer" course, and average pre-test and post-test scores were 31% and 61%, respectively. Ten instructors participated in the following courses. Phase three: Ten CRM courses conducted for 184 healthcare workers with different backgrounds. Pre-test and post-test cumulative scores were 48% and 64% ($p=0.0008$), respectively. Phase four: average score for all four mock codes was 76% compared to 46% in the needs assessment phase ($p=0.0003$).

Conclusion: Simulation-based training is an effective tool for the application of CRM principles. It might lead to improvements in patient safety and reduction in human errors. An organization's leadership is essential to ensure the successful implementation of the program.

Keywords: Simulation, crisis resource management, interprofessional training

Introduction

Crisis resource management (CRM) principles were introduced in the 1970s in the aviation industry in response to the alarming fact that approximately 70% of airplane crashes happened because of teamwork failure and human errors (1-3). Anesthesia was the first medical specialty to adopt the CRM principles and bring them to the healthcare industry to mitigate human errors and improve teamwork (4, 5). Emergency medicine followed the same path and introduced CRM for its physicians and trainees (6-9). CRM refers to the set of non-technical skills and behavioral principles such as leadership, task distribution,

communication, knowledge of environment, anticipation and planning, obtaining timely assistance, attention allocation, and workload distribution (4-9) required during crisis for effective teamwork. The Institute of Medicine recommends the use of simulation in interdisciplinary team training to improve patient safety (10).

The Clinical Skills and Simulation Center (CSSC) at the King Abdulaziz University Hospital (KAUH) is a well-known simulation-based training center both nationally and in the Middle East. It was recently internationally accredited by two prestigious bodies in the field of simulation: The Royal College of Physicians and Surgeons of Canada

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and Society for Simulation in Healthcare. In addition, CSSC awarded KAUH with the ASPIRE trophy for "Excellence in Simulation" at the Association for Medical Education in Europe's (AMEE) 2017 International Conference in Medical Education in Finland.

King Abdulaziz University Hospital did not have a formal interprofessional CRM training for healthcare workers (HCWs). This issue was recognized during the risk management and quality improvement executive meetings, which received reports from the cardiopulmonary resuscitation (CPR) committee that there is scope for improvement in the non-technical skills during resuscitation and rapid response situations. Hence, KAUH leaders along the CSSC leaders sought to develop a simulation-based CRM training program for all HCWs in KAUH as continuous efforts to improve patient safety and mitigate human errors during crisis and critical situations.

Materials and Methods

This is a quasi-experimental (pre-test and post-test) study that was conducted in 2016 in the CSSC at KAUH located in Jeddah, Saudi Arabia. Initially, an interdisciplinary committee was formed (ten members: six physicians and four nurses) to develop the CRM program under the guidance of KAUH and CSSC leadership. The committee met a couple of times until they developed the structure of the program and the implementation plan. Ethics committee approval was received for this study from the Unit of Biomedical Ethics at King Abdulaziz University, School of Medicine (Reference No. 378-16, 2016). As with any other activity that takes place in the CSSC, all the participants in the program signed confidentiality agreements, and consented to participate as per the CSSC policy and procedures.

The CRM program consisted of four phases. Phase One: Needs assessment. This was done by running four mock codes in different areas of the hospital: the emergency department (ED) and hospital wards. The cases were two patients with CPR (unresponsive patient with no palpable pulse and apneic) and two critically ill patients (septic shock and gastrointestinal active bleeding) consisting of two adults and two children. We developed a checklist that addressed the main CRM principles. The listed ten items were based on what has been mentioned in the literature (4-6). It included: know the environment, effective leadership, effective communication (closed-loop), good teamwork, call for help, frequent re-evaluation, sharing information, workload distribution, utilization of available resources, and allocate attention wisely (avoid fixation error). The checklist was used together with the standard KAUH checklist for a Code Blue resuscitation.

Phase Two: "Train the Trainer" Course. This was a one-time course to develop CRM course instructors. The participants in this course were personally selected by the CSSC leaders from different specialties. The selection was based on prior knowledge of the candidates' skills in teaching and experience with simulation training. The course focused on the essential skills of simulation-based training, basic debriefing, and the CRM principles. In addition, candidates underwent two high-fidelity simulation scenarios that were then followed by a group debriefing. The scenarios and the debriefing focused mainly on the CRM principles. Written pre-tests and post-tests were also conducted.

Phase Three: CRM courses for HCWs. In this phase, invitations were sent to all clinical department heads, including the nursing department, of the hospital. The invitations listed the dates for the CRM courses, and encouraged each department to send their HCWs to attend the CRM course on any of the assigned dates. The CSSC was responsible to balance the list of participants to have enough physicians to be able to run the scenarios in a realistic way that mimics real patient encounters. The CRM course objectives focused on introducing the CRM principles and human errors. The course started with theories, and then was followed by four stations. Each has an internally peer-reviewed scenario involving crisis clinical situation. The scenarios were run using high-fidelity simulators. All stations were followed by a debriefing using a video recording to assist in the discussion and reflection. The courses were directed and instructed by the CSSC leaders who are simulation experts, and who have received formal postgraduate training in simulation. Additionally, ten co-instructors from the "Train the Trainer" course participated in the course instructions. Written pre-tests and post-tests were conducted in addition to the course evaluation.

Phase Four: Post-program evaluation. After conducting ten courses, the program organizing committee decided to evaluate the impact of these courses on the ground. Around one month after the last course, four mock codes took place on different occasions in the ED and hospital wards. The cases were two patients with CPR and two critically ill patients-two adults and two children. The same checklist was used to evaluate team performance in the CRM principles.

Statistical analysis

Data coding was carried out manually and analyzed using Stata Version 13.0 (Stata Corp, College Station, Texas, USA). The descriptive analysis of the quantitative data for categorical variables was presented by frequencies and percentages. Paired t-test was used to assess the difference between pre-test and post-test among participants. The significance level was set at $p \leq 0.05$.

Results

Phase One: A total of 25 HCWs participated during the care of the four mock codes; 13 were from the ED, four were from the intensive care unit (ICU), 4 were from Internal Medicine, and four were from Pediatrics. Scores for the four mock codes were 50%, 45%, 45%, and 45% of the checklist items. The average score for all four codes was 46% (Figure 1).

Phase Two: Eighteen potential CRM instructors participated in the "Train the Trainer" course. The group had 61% male with 11 physicians, five nurses, and two others. Seven participants were from the ED, four were from Anesthesia, five were from Nursing, and two were technicians. The average pre-test and post-test scores were 31% (10-50%) and 61% (40-80%), respectively. From the 18 participants, 10 joined as instructors at least once in subsequent courses, and five became regularly involved.

Phase Three: Ten courses were conducted during the study period. The total number of participants was 184; 73% were female, and 106 (58%) were nurses. A total of 58 physicians from different specialties attended the courses. The detailed characteristics of HCWs who at-

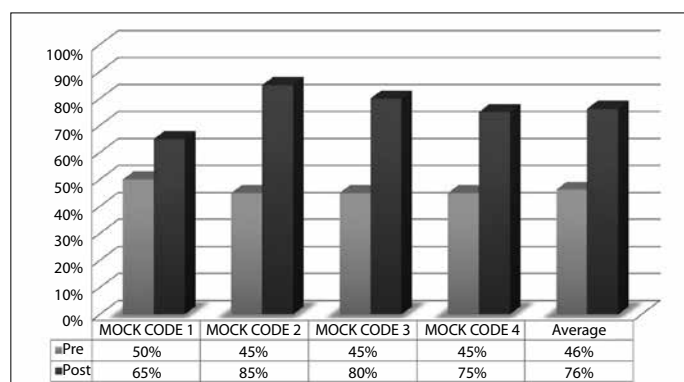


Figure 1. Pre and Post program evaluations of the 4 Mock codes conducted in the different hospital areas. (%) Is the percent (average) of satisfactory items checked in the checklist by two reviewers

Table 1. Characteristics of healthcare workers who participated in the 10 courses

	n=184 (%)
Female	135 (73%)
Physicians	58 (32%)
Emergency Medicine	27 (47%)
Anesthesia	13 (22%)
Surgery	8 (14%)
Intensive Care Unit	6 (10%)
Internal Medicine	4 (7%)
Nurses	106 (58%)
Ward, clinics, and non-critical	75 (71%)
Critical Care	22 (21%)
Emergency Department	9 (8%)
Technicians	20 (11%)
Paramedics	9 (45%)
Anesthesia Tech.	5 (25%)
Others	6 (30%)

tended these ten courses are shown in Table 1. Pre-test and post-test cumulative scores for the participants in the ten courses improved significantly ($p=0.0008$) and were 48% (64-28%) and 64% (53-74%), respectively.

Phase Four: Scores of the four mock codes post-program were 65%, 85%, 80%, and 75% of the checklist items. The average score for all four codes improved significantly ($p=0.0003$) compared to the needs assessment phase (76% vs. 46%) (Figure 1).

Discussion

Team failures and human errors continue to occur in the healthcare sector, which results in unfortunate medical errors, and thus places a huge burden on healthcare system (10). In this study, we provided interprofessional CRM simulation-based training for more than 200 HCWs from different backgrounds and different experiences within

the same institution. We were able to improve the knowledge and team performance in applying the CRM principles during crisis situations. This was evident in the post-tests after each course and the post-program evaluations.

The literature clearly supports simulation's impact on team performance and competency in numerous works. However, we still struggle to conduct works that show measurable impacts on patient safety and outcomes (11-14). Conducting CRM training programs for HCWs on this scale and sustaining training operations could be effective ways to mitigate human error and improve patient safety in the medical field. Establishing a training program that targets all HCWs in an institution is a difficult task. Leadership at different levels in KAUH and CSSC had to come together to launch and support a simulation-based training that focuses on the CRM principles at the hospital level. One of the biggest obstacles to this program was recruiting participants and freeing them from their duties to attend a full-day simulation course. More challenging than the implementation of such a program is the sustainability to keep the momentum and to ensure continuous effect, which we are still striving to achieve.

Study limitations

The limitations of this work include the fact that we only covered about 8% to 10% of our HCWs. However, the focus was on the HCWs working in critical areas (ED, ICU, or anesthesia). Outcomes related to patient morbidity, mortality, or decrease in medical errors need to be studied to determine whether a higher level in Kirkpatrick's model can be achieved (15).

Conclusion

Applying CRM principles is crucial for effective teamwork during crisis situations, which can lead to improved patient safety and decreased human errors. The lack of formal training in CRM among HCWs can be addressed by conducting interprofessional simulation-based training courses by simulation experts. Investing in developing CRM instructors with different backgrounds within the organization is of great value. Developing a simulation-based training program requires joint effort from the organization's leadership.

Ethics Committee Approval: Ethics committee approval was received for this study from the Ethics Committee of the Unit of Biomedical Ethics at King Abdulaziz University, Faculty of Medicine (Approval No.: 378-16, 2016).

Informed Consent: Written informed consent was waived by the ethical committee because all data were deidentified and no identifiable participants' information was collected or utilized during the study.

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Breaking Bad News in the Emergency Department: How do the Patients Want it?

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Abstract

Aim: When breaking bad news (BBN) is not managed correctly, the negative impact on patients and patient's relatives is much greater. The aim of the present study was to investigate the thoughts of the patient/patient's relatives about how BBN should be given in four hospitals located in the eastern region of Turkey.

Materials and Methods: In this cross-sectional, multicenter study, a total of 760 patients were included using a six-item questionnaire. Participants were divided into two groups according to educational status as high school and below (Group 1) and university and above (Group 2). The difference between the groups was determined according to $p < 0.05$ level of significance.

Results: There was a statistically significant difference between the two groups in terms of the answers to items about how, where, and to whom should a doctor tell the death and also possible negative situation of a patient to his/her relatives. All participants were asked where they preferred to stay in the emergency department when cardiopulmonary resuscitation (CPR) was needed in one of the family members. Of the participants, 47.4% ($n=360$) reported that they preferred waiting in a seat close to the room where CPR was performed.

Conclusion: The emergency physician should break the bad news considering the educational status of the patient/patient's relatives. BBN should be carried out by sitting down face-to-face with the patients or family members in a room where no other patients are present. In contrast to some literature data, patient's relatives are more likely to wait near the CPR room instead of watching CPR.

Keywords: Breaking bad news, emergency department, patients

Introduction

Bad news is defined by Robert Buckman as "any news that adversely and seriously affects an individual's view of his or her present and future" (1-3). Breaking bad news (BBN) in the emergency department

(ED) is a common and routine practice performed practically every day by physicians (4). BBN to patients or their family members is one of the most challenging aspects of medical practice (5). In our country, BBN to a patient is not in a standardized approach and also the relatives of the patients try to hide the disease from the patient. In

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the study conducted by Atesci et al. (6), they concluded that more than half of the patients are not aware that they have cancer. This puts emergency physicians in a difficult situation in emergency management and in communication with these patients who are often admitted to the ED.

Breaking bad news is an important and difficult task for any physician. A physician should be able to communicate effectively and should take a patient-family-centered approach (4). Bad news includes a serious illness or clinical condition and the possibility of death. This news may lead to feelings of abandonment, loneliness, and loss of control on the patient or their family members (2).

Informing family members or patients about the bad news is a highly stressful experience for emergency physicians (7). In this evidence-based era, it is imperative that all healthcare be redesigned from the perspective of the patient (5). A physician is expected to be able to disclose bad news and evaluate patients' request for it (1). There is a need for effective communication in health care (8). Effective communication skills hold the key to solve such complex issues of clinical practice as a well-communicated message though tragic (5).

There is no standard answer about how this should be when the patient and their family members have to receive bad news. This can vary according to the educational status, occupation, and culture of the patient and their family members (9-11). People with different cultural backgrounds may show different attitudes toward disclosing bad news (1, 3). The purpose of the present study was to explore the patients' preferences toward being informed about the bad news in the ED.

Materials and Methods

This cross-sectional study was conducted on patients admitted to the ED of four hospitals in eastern Turkey from March 2017 to June 2017. A total of 760 patients >18 years old who were referred to the ED of four hospitals were enrolled in the study. All subjects consented to participate in the study. Exclusion criteria were refusing participation, disability to talk and communicate, presence of cognitive disorders, alcohol or drug abuse, and patients who need urgent intervention.

The questionnaire was established based on the literature review and after examining its content validity by a number of psychiatrists. Patients' view and variables affecting how to break the bad news were discussed in the questionnaire. A questionnaire that contains the study form and consists of two parts was used. The first part includes items for sociodemographic data, whereas the second part includes items for the preferences of patients about bad news (Table 1).

The study was approved by the Bitlis Eren University Ethics Committee (no. 2017/02-V) and conducted in accordance with the principles of the Declaration of Helsinki. All participants were informed about the nature of the study. Written informed consent was obtained from the participants. Then, they were interviewed, and a questionnaire was completed for each of them by the interviewers.

Statistical analysis

Statistical analysis was performed using the Statistical Package for the Social Science 22.0 software (IBM SPSS Corp.; Armonk, NY, USA). Descriptive data were expressed as median (min-max) values, whereas categorical data were expressed as number (n) and frequency (%). The significant differences in frequency between the groups were compared using the chi-square test. For testing reliability, the Cronbach's alpha coefficient was used to identify the internal consistency of the scales. A p value of <0.05 was considered statistically significant.

Results

Of a total of 760 patients included in the study, 42.6% (n=324) were females, and 57.4% (n=436) were males. The median age of the patients was 29 (range 23-38) years. Participants were divided into two groups according to their educational status. The first group consisted of illiterate and primary and high school graduates (67.9%, n=516), whereas the second group consisted of university graduates and doctorate degrees (32.1%, n=244).

The Cronbach's alpha value was 0.613 in the reliability analysis for the second part of the questionnaire that includes items questioning the preferences of the patient about BBN.

Table 2 shows the answers to the questionnaires and the frequency rates. In response to the question "How do you want your doctor to communicate with you?", which was the first item of the part related to BBN in the questionnaire, 56.8% (n=432) of the participants answered as "formally and gently".

In response to the second item "How should a doctor tell a possible negative situation to his/her patient?", 51.2% (n=389) of the participants answered as 'by explaining the cause of death with medical details.'

In response to the third item "How should a doctor tell the death of the patient to his/her relatives?", 42.5% (n=323) of the participants answered as "by keeping the values of faith in the foreground."

In response to the fourth item "To whom should a doctor tell the death of the patient?", 44.6% (n=339) of the participants answered as 'to one of the family members.'

In response to the fifth item "Where should a doctor tell the death of the patient?", 56.3% (n=428) of the participants answered as "in a separate room where no other patients are present by sitting down face to face with the patient's relatives."

In response to the sixth item "Where should the patient's relative(s) be while the doctor is performing resuscitation (bring back to life efforts, heart massage etc.) to the patient in the cardiopulmonary resuscitation (CPR-bring back to life efforts) room?", 47.4% (n=360) of the participants answered as "by waiting in a seat close to the room where CPR is performed".

Table 2 shows the presence of difference in terms of answers to the questionnaire of the participants who were evaluated into two (first and second) groups according to educational status and its level of

Table 1. The form of the study entitled 'the preferences of patients about breaking bad news who admitted to the emergency department.'

1. How do you want your doctor to communicate with you? a. Sincerely as my relative b. Formally and gently c. It does not matter
2. How should a doctor tell a possible negative situation to his/her patient? a. Directly b. By keeping the values of faith in the foreground c. By explaining the condition of the disease and how this was developed d. It does not matter
3. How should a doctor tell the death of the patient to his/her family members? a. Directly. (We could not save your patient. We are sorry, our sincere condolences.) b. By keeping the values of faith in the foreground (Hello. My name is Dr __, Mr/Mrs __. My specialty is __. We have done all necessary interventions for him/her. But it is destiny, so it is written in destiny, it is necessary to submit to fate. We could not save your patient. We are sorry, our sincere condolences.) c. By explaining the cause of death with medical details (Hello. My name is Dr __, Mr/Mrs __. My specialty is __. He/she was brought to the emergency service in the condition of __. He/she had __ illnesses. In his/her tests (laboratory)/imaging results, __ was/were detected. We have done __ interventions for __ hour/minute. But we could not save Mr/Mrs __. We could not save your patient. We are sorry, our sincere condolences.) d. It does not matter
4. To whom should a doctor tell the death of the patient? a. To one of the family members b. To one of the relatives c. To all family members to be present d. It does not matter
5. Where should a doctor tell the death of the patient? a. In front of the reanimation room, by standing b. In any part (room) of the emergency department c. In a separate room where no other patients are present, by sitting down face-to-face with family members d. It does not matter
6. Where should the family members be while the doctor is performing resuscitation (bring back to life efforts, heart massage etc.) to the patient in the cardiopulmonary resuscitation (CPR-bring back to life efforts) room? a. In the resuscitation room (by seeing the condition of the patient and the medical interventions performed) b. By waiting in front of the CPR room c. By waiting in a seat close to the room where CPR is performed d. It does not matter

significance. Accordingly, there was a statistically significant difference between the two groups in terms of the answers to items about how, where, and to whom should a doctor tell the death of a case and also possible negative situation of a patient to his/her relatives ($p < 0.001$, $p < 0.001$, $p < 0.001$, and $p < 0.001$, respectively).

Discussion

When BBN is not managed correctly, the negative impact on patients and patient's relatives is much greater. BBN is an important and difficult task for any physician. A physician should be able to communi-

cate effectively and should take a patient-family-centered approach. In the last few decades, the traditional paternalistic model of patient care has been replaced by one that emphasizes patient autonomy, empowerment, and full disclosure (12, 13). Today, telling the truth is considered as a doctors' ethical duty and a patients' legal right, and patients play a major role in making decisions about their health and therapeutic procedures (1, 12). Thus, doctors have a legal duty to break the bad news to patients and their families. It is truly necessary and requires skill on the part of health care professionals. Thus, BBN is difficult, unpleasant, and uncomfortable. To improve such skills, guidance on how to systematize BBN and make it less traumat-

Table 2. The responses of patient/patient's relatives to questionnaire items according to educational status

	First group* (n=516)	Second group* (n=244)	p
	n (%)	n (%)	
1 st item			0.077
Sincerely as my relative	165 (32.0)	79 (32.4)	
Formally and gently	285 (55.2)	147 (60.2)	
It does not matter	66 (12.8)	18 (7.4)	
2 nd item			0.001
Directly	86 (16.7)	30 (12.3)	
By keeping the values of faith in the foreground	155 (30.0)	41 (16.8)	
By explaining the condition of the disease and how this was developed	230 (44.6)	159 (65.2)	
It does not matter	45 (8.7)	14 (5.7)	
3 rd item			0.001
Directly	81 (15.7)	28 (11.5)	
By keeping the values of faith in the foreground	240 (46.5)	83 (34.0)	
By explaining the cause of death with medical details	160 (31.0)	121 (49.6)	
It does not matter	35 (6.8)	12 (4.9)	
4 th item			0.001
To one of the family members	196 (38.0)	143 (58.6)	
To one of the relatives	101 (19.6)	30 (12.3)	
To all family members and relatives present	163 (31.6)	53 (21.7)	
It does not matter	56 (10.9)	18 (7.4)	
5 th item			0.027
In front of the reanimation room, by standing	64 (12.4)	15 (6.1)	
In any part (room) of the emergency department	73 (14.1)	35 (14.3)	
In a separate room where no other patients are present, by sitting down face-to-face with family members	276 (53.5)	152 (62.3)	
It does not matter	103 (20.0)	42 (17.2)	
6 th item			0.001
In the resuscitation room	76 (14.7)	23 (9.4)	
By waiting in front of the resuscitation room	153 (29.7)	40 (16.4)	
By waiting in a seat close to the room where CPR is performed	207 (40.1)	153 (62.7)	
It does not matter	80 (15.5)	28 (11.5)	
*First group: high school and lower degrees. Second group: university and higher degrees			
CPR: cardiopulmonary resuscitation			

ic has been provided. One example of such technique is the SPIKES (Set the stage, Perception, Inform, Knowledge, Empathy, Summary and Strategy) protocol, which describes six steps of communication (13). The SPIKES protocol was developed in 2000 by an oncologist to train providers in delivering bad news (14). In 2005, the GRIEV_ING (Gather, Resources, Identify, Educate, Verify, Space, Inquire, Nuts and Bolts, Give) educational intervention was developed and tested by emergency physicians (15). Another study by Park et al. (4) described physicians' experience and designed an educational program for

physician's confidence and competence in bad news and death notification.

Recent studies have focused on training doctors to improve their communication skills.

In the literature, a number of methods have been described how to break the bad news to a patient or his/her relatives. One of these is the ABCDE model, which consists of five steps based on the initials

of advanced preparation, build a therapeutic relationship and environment, communicate well, deal with patient and family reactions, and encourage and validate emotions (16). Another method is the SPIKES protocol that was developed by an oncologist in 2000 (14). BREAKS (Background, Rapport, Exploring, Announce, Kindling, Summarize), which was developed by oncologists and anesthesiologists in 2010, is another method used for BBN (17). Based on all three models, they were formed and developed by either internal medicine or oncologists and anesthesiologists. However, emergency physicians, in contrast to oncologists and anesthesiologists, often encounter the patient's family for the first time or do not have enough background information about the family (4, 18). In addition, the emergency physician does not have enough time for both preparing the family and preparing himself/herself for BBN (4).

GRIEV_ING is a protocol that is developed by emergency physicians (15). Both GRIEV_ING and other protocols have been developed to establish good communication strategies with patients and their family members in case of BBN. In our study, we asked ED patients as emergency physicians about what might be the facilitating factors for BBN in addition to how good communication should be. Participants in our study reported that they preferred good communication to be formal and gentle. GRIEV_ING and other protocols did not take into account whether the educational status of the individual or the family influenced the preferred language of communication. Participants in our study were divided into two groups according to their educational status, and we found that the language of communication they preferred varied according to educational status. Most of the participants in the second group (university or higher degrees) indicated that they would like to have BBN with medical details. In the G (Gather) of GRIEV_ING, it is recommended that the physician should gather the whole family together to inform them at once. In our study, in response to the item "To whom should a doctor tell the death of the patient to?", participants most frequently answered as 'to one of the family members' and less frequently as "to all family members and relatives present". Even participants in the second group (university and higher degrees) according to educational status answered as 'to one of the family members' more frequently.

In the S (Setting up the interview) of SPIKES, it is indicated that BBN should be conducted by sitting down in a room. Similar to SPIKES, participants answered the item 'Where should a doctor tell the death of the patient?' as "by sitting down face to face with family members, in a separate room where no other patients are present".

A similar study to our work, but with fewer participants and single center, conducted by Aminiahidasti et al. (3) in 2016 found that 83.7% of the participants said that a hospital corridor is not appropriate for BBN, and 52.30% of the participants pointed out that bad news should be delivered in a private room. These results are compatible with our study results. In a study investigating the effect of the patient's educational level on BBN conducted by Rao et al. (19), participants divided into two groups as high and low educational status and participants with high educational status preferred that BBN must be disclosed, and this difference is statistically significant. In our study, similar to the results by Rao et al. (19), participants with high educational status preferred to know all bad news in medical

details. Similar results were concluded by Parker et al. (20) with 351 patients with cancer, and participants with high educational status wanted to know the bad news in more medical details.

Another issue that we questioned in our study was watching CPR or whether the family members prefer to be present during CPR. Although there are studies with different conclusions about this topic in the literature, it is thought that the mourning process may be more easily overcome by the presence of family members during CPR (21-23). In contrast, in our study, participants reported that they preferred not to stay in the room where CPR was performed, but rather wait in a seat close to the room where CPR was performed. This result was the same for both groups.

Study limitations

Our study is limited by the number of patients.

Conclusion

Breaking bad news is a difficult task that needs to be overcome with less damage, for both patients and emergency physicians who deliver the news. Emergency physicians who often encounter this condition should learn good communication strategies and should consider the educational status of patients. Ideally, bad news should be delivered to one of the family members by sitting down face-to-face in a room. It should also be taken into account that the patients may want to know the medical reasons of the condition they are in. Another finding of our study is that during CPR to one of the family members of the participants, they often prefer to wait in a room close to the CPR room rather than watch the CPR procedure.

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Does Emergency Severity Index Predict Acuity Among Traumatic Brain Injury Patients?

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Abstract

Aim: It is unclear whether emergency severity index (ESI) is valid to triage patients with trauma. We aimed to determine the accuracy of ESI in both prehospital and hospital settings.

Materials and Methods: This study was an observational prospective cohort where in patients with traumatic brain injury (TBI) were followed from the accident scene to the hospital. Used resources and timing indices were collected both on the scene as well as at the hospital. A logistic regression was performed to ascertain the effects of clinical parameters on the likelihood of survival of patients with TBI regarding 24 hour mortality.

Results: A total of 185 patients were included in this study. The mortality rate was 14% (25/185). The logistic regression model was statistically significant at $\chi^2=57.8$, $p=0.001$. An enter logistic regression analysis showed that used resources either in prehospital or in hospital significantly improved predictions related to mortality. The model explained the 49% variance in survival of patients with TBI.

Conclusion: The ESI-used resources can be used to triage patients with TBI for pre-hospital and hospital emergency care. It is recommended that ESI triage tool be used to triage patients with TBI.

Keywords: Traumatic brain injury, emergency severity index, triage, prehospital emergency

Introduction

Trauma is the main cause of morbidity and mortality in people aged <40 years, and is the third most common cause of death worldwide. It is responsible for 5 million deaths annually (1-3). Time is considered an essential determinant for the outcome of patients with trauma (4). A fundamental tenet of trauma care is the "golden hour." It is the immediate time after injury when resuscitation, stabilization, and rapid transport are perceived to be most beneficial for the patient (5, 6). The basic principle of caring for patients with trauma is to provide timely care. Prehospital prompt response, resuscitation,

immobilization, and rapid transfer of patient to trauma centers are very important factors in the trauma management system (7, 8). It has been shown that providing definitive care earlier at trauma centers decreases mortality (9, 10). Although prompt response is common in developed countries, it is unclear whether response time is plausible in developing countries, and what its effects on mortality are (11). Any delay in management of progressive hemorrhagic injury is a significant cause of morbidity and mortality in the emergency department (ED). A computed tomography (CT) scan reliably predicts progressive hemorrhagic injury in patients with trauma; therefore, time to CT scan (12) as well as other tests such as hematocrit (HCT), which is a significant independent predictor of mortality in patients

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with trauma (13-15), must be monitored rigorously. Therefore, it can be concluded that timing indices have a great impact on management of patients with trauma. Literature shows that little empirical knowledge exists about the exact influence of prehospital time, hospital time, radiological and laboratory testing time, and time to therapeutic interventions on outcome of patient with trauma. In addition, because traumatic injuries are increasingly recognized as a leading source of morbidity and mortality in developing countries, context-specific research is necessary to identify opportunities for the prevention and improved treatment.

Triage systems are also important tools for reducing time to definite care (16, 17). Although emergency severity index (ESI) is practiced worldwide, little data exist about its use in trauma centers. ESI uses patient acuity (stability of vital signs and degree of distress) as well as expected used resource to assign five triage levels from level 1 (most urgent) to level 5 (least urgent) (18). As compared to other triage systems, estimating expected resource in the triage assignment is a unique feature of ESI. The nurses in ED need to clearly understand that the estimate of resources is related to the standards of care. Resources can be diagnostic services such as tests, procedures, consults, or therapeutic interventions. However, validity and reliability of ESI have been well documented in the literature. It is unclear whether used resource rating system of ESI predicts acuity in patients with trauma. Therefore, we aimed to determine the description of the timing and preventive care measures in prehospital and hospital settings with the mortality of the patients with trauma and validity of used resource rating system of ESI among patients with traumatic brain injury (TBI).

Materials and Methods

This study was an observational prospective cohort that followed patients with TBI from the accident scene to the hospital between February and September 2016.

Data collection was performed after receiving approval from the ethics committee at Mashhad University School of Medicine (No. 940948). The study is granted exemption from ethics committee, so informed consent is not required because the study involves no more than minimal risk to the subjects.

Setting

This study was conducted in the Hasheminezhad Hospital in Mashhad, Razavi Khorasan, Iran, which is the second largest Level 1 trauma center (320 beds) in the city. The hospital provides several specialties, including neurosurgical, emergency medicine, orthopedic, surgical, and internal medicine services, 24 hours per day. Annually, the hospital ED receives 14,500 patients with trauma, most of whom arrive by ambulance. All nurses in the ED have both a Bachelor of Science (B.S.) in nursing and Trauma Certified Registered Nurse certification. All emergency physicians in the ED are specialists in emergency medicine. Emergency medical services (EMS) are provided by professional individuals who are trained to provide basic trauma life support, such as immobilization, airway management, and intravenous fluid therapy, during ambulance transfers. All paramedics must have a B.S. in EMS. They transfer patients with trauma from the scene to the EDs in the shortest possible time with the aim of reducing morbidity as well as mortality.

Data collection

The patients with TBI who were received by ambulance and admitted to the ED were assessed. Patient records were used to collect relevant data, including age, gender, mechanism of injury, and medical history. Prehospital transfer time and hospital timing measures and used resources were recorded.

Prehospital transfer time included time taken to reach scene and transfer time from scene to hospital. Hospital time included time taken to emergency physician visit and neurosurgeon specialist visit, as well as time taken to perform imaging studies (X-ray, CT scan, and sonography), laboratory examination (hemoglobin, HCT), and intubation. Used resources in prehospital and hospital settings were calculated based on ESI method and conventional method. For example; if a patient receives a chest X-ray and a sonography in ED, she/he would receive score 1 in ESI method and score 2 in conventional method. All imaging studies are considered score 1 in ESI method apart from the numbers of resources. In other hand, each imaging study scores 1 in conventional method and 2 in the above example. In fact, each intervention was scored one in conventional method.

To assess in-hospital mortality, we examined death rates in the first 24 hours post-injury. All included patients were followed up for mortality over 24 hours in ED. Therefore, based on their outcome (dead or alive) in the first 24 hours post-injury, patients with TBI were divided into two groups.

Patient selection

During the study period, patients with TBI who met the following criteria were included in the study: the mechanism of injury (MOI) was a traffic accident, they were transported directly from the scene by an EMS ambulance, they had an injury severity score (ISS>9), they were aged more than 18 years but less than 85 years, and they had at least one vital sign parameter higher than zero at the scene (to include only cases without clinical death). Exclusion criteria included incomplete data in either the pre-hospital or hospital patient records (i.e., vital signs and parameters), pregnancy, comorbidities (diabetes, cardiovascular disease, and chronic obstructive pulmonary disease), and transfer time from the scene to the hospital of more than 60 min and transfer of patients to other health-care centers in the first 24 hours.

Variables: Used resources and time periods were assessed in prehospital and hospital settings.

Used resources based on emergency severity index (ESI Ver.4)

ESI is a five-level triage algorithm that categorizes patients by evaluating both patient acuity and resource needs. To sort patients into one of the five triage levels, the ESI algorithm uses four decision points (A, B, C, and D). At decision point C, the nurse assigns ESI levels 3-5 by assessing both acuity and predicted resource needs. Acuity level is assessed by the triage nurse. If a patient does not meet high acuity level criteria (ESI level 1 or 2), the triage nurse evaluating expected resources needs to help determine a triage level (ESI level 3, 4, or 5). Resources can be hospital services, tests, procedures, consults, or interventions in ESI (18, 19). The nurse then predicts the number of resources a patient will need to reach a disposition. It is important to note that resource prediction is only used for less acute patients (level 3, 4, or 5). ESI levels 3, 4, and 5 are differentiated by the nurse's de-

termination of how many different resources are needed to make a patient disposition (20). On the basis of the triage nurse's predictions, patients who are expected to consume no resources are classified as ESI level 5, those who are likely to require one resource as ESI level 4, and those who are expected to need two or more resources as ESI level 3. Patients who need two or more resources have been shown to have higher rates of hospital admission and mortality, and longer lengths of stay in the ED (21).

Used resources based on the conventional method

Used resources were also calculated based on the conventional method. Each intervention was valued one in the conventional method. For example, simple dressing or splint scored one. In the conventional method, patient with two graphies receives two scores, whereas they receive one score based on the ESI method. All used resources were summed up for each patient.

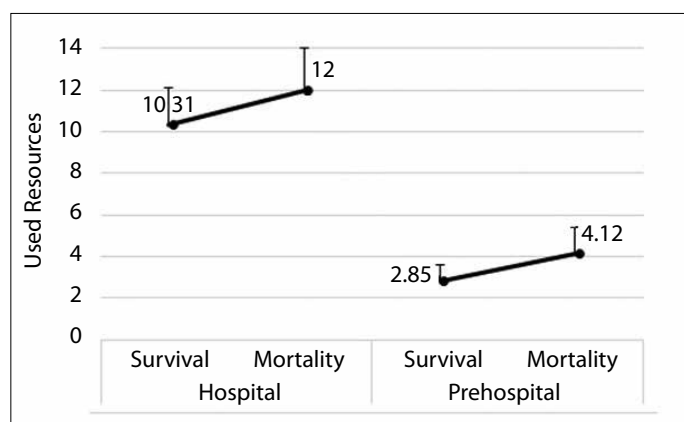


Figure 1. Frequency of used resources in pre-hospital and hospital settings based on the emergency severity index method

Table 1. Characteristics of patients in both groups

Characteristics	All (n=185)	Survival (n=160)	Mortality (n=25)	Characteristics	All (n=185)	Survival (n=160)	Mortality (n=25)
Age years old (mean±SD)	39.01±18.4	38.1±17.7	44.2±21.9	Gender female (n, %)	44 (24)	37 (23.1)	7 (28)
Blunt trauma (n, %)	170 (92)	147 (91.9)	23 (92.0)	Penetrating trauma (n, %)	15 (8)	13 (8.1)	2 (8.0)
Prehospital							
Time to scene (min) (mean±SD)	15.17±6.05	15.20±6.09	15.03±5.45	Scene to hospital time (min) (mean±SD)	15.42±6.15	15.42±6.21	15.37±5.45
Transfer time (min) (mean±SD)	47.5±76.3	49.8±81.7	33.3±13.3	Used resources	3.02±0.93	2.85±0.74	4.12±1.26
Hospital							
Time to physician visit (min) (mean±SD)	15.47±6.17	15.48±6.23	15.40±5.48	Time to specialist visit (min) (mean±SD)	15.51±6.58 n=155	15.51±7.05	15.50±6.24
Time to graphy (min) (mean±SD)	15.35±6.51 n=170	15.24±6.54 n=152	17.07±6.22 n=18	Time to CT scan (min) (mean±SD)	15.47±6.48 n=173	15.36±6.50 n=156	17.17±6.26 n=17
Time to sonography (min) (mean±SD)	13.15±7.35 n=62	12.47±7.36 n=56	17.36±6.23 n=6	Time to laboratory exam (min) (mean±SD)	15.21± 7.24 n=175	15.17±7.26 n=156	15.59±7.14 n=19
Hemoglobin (mg/dL) (mean±SD)	13.98±2.70 n=135	14.20±2.27 n=118	12.46±4.56 n=17	Hematocrit (%) (mean±SD)	40.62±6.54 n=136	41.33±4.99 n=118	36.00±11.92 n=18
Used resources	10.54±1.91	10.31±1.79	12.0±2.04				
*Significant data is marked							

Prehospital time

Transfer time is composed of "Time to Scene" and "Scene to Hospital time." Time to scene is defined as the time required for EMS to deploy after emergency call; and scene to hospital time is defined as the time from departing scene to arrival at the hospital.

Hospital time

Time to hospital resources including emergency physician, specialist, intubation, imaging studies (X-ray, sonography, and CT scan), laboratory exam [hemoglobin (mg/dL) and HCT (%)] were computed from call to EMS as well as during in-hospital stay. Time period was calculated in minutes.

Confounders analysis

We considered several potential confounders of the association between acuity of head injury and mortality during the first day of admission. These included MOI, ISS<9, and other life-threatening injuries. For analysis, traffic accident survivors (driver, passenger, motorcycle, bicycle, and pedestrian) were included in the study. Other MOIs were excluded because they may have coincided with different patterns of injury. Patients with TBI with a minimum ISS score of 9 were included only if that score belonged to a brain injury. TBI is often associated with a high-velocity circumstance; hence, injuries to other parts of the body are common.

Statistical analysis

Timing measure variables that were normally distributed between the two independent groups were compared using the T-test. Acuity scales for survival probability in patients with TBI, such as the ESI, were calculated based on both prehospital and hospital parameters.

The effect of each predictor on the outcome variable was assessed individually by performing a univariate analysis. Variables showing a statistically significant association at 5% level of significance in the univariate analysis were included in the multivariate analysis. Multivariate logistic regression was used to develop a prognostic model for the outcome (mortality, no/yes) of the first 24 hour of admission. Models using a pre-defined group of predictor variables (method, "enter") in the univariate analysis as well as multivariate analysis were employed.

Table 2. Univariate analysis of variables in the equation according to the enter method (Ref=Survival)

		95% CI		
Variable	Odds ratio	Lower	Upper	p
ESI method				
Used resources in prehospital	0.261	0.152	0.448	0.000
Used resources in hospital	0.591	0.453	0.772	0.000
Total used resources (Prehospital plus hospital)	0.649	0.547	0.771	0.000
Conventional method				
Used resources in prehospital	0.507	0.377	0.683	0.000
Used resources in paraclinic	2.756	1.677	4.527	0.000
Used resources in hospital	0.428	0.289	0.634	0.000
Used resources in paraclinic and hospital	0.778	0.579	1.045	0.096
Total used resources	0.682	0.566	0.822	0.000

In prognostic research, the logistic regression model is a commonly used statistical method. It is estimated when the outcome variable follows a binomial distribution by using maximum likelihood methods. Coefficients of the final model are presented together with the respective odds ratio (OR) and a corresponding 95% confidence interval (CI).

Statistical analyses were performed with IBM Statistical Package for the Social Sciences version 18.0 software (IBM SPSS Corp.; Armonk, NY, USA). Data are presented as a mean (standard deviation) for continuous variables and as proportions for categorical variables.

Results

Patient characteristics

Clinical characteristics of the 185 patients are demonstrated in Table 1. The mean age of the patients was 39 years, and 76% were men. Overall, 116 (71%) patients were pedestrians or motorcycle riders, and 170 (92%) had a blunt injury. The mean transfer time was 39 min. The survival rate was 86% (25/185). In either the prehospital or hospital setting, patients in the mortality group were not significantly older ($p>0.05$). The proportions of both groups also did not differ with respect to gender. The frequency of used resources in prehospital and hospital settings based on ESI method is illustrated in Figure 1.

Survival analysis

Univariate logistic regression analysis showed that used resources (calculated either by ESI or by the conventional method) is inversely associated with survival, which means that severely injured patients

Table 3. Multivariate analysis of variables according to the enter method (Ref=Survival)

Variable	B	S.E.	Wald	df	Sig.	Exp (B)	95% C.I.	
							Lower	Upper
ESI-used resources in hospital	-0.727	0.185	15.45	1	0.000	0.483	0.336	0.694
Para-clinical resources in hospital	1.379	0.443	9.688	1	0.002	3.972	1.667	9.468
ESI-used resources in prehospital	-0.655	0.317	4.259	1	0.039	0.519	0.279	0.968
Constant	8.180	2.201	13.813	1	0.000	3570.004		

Table 4. Comparison of time measures between survival and mortality groups (min)

Characteristics (minutes)	All	Survival	Mortality	p
Time to physician visit* mean $\pm$ SD	58.15 $\pm$ 77.2 (n= 185)	61.2 $\pm$ 82.4 (n=160)	38.4 $\pm$ 15.7 (n=25)	0.171
Time to intubation mean $\pm$ SD	93.97 $\pm$ 107.1 (n=60)	107.6 $\pm$ 122.9 (n=38)	70.3 $\pm$ 68.5 (n=22)	0.196
Time to graphy mean $\pm$ SD	102.05 $\pm$ 83.03 (n=170)	102.5 $\pm$ 87.2 (n=152)	97.7 $\pm$ 29.1 (n=18)	0.816
Time to laboratory exam mean $\pm$ SD	150.0 $\pm$ 117.5 (n=175)	155.1 $\pm$ 122.1 (n=156)	107.8 $\pm$ 53.5 (n=19)	0.098
Time to sonography	63.9 $\pm$ 45.1 (n=60)	65.4 $\pm$ 46.9 (n=54)	50.5 $\pm$ 21.3 (n=6)	0.446
Time to CT scan	96.5 $\pm$ 83.6 (n=173)	97.1 $\pm$ 87.7 (n=156)	90.8 $\pm$ 25.5 (n=17)	0.769

*Prehospital transfer time is included.

consumed more resources than other patients with TBI (Table 2). A multivariate logistic regression was performed to ascertain the effects of clinical parameters on the likelihood of survival of patients with TBI. The analysis showed that used resource is calculated based on ESI method either in prehospital or in hospital settings, and paraclinical resource predicts survival significantly. The model provided a statistically significant improvement over the constant-only model. The logistic regression model was statistically significant at (χ^2 (2, $n=185$) = 57.894, $p=0.0001$). The model explained the 86.5% variance in survival of patients with TBI. Nagelkerke R^2 (49%) indicated a moderate relationship between prediction and grouping. The correct prediction rate was 91.4% (98.1% for survival and 48.0% for mortality). An enter logistic regression analysis showed that ESI-used resources in prehospital and hospital settings both inversely improved predictions ($p<0.05$) (Table 3). Higher use of resources in prehospital and hospital settings predict a decrease in the probability of survival. In contrast, paraclinical resource consumption positively associated with survival. Alive patients often stay longer in ED than dead ones did; therefore, the probability of being tested increased. Survival group did not differ from mortality group in terms of time measures (Table 4).

Discussion

The result of this study showed that used resources based on the ESI method in patients with head trauma are valid, which means that prioritizing used resources based on the ESI method may have a significant association with mortality of patients with head trauma. ESI scale prediction is valid both in prehospital and hospital settings. It is also worth noting that this method provides a stronger validity than the conventional method (that takes a value of one for each resource) does. The more used resources increased, the less patients survived, as an increase in the used resources was associated with 48% decrease in survival probability in prehospital and 52% decrease in survival probability in the emergency room setting. This is because critically ill patients used more resources and had a higher mortality risk.

Used resources were calculated using two methods: conventional and ESI. In the conventional method, each used resource is assigned one value, whereas in the ESI scale, some of measures taken for the patients with trauma such as immobility or laboratory tests and radiographies are calculated once, no matter how many they are. Moreover, as some measures taken for patients with trauma such as immobility or several radiographies, CT scans, and sonographies are more frequent among patients with trauma, validity of the ESI scale in predicting the used resources could be significantly important with regard to the fact that no study has been conducted in this regard. Although in the regression model of the conventional method (whether in the prehospital or hospital settings), the relationship of the used resources with mortality was significant; in the multiple regression model, it was not significant and variables were not included in the final model. Of course, the only resources used in the paraclinical resources including laboratory tests and radiographies were significant because patients who survived could undergo more diagnostic tests in the emergency room. As a result, this variable was included in the final model. Therefore, receiving more diagnostic tests was associated with four times higher chance of survival comparing to those not receiving diagnostic tests. The underlying cause may be that a simple radiography or a blood test can be requested for patients with trauma even if they are not critically ill. This

leads less critically ill patients to consume more resources. In contrast, radiography and tests may not be a priority for critically ill patients, and therefore, paraclinical resources did not increase for them. Elshove et al. (22) showed that performing a simple radiography is the most commonly used resource in category 4 and 5 patients.

We observed in the univariate regression model that a rise in used resources (except for laboratory tests), whether calculated using the conventional or the ESI method, indicated severity of the patient's illness and increased risk of mortality. ESI-used resources (ESI method) was significant in the multiple regression model. This means that the ESI method is valid to calculate resources in patients with trauma. Compared to clinical measures, radiographies and laboratory tests as resource have limited power to differ between critically ill patients and outpatients; therefore, counting several radiographies of the patients as one radiography or several laboratory tests as one test is enough to make a difference between critically ill patients and outpatients. However, clinical measures such as intravenous line, monitoring and other significantly increased scores, whereas patients with less severe illness receive fewer clinical measures. Table 3 suggests that patients who received more resources in prehospital setting or in the emergency room had decreased survival chances by 48% and 52%, respectively. These findings are in line with the findings of other studies (23). Grossmann et al. (24) showed that mean resources used by patients with more severe illnesses (level 1) was significantly more than those used by patients with less severity (Level 1: 4.68, level 2: 3.17, level 3: 2.68, level 4: 1.08 and level 5: 0.32). Mortality in level 1 patients was equal to 27.3. In another study, the mean of used resources used by level 1 patients was 7.48 (25). Mortality in level 1 patients was 58.6%. As these studies suggest, the more frequent critically ill patients were, the more resources were also used. Although these two studies were conducted in general hospitals, the results of these studies indicated that this scale is also valid in patients with trauma. The mean of resources used by the mortality group in prehospital settings and the emergency room was 4.12 and 12, respectively, which was significantly more than the mean in the survival group (2.85 and 10.31). Bigger number of resources used for critically ill patients compared to previous studies may be because patients with trauma need more intervention. Previous studies revealed that 85% of level 2 patients use more than two resources (22).

Study limitations

Our study was limited to one hospital trauma center in a densely populated area of a metropolitan city. We could not extend the study period further because strict supervision was required to collect reliable data. Therefore, other studies may want to replicate this study with larger sample sizes. Other limitation of this study was the fact that the paramedics collected data in the field, and we used the documented data in the ED. Paramedics were well trained and educated, so documented data can be considered reliable.

Conclusion

The ESI triage system is valid to calculate used resources among patients with trauma. ESI has greater power to predict mortality based on used resources than the conventional method because radiographies and laboratory tests are calculated once. Therefore, the ESI-used resource protocol may be used to predict mortality in patients with trauma.

Ethics Committee Approval: Ethics committee approval was received for this study from the Ethics Committee of Mashhad University of Medical Sciences (Approval Number: 940948).

Informed Consent: The study is granted exemption from ethics committee, so informed consent is not required because the study involves no more than minimal risk to the subjects.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept - A.M.; Design - Z.N., H.Z., A.M.; Supervision - Z.N., H.Z., A.M.; Resources - A.M., M.E., A.A.; Data Collection and/or Processing - Z.N., H.Z., A.M.; Analysis and/or Interpretation - Z.N., H.Z., A.A., M.E. and A.M.; Literature Search - Z.N., H.Z., A.M.; Writing Manuscript - Z.N., H.Z., A.M.; Critical Review - Z.N., H.Z., A.A., M.E. and A.M. Other - M.E., A.A.

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An Analysis with Rotter Internal-External Locus of Control Scale, Rosenberg Self-Esteem Scale, and the Barratt Impulsivity Scale on Patients Who Attempted to Recurrent Suicide

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Abstract

Aim: This study was actualized in order to see whether the patients who applied to the emergency service based on suicide would repeat this situation, to overtake again also to take necessary precautions.

Materials and Methods: A total of 910 folders of patients who were admitted to Adiyaman University Medical Faculty Education and Research Hospital Emergency Service with suicide attempt between January 1, 2012, and December 31, 2014, were evaluated retrospectively. Eventually 148 patients with recurrent suicide attempts were reached. Fifty-two patients voluntarily participated in the study. Rotter internal-external locus of control scale, Rosenberg self-esteem scale and the Barratt impulsiveness scale tests were applied to those patients. As a control group, 51 patients who attempted suicide once and 45 healthy subjects who were never involved in suicide attempts were included in the study.

Results: There was no difference between the groups in terms of age and sex. According to the Rotter scale, both groups attempting suicide were found to be more external-focused than the group without any suicide attempts. On the contrary, there is no difference among those attempting suicide. According to Barratt impulsiveness scale scores, patients who attempted suicide once were more impulsive than patients who attempted suicide recurrently.

Conclusion: Barratt impulsiveness scale and Rosenberg self-esteem scale can be used to evaluate the risk of recurrent suicide attempts in patients who has single suicide attempted. Since the Rotter scale can make a distinction between healthy individuals and those who attempt suicide, it can be used for screening in high-risk groups for suicide attempts, especially for adolescents.

Keywords: Barratt, rotter, rosenberg, suicide

Introduction

Suicide is an attempt to put an end to a person's life voluntarily. It is a form of aggression directed at a person's self (1). According to the World Health Organization (WHO), 2% of the deaths are caused by suicides, and more than one million people commit suicide every year (2). Suicide rates vary between 0.003% and 0.045%, and especially among young people, it is one of the leading causes of death follow-

ing traffic accidents. It is also ranked second in the causes of injury (3). Therefore, suicide must be considered as a public health problem.

One of the most important predictors for a suicide attempt is the presence of previous suicide attempts. For this reason, one of the approaches to prevent suicide is to identify the risk for recurrence suicide after first suicide attempt (4). If it is possible to investigate socio-demographic data to determine individuals with high recurrence

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risk using various scales for the suicide patients who applied emergency services, then completed suicide attempts may be prevented by conducting more intense psychiatric help for those patients. For this reason, it is vital to determine scales that guess recurrence for patients who had attempted first suicide.

The impulsive act is defined as "a cognitive function where an individual does not thoroughly think before giving a response or start a task" (5). Impulsive suicide attempts are more common especially in young people, and it is also stated to be more common in women than in men (6). Anger and aggressive behavior are treated as significant risk factors for suicidal behavior. Studies that show the relationship between aggression, impulsive behavior, and suicide attempts are frequently encountered (7).

The concept of locus of control is based on the belief whether there will be a rein forcer coming after an individual's behavior. If someone believes that those rein forcers are under the control of their own behavior, it is accepted as internal locus of control; however, if s/he thinks they are under the control of luck or other powers, then it is considered to have external locus of control (8). Many studies indicate that suicide attempts are more common with in individuals who have external locus of control (9).

Self-esteem, in the broadest sense, reflects a person's evaluation of their own as valuable, effective, and successful (10). Feeling of self-worthy; ability to reveal their skills, abilities and knowledge; boasting of achievements, acceptance within the community, accepting and embracing their own bodily characteristic; and having own self-esteem are the leading factors in the formation and development of self-esteem (11). Low self-esteem has been reported to be associated with self-harm and suicide attempts (12).

In this study, we investigate the predictability of the risk of recurrence for the individuals who had recurrent and non-recurring suicidal attempts with using the Barratt impulsivity scale (BIS), the Rotter internal-external locus of control scale (RIELCS), and the Rosenberg self-esteem scale (RSS).

Materials and Methods

Sample

In this study, 910 patients who attempted suicide had been taken to the emergency service at the Department of the Medical Faculty of Adiyaman University Educational and Research Hospital between January 1, 2012 and December 31, 2014. The patients who had attempted suicide in 2012, before or following 3 years, were accepted as recurrent suicide attempts. These patients were called and invited to the hospital for interview. Patients who did not sign the patient consent form and also who died were not included in the study. The control group consisted of volunteers who were healthy. Ethics committee approval was obtained from Adiyaman University Faculty of Medicine Ethics Committee.

Scales

Rosenberg self-esteem scale (RSS)

Rosenberg self-esteem scale was developed by Rosenberg (1965) and adapted to Turkish; reliability and validity studies were carried

out by Çuhadaroğlu in 1985. The scale has 12 sub-tests-one of which is self-esteem sub-test and is composed of 10 articles. In the self-esteem sub-test, it has been accepted that scores between 0 and 1 indicate high self-esteem, scores between 2 and 4 indicate average, and scores between 5 and 6 indicate low self-esteem (13).

Rotter internal-external locus of control scale (RIELCS)

In our country, the validity and reliability studies of RIELCS developed by Rotter have been made by Dag (1966) (14). This scale is composed of 29 double articles and aims to locate the individuals' generalized control expectations on internal-external locus. Each article contains two choices that are restricted to elective answering type. Six articles were placed as a filling in order to hide the aim of the scale and external aspects of choices of other 23 articles were evaluated as 1 point. Thus, scale scores show differences between 0 and 23, and higher scores point out increase in belief in external locus control (15, 16).

Barratt impulsiveness scale (BIS)

The scale, developed by Barrat et al. (17), is a self-report measure composed of 30 articles (16). Higher scores point out to higher impulsiveness levels. Validity and reliability studies of the scale have been carried out.

Statistical analysis

Data have been evaluated by IBM Statistical Package for the Social Sciences version 21.0 (IBM SPSS Corp.; Armonk, NY, USA). Frequency and percentage have been used for categorical variables as descriptive statistics, and mean and standard deviation have been used for continuous variables. Chi-square test has been used for comparing categorical variables among groups. Kolmogorov-Smirnov test was used to evaluate whether continuous variables meet the parameters of normal distribution. Kolmogorov-Smirnov test was used to evaluate whether continuous variables meet the parameters of normal distribution. Independent two-samples t-test was used for parameters fitting normal distribution in comparing among groups of continuous variables, and Mann-Whitney U test was used for parameters not fitting normal distribution. ANOVA test was applied for parameters fitting normal distribution in comparing among three groups of continuous variables, and Kruskal-Wallis test was applied for parameters not fitting normal distribution. $p < 0.05$ was accepted as statistically significant level.

Results

In the scanning of the folders, 148 recurrent suicide attempted patients were detected. Of these patients, 114 were female, 89 patients were single (60.1%), 80 patients were primary school graduate (54.1%), and 59 patients were unemployed. At most, there were patients who were in the age group of 15-24 y ($s=94$, 63.5%). A total of 129 patients took medicine and toxic substance as a way of suicide attempt. The most frequent cause of suicide was reported as familial problems ($s=41$, 27.7%); 88 (59.5%) patients had psychiatric diagnoses and 64 (43.2%) patients had psychiatric treatment in the last six months.

After scanning of the patient folders, they were called and invited to the hospitals for interview. Fifty-one single suicide attempted patients, 52 recurrent suicide patients, and 45 control patients who

have never attempted are included in the study. Sociodemographic data of the three groups are presented in Table 1. There was not any significant difference among groups in terms of age and sex ($p=0.216$ and $p=0.297$, respectively). However, it has been understood that the control group has a higher level of education, and they are mostly employed (for each $p<0.001$).

Average RIELCS scores of single attempted and recurrent patients were not different ($p=0.677$) but they were lower in control groups ($p<0.001$). While the BIS scores of single suicide attempted patients were higher than recurrent patients ($p<0.001$), there were no difference between all attempters and control group. Average RSS score was the highest in recurrent suicide attempts in single attempts and were significantly lower than them ($p=0.023$), and when compared, control groups were significantly lower in all attempted patients ($p<0.001$) (Table 2).

Discussion

It has been detected in studies including psychologic autopsy that nearly 44% of deaths in completed suicides attempted suicide before (18). In the study carried out on 898 patients by Kir et al. (17), the rate of recurrent suicide attempts was found to be 4% ($s=36$) (19). In literature, it has been reported that 30%-60% of suicide attempters have attempted suicide earlier too (20). It may be expected that the rate of recurrent suicide attempts in our country is lower than Western countries just because the rate of suicide attempts is lower. In our study, the rate of recurrent suicide attempts has been found to be 16.2% ($s=148$). This rate which is closer to the rates in literature may represent the increasing rate of suicide and recurrent suicide attempts in our country in years.

In a study carried out in the Netherlands, it has been stated that the highest risk age group for recurrent suicide attempt is 25-49 y (21). In our study, this age group has been the second rank with 35.8% rate. The age group of 15-24 y has been the first rank with 63.5% rate. Our study shows us suicide attempts in children and adolescents has been increasing recently.

It is widely accepted that individuals who believe the resulting outcome of an event is linked to their own effort, own behavior are internally controlled and individuals who believe that outcome is linked to luck, fate, or powerful people are externally controlled according to the concept of locus of control (22). In most of the previous studies, depression and suicide attempts were found more often in individuals with external locus of control (23). Similar to literature, in our study, it has been determined that suicide attempters are more external locus than the control group. However, there is no difference between recurrent suicide attempters and single suicide attempters. According to these results, RIELCS can be used in general society scans and to determine the risk of suicide particularly risky groups such as adolescents, but this is not a suitable tool to determine the risk of recurrent attempts for single attempters.

Impulsivity includes a variety of behaviors that are unsuitable to condition, overly risky, not well-planned, and generally lead to undesirable consequences. Impulsivity is manifested by some features such as carelessness, headiness, neophilia, risk taking, pursuit of excitement and pleasure, low probability of damage, and extraversion (24).

Impulsiveness can be identified as a tendency to act thinking less than individuals with similar talent and knowledge, act without thinking enough and act quickly without deciding consciously or

Table 1. Sociodemographic features of recurrent suicide attempted patients or single suicide attempted patients and control groups

		Single suicide attempt	Recurrent suicide attempt	No suicide attempt	p
Sex	Female (n, %)	36 (70.6)	37 (71.2)	26 (57.8)	0.297
	Male (n, %)	15 (29.4)	15 (28.8)	19 (42.2)	
Age	Avarege (SS)	29.26 (8.91)	26.47 (8.44)	26.85 (8.49)	0.216
Education period	Year (SS)	10.27 (3.77)	10.12 (2.57)	13.69 (3.13)	<0.001
Employment status	Employed (Number, %)	8 (15.7)	9 (17.6)	24 (53.3)	<0.001
	Unemployed (Number %)	43 (84.3)	42 (82.4)	21 (46.7)	

Table 2. Comparison of scores of Rotter Internal-External Locus of Control Scale, Rosenberg Self-esteem Scale, and The Barratt Impulsivity Scale in recurrent suicide attempted patients or single suicide attempted patients and control groups

Scale	Single suicide attempt (mean)	Recurrent suicide attempt (mean)	p (Comparing groups of single suicide attempted patients with recurrent suicide attempted patients) (mean)	Control groups (mean)	p (Comparing the suicide attempted groups with control groups)
Rotter Internal-External Locus of Control Scale (average SS)	13.45 $\pm$ 2.91)	13.72 ($\pm$ 3.54)	0.677	10.61 ($\pm$ 3.21)	<0.001
Barratt Impulsiveness Scale (average SS)	67.24 ($\pm$ 7.90)	60.25 ($\pm$ 10.73)	<0.001	63.86 ($\pm$ 7.77)	0.927
Rosenberg Self-esteem Scale (average SS)	2.07 ($\pm$ 1.04)	2.55 ($\pm$ 1.04)	0.023	1.20 ($\pm$ 0.62)	<0.001

without thinking ahead. Impulsiveness is an important concept for many psychiatric disorders especially attention deficit and hyperactivity disorder. The relationship between impulsiveness and suicide attempts has frequently been reported before. It has been reported that suicide attempts carrying features of impulsiveness are seen mostly among teenagers and women (25). In a study carried out with suicide attempters and non-attempters, it has been determined that impulsiveness scores of patients suffering from depression lowers in both groups after treatment, but impulsiveness scores were found to be higher in suicide attempters group both before and after treatment (26). Researchers commented on this situation as impulsiveness is a state and constant feature. According to the BIS, we could not find any difference between suicide attempters and control groups. However, impulsiveness scores were higher in single suicide attempters. So, we think that first suicide attempt can carry impulsive features, but non-impulsive planned suicide attempts are more risky for recurrent attempts.

It has been reported previously in many studies that low self-esteem increases the risk of suicide in adolescents and young adults (25, 26). We found that recurrent suicide attempters have the lowest self-esteem, single attempters have a significantly higher self-esteem than them and control group has the highest self-esteem. This situation makes us think that RIELCS can be used to foresee the risk of recurrent suicide both in general population and in single suicide attempters.

Study limitations

In our study, also the number of cases shows statistically significant results, we need to increase the number of cases to obtain a stronger result. Multi-center studies can be done to increase number of cases. Because the patients' contact addresses were wrong and some patients refused to participate in the study, 52 of 148 patients could be taken to study.

Conclusion

As a result, the first place to apply for patients who attempt suicide is the Emergency Service. Patients who underwent initial treatment are evaluated by psychiatry after the clinical condition has been corrected. With this study, these tests can also be done during adolescence to prevent suicide attempts and necessary precautions can be taken in advance. We believe that these tests will help us determine the risk of recurrence for those who are attempting suicide for the first time both in emergency services and during a psychiatric consultation.

Ethics Committee Approval: Ethics committee approval was received for this study from the Ethics Committee of Adiyaman University (Date: 16.06.2015, Number: 05-11).

Informed Consent: Patients/the parents of the patients who participated in this study confirmed the written approval form.

Peer-review: Externally peer-reviewed.

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Impact of NEXUS Low-Risk Criteria on Cervical Injuries in a Turkish Tertiary-Care Hospital

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Abstract

Aim: In the present study, we aimed to determine the amount of unnecessary X-ray graphics that could lead to cost-load and radiation side effects using NEXUS Low-Risk Criteria (NLC) that was applied and evaluated in patients with cervical spine trauma in the Izmir Atatürk Training and Research Hospital's emergency department.

Materials and Methods: Between June 2010 and September 2010, the trauma patients admitted to the emergency department were evaluated retrospectively. The age, sex, NLC, mechanisms of trauma, radiological imaging, cost, radiation load, and degree of cervical injuries were assessed.

Results: In the present study, 1317 patients with a possible cervical spine injury were included. It was confirmed that the numbers of excluded and included patients according to NLC were 1014 and 303, respectively. In excluded patients, 479 (36.3%) did not have any radiology, but in 535 (52.7%) of them, unnecessary radiological imaging studies were administered. The trauma mechanism was crash at the same level in 310 (23.5%) of the total and 267 (26.3%) of the excluded patients. In addition, in-vehicle traffic accident was observed in 64 (21.1%) included patients. It was found that the number of cervical spine injuries was four in the excluded and 10 in the included groups, which was confirmed according to NLC.

Conclusion: The increase in the use of NLC leads to a decrease in both the cost and amount of radiation exposure in patients and health workers. In addition, the number of cancers due to iatrogenic etiologies in humans will be lower.

Keywords: NEXUS low-risk criteria, trauma, cervical spine

Introduction

Cervical spine traumas are among the most serious injuries among trauma patients. In the United States and Canada, 13 million trauma patients annually are at risk for damage to the cervical spine. Cervical spinal injury is found in 2%-3% of patients with multiple trauma (1). Routine cervical radiography is performed to exclude cervical injuries, but few of these patients have cervical vertebrae injuries. For this reason, it can be predicted that cervical radiography may have been taken unnecessarily in some patients.

Unnecessary graphs taken in patients with suspected cervical trauma put a financial burden on patients and insurance institutions.

Patients are subjected to cervical immobilization, which is a disturbing intervention for a long time, due to the absence of indications in their wishes for radiographic imaging. An emergency service that is crowded and heavy in workload causes patient dissatisfaction and loss of work power (2).

The National Emergency X-Radiography Utilization Study (NEXUS) Low-Risk Criteria (NLC) has been developed for patients with suspicious cervical trauma with the goal of reducing unnecessary radiographic requests and improving standard imaging indications. These criteria demonstrate the indications for cervical direct X-ray in trauma patients with the risk of cervical injuries (2).

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In the present study, we investigated the number of unnecessary vertebrae graphs and the cost and radiation burden generated as a result of the application and evaluation of NLC in cervical trauma patients who presented to our emergency department.

Materials and Methods

Center of the study

A retrospective cross-sectional study was conducted at Izmir Atatürk Training and Research Hospital Emergency Medicine Clinic. Izmir Atatürk Training and Research Hospital is a third-level health institution, and the number of patients that apply to the emergency service annually is approximately 210,000. Approval was obtained from the ethics committee of Izmir Atatürk Training and Research Hospital for the study.

Sample of the study

The sample of the study comprised patients over the age of 18 years who applied within the first 48 h after trauma between June 2010 and September 2010. The criteria for inclusion or exclusion are given in Table 1.

Table 1. Study sample criteria

Inclusion criteria for the study	Exclusion criteria for the study
1. Patients over 18 years old	1. Patients under the age of 18
2. Patients whose consciousness state is open, co-operative, and oryante (GCS=15/15)	2. Pregnancy
3. Patients with acute blunt head trauma or blunt neck trauma or both	3. Patients with penetrating stab wounds on the neck
4. Whether or not a patient has pain in the neck area; patients who cannot be treated remotely and whose injury to the head/neck area above the clavicle is detected	4. Patients with cervical injury story
	5. Patients with a known vertebrae disease
	6. Patients who had undergone previous neck surgery
	7. Patients with inadequate information in hospital files or serious deficiencies in their files

Table 2. NEXUS low-risk criteria

The following criteria are indicated for radiographic imaging of cervical vertebrae in trauma patients who do not meet all of them: • Normal alertness • No midline cervical tenderness • No intoxication • No focal neurological deficit • No painful distracting injuries
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Nexus Low-Risk criteria are given in Table 2 (2). Patients were divided into two groups according to these criteria. The first group comprised patients who did not require any imaging modality (physical examination and severe cervical trauma excluded), and the second group included patients who did not have NLC (advanced physical examination and severe cervical trauma could not be ruled out) because of low-risk criteria. Both groups were examined in terms of trauma mechanisms.

The examination cost of the patients who underwent advanced imaging methods when they were included in group 1 and the radiation burden they received were also studied.

The relationship between NLC and vertebrae injury was investigated in group 2 patients.

Data collection

Data of the patients with a potential head trauma were screened with the International Classification of Diseases (ICD) 10 diagnostic codes from the hospital automation system (Scanned ICD Codes: S00-03, S06-07, S09-14, S16-19, V00-99, W01-19, W50-55, W76, X70, X81, Y00-04, Y20, Y29-32, and Y35.3).

Patients included in the hospital automation system science study module were identified by defining NLC, trauma mechanism, cost burden, and radiation burden.

Cervical vertebrae-computerized tomography (CT) and graphs of the patients were interpreted by our radiology specialist physicians. The radiation dose of patients exposed to direct X-rays was 0.12 milliSievert (mSv), and the radiation dose of patients undergoing CT was calculated to be 5 mSv. According to the NLC, group 1 represented as pathologic results eventhough belong to the low risk group were reached via telephone and were asked whether they had any complaints about cervical trauma.

Statistical analysis

All data obtained from the study were recorded in the standard program Statistical Package for Social Sciences (SPSS Inc.; Chicago, IL, USA) for Windows 16 and evaluated. Numerical variables were summarized as mean±SD and categorical variables as number and percentage. ANOVA (Analysis of variance) test was used for age and gender comparisons in groups 1 and 2, and Chi-square and Fisher's exact tests were used in other groups.

Results

International Classification of Diseases diagnostic codes were obtained from 5057 patients with possible neck trauma. 3740 patients were excluded from the study because of the patient's age of under 18 years old, incomplete documents and incompatible clinical findings (single extremity injury, cutter or penetrant injury, chest or abdominal trauma, etc.). Of the remaining patients, our study group comprised 1317 (26.0%) patients with possible head or neck trauma.

Among these patients, 1014 (77.0%) patients were included in the group (group 1) excluding possible cervical injuries as they met NLC. The remaining 303 patients (23.0%) were included in group 2 because they did not meet NLC.

Table 3. Trauma mechanisms

Mechanism	Group 1 n (%)	Group 2 n (%)	Total n (%)
Same-level fall	267 (26.3)	43 (14.2)	310 (23.5)
In-vehicle traffic accident	174 (17.2)	64 (21.1)	238 (18.1)
Stabbing in the head with an unknown object	184 (18.1)	29 (9.6)	213 (16.2)
Motorcycle accident	83 (8.2)	53 (17.5)	136 (10.3)
Hitting the head to/with an object	82 (8.1)	3 (1.0)	85 (6.5)
Pedestrian traffic accident	58 (5.7)	23 (7.6)	81 (6.2)
Impact with blunt object	68 (6.7)	9 (3.0)	77 (5.8)
Falling from 1 to 3 m high or 5-15 steps	26 (2.6)	31 (10.2)	57 (4.3)
Falling from <1 m elevation or <5 steps	30 (3.0)	10 (3.3)	40 (3.0)
Falling from >3 m or 15 steps	7 (0.7)	18 (5.9)	25 (1.9)
Others	35 (3.4)	20 (6.6)	55 (4.2)
TOTAL	1014 (100)	303 (100)	1317 (100)

In total, 841 (63.9%) patients of the study group were male, and the mean age was 41.2 ± 18.8 years (40.9 ± 19.0 years for group 1 and 42.3 ± 18.2 years for group 2).

When examined by gender, in-vehicle traffic accidents ($n=167$, 19.9%) and hitting the head of the unidentified object ($n=150$, 17.8%) in men and same-level falls ($n=180$, 37.8%) and in-vehicle traffic accidents ($n=71$, 14.9%) in women were among the most common causes. When trauma mechanisms were examined according to the age group, the most common injury mechanism in the age groups of 18-20 years and 21-40 years was in-vehicle traffic accidents (22.7% and 22.0%, respectively). In the 41-60- and over 60-year-old groups, it was determined that the most common mechanism was falling from the same level (22.3% and 49.1%, respectively) (Table 3).

Cervical vertebrae injuries

Cervical vertebrae injuries that were not included in group 1 are given in Table 4. The patients with cervical injuries in group 1 were called by telephone approximately 4 months later. These four patients were found to have no complaints or deficits by themselves or their relatives.

Table 4. Cervical vertebra injuries that failed to be detected in group 1

	Age, Gender	Mechanism	Injury type	Prognosis
1	20, M	Pedestrian traffic accident	C3 vertebrae mild anterolysis	No complaints. There is no deficit.
2	55, M	Impact with blunt object	C6-7 disc prolusion and minimal cord pressure	No complaints. There is no deficit.
3	22, M	In-vehicle traffic accident	C6 vertebrae pedicle posterior fracture	No complaints. There is no deficit.
4	77, F	Same-level fall	Suspicious atlantoaxial dislocation	No complaints. There is no deficit.

Table 5. Cervical vertebra injuries detected in group 2

	Age, Gender	Mechanism	Injury type	Findings	Treatment	Hospitalization
1	63, M	In-vehicle traffic accident	C2 left neural arcus fracture	SPS	Internal fixation	Yes
2	19, M	In-vehicle traffic accident	Corpus C6 fracture	SPS	Internal fixation	Yes
3	49, F	In-vehicle traffic accident	C5-C6 vertebrae corpus fracture	Consciousness disorder, painful distracting injury	None	Yes
4	32, F	In-vehicle traffic accident	C3 arcus, C4 pedicle, and lamina fracture	SPS, FND, painful distracting injury	Internal fixation	Yes
5	26, M	Motorcycle accident	C2 left neural arcus fracture	SPS+FND(top left, extremity muscle power 4/5)	Internal fixation	Yes
6	19, M	Motorcycle accident	C2, C5, and C6 corpus fracture	FND (paraplegic)	None	Yes
7	18, M	Motorcycle accident	C1 anterior arcus and C6 corpus fracture	SPS	None (exitus)	Yes
8	42, M	Plunge	C7 corpus fracture	SPS	Internal fixation	Yes
9	18, M	Plunge	C5 corpus and both two neural arcus fractures	FND (lower extremity sensation, upper-lower extremity motor loss)	Internal fixation	Yes
10	47, M	Falling from >3 m or 15 steps	C6-C7 lamina fractures	Painful distracting injury	Yok (toracal internal fixation)	Yes

M: male; F: female; SPS: spinal process sensitivity; FND: focal neurological deficit

Cervical vertebrae injuries were detected in 10 patients in group 2. This group is shown in Table 5. Eight of the injuries occurred in males, whereas two occurred in females. Four (18.2%) patients in the 18-20 year age group, two (1.4%) patients in the 21-40 year age group, three patients (3.3%) in the 41-60 year age group, and one (2.0%) in the 61 year and older age group had cervical vertebrae injuries ($p=0.001$).

Cervical vertebrae injuries were found in one (1.7%) of the unconscious patients and in nine patients (3.7%) without consciousness impairment ($p=0.693$). Cervical vertebrae injuries were detected in six (10.9%) of the patients with midline cervical tenderness and in three (1.6%) of the patients without midline cervical tenderness ($p=0.005$). Cervical vertebrae injuries were not detected in patients with intoxication status, but they were detected in nine (4.5%) of the non-intoxication patients.

Cervical vertebrae injuries were found in four (36.4%) of the patients with a focal neurological deficit and in five of the patients without a focal neurological deficit (2.1%) ($p=0.001$). Cervical vertebrae injuries were found in two (1.3%) of the patients with a distracting painful injury, whereas it were found in seven (7.0%) of the non-injured patients ($p=0.032$).

Patients with multiple criteria within NLC were excluded because of the incidence of cervical vertebrae injuries and inadequate patient groups.

Unnecessary performed radiological imaging

Of the 1014 patients in group 1, 535 (52.7%) underwent unnecessary radiological imaging; 423 (79.1%) had two-way cervical vertebrae; cervical vertebrae CT was performed in seven patients (1.4%); a two-way cervical vertebrae graph and CT were performed in 45 patients (8.4%); one (0.2%) patient underwent two-way cervical vertebrae graph and cervical MRI; one (0.2%) patient underwent two-way cervical vertebrae graph, cervical vertebrae CT, and cervical MRI; and in the remaining two (0.4%) patients, two-way cervical vertebrae and one cervical CT scan were performed.

From the hospital automation system, it was determined that the above unnecessary radiological examinations resulted in a financial burden of Turkish lira (TL) 55.366 in hospital costs. Patients were exposed to an additional dose of approximately 331.88 mSv. It was found that 424 (79.2%) patients were exposed to radiation doses to 0.12 mSv, seven (1.4%) patients to 5 mSv, 46 (8.5%) patients to 5.12 mSv, and two (0.4%) patients to 5.24 mSv.

Discussion

In the present study, patients were exposed to approximately 331.88 mSv total radiation in effective dose. The distribution of these doses was 5.24 mSv in 424 patients (79.2%), 5 mSv in seven patients (1.4%), 5.12 mSv in 46 patients (8.5%), and 5.24 mSv in two patients (0.4%). The risk of developing lifetime cancer in these patients increased by 1 per 10,000.

Economically, there was an extra cost of TL 55.366 in total. However, when considering the expenditure for all trauma patients across the country, it is clear how high the figures will be. Approximately 50,000

patients were admitted to our emergency department from June 1, 2010, to September 1, 2010. According to the data from The Ministry of Health of the Republic of Turkey, the annual number of registrations to emergency services in Turkey is approximately 60,000,000. It has been observed that unnecessary cervical imaging costs about TL 60 million annually. With a similar calculation, these patients are exposed to about 400,000 mSv of radiation in total, which is equal to the amount of radiation received by 130,000 people per year from nature.

Approximately 800,000 cervical vertebrae graphs per year are required in patients with blunt neck trauma in the United States, resulting in a cost of approximately US\$ 180 million. Consequently, 10,000 cervical vertebrae injuries were detected; the remaining 790,000 (98%) were negative expense costs and radiation exposure for the patients. NLC have been tried to be developed for those with a minimal risk of injury to the cervical vertebrae, which constitutes the vast majority. The application of these criteria will reduce the number of radiographs to one-third, which will reduce the cost by approximately US\$ 60 million, the radiation dose, and radiation-induced morbidity and mortality (3). In addition, the reasons for the development of NLC include the need for diagnostic testing with standard indications and a reduction in patient immobilization and the waiting period in emergency care, thus reducing the workload. In addition, any unnecessary radiographs and examinations required from patients cause the more vital problems of the patients to be ignored and the patients to be transported to distant centers, such as CT and graph centers, which are not controlled from the emergency room. This procedure also makes it difficult to control patients who are not stable, carrying the risk of rapid deterioration. This also delays -to transfer to other services or hospitals for further care of these patients.

Hoffman et al. (2) published a brief prospective study in 1992 on low-risk criteria. They planned a large-scale NEXUS study in 1998 and published the work method. In 2000, they tested and published the validity of the completed work. In that study, NLC was found to be 99.6% sensitive and 12.9% specific for cervical trauma in 34,069 patients. Eight of the 818 patients with NLC cervical vertebrae injuries failed to be detected. Clinically non-sequela or asymptomatic patients were -may cause misdiagnosis. These patients recovered without surgical treatment.

In a study on the use of NLC in Australia, nurses and doctors were compared based on the time of completion of the work. The study revealed that NLC is easily applicable by nurses and assistant health personnel for low-risk trauma patients (4).

In a study conducted in the UK, it was stated that the shortening of the immobilization period of the patients showed a significant improvement in patient care because the NLC allowed accident and triage nurses to safely remove the neck and trauma boards (5).

The application of NLC, Stiell et al. (2) found that 2347 (28.4%) of 8283 patients avoided radiographic imaging (1). In the study by Hoffman et al. (2), 4309 of 34,069 patients (12.6%) avoided radiological imaging, whereas in a study by Dickinson et al. (6), 2779 (31.1%) of 8924 patients avoided radiological imaging (6). Radiologic imaging was applied to 535 (52.7%) patients, although we excluded 1014 patients (77.0%) from 1317 patients in our study.

In a study by Hoffman et al. (2), 34,069 patients had a mean age of 37 years, and 2.5% of these patients were 8 years of age or younger; the mean age of 818 (2.4%) patients with cervical vertebrae injuries was 40 years, and 1.3% of these were 8 years old or younger. In the present study, the mean age of 1317 patients was 41.2 ± 18.8 years (not included under 18), and 14 (1.1%) patients had cervical vertebrae injuries; their average age was 36.1 ± 19.4 years. In addition, in the study by Hoffman et al. (2), they misinterpreted eight (0.02%) patients with cervical vertebrae injury of 34,069 patients, whereas our study passed over four (0.3%) of 1317 patients. Stiell et al. (1) found that the mean age was 37.6 ± 16 years and that 4328 (52.3%) were males; the mean age of 8924 patients was 36.7 ± 16 years, and 4600 (51.5%) were males in the study by Dickinson et al. (6) In the present study, 841 patients (63.9%) were male.

Dickinson et al. (6) reported the most common trauma mechanism in their study as in-vehicle traffic accidents (1). In the present study, falling from the same level was the most common trauma mechanism. The reason for this may be because Dickinson et al. (6) studies were conducted in the same centers. In addition, because the patient population was at the age of over 16 years, there may have been an increase in the number of in-vehicle accidents due to greater motor vehicle use and more dangerous driving. In general, spinal injuries in the cervical region are the most common in-vehicle accidents (7).

In a study by Paykin et al. (8), 4035 patients who were older than 65 years were analyzed; 468 patients were diagnosed with cervical spine fractures, of whom 21 were determined to be NEXUS-negative. The NEXUS criteria were performed with a sensitivity of 94.8% in complete case analysis in older blunt trauma patients.

Denver et al. (9) performed the NEXUS criteria in 169 patients and found that this criteria demonstrated 81.8% sensitivity and a 95.9% negative predictive value in detecting any cervical spine injury.

Study limitations

Although anterior-posterior, lateral, and odontoid views of the cervical spine radiography series are required for the determination of cervical trauma, we could not achieve the odontoid views of our patients retrospectively. Based on this limitation, it is possible that there were some missed fractures in both the study groups. Particularly in group 2, those who cannot be excluded by the NEXUS criteria, we were able to achieve MRIs, CTs, and both MRI and CT of the patients (94, 3, and 3, respectively). Ordered radiographic tests were officially reported by radiologists in different hospitals, and this issue limited the external validity of the study.

Conclusion

Although the academic environment of emergency medicine in our country is high on the NLC awareness level, research has not re-

vealed how much of these rules are applied in everyday practice. The increased practical application of NLC will reduce the cost and radiation exposure of patients and healthcare personnel.

Ethics Committee Approval: Ethics committee approval was received for this study from the Ethics Committee of Izmir Ataturk Training and Research Hospital (Date: 13.07.2010 Decision Number: 10).

Informed Consent: Informed consent was not taken from patients due to the retrospective nature of the study.

Peer-review: Externally peer-reviewed.

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Detection Rate of Fractures by Triage Nurses Applying the Ottawa Foot Rule

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Abstract

Aim: The purpose of this study was to investigate the detection rate of fractures by triage nurses by applying the Ottawa foot rule.

Materials and Methods: This is a prospective observational validation study that was designed in a training and research hospital between January and December 2013 on 98 patients with isolated foot injury. After triage nurses were provided training on the Ottawa foot rule for 4 hours, they evaluated patients with foot trauma by applying the rule. Foot radiographs were obtained from all trauma patients who were evaluated in the triage. Radiographs were evaluated by an emergency medicine specialist and fractures were determined.

Results: Data collection procedures included the evaluation of 90 out of 98 patients who demonstrated one or more qualities of the Ottawa foot rule according to the trained nurses. The fracture prediction rate of the triage nurses using the Ottawa foot rule was found to be 14.4%. The sensitivity of the "the inability to take four steps in the Emergency Department" was 100% and the specificity was 41.6%. Of all patients, 69.2% with fractures were aged <55 years, while 30.8% were aged ≥55 years.

Conclusion: This study revealed that triage nurses could successfully perform the Ottawa foot rule after a brief training. According to the Ottawa foot rule applied by the triage nurses, the "inability to take four steps in the Emergency Department" rule was found to be the most significant.

Keywords: Emergency department, Ottawa foot rule, foot trauma

Introduction

Emergency departments (EDs) face overcrowding, particularly during rush hours. One of the reasons for this overcrowding is the admission of minor trauma patients (1). Acute foot injuries are the primary reason for applying to the ED with minor trauma, but there is no fracture detected in most of the patients upon radiological visualization (2, 3). Despite the low incidence of fractures, the common clinical practice in most EDs is to evaluate these patients using radiography to avoid

medicolegal problems and patients' dissatisfaction in addition to the real indications (4-7).

To overcome this problem, clinical decision rules for ordering diagnostic radiographs for in-patients with acute foot injuries have been developed and the Ottawa foot rule is one such rule. Stiell et al. (8) described the Ottawa foot rule as experiencing tender pain at the navicular or basis of the fifth metatarsus, in the middle foot, inability to take four steps due to not bearing weight on foot immediately after trauma or in the ED (8-10).

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The Ottawa foot rule can determine the possibility of fracture and reduce the number of negative radiographies (11). A prospective observational study determined that ED triage nurses can successfully apply this rule (12).

The primary objective of this study was to investigate the detection rate of fractures by triage nurses applying the Ottawa foot rule.

Materials and Methods

Study design and setting

This prospective observational study was designed in a tertiary care hospital between January 2013 and December 2013 on 98 patients with isolated foot injury except ankle. The study protocol was examined and approved by the ethics committee of Dr Lutfi Kirdar Kartal Training and Research Hospital.

Selection of participants

All patients admitted to the ED with the complaint of foot trauma were investigated for eligibility in the study. All patients aged >10 years with isolated foot injury sustained within 7 days were included in the study and provided written informed consent.

Patients who had been transferred from another hospital on diagnosis of fracture, pregnancy, altered mental state, making an application for the second time, multiple trauma patients, and patients with isolated skin injuries, such as burns, abrasions, lacerations, and puncture wounds were excluded from the study.

Observer groups

The triage nurses group consisted of four ED nurses. The median age for the triage nurses was 30 years, and the median duration of their clinical experience in the ED was 7 years. The triage nurses groups included two males and two females.

Study protocol

Triage nurses were provided training in the anatomy of foot, Ottawa foot rule, objective of the study, study protocol for foot examination, and a practice of Ottawa foot rule for 4 hours by an emergency medicine specialist. After an interactive and applied training, data including patients' age and sex were collected and Ottawa foot rule screening was performed.

Triage nurses evaluated patients by applying the Ottawa foot rule as experiencing tender pain at the navicular or basis of the fifth metatarsus in the middle foot and the inability to take four steps immediately after trauma or in the ED. They recommended foot radiographies in patients meeting any of the rules. Foot radiographies were performed for all patients (n=98) admitted to the ED and evaluated in the triage with foot trauma. Patients and their radiographies were evaluated by an emergency medicine specialist and fractures were determined. The sensitivity and specificity of each components of the Ottawa foot rule were calculated.

Statistical analysis

Statistical analyses were performed using the IBM Statistical Package for Social Sciences (IBM SPSS Corp.; Armonk, NY, USA) 19.0 software. Descriptive statistics were expressed as frequency and percentage.

The Fisher exact and Chi-square tests were used to determine the difference between groups. A p value of <0.05 was considered statistically significant for all tests.

Results

Ninety-eight patients who had applied to the emergency service with the complaint of isolated foot trauma were evaluated by the trained nurses and underwent foot radiography. Ninety of 98 patients demonstrated one or more component of the Ottawa foot rule (Figure 1), and 13 patients (14.4%) were identified with a fracture in the foot radiograph. At least one component of the Ottawa foot rule was positive in all patients who were identified with fracture in the foot radiograph. The Ottawa rule applied by nurses for diagnosing foot fracture had a 100% sensitivity and 10.4% specificity.

Of the 90 patients who demonstrated one or more components of the Ottawa foot rule, 64.4% (n=58) were males and 35.6% (n=32) were females. The average age was 30±15 years (min. 10, max. 70). The fracture rate was observed in 15.6% of females and 13% of males.

While 69.2% (n=9) of the patients with fractures experienced tender pain on the navicular or basis of the fifth metatarsus, 30.8% (n=4) experienced no tender pain. In contrast, 61.0% (n=47) of the patients without fractures experienced tender pain on navicular or basis of the fifth metatarsus. The sensitivity of the tender pain on navicular or basis of the fifth metatarsus with fractures was 69.2% and the specificity was 39.0% (Table 1).

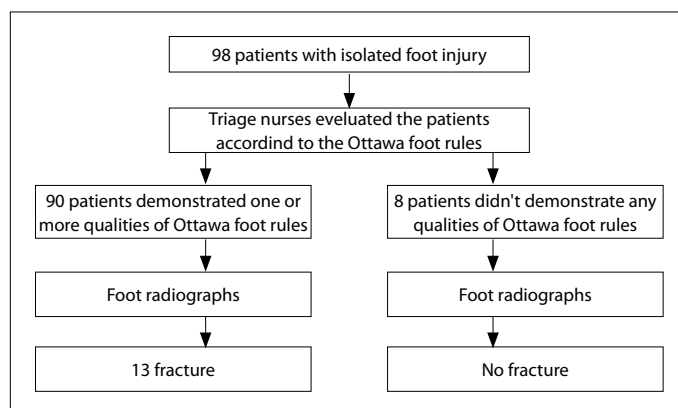


Figure 1. Flow diagram of the study population

Table 1. The relationship between Ottawa foot rule and fractures

		Fracture		
		No % (n)	Yes % (n)	Total % (n)
Tender pain on navicular or basis of the fifth metatarsus	Yes	69.2 (9)	61.0 (47)	62.2 (56)
	No	30.8 (4)	39.0 (30)	37.8 (34)
Tender pain on the middle foot	Yes	46.2 (6)	81.8 (63)	76.7 (69)
	No	53.8 (7)	18.2 (14)	23.3 (21)
Inability to take four steps	Yes	100.0 (13)	58.4 (45)	64.4 (58)
	No	0	41.6 (32)	35.6 (32)

Table 2. Distribution of fractures according to age group

		Age group, years		Total % (n)
		<55 % (n)	>55 % (n)	
Fracture	Yes	10.8 (9)	57.1 (4)	14.4 (13)
	No	89.2 (74)	42.9 (3)	85.6 (77)
Total		100.0 (83)	100.0 (7)	100.0 (90)

While 46.2% (n=6) patients with a fracture felt tender pain in the middle foot, 53.8% (n=7) did not state any tender pain. Of the patients, 81.8% without a fracture felt tender pain in the middle foot. The sensitivity of tender pain on the middle foot among fracture cases was 46.2% and the specificity was 18.2% (p=0.010; Table 1).

Of the patients without fractures, 58.4% (n=45) were unable to take four steps in the ED. The sensitivity of the inability to take four steps in the ED for diagnosing a fracture was 100% and the specificity was 41.6% (Table 1).

Of all 90 patients, 7.8% (n=7) were aged >55 years. Fractures were identified in 10.84% (n=9) of patients younger than 55 years, while fractures were identified in 57.1% of patients older than 54 years (p=0.008; Table 2).

Discussion

In this study, we aimed to evaluate the detection rate of fractures by triage nurses applying the Ottawa foot rule. We showed that the detection rate of fractures by triage nurses applying the Ottawa foot rule was 14.4%. In recent studies, the detection rate of fractures by triage nurses was similar to that in our study. Crosswell et al. (6) performed a study on doctors and found the ratio to be 15%. This ratio was found to be 16% and 17% in the studies conducted by Knudsen et al. (13) and Morrisin and Lovell (14). Our results were also similar to those of other studies and the ratio was 14.4%. Hence, our nurses successfully performed the Ottawa foot rule.

Our nurses performed Ottawa foot rule after a 4-hour interactive and practical training, and we found that they could evaluate fracture with ratio of 14.4%. Derksen et al. (15) found similar results where nurses could evaluate patients after a brief training on the Ottawa foot rule. In the United States, nurses who were working at the triage training were trained of the same practice to evaluate minor trauma patients, and they were provided the title of mid-level practitioners (16). This was performed to reduce overcrowding of the ED and workload of doctors. However, this practice was difficult due to the long and expensive training period, which was not a part of nursing (17).

In the present study, when the Ottawa foot rule was applied by the triage nurses, sensitivity and specificity of each parameter of the Ottawa foot rule was evaluated. Inability to take four steps in the ED was the best predictor within the rule. The sensitivity of this rule was 100% and the specificity was 41.6%. Moreover, 100% sensitivity of this rule indicates the adequacy to suggest foot radiographies without considering other rules.

In this study, fracture incidence of patients >55 years was 5.28 times that of those <55 years. Hence, we can suggest that the Ottawa foot rule may be modified for two criteria, including the age of 55 years and the inability to take four steps immediately after trauma or in ED, similar to the Pittsburgh knee rule, which can be used as an alternative to the Ottawa knee rule, and includes criteria such as age and inability to take four steps immediately after trauma or in ED (18).

Study limitations

There exist certain limitations to this study. This is a single-center study, the number of patients was small, and the fracture rates were lower since major trauma patients were excluded.

Conclusion

Triage nurses could successfully perform the rule after a brief training. The similarity between doctors and triage nurses ratio for fracture determination with Ottawa rule is the indicator.

According to the Ottawa foot rule applied by the triage nurses, inability to take four steps in the ED was the most sensitive: the sensitivity of this criterion was 100% and the specificity was 41.6%. Ottawa foot rule modified by the inability to take four steps in the ED and applied to the patients aged >55 years will be at the forefront and can reduce unnecessary imaging.

Ethics Committee Approval: Ethics committee approval was received for this study from the Ethics Committee of Dr Lutfi Kirdar Kartal Training and Research Hospital (Approval Date: 08.12.2012; Approval No.: 8951337/1009/136).

Informed Consent: Written informed consent was obtained from patients who participated in this study.

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Conflict of Interest: The authors have no conflict of interest to declare.

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For Whom the Sirens Toll: A Study on an Ethical Challenge in Prehospital Emergency Medicine

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Abstract

Aim: The main responsibility of an emergency medical dispatcher (EMD) is to determine the situation and location of an emergency and allocate emergency resources to the scene. However, in some cases, there might be more than one emergency calls at one time forcing an EMD to decide which call should be given priority. Triage, prioritization, and choosing are issues that may be influenced by the EMD's personal values and thus raise ethical challenges. The aim of the present study was to determine (theoretically) the triage decisions of dispatchers in equal emergency care situations and the factors influencing their thinking and decisions.

Materials and Methods: A questionnaire containing two emergency scenarios was applied to 92 students who were candidate ambulance dispatchers in training. The distribution of the participants' response was analyzed and the Chi-square and Fisher's exact tests of independence were performed.

Results: Most of the participants chose to direct the ambulance to the orphanage. Results showed that the number of victims was the main factor influencing priorities and resource allocation in an emergency. In the second survey, age of the injured person influenced the choices.

Conclusion: In triage decisions, EMD students prioritize the age and the number of the victims while deciding the allocation of emergency resources. It includes many individual values that might influence the decision. The ethical conflict of principles in a triage decision is between justice and beneficence.

Keywords: Emergency dispatch center, ethics, triage, decision-making

Introduction

An emergency medical dispatcher (EMD) is a professional tele communicator who gathers information about medical emergencies, provides assistance through emergency medical advice and instruction, and dispatches emergency medical service (EMS) resources to the scene. Evidently, the types of tasks and resources that EMDs handle may change among countries (1). EMSs include the ambulance service as well as the fire and police department in some countries.

Regardless of the type of EMS, the main role of an EMD is to determine the situation and location and to dispatch the EMS resources to the emergency. However, in some cases, there might be more than one emergency calls at one instance, and an EMD needs to prioritize the calls. An EMD is the person who must establish priorities for the allocation of limited EMS resources. During an emergency, the process of organizing the closest appropriate ambulance to the person in genuine need is crucial. It is called (tele) phone triage and it involves many technical, medical, and ethical challenges.

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In Turkey, there are currently two types of emergency dispatch centers: one is just for medical emergency calls and the other is a combination of medical, fire, and police departments. The government's plan is to complete the combination process throughout the country by the end of 2016 (2). The emergency call number is 112 in Turkey, and the dispatchers answering the calls are healthcare professionals. In recent years, the dispatchers have developed to be more professional and have improved their communication skills through a special school for dispatcher education. The Turkish EMS system is based on the perspective of "scoop and run," which indicates to avoid time wasting at the scene by transporting the patient to the nearest convenient hospital and providing emergency care during transport (3).

It is a critical aspect of an EMD's responsibility to prioritize dispatch of service (4, 5). Although some electronic systems and programs are available, it is essential for EMDs to prioritize the calls (6). Performing triage of incoming calls is one of the responsibilities of the EMD. Triage, prioritization, and decision-making are issues that might be influenced by personal values and thus are worth consideration (7).

Decisions on how to distribute the EMSs among multiple patients raise important ethical issues of distributive justice (8). These preferences are not mere medical judgments because they are strongly influenced by the decision makers' characters, perceptions, and values.

Triage

Triage is a French term indicating to "choose" and "sort." It is mostly practiced by prehospital emergency care givers in their daily routines, which means doing "the greatest good for the greatest number" by classifying patients (9, 10).

There are three stages of triage in the modern healthcare systems (11, 12):

- Prehospital triage to dispatch prehospital care resources (EMS);
- Triage at the scene by the first emergency healthcare providers attending to the patient(s);
- Triage upon arrival at the hospital emergency department.

(Tele) phone triage is used for primary ambulance triage, which is the issue studied in this article, and is different from the on-scene triage. It is a dynamic task and needs a significant level of practice, skill, and medical maturity. No EMD can realistically consider all the compounding variables for every decision, which questions the practice of phone triage (13). The crucial question is "How can an EMD be objective and fair during triage?"

While seeking to obtain the most utility from the resources, ethical challenges arise in terms of deciding the best way to allocate the limited resources (14, 15). It is the duty of justice, which states "equals should be treated equally and unequals unequally in proportion to the relevant inequalities" by the principle of formal "distributive justice" (9). In emergency medical practice, the most direct application of distributive justice is in triage (16). The principle that an EMD holds as a core value is the idea that patients will be served according to their medical need. Some issues, such as social status and economic condition, should not limit access to emergency care (17).

Objective

The aim of the current study was to determine (theoretically) EMDs' decisions in equal emergency care situations via phone triage and the factors that influence their decisions.

Research Design

Data collection

A questionnaire was used to collect data. Face-to-face interviews of participants were conducted. The questionnaire consisted of two parts. The first part contained demographic information about the participants, such as class, gender, and age. The second part contained two emergency scenarios to measure participants' attitudes.

SCENARIO 1

You are a dispatcher in a small city's emergency dispatch centre that directs all EMS (Emergency Medical Service) ambulances and fire departments. There is only one ambulance and fire crew available for any operation at a time. During your shift, fire alarm tolls at three different buildings far from each other almost at the same time. One building is an orphanage, and the others are an eventide home and a prison.

1. Based on the scenario and available resources, what location do you direct the only ambulance to? (please select one option)

- a) The orphanage
- b) The eventide home
- c) The prison

2. Based on the scenario, where do you send the only fire crew? (please select one option)

- a) The orphanage
- b) The eventide home
- c) The prison

3. Independent from the case above; when sending an ambulance to an emergency situation, what is the main factor influencing your decision? (please make one selection)

- a) The age of the victims
- b) The number of the victims
- c) The dependency of someone else care of the victims
- d) The gender of the victims
- e) The social position of the victims

SCENARIO 2

You are a member of the ambulance crew that is transporting a patient who is (medically) stable and conscious to another city. During the transport, you come across a recent traffic accident. You observe the accident and notice there are three people injured. You can only take one of the injured, in addition to your patient currently in transfer. You notice that all three injured from the car accident suffer from identical injuries.

One of these three is a child aged 6-7, while the others are a woman in her thirties and a man in his seventies.

4. Based on the scenario, which injured person do you transport to the hospital? (please click one selection)

- a) The child
- b) The woman
- c) The man

5. What is the factor that led to your decision? (please click one selection)

- a) The age of the injured one
- b) The gender of the injured one

6. Would you prefer to change your earlier decision if any of the injured people or their close family and friends is strong in terms of social-political-administrative or academics etc.? (Please choose one.)

(Would it have changed your choice if any of the injured people or their closest person had been strong in terms of social-political-administrative or academic etc.?) (Please click one selection.)

- a) Yes, I would have changed my decision
- b) I am not sure
- c) No, I would not have changed my decision

7. You have learned that the injured woman in her thirties is pregnant. In that case, which injured person would you get the transport to hospital? (please click one selection)

- a) The child
- b) The woman
- c) The man

Methods

The questionnaire was applied to 92 students who were candidate ambulance dispatchers attending the Mustafa Kemal University Department of Emergency and Disaster Management for May-June 2015. The sample consisted of 108 students, some of whom were on duty in a few healthcare services. Initially, the questionnaire was tested among eight people as a pilot study. Based on their comments, it was adjusted and applied in the present study.

Approval was obtained from the Afyonkarahisar Clinical Trials Ethics Committee (05.03.2015/2015/04-121), and participants were assured that their participation was voluntary.

Statistical analysis

Data analysis was performed using the R program. First, the distribution of the participants was analyzed. In the second section, the Chi-square test of independence and Fisher's exact test of independence were per-

formed to determine whether there were associations between demographic characteristics and responses to the scenario questions. In this context, each null hypothesis can be expressed as follows:

Null hypothesis: The response is not influenced by personal characteristics.

Before performing the tests of independence, data were organized in a contingency table and the expected counts were calculated. If any expected count was very low (<5), the Chi-square test of independence was deemed inappropriate and Fisher's Exact test of independence was used instead.

If a p value is less than the significance level (α), the null hypothesis of the independence assumption is rejected.

Results

According to the results obtained from the data analyses, 45 (48.9%) participants were first-year students, 64 (69.6%) were males, 33

Table 1. Demographic characteristics of participants

Variables	Groups	Frequencies	%
Class	1	45	48.9
	2	27	29.3
	3	20	21.7
Gender	Female	28	30.4
	Male	64	69.6
Age, years	<20	30	32.6
	20	29	31.5
	>20	33	35.9
Working status	Employed	20	21.7
	Unemployed	72	78.3
Child	Yes	0	0.0
	No	92	100.0
Total		92	100.0

Table 2. Distribution of the responses for the question "What location do you direct the only ambulance to?"

		Orphanage	Eventide home	Prison	Total	p
Class	1	40 (88.9%)	2 (4.4%)	3 (6.7%)	45	0.646
	2	25 (92.6%)	0 (0.0%)	2 (7.4%)	27	
	3	17 (85.0%)	2 (10.0%)	1 (5.0%)	20	
Gender	Female	25 (89.3%)	2 (7.1%)	1 (3.6%)	28	0.644
	Male	57 (89.1%)	2 (3.1%)	5 (7.8%)	64	
Age, years	<20	26 (86.7%)	1 (3.3%)	3 (10%)	30	0.466
	20	28 (96.6%)	0 (0.0%)	1 (3.4%)	29	
	>20	28 (84.8%)	3 (9.1%)	2 (6.1%)	33	
Working status	Employed	19 (95.0%)	1 (5.0%)	0 (0.0%)	20	0.469
	Unemployed	63 (87.5%)	3 (4.2%)	6 (8.3%)	72	

Table 3. Distribution of the responses for the question "Where do you send the only fire crew?"

		Orphanage	Eventide home	Prison	Total	p
Class	1	35 (77.8%)	2 (4.4%)	8 (17.8%)	45	0.373
	2	23 (85.2%)	3 (11.1%)	1 (3.7%)	27	
	3	16 (80.0%)	2 (10.0%)	2 (10.0%)	20	
Gender	Female	21 (75.0%)	2 (7.1%)	5 (17.9%)	28	0.478
	Male	53 (82.8%)	5 (7.8%)	6 (9.4%)	64	
Age, years	<20	21 (70%)	3 (10%)	6 (20%)	30	0.515
	20	25 (86.2%)	2 (6.9%)	2 (6.9%)	29	
	>20	28 (84.8%)	2 (6.1%)	3 (9.1%)	33	
Working status	Employed	18 (90.0%)	0 (0.0%)	2 (10.0%)	20	0.451
	Unemployed	56 (77.8%)	7 (9.7%)	9 (12.5%)	72	

Table 4. Distribution of the responses for the question "Independent from the case; when sending an ambulance to an emergency situation, what is the main factor influencing your decision?"

		Age of the victims	Number of the victims	Dependency of someone else care of victims	Social position of the victims	Total	p
Class	1	9 (20.0%)	19 (42.2%)	7 (15.6%)	10 (22.2%)	45	0.029*
	2	9 (33.3%)	14 (51.9%)	4 (14.8%)	0 (0.0%)	27	
	3	4 (20.0%)	6 (30.0%)	8 (40.0%)	2 (10.0%)	20	
Gender	Female	5 (17.9%)	8 (28.6%)	11 (39.3%)	4 (14.3%)	28	0.031*
	Male	17 (26.6%)	31 (48.4%)	8 (12.5%)	8 (12.5%)	64	
Age, years	<20	6 (20%)	14 (46.7%)	4 (13.3%)	6 (20%)	30	0.369
	20	8 (27.6%)	14 (48.3%)	4 (13.8%)	3 (10.3%)	29	
	>20	8 (24.2%)	11 (33.3%)	11 (33.3%)	3 (9.1%)	33	
Working status	Employed	7 (35.0%)	5 (25.0%)	5 (25.0%)	3 (15.0%)	20	0.288
	Unemployed	15 (20.8%)	34 (47.2%)	14 (19.4%)	9 (12.5%)	72	

*p<0.05

Table 5. Distribution of the responses for the question "Which injured person do you transport to the hospital?"

		Orphanage	Eventide home	Prison	Total	p
Class	1	40 (88.9%)	3 (6.7%)	2 (4.4%)	45	0.547
	2	24 (88.9%)	3 (11.1%)	0 (0.0%)	27	
	3	17 (85.0%)	1 (5.0%)	2 (10.0%)	20	
Gender	Female	25 (89.3%)	2 (7.1%)	1 (3.6%)	28	1.000
	Male	56 (87.5%)	5 (7.8%)	3 (4.7%)	64	
Age, years	<20	25 (83.3%)	3 (10.0%)	2 (6.7%)	30	0.699
	20	27 (93.1%)	2 (6.9%)	0 (0.0%)	29	
	>20	29 (87.9%)	2 (6.1%)	2 (6.1%)	33	
Working status	Employed	18 (90.0%)	2 (10.0%)	0 (0.0%)	20	0.591
	Unemployed	63 (87.5%)	5 (6.9%)	4 (5.6%)	72	

(35.9%) were older than 20 years, 72 (78.3%) were not employed, and none of the participants had a child (Table 1).

Most participants chose directing the ambulance to the orphanage (Table 2).

Most participants chose directing the fire crew to the orphanage (Table 3). Prison was the second choice.

Results of the third question indicate that the number of victims was the greatest factor influencing the emergency resource allocation (Table 4). The first-year students' second choice was social position of the victims, and the third-year students' first choice was the dependency of someone else to care for the victims.

In the second scenario, most participants specified that they would first transport the injured child to the hospital (Table 5).

Age of the injured victim led the students to choose the child (Table 6).

The participants mostly stated that they would not change their earlier decision if any of the injured victim or their spouses were strong in terms of social-political-administrative or academic positions, etc., (Table 7).

The decision of the students after learning that the injured woman was pregnant was mostly to get her to the ambulance and take her to hospital (Table 8). None of the participants chose the man.

According to the p values, we can conclude that the responses for the third question of scenario 1 were influenced by class ($p=0.029 < \alpha=0.05$) and gender ($p=0.031 < \alpha=0.05$) of the participants. Other responses do not seem to be related to class or gender. Additionally, the responses to each scenario are independent of age and working status of the participants.

Discussion

It is important in emergency medicine to ensure equal availability, justice, and fairness of emergency medical care (18-20). This indicates treating the patient in an unbiased and unprejudiced manner regardless of their status or position (15, 17, 21). However, in disasters, where there is an acute and unforeseen imbalance between the capacity and resources of the medical profession and the needs of survivors, EMS organizations and crews face ethical challenges while deciding the best way to allocate resources (10, 13, 22-24). The resources of any EMS system are finite and the crew is under the pressure of the limited time during these kinds of triage decisions (4).

Table 6. Distribution of the responses for the question "What is the factor that led to your decision?"

		Age of the injured one	Gender of the injured one	Total	p
Class	1	45 (100.0%)	0 (0.0%)	45	0.511
	2	26 (96.3%)	1 (3.7%)	27	
	3	20 (100.0%)	0 (0.0%)	20	
Gender	Female	28 (100.0%)	0 (0.0%)	28	1.000
	Male	63 (98.4%)	1 (1.6%)	64	
Age, years	<20	30 (100.0%)	0 (0.0%)	30	0.315
	20	28 (96.6%)	1 (3.4%)	29	
	>20	33 (100.0%)	0 (0.0%)	33	
Working status	Employed	20 (100.0%)	0 (0.0%)	20	1.000
	Unemployed	71 (98.6%)	1 (1.4%)	72	

Table 7. Distribution of the responses for the question "Would you prefer to change your earlier decision if any of the injured people or their close family and friends is strong in terms of social-political-administrative or academics etc.?"

		Would change decision	Not sure	Would not change decision	Total	p
Class	1	1 (2.2%)	3 (6.7%)	41 (91.1%)	45	0.708
	2	1 (3.7%)	2 (7.4%)	24 (88.9%)	27	
	3	1 (5.0%)	3 (15.0%)	16 (80.0%)	20	
Gender	Female	1 (3.6%)	1 (3.6%)	26 (92.9%)	28	0.552
	Male	2 (3.1%)	7 (10.9%)	55 (85.9%)	64	
Age, years	<20	1 (3.3%)	3 (10.0%)	26 (86.7%)	30	0.956
	20	1 (3.4%)	3 (10.3%)	25 (86.2%)	29	
	>20	1 (3.0%)	2 (6.1%)	30 (90.9%)	33	
Working status	Employed	0 (0.0%)	2 (10.0%)	18 (90.0%)	20	1.000
	Unemployed	3 (4.2%)	6 (8.3%)	63 (87.5%)	72	

Table 8. Distribution of the responses for the question “You have learned that the injured woman in her thirties is pregnant. In that case, which injured person would you get the transport to hospital?”

		Child	Woman	Total	p
Class	1	3 (6.7%)	42 (93.3%)	45	1.000
	2	2 (7.4%)	25 (92.6%)	27	
	3	1 (5.0%)	19 (95.0%)	20	
Gender	Female	2 (7.1%)	26 (92.9%)	28	1.000
	Male	4 (6.3%)	60 (93.8%)	64	
Age, years	<20	2 (6.7%)	28 (93.3%)	30	0.435
	20	3 (10.3%)	26 (89.7%)	29	
	>20	1 (3.0%)	32 (97.0%)	33	
Working status	Employed	0 (0.0%)	20 (100.0%)	20	0.333
	Unemployed	6 (8.3%)	66 (91.7%)	72	

The conflicts that EMDs experience in triage decisions are different from those they experience at the scene. From an EMD's perspective, in addition to the potential problems and misunderstandings in communication, decision-making in mass casualty care is also a challenge. EMDs face ethical challenges when deciding on the best way to allocate resources (which mostly means ambulances). Obviously, their decisions to choose someone during these situations may be different from those in daily routines. The conflict of ethical principles in such cases is between the principles of duty and utility (14).

In some studies, it has been stated that the healthcare providers acted according to how they would want to be treated in a similar situation (25). In triage decisions, this inevitably resulted in the way of individual choices (biased choices). In fact, professionalism means acting neutrally toward people, but this is clearly difficult in such challenging circumstances. As found in the present study, responders prioritize children first. It is probably related to the expected lifetime of the victims. In routine daily life, many people hope for a child to live longer than an adult or elderly. In a highly stressed and ethically sensitive environment, this preference may dominate and influence the decision in favor of children.

Interestingly, there was no significant difference on directing an ambulance to the orphanage in the subgroups and the social position of the victims. Directing the fire crew to the cases is a bit different from directing the ambulance. It is probably the effect of the bars of the prison and the need for professional support to pull the prisoners out that influences this choice.

The fundamental equality of all individuals is an important perspective that should not be influenced particularly by any social status of the people. In this study, participants mostly stated that they would not change their earlier decision if any of the injured ones or their spouses were strong in terms of social-political-administrative or academic positions. This is an important point that their perspective on the equality of all humans will continue when they really become in charge in future.

Two of the ethical principles most pertinent to this discussion are justice and beneficence. In this regard, justice is principally considered distributive justice, which is based on the core principle that everyone should receive the amount of goods he or she merited within a community (26). Moreover, it is a subgroup of distributive justice, prioritization, that plays a crucial role in prehospital emergency (tele)phone triage (27). An EMD who has a challenging situation strives to achieve

a balance of two principles: the principles of duty and utility. An EMD must make a choice about “who shall live when not everyone can live?” It most undoubtedly affects the ethical values of the EMD and his or her individual preferences (7). At this stage, it is not merely a related issue about adherence to ethical principles. It is an individual choice about expectancy of life (time), innocent ones, dependency of someone else, deprived of liberty, and or show mercy to those most vulnerable.

Subsequently, beneficence is the other primary concern during triage; however, it is also relative to the situation. What is the main purpose-saving most victims or rescuing only one person who is really in need of an ambulance for further emergency care? Disaster triage decisions are intrinsically utilitarian, making an effort to do the most for the most (which means the number), with the limited resources (11). This is an important point of attitude that creates a great challenge in the EMD's mind (4). The age of the victims also generates a challenge for EMDs. Age, the second most prioritized parameter, might influence EMDs in that younger people deserve the ambulance more than elders do. Obviously, this stigmatization should not affect the healthcare providers.

Based on the results, it was concluded that most participants in this study chose the orphanage. There was no difference in subgroups; however, in scenario 1-question 3, there were some differences in terms of class and gender of the participants. The provision of ethics education explains the differences between classes. An interdisciplinary format on disaster medicine and triage education, including dispatching, medical assistance, law, coordination, communication, and ethics, can make a difference on students' triage decisions (28). At the school in which this study was conducted, ethics education begins mainly in the second grade. Hence, it could be seen that the impact of the social status of the injured one does not influence the decision of the EMD. Another difference may be a diversion of perception about care and differences of women, who are more important to them in the decision-making process (29).

As “triage” is fundamentally a military term, prioritization of wounded soldiers is based on a utilitarian approach that considers a significant number (13). In this study, the pregnant woman was preferred by the participants over the number of victims. Moreover, it might be the age as a factor of preference. Contemplating these scenarios may generate differences; however, it is possible that healthcare providers play it by the ear when deciding according to the manner in which a situation develops.

There are different prehospital and emergency service guidelines for triage in international literature, including triage score, acuity score, triage scale, and severity index (24, 30-32). The algorithm Simple Triage and Rapid Transport (START) is mainly used in emergency medicine in Turkey. Obviously, the principle of utility is not the only ethical approach for triage. Doing the greatest good for the greatest number, by means of utilitarianism, might be considered the rationale for triage systems. However, it is important for the EMS personnel to approach triage and related issues from a wider perspective. The number of survivors is important but it is not the only factor to consider.

Finally, it should be noted that triage involves significant moral implications. Therefore, it requires effective ethics education for the EMSs and re-thinking on triage by means of the term, ethical features, and decision-making process. Triage is conceptually very clear but practically and ethically very complicated (13).

Study limitations

The study was based on two theoretical scenarios, which is a limitation. They were unusual triage scenarios for EMDs. Furthermore, all participants were students and they were not legitimate EMDs. However, this does not prevent us from evaluating the issue of ethical aspects of triage decisions.

Conclusion

In triage decisions, EMD students prioritize the age and the number of victims. Triage decisions include many individual characteristics that might affect the current decision. There was no difference with regard to gender, but it could mean the over triage of some victims based on age and number.

The ethical conflicts of principles in triage decision-making are justice and beneficence. Although there are many strategies for triage, highlighting the number victims is the most common approach. However, it may be ethically risky to handle the victims by number. The injured victims should not be treated as numbers only because each individual has a value that cannot be measured merely in terms of numbers or age. Triage is a matter that comprises not only medical issues but also ethical, public health, political, and planning of health resource issues.

Ethics Committee Approval: Ethics committee approval was received for this study from the Ethics Committee of Afyonkarahisar Clinical Trials Ethics Committee (05.03.2015/ 2015/04-121).

Informed Consent: Written informed consent that on the first part of questionnaire was obtained from participants, who participated in this survey.

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Severe Craniocerebral Traumas From Television-Tip-Over in Children

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Abstract

Aim: To present a detailed description and to assess outcomes of trauma caused by televisions (TVs) toppling onto children during the last 17 years

Materials and Methods: The records of 34 patients aged 0-16 years with TV-related serious head injuries presenting to a tertiary hospital during the last 17 years were retrospectively reviewed. From the hospital's file recordings, authors retrieved data about demographic information; Pediatric Glasgow Coma Scale (PGCS) score; length of hospital stay; injuries supervened to the scalp, cranium, or brain; and Glasgow Outcome Scale score.

Results: Thirty-four children were injured following TV falls between January 2000 and December 2017. Of these, 44.1% (n=15) were toddlers aged 2-3 years, and 73.5% (n=25) were girls. All of the injuries occurred at home, and all of them had skull fractures. Five children (14.3%) had a PGCS of <7, and seven patients (20.6%) died in the hospital. The median duration of hospitalization was 2 days (minimum 1 and maximum 27), and 23 patients (67.6%) were discharged home with a good outcome.

Conclusion: These data indicate that TV-related injuries are still an important source of hazard, especially for toddlers. TV-related home accident prevention programs should include awareness-raising campaigns for parents as well as setting production and construction standards for the industry.

Keywords: Home accidents, head trauma, television, children

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Introduction

Research has shown that watching television (TV) is a spare time activity for approximately 65% of school children in Turkey (1). Although smartphones and computers are substituting TV over time, 92.5% of Turkish children still watch TV on a daily basis (2). TV is present in almost all Turkish households. Moreover, 24% of families even have more than one TV (3). This situation is not very different in other countries. Indeed, watching TV is often employed by parents as a means of ensuring that their children sit in one place without expos-

ing themselves to danger, that is, "staying out of trouble" (4). However, this activity may harbor vulnerability. TV sets can be as heavy as 80 kg, standing on an item of furniture that is usually not adapted to support it safely (5). In addition, children may climb up the furniture, resulting in the tip-over of the entire furniture and leading to various injury scenarios.

Data from the Centers for Disease Control in the USA indicate that accidents and inflicted trauma account for 33% and 5%-8% of childhood deaths, respectively (6). Blunt trauma secondary to falling TVs is



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occasionally reported in the clinical literature (7). Trauma remains the leading cause of death in children over the age of 1 year (8). Injuries sustained in the home account for up to 50% of cases, and head injury is the most common cause of death in pediatric traumas (9, 10).

In this report, we aim to present data regarding the frequency and characteristics of children admitted to a university emergency department in Erzurum, Turkey due to a falling TV between 2000 and 2017. Our secondary aim was, by providing trustworthy research information, to raise awareness on this issue and advise policymakers about the dangers and circumstances involved with a toppling TV, a hazard to which almost all children are exposed.

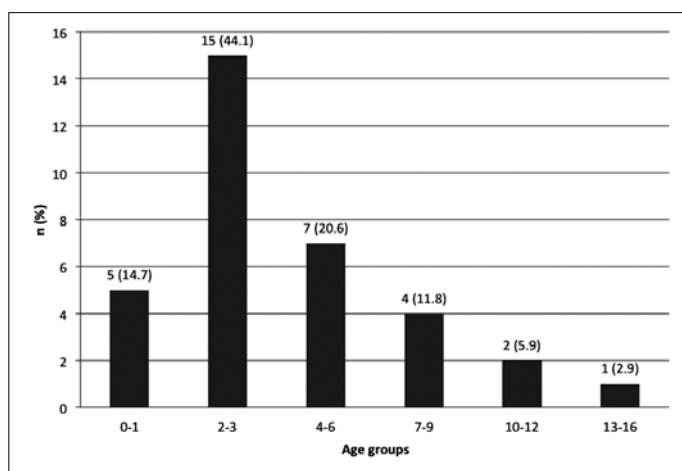


Figure 1. Age distribution of the patients

Table 1. Admission and outcome characteristics

Variables	n	%
Pediatric Glasgow Coma Scale score on admission		
15	18	51.4
13-14	5	14.3
11-12	2	5.7
9-10	2	5.7
7-8	3	8.6
4-6	2	5.7
3	3	8.6
Length of hospitalization (days)		
1-3	18	52.9
4-7	11	32.4
8-15	4	11.8
>15	1	2.9
Glasgow Outcome Scale score		
5: low disability	23	67.6
4: moderate disability	4	11.8
3: severe disability	0	0.0
2: persistent vegetative state	0	0.0
1: death	7	20.6

Materials and Methods

In this descriptive and analytical file survey, we reviewed our file records between January 2000 and December 2017. The study was conducted at the research and training hospital of Ataturk University School of Medicine, Erzurum, Turkey. The hospital is a tertiary care setting, attracting approximately 400,000 patients annually from a broad geographical area in eastern Anatolia (11).

The inclusion criteria were 0-16-year-old patients admitted to the emergency department with isolated craniocerebral trauma due to TV tip-over and who were referred to neurosurgery clinics. Files of 128 patients meeting the inclusion criteria were retrieved from the hospital's electronic archives. Ethical consent was taken from the Ataturk University School of Medicine, Clinical Research Ethics Board (#2/56-15/02/2018).

Exclusion criteria comprised patients with minor cranial injury and who were discharged from the emergency department without any need for neurosurgery consultation. After the exclusion of 94 patients (73.5%), data for 34 patients (26.5%) are presented in the present study.

The following data were extracted from the patient records: age, sex, presenting Pediatric Glasgow Coma Scale (PGCS) score, injured cranial region, radiological findings, admission to the intensive care unit (ICU), length of hospital stay, hospital mortality, and disposition at hospital discharge (12). The outcome at hospital discharge was categorized using the Glasgow Outcome Scale, where a score of 5 is translated as "mild damage with minor neurological and psychological deficits" (13). The parents were inquired about the injury scene and the type of TV.

Statistical analysis

Results were entered into the computer and analyzed with descriptive statistics. Data were presented as median (minimum-maximum), mean±standard deviation, or n and percentage, where applicable.

Results

The results from 34 children were analyzed at the end of the analysis of files from over 17 years. The mean age of participants was 4.2±3.3 years, and nine (26.5%) were males and 25 (73.5%) were females. Most of the patients (44.1%; n=15) were in the age group of 2-3 years. The number of cases decreased as age increased (Figure 1).

None of the TVs or the furniture that the TVs were placed on was secured to the wall. Most TVs were with 49-51 cm (19-20 in.) screens (n=29; 85.2%). The remaining accidents were with TVs having screen sizes of 51-76 cm (20-30 in.) (n=5; 14.8%). All of the TVs were set at a height between 60 and 120 cm from the floor. Eighty-eight percent of parents (n=30) said that the child was or may have been climbing on the furniture.

Of the patients, 27 (79.4%) were hospitalized in the Department of Neurosurgery, whereas 4 (11.7%) were admitted to the ICU. The initial PGCSs of the study population ranged from 3 to 15 with more than half (51.4%; n=18) having full scores. However, five chil-

Table 2. Physical and radiological findings

Findings	n	%
Skull fractures		
Linear fractures	25	73.5
Occipital bone	7	28.0
Temporal bone	6	24.0
Frontal bone	9	36.0
Parietal bone	3	12.0
Depressed fractures	18	52.9
Frontal bone	8	44.4
Parietal bone	4	22.2
Occipital bone	6	33.3
Basis Cranii Fractures	17	50.0
Frontobasal	7	41.2
Temporobasal	6	35.3
Occipitobasal	4	23.5
Intracranial lesion		
Extradural hematoma	13	38.2
Subarachnoid hemorrhage	6	17.6
Subdural hematoma	4	11.8
Cerebral edema	8	23.5
Diffuse axonal injury	2	5.9
Pneumocephalus	13	38.2
Additional lesions		
Subgaleal hematoma	14	41.2
Unilateral/bilateral periorbital hematoma	7	20.6
Otorrhea	3	8.8
Otorrhagia	1	2.9
Rhinorrhea	1	2.9
Rhinorrhagia	4	11.8
Superficial scalp maceration	9	26.5

dren (14.3%) had a PGCS of <7. The median duration of hospitalization was 2 days (minimum 1 and maximum 27). Of the patients, 85.3% (n=29) were hospitalized for less than a week. One case had complex skull fractures and an intracranial hemorrhage and stayed in the hospital for 27 days. Twenty-three patients (67.6%) were discharged with good outcome scores from the hospital, whereas seven patients (20.6%) died (Table 1). Three of the mortalities resulted due to severe craniocerebral trauma in the emergency department.

All of the children were radiologically investigated by X-rays of the skull and computed tomography scan. Table 2 shows the physical and radiological findings. One patient, who had hemiparesis and facial paralysis on admission, later developed the syndrome of inappropriate antidiuretic hormone secretion.

Discussion

Our study demonstrated the severe risk of unsecured TVs in the household with a lack of parent awareness. Trauma is a significant cause of death and disability during childhood. It is responsible for nearly 50% of all childhood deaths (7, 14). Over one-third of the significant childhood injuries occur in the home environment (14). However, blunt trauma secondary to falling TVs is occasionally reported in the clinical literature (7).

Injury by a falling TV unit is not a new problem in developed countries, and the number of injuries following TV tip-over has been increasing over the past decade (15, 16). According to Jea et al. (16), the increasing number of casualties from falling TVs is much higher than the increase in the quantities of TV sets sold. Previous studies from Turkey have stressed the increasing danger of TVs toppling (17-19). However, to the best of our knowledge, this is the first report including a detailed description of cases with isolated serious head trauma.

As important as the TV itself, the furniture on which a TV set is situated is of fundamental significance. Attention-raising studies were conducted in the past, suggesting the development of safety criterion and changing the weights of some furniture items to resist tipping (20). Injury prevention counseling and other strategies supporting in-home safety should also include efforts to increase parent awareness. A secure and child-safe location should be ensured for TV sets (8). Attention should be paid to safer design and placement of this ubiquitous product.

Almost all of the parents were blind to the possible risks of a TV at home and unaware that injuries could occur by this mechanism. Of course, "blaming the mom" is not a solution to the problem. However, our study shows that the majority of injuries involved toddlers. Besides, most parents saying that the child was or may have been climbing on the furniture lead our attention to hyperactive toddlers. Patient age as a risk factor is stressed in a previous study (21). Further, a notable increase in domestic accident risks occurs with toddlers (22). Hence, we can confidently claim that childhood home-safety programs should primarily target toddlers.

The main findings of previous studies are similar: craniocerebral injuries caused by TV fall occurring mainly in children between the ages of 1 and 3 years (7, 14, 15). Our findings are also comparable with those reported in other countries (4, 5, 8, 14, 15), suggesting that injuries from TV tip-over occur mainly among children between 1 and 3 years. In the present study, all of the cases were determined to have cranial fractures. Of these fractures, nearly half were multiple and more localized in the occipital bones. Additionally, in more than one-third of the cases, skull fractures were complex, such as separated linear, basilar, numerous, and depressed. According to Dolinak and Matshes (23), complex skull fractures usually occur as a result of severe head trauma and are associated with extradural and subarachnoid hemorrhages, cerebral edema, and diffuse axonal injury, which are additional markers of severe head injury. DiScala et al. (5) reported that many TV tip-overs are caused by children climbing onto unstable TV stands. Further, the design of TV sets has changed toward larger and heavier front screens.

There is a relationship between falling TV sets and resulting severity of traumas. TVs involved in toppling accidents range in size from 33 to 101 cm (13-40 in.), and the average height of fall ranges from 75 to 115 cm (2.5-3.7 ft) (14, 24). According to Bernard et al. (8), a 91 cm (36 in.) TV, which typically weighs 78 kg, falling from 1 m has the same momentum as a 10 kg 1-year-old child falling 10 stories (60 m). Even a smaller 51 cm (19 in.) TV, with a typical weight of 18 kg, has the same momentum as a 1-year-old child falling 3.2 m (10 ft) (7). Jea et al. (16) noted the exceedingly somber and even fatal outcomes of TV sets tipping onto children. DiScala et al. (5) suggested that the consequences of children hospitalized because of TV tip-overs are comparable with that of similarly aged children injured by unintentional blunt trauma, including motor vehicle-related injuries. However, despite the enormous hazard of this condition, this issue has not gained enough attention from researchers, policymakers, or families.

Study limitations

The present study was a retrospectively designed study, and the number of participants was limited. More studies are needed in larger groups, and prospective studies will present a broader view in these kinds of accidents. Results may change in accordance with local variables; therefore, multicenter studies may broaden their acknowledgement about the present subject.

Conclusion

It is evident that craniocerebral injuries following TV tip-overs are significant in childhood deaths. The most common injuries were associated with skull fractures and intracranial or extracranial lesions, such as periorbital hematomas, subgaleal hematomas, extradural hematomas, subarachnoid hemorrhages, and brain edema. Injuries from falling TVs were exceptionally high among toddlers. Regrettably, most parents were unaware of this risk, and none took precautions to secure their furniture. Because of these reasons, we suggest that most of the TV-related head traumas are preventable; increased awareness as well as specific recommendations and education can be proposed to minimize the scope and impact of these injuries on children.

Ethics Committee Approval: Ethics committee approval was received for this study from the Ethics Committee of Ataturk University Medical Faculty (2/56; Date: 15.02.2018)

Informed Consent: The study data was obtained from the hospital's electronic archives. Hence, informed consent did not apply.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept - M.C.; Design - M.C., C.C., O.O.; Supervision - M.C., C.C., O.O.; Resources - M.C.; Materials - M.C., C.C.; Data Collection and/or Processing - M.C.; Analysis and/or Interpretation - M.C., C.C., O.O.; Literature Search - M.C., C.C., O.O.; Writing Manuscript - M.C., C.C., O.O.; Critical Review - M.C., C.C., O.O.; Other - M.C., C.C., O.O.

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Colonic Barotrauma Causing Tension Pneumoperitoneum Following Jet Air Insufflation to the Rectum

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Abstract

Rupture of colon caused by high-pressure air is a rare traumatic intra-abdominal injury. Recently, we experienced a case of colonic barotrauma followed by tension pneumoperitoneum that caused severe abdominal pain in an otherwise healthy young individual. Initially, he denied any history of trauma; later he was found to have high-pressure jet air insufflation to his rectum by the coworkers at his workplace. Radiological imaging showed high volume pneumoperitoneum. Exploratory laparotomy revealed extensive serosal lacerations. Postoperatively, the patient was discharged with uneventful recovery.

Keywords: Colon injury, barotrauma, tension pneumoperitoneum

Introduction

The use of compressed air has become increasingly common at workplaces. Its misuse is associated with injuries. Many injuries occur during pranks among the workers, and incidents have occurred in the past as a part of the practical joke. Workers do not understand that it can cause serious colonic injury, as in our case. Such injuries require adequate medical and surgical interventions to deal with their critical nature. Spraying of the perianal and anal area with excessive pneumatic force greater than the resting anal pressure and high airflow rate causes multiple site colon injury and tension pneumoperitoneum due to colon perforation. In this way, large amount of air enters through rectum in a very short time. The first case of pneumatic rupture of the colon was previously reported by Stone in 1904 (1). Here, we report an unusual and unique case of colonic barotrauma resulted in pneumatic rupture of colonic segment.

Case Presentation

A 39-year-old healthy male developed sudden onset of tense abdominal distention. He did not develop fever, melena, or vomiting. Patient was brought to our attention in the emergency room. On arrival, he was awake and complained of severe abdominal pain and respiratory

distress. His vital signs were as follows: temperature, 37.7°C; heart rate, 143 beats/min; respiratory rate, 30/min; and blood pressure, 130/60 mmHg. Physical examination revealed a markedly distended tense abdomen with hypoactive bowel sound with generalized tenderness. Percussion produced tympanic sound. Rectal examination was unremarkable. Supine chest X-ray and upright abdomen film revealed the presence of marked pneumoperitoneum, elevation of diaphragm, and colon dilatation (Figure 1). CT abdomen showed large volume pneumoperitoneum with no contrast extravasation. Accompanying coworker initially denied any history of trauma. Perianal area did not show any sign of trauma. With the assumption of trauma-related injury, further investigation for its history was done. His coworker later confessed that the patient's rectum was deliberately sprayed using a jet-type air pipe with high pressure. The nozzle of the compressed air hose was misdirected toward his anal region and ejected high-pressure air was passed through the rectum.

He was diagnosed with colonic barotrauma secondary to insufflation of jet air through the rectum causing tension pneumoperitoneum.

His laboratory workup were as follows: hemoglobin, 14.6 g/dL; hematocrit, 42.8%; white blood cell count, $10.3 \times 10^3/\mu\text{L}$; platelet count,

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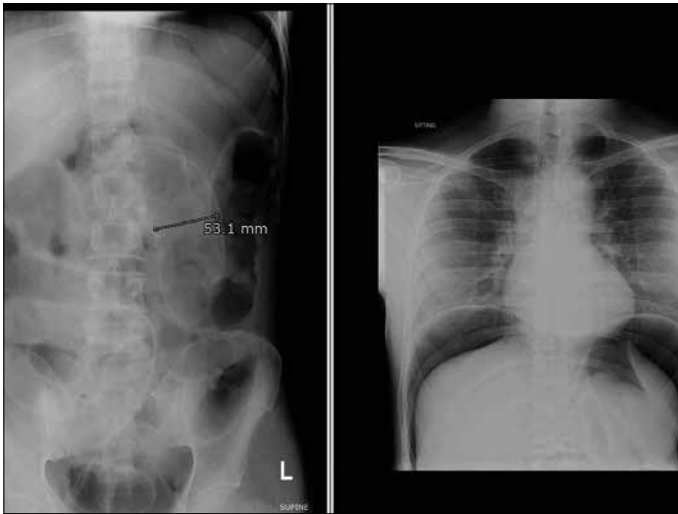


Figure 1. Supine chest X-ray and upright abdominal film showed the presence of pneumoperitoneum with distention of the colon

194×103/ μ L; amylase, 35 IU/L; and lipase, 28 U/L. Nasogastric tube was passed, and kept on low wall suction in the emergency room. After fluid resuscitation and analgesia, emergent exploratory laparotomy and extended right hemicolectomy with double barrel stoma was performed. Intraoperatively, there was no fecal contamination. The colon was distended with air with multiple areas of serosal lacerations and subserosal hemorrhage of the entire colon. The diaphragm, liver, spleen, and pancreas were observed to be normal. The serosal tears were repaired, and the colonic rupture was treated with ileostomy. The patient was kept under special care post-operatively and discharged few days later in stable condition with a well-functioning colostomy. Verbal consent was taken from the patient for case discussion and publication.

Discussion

External pneumatic insufflation of the colon through the anus depends on the air pressure, airflow velocity, anal resting pressure, and the distance between the source and anus (2). Under normal condition, normal resting anal pressure can prevent the insufflation of the colon from a direct external source with low air pressure (3, 4). Andrew has postulated that air at 3.5-8.8 kg/cm² forms a column that acts like a solid body, which forces the anal sphincter open (4). In our case, high-pressure jet insufflation can produce an air thrust of tenfold greater than the resting anal pressure. This overcomes the anal sphincter pressure, resulting in sudden inflation of the colon. The bowel wall is elastic and distensible, and it can tolerate certain amount of pressure (4). Of the four layers of the intestinal wall, mucosa is the most elastic and strongest layer and the serosa and the muscularis are the least (5). Furthermore, the funnel shape of buttocks and anus facilitates easy delivery of air. The intraluminal pressure that is required to result in colon perforation has been estimated through colonoscopic studies and has been found to be greater than 0.109 kg/cm² (5). However, previous experimental studies showed that the air pressure that leads to colon perforation was 1-4 times higher. Shiels et al. (6) found that the hydrostatic pressure to cause perforation in pig bowel is 0.16 kg/cm² (6-8).

During gradual insufflation of colon or in large bowel obstruction distal to the caecum, the caecum is the segment most prone to distention

injury that is explained by the Law of Laplace (9). The caecum has the largest diameter and requires the least amount of pressure to distend (10). The anatomy of the distal colon with the firm lateral support of the rectum makes the first part of the colon to be struck by a column of pressure from external source and the bending of the sigmoid pose the recto sigmoid to rupture in pressure-related colon barotraumas (11). During rapid air distention, inability to produce a total obstruction by the bending of sigmoid and high pressure allow the flow of air proximally to the next anatomical bending such as splenic flexure and hepatic flexure and ileocaecal valve. This results in a stepwise closed loop obstruction, resulting in other site of the bowel to be injured and perforated (2, 9). Single site perforations are common during colonoscopic examination; however, the speed of pressure builds up following high-pressure insufflation with high flow rate resulting in multiple site colon injury (2, 9, 11). The pathologic lesions following pneumatic insufflation depend on the resultant intraluminal pressure and include serosal hemorrhage, lacerations of the serosa and muscular coat with bulging of the mucous membrane, or complete rupture of the bowel through the serosa, muscular coat, and mucous membrane as in our case (2, 11).

Depending on the extent of intraluminal pressure and the presence of colonic injury, clinical manifestations vary. It can occur in single or multiple forms. Rectosigmoid region is the most common site for the perforation in particular antimesenteric wall (11). Abdominal distention and pain develops abruptly, and abdominal tenderness and rigidity are presented in case of colonic perforation. Symptoms of respiratory distress are also observed.

Tension pneumoperitoneum means that the intra-peritoneal air exerts so much pressure on the circulatory and respiratory systems that it causes respiratory distress and hypotension. Diagnosis is typical while looking at the history of exposure to compressed air and clinical manifestations. Distended colon or large amount of free air in the peritoneal cavity can be observed on imaging. Arterial blood gases showed hypoxia and respiratory alkalosis. Air pressure can compress inferior vena cava and cause hypotension and circulatory collapse.

Management of pneumatic colon injury includes two important aspects: tension pneumoperitoneum and colonic injury. After initial resuscitation, intraoperative decompression of bowel in the presence of distended bowel, resection of severely injured segment of colon, and repair of perforation with proximal diverting colostomy or enterostomy when the integrity of the bowel is in doubt should be performed (10, 11). Careful observation following surgery is often necessary because full-thickness perforation of the colon may have delayed presentation. Closure of stoma can be performed as early as 2-3 weeks of following creation without significant increase in complications compared with late closure, and depends on whether patient had recovered from his initial injuries, which is assessed with barium enema or sigmoidoscopic examination (11). Prognosis is favored if early surgical management is employed.

Conclusion

Patient with jet insufflation to the rectum causing tension pneumoperitoneum associated with multiple site colon injury and perforation is a unique case presentation. Laundry workers were later cautioned against playing with pneumatic tool to avoid barotrauma. Patients with jet insufflation of the rectum are at high risk of devel-

oping bowel trauma, and as a result could develop pneumoperitoneum. Compressed air at high pressure can be hazardous and can cause significant injuries. Professionals who use them should warn their employees of the hazard and risk associated with them.

Informed Consent: Verbal informed consent was obtained from the patient who participated in this study.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept - S.S., M.A.B.; Design - S.S., M.A.B.; Supervision - S.S., M.A.B.; Resources - S.S., M.A.B.; Materials - S.S., M.A.B.; Data Collection and/or Processing - S.S., M.A.B.; Analysis and/or Interpretation - S.S., M.A.B.; Literature Search - S.S., M.A.B.; Writing Manuscript - S.S., M.A.B.; Critical Review - S.S., M.A.B.

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Primary Omental Torsion Mimicking Acute Appendicitis: An Unusual Cause of Acute Abdominal Pain in a Young Male

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Abstract

Omental torsion is a very rare cause of acute abdomen. It commonly indicates itself with the symptoms and signs of acute appendicitis because of its localization on the right of the abdomen. The diagnosis is usually finalized by performing laparotomy or laparoscopy. Omental torsion may be primary or secondary, depending on omental cyst, tumor, intra-abdominal adhesions, or hernias. In this article, we present a 27-year-old male patient who underwent emergency surgery with a preliminary diagnosis of acute appendicitis and postoperatively diagnosed to have omental torsion. Considering omental torsion and different pathologies in patients with suspected clinical acute appendicitis, we are of the opinion that it would be useful to consider alternatives such as different surgical incisions and diagnostic laparoscopy.

Keywords: Acute abdomen, appendicitis, omentum, torsion

Introduction

Omental torsion is a very rare cause of acute abdomen. Necrosis can emerge in the omental tissue with torsion secondary to ischemia. Depending on the localization of the necrotic omentum, it can mimic acute appendicitis, acute cholecystitis, peptic ulcer perforation, diverticulitis, or renal colic clinic. Symptoms are non-specific, and hence it is hard to preoperatively diagnose it (1). In this article, we investigated a young male patient who was diagnosed with intraoperative omental torsion in our clinic, in the light of literature data.

Case Presentation

A 27-year-old male patient was admitted to the emergency department with complaints of abdominal pain and nausea persisting for 3 days. The patient had no history of any surgical operation or disease. The patient had a pulse of 84 beats/min, blood pressure of 100/60 mmHg, and a temperature of 37.3°C. The right inferior abdominal quadrant was associated with tenderness, defense,

and rebound during the physical examination. Laboratory tests results showed 12.500/mm³ white blood cell and 15 mg/dL C-reactive protein, and the other biochemical parameters were found to be normal. Minimal free fluid was observed in the periphery of the intestinal loop in the abdominal right inferior quadrant on the ultrasonography (US) conducted because of the preliminary diagnosis of acute appendicitis. Abdominal tenderness induced by compression of the probe was observed, and a suspicious condition was identified for acute appendicitis. On abdominal computed tomography (CT), the mesenteric adipose planes were contaminated and inflamed; however, no clear tubular formation was detected in the ileocecal region (Figures 1a and b). The patient was operated with the preliminary diagnosis of acute appendicitis based on the current findings. The abdominal cavity was accessed through a Mc Burney incision, and the appendix of the patient was found to be normal. Intra-abdominal serohemorrhagic fluid of approximately 200 cc was observed, and an abdominal mid-line incision that turns around the umbilicus was made to reveal the etiology clearly. During exploration, the omentum, with approximate dimensions

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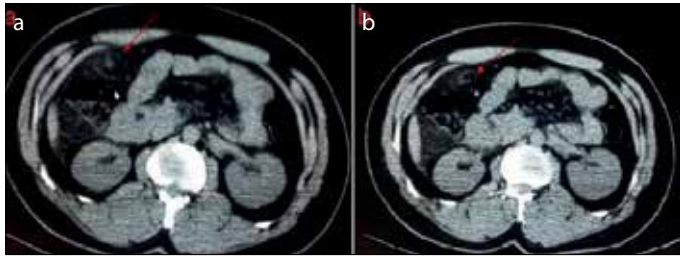


Figure 1. a, b. Computed tomography scan images of the patient

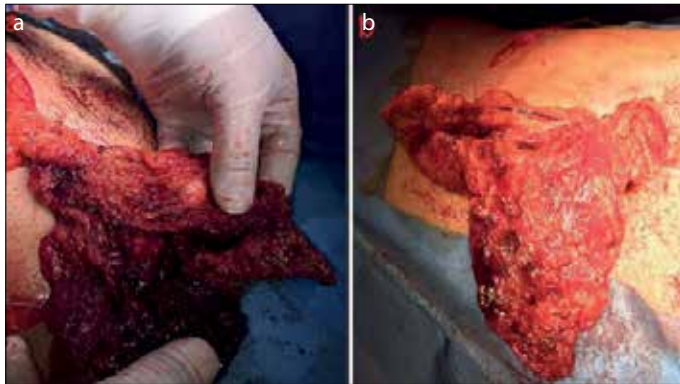


Figure 2. a, b. Intraoperative view of the twisted omentum showing ischemia and necrosis

of 12x8x5 cm and twisted around itself with a narrow pedicle and distorted circulation and not adhered on any place from its distal, was seen on the right and then excised (Figures 2a and b). No other pathology was seen in the intra-abdominal organs and the abdomen was irrigated, following which appendectomy was performed, and the operation was terminated. The patient was discharged with full recovery after 3 days of hospitalization because no problems or complications were observed. Necrosis and hemorrhagic foci of the omental tissue were reported in the postoperative histopathological examination. Informed consent was obtained from the patient who participated in this case.

Discussion

Omental torsion is a very rare clinical condition having commonly peritonitis signs, in which edema, vascular stasis, ischemia, and necrosis are seen distal to the torsion because of the rotation of the omentum magus around the long axis and deterioration of arterial feeding and venous drainage secondary to this. The omental torsion, which has a small share among the emergency surgical procedures, was first described by Eitel in 1899 (2).

Omental torsion is divided into primary (idiopathic) and secondary. The more common secondary omental torsion is usually caused by adhesions, omental cysts, tumors, and hernias. Anatomic variations such as accessory omentum, bifid omentum, omental venous malformations, and obesity are included in the primary omental torsion (POT) as predisposing factors (3). Anatomical variations in the vascular structures, venous malformations that may cause stasis or thrombosis, and venous congestion emerging after an excessive and heavy meal are among the suggested reasons for primary omental infarction (4).

Omental torsion often occurs in the 4th and 5th decades and usually in males. The occurrence of omental torsion on the right flank more commonly leads to difficulties in differential diagnosis from diseases such as acute appendicitis, acute cholecystitis, and cecal diverticulitis. The reason of occurrence of omental torsion on the right flank more commonly is that the omentum is longer and larger on the right side than on the left side. Omental torsion develops in two ways. The first is in the form of torsion of a piece of omentum with a large volume around a fixed point and the second is in the form of rotation of the omentum around a narrow form (5). The type of omental torsion in our patient is of the second form.

In omental torsion, patients often get admitted because of complaints of abdominal pain. According to anamnesis, sudden onset of pain accompanied by trauma, excessive exercise, sudden movements, coughing and strain, and gradual worsening of these symptoms may suggest omental torsion. In addition, pain not accompanied by nausea, vomiting, or lack of appetite in many patients may be important in terms of differential diagnosis. In omentum torsion, pain is felt in the region where torsion occurs in association with the localization of the segment with torsion and often on the right flank. Many literature reports have suggested that the diagnosis is usually made intraoperatively because the symptoms are non-specific (6). Ultrasound and CT can be rarely useful. An oval-shaped, non-compressed, hyperechoic solid mass and a hypoechoic ring surrounding it may be detected on ultrasound, especially in the region of tenderness, just below the anterior abdominal wall. Again, on ultrasound, minimal fluid might be detected although the appendix appears normal. No pathology other than minimal fluid was detected on the patient's ultrasound. In the CT examination, it appears as a heterogeneous fatty mass in front of the intestines. Concentric circular lines may be seen in the middle of the mass because of damages in the vascular structures. These lines are named as whirl sign, and they are pathognomonic for the torsion of the omentum (7).

The POT complications are omental necrosis, peritonitis, adhesion, bowel obstruction, and sepsis (8). No consensus has yet been reached on POT treatment. Some authors believe that surgical treatment should be performed because of complications that may develop, whereas others argue that late complications are not actually as predicted, and that conservative treatment will be successful. However, surgical resection is easier to relieve pain and the recovery is faster. The duration of the hospital stay is shorter, and the likelihood of developing sepsis is lower. In the medical treatment, the risk of development of sepsis, abscess, and intra-abdominal adhesive band is higher than in the surgical treatment (9). In the recent years, laparoscopic approach is considered to be an effective, safe, and minimally invasive technique for the diagnosis and treatment of POT (10).

Conclusion

Preoperative diagnosis of torsion of the omentum is hard and is a reason for an acute abdomen. The occurrence of omental torsion should also be kept in mind if the appendix does not disclose the pathology in patients who underwent laparotomy because of the preliminary diagnosis of acute appendicitis. For such patients, alternative approaches, such as paramedian or mid-line incision and diagnostic laparoscopy, should be considered.

Informed Consent: Written informed consent was obtained from the patient who participated in this case.

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The Forgotten Disease: A Case of Lemierre's Syndrome

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Abstract

Lemierre's syndrome (LS) is a rare but life-threatening condition that presents as an oropharyngeal infection. There is no screening test for it, and its diagnosis is clinical. We report the case of a previously healthy young man who presented with LS. His diagnosis was made with bedside ultrasound; hence, we recommend it as a screening tool in the emergency department. His delayed treatment resulted in his demise. In a developed country with easy access to antibiotics, we need to urgently raise physician's awareness toward LS and highlight the importance of early diagnosis and antibiotic use for its patients.

Keywords: Lemierre syndrome, postanginal sepsis, thrombophlebitis

Introduction

Lemierre's syndrome (LS) is a rare but life-threatening condition commonly caused by *Fusobacterium necrophorum*. Patients present with a more severe sore throat than that in streptococcus infection. There is no screening test for *Fusobacterium*, which makes its diagnosis challenging. Its diagnosis is largely clinical, and if recognized and treated early, the prognosis is good. LS is characterized by an oropharyngeal infection leading to thrombophlebitis of the internal jugular vein with secondary metastatic abscesses to the lungs and joints. If treatment is delayed, mortality can be as high as 25% compared with 0%-18%, if treated early (1).

We report the case of a young immunocompetent adult who presented with LS, but whose treatment was delayed, resulting in dire consequences. In a developed country with easy access to antibiotics, we need to urgently raise primary care physicians' awareness toward LS.

Case Presentation

A 36-year-old immunocompetent man, who is a front-desk officer at a hotel, sought treatment at his general practitioner's (GP) clinic with a four-day history of fever, right-sided throat pain, and loss of appetite. He was diagnosed as having tonsillitis, but no antibiotic was admin-

istered. Three days later, he returned to the GP's clinic with complains of persisting fever, sore throat, cough, orthopnea, and vomiting. The patient was also hypotensive (blood pressure, 80/60 mmHg). The patient was then referred to the emergency department.

In the emergency department, his blood pressure was 95/69 mmHg after fluid boluses, respiratory rate was 24 per minute, heart rate was 120 beats per minute, temperature was 38.4°C, and oxygen saturation in room air was 93%. He was very lethargic, tachypneic, and dehydrated. Physical examination revealed erythematous tonsils, mild right neck swelling, and crepitations over the lung bases.

His blood test showed leukocytosis, thrombocytopenia, hyperlactatemia, coagulopathy, and raised C-reactive protein and creatinine levels. Chest X-ray revealed prominent pulmonary vessels and increased shadowing in both lungs. Neck X-ray was unremarkable. The patient was then treated for severe community-acquired pneumonia with type 1 respiratory failure.

He was admitted to the intensive care unit (ICU) for inotropes and was started on co-amoxiclav, ceftazidime, and azithromycin. He remained hypotensive and hypoxemic, eventually requiring intubation and mechanical ventilatory support.

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Bedside ultrasound of the right internal jugular vein (IJV) showed a thrombus. Despite his thrombocytopenia, the patient was treated with enoxaparin. Clindamycin and metronidazole were also initiated.

Lemierre's syndrome was diagnosed based on the presence of septic emboli on chest X-ray and right IJV thrombus on the Doppler scan. Computed tomography (CT) of the neck and chest confirmed the presence of thrombus in the right IJV. There was abscess in the right tonsillar region with extension to the right parapharyngeal region. Extensive areas of consolidation with septic emboli were found in both lungs. Serology test for HIV was negative. Sputum cultures for tuberculosis tested negative. Subsequent blood culture results were found positive for *Dialister pneumosintes*. The patient's health condition progressively deteriorated despite aggressive medical management, and he succumbed after 2 weeks of ICU stay.

Telephonic verbal consent by the patient's mother was obtained to publish this case report. All details that would enable any reader (including the individual or anyone else) to identify the person are omitted.

Discussion

Lemierre's syndrome is also known as postanginal septicemia. It usually presents as an acute oropharyngeal infection. It causes thrombophlebitis of the IJV that may result in bacteremia, with hematogenous spread to other sites such as the lungs and joints. The infection spreads via the peritonsillar tissue to the adjacent pharyngeal space (1). Our patient's presentation of tonsillitis and his primary physician's failure to diagnose LS led to a delay in his referral. Although the diagnosis of LS is difficult, it should be a clinical one. Dr Andre Lemierre, the microbiologist who first described this disease, stated that the classical findings were so characteristic that it was possible to make a diagnosis without the results of any type of bacterial testing (2). There should be a high index of suspicion when patients present with respiratory symptoms, neck swelling, or signs of toxicity that occur within a week after an oropharyngeal infection (3). A scoring criterion such as the Centor criterion should be utilized to assess the likelihood of a bacterial infection and assist in the decision on whether antibiotics should be started in patients complaining of a sore throat (4).

Treatment for LS should be started based on suspicion, before positive blood culture results, which would otherwise require an incubation period of 6-8 days. Clinical suspicion should be followed up with CT scans of the neck and lungs to identify thrombus in the jugular veins and cavitating lung lesions.

Although the most common causative microorganism implicated in LS is *F. necrophorum*, the etiology of LS can also be polymicrobial (1). In our patient, the organism implicated was *D. pneumosintes*, otherwise known as *Bacteriodes pneumosintes*. To the best of our knowledge, this is the first reported case of *D. pneumosintes* as the causative organism of LS. This gram-negative anaerobe is a periodontal pathogen implicated in periodontitis, bacteremia, and abscesses (5). Our patient was otherwise healthy with no known risk factors such as poor dental hygiene, rendering his diagnosis bizarre.

Our patient's thrombus on the IJV was realized by ultrasound while attempting to insert a central venous line. As such, the authors feel that

bedside Doppler ultrasound should be performed as an initial point of care investigation in patients with sepsis presenting to the emergency department with sore throat and neck pain. The diagnosis should then be confirmed by high-resolution CT of the thorax and neck (6).

Treatment for jugular thrombophlebitis and LS has not been yet standardized, but high doses of penicillin, metronidazole, clindamycin, and chloramphenicol are recommended (6). Our patient was treated with co-amoxiclav, metronidazole, clindamycin, azithromycin, and ceftazidime, although his blood culture later showed resistance to metronidazole and penicillin. Although controversial, other treatment modalities include anticoagulation and ligation and resection of thrombosed veins (1,7).

Conclusion

Lemierre's syndrome is a rare but life-threatening condition that presents with a common sore throat. To achieve a good outcome, it requires early recognition and treatment. Bedside ultrasound can be utilized as a screening tool. Despite cutting-edge investigations and treatments, once the diagnosis is delayed, as in the case of our patient, death is the outcome. Aggressive and extended duration of intravenous multi-antimicrobial therapy remains the predominant appropriate therapy.

Informed Consent: Verbal informed consent to report the case was obtained from patients' parents as patient had demised.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept - M.P.A. ; Supervision - A.S.N.; Resources - M.P.A.; Materials - M.P.A.; Data Collection and/or Processing - M.P.A.; Analysis and/or Interpretation - A.S.N.; Literature Search - M.P.A, A.S.N.; Writing Manuscript - A.S.N.; Critical Review - A.S.N.

Conflict of Interest: The authors have no conflict of interest to declare.

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Left Bundle Branch Block Secondary to Subarachnoid Hemorrhage

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Abstract

Many electrocardiogram changes associated with subarachnoid hemorrhage have been described. A 55-year-old female patient was admitted to the emergency service due to complaints of dizziness and fainting after headache persisting for several days. Left bundle branch block was detected on electrocardiogram, and a subarachnoid hemorrhage was detected on brain tomography. Our case illustrates that left bundle branch block may occur in patients with subarachnoid hemorrhage, having no symptoms of a heart problem, previously.

Keywords: Left bundle branch block, subarachnoid hemorrhage, electrocardiogram

Introduction

Several electrocardiogram (ECG) changes associated with subarachnoid hemorrhage have been described (1-6). In the current case report, we present a patient who was diagnosed with subarachnoid hemorrhage and had left bundle branch block (LBBB).

Case Presentation

A 55-year-old female patient was admitted to the emergency service due to complaints of dizziness and fainting after headache persisting for several days. There were no additional complaints such as chest pain or palpitation. The patient did not have any known history of diabetes, hypertension, heart disease, and other illnesses. Physical examination revealed that the patient was conscious, cooperated, and oriented, and her vital findings were stable. The results of systemic and neurological examinations were normal. The requested blood tests were normal, except hemoglobin: 12.3 g/dL, hematocrit: 36.3%, and glucose: 162 mg/dL. LBBB was detected on ECG. The results of cardiac enzyme tests were normal. Chest X-ray was normal,

but subarachnoid hemorrhage was detected on brain computed tomography (Figure 1). The control ECG taken later was normal, and no LBBB was observed. Subsequently, ECG and cardiac enzyme tests were conducted for the patient at follow-up. In these follow-ups, it was observed that episodic LBBB (Figure 2). No elevation in the levels of cardiac enzymes was observed. The patient was then admitted to the brain surgery intensive care unit. The general condition of the patient began to deteriorate. The patient underwent cerebral angiography and a lobule-irregular contouring saccular aneurysm of the size of approximately 4-5 mm was detected in the right vertebral artery at the level of the posterior inferior cerebellar artery orifice; then the patient underwent endovascular aneurysm embolization. The patient was followed up for 14 days in the intensive care unit. However, the patient's condition worsened, and she died.

Discussion

Non-traumatic subarachnoid hemorrhages are very important owing to their high mortality and morbidity, although they are not frequent causes of urgent hospital admissions. Many cardiac arrhythmias are

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Figure 1. Subarachnoid hemorrhage

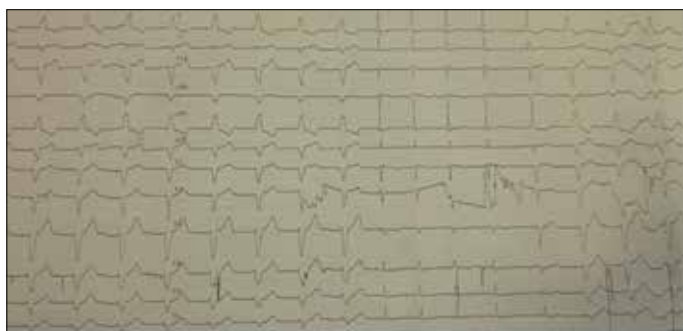


Figure 2. Episodic left bundle branch block

known to develop in patients with subarachnoid hemorrhage (1). LBBB may also develop in patients with subarachnoid hemorrhage (2). The cause of ECG changes in these patients with subarachnoid hemorrhage is not fully understood but appears to have a multi-factorial etiology (2). There is a close relationship between brain and cardiac functions (3). Acute cerebro-vascular disease may lead to cardiac arrhythmias and ECG abnormalities as a result of increased sympathetic nervous system activity and secretion of endogenous catechol amines, causing pulmonary edema and myocardial damage (4). In addition, autonomic dysfunction may contribute to the onset of arrhythmias by disturbing heart rate and blood pressure regulation (5). Clinically significant arrhythmias following subarachnoid hemorrhage have been associated with high mortality (6).

Episodic LBBB is associated with different clinical situations such as bradycardia, tachycardia, anesthesia, acute pulmonary embolism, intrathoracic pressure changes, chest trauma, cardiac interventional procedures, and mad honey poisoning, excluding acute coronary syndrome when the detected episodic LBBB has great prominence. Episodic LBBB and left ventricular systolic and diastolic dysfunction can lead to conduction disorders as well as findings such as syncope (7).

In our case, we investigated other conditions that may be the cause of LBBB in our patient with subarachnoid hemorrhage. The cause of episodic LBBB in our patient was linked to subarachnoid hemorrhage.

Conclusion

When patients with subarachnoid hemorrhage are diagnosed with LBBB, the differential diagnosis of the disease that might be the cause of LBBB should be considered. It should be noted that LBBB may occur in patients with subarachnoid hemorrhage and without any cardiac problems.

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Ileal Perforation due to Pyloric Stent Migration in a Patient with Inoperable Gastric Cancer

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Gastric cancer is among the most common cancer types and predominantly involves the gastric antrum. When advanced, gastric antral cancer usually obstructs the gastric pylorus, a condition also known as gastric outlet obstruction. Whereas surgical relief of the obstruction is possible, most patients with advanced surgery is not possible. Moreover, gastric decompression, parenteral nutrition, and percutaneous enteral nutrition are not beneficial to the overall quality of life of these patients (1). In recent years, a novel approach, expandable metallic stent deployment, has been developed for esophageal and gastric cardiac strictures, but this approach is yet to be tested on a wide scale for use in gastric outlet obstruction of malignant origin. Although stent placement is a safe and effective method, complications increase the morbidity and mortality rates (2). Herein, we present a rare cause of acute abdomen in a patient with obstructive inoperable gastric cancer who had small bowel perforation as a consequence of a migrated pyloric stent.

A 45-year-old female was admitted to the emergency department of our hospital with complaints of abdominal pain, abdominal distension, and vomiting for 2 days. Her past medical history included inoperable gastric antral cancer (adenocarcinoma) for 6 months. She underwent pyloric stent placement performed by a gastroenterologist after a pyloric stricture dilatation procedure 3 months ago. In the laboratory examinations, WBC level was 15600/mm³, CRP level was 40 mg/dL, and other parameters were normal. On abdominal examination, there was generalized tenderness with rebound. Computed tomography showed that the stent had migrated. With these findings, laparotomy was performed, and laparotomy revealed a perforation at the ileal segment approximately 40 cm away from the

cecum due to the migrated pyloric stent (Figure 1a, b). Enterotomy was performed, and the stent was removed from the intestine (Figure 1c-f). A 10-cm-long ileal segment, including the perforation area, was resected, and end-to-end anastomosis was performed. The patient was transferred to the intensive care unit for postoperative care where clinical issues were addressed by a multidisciplinary team. She was discharged with full recovery after 7 days of hospitalization because no problems or complications were observed. Follow-ups over 2 months after the surgery were uneventful. Informed consent was obtained from the patient who participated in this case.

Pyloric stent placement is a technique usually performed to relieve benign strictures and fistulas, but it is also performed for palliation in patients with gastric cancer. For the latter indication, the stenting procedure is a relatively low-complication procedure and provides satisfactory symptomatic relief from debilitating symptomatology of gastric outlet syndrome originating from non-curable malignant conditions. One common complication after deployment of a stent is its migration, which is mostly asymptomatic but may still lead to potentially catastrophic consequences, such as fistula formation, hemorrhage, obstruction, and perforation. It is possible that migrating stents are discharged via the rectum; alternatively, they may remain in the body for long periods without posing any gross threat (3, 4).

In conclusion, endoscopic stent placement should be considered a first-line treatment to overcome gastric outlet obstruction in patients with gastric cancer who have a limited life expectancy and who are not candidates for surgery. Although rare, intestinal perforation can arise as a potentially fatal complication of stent migration.

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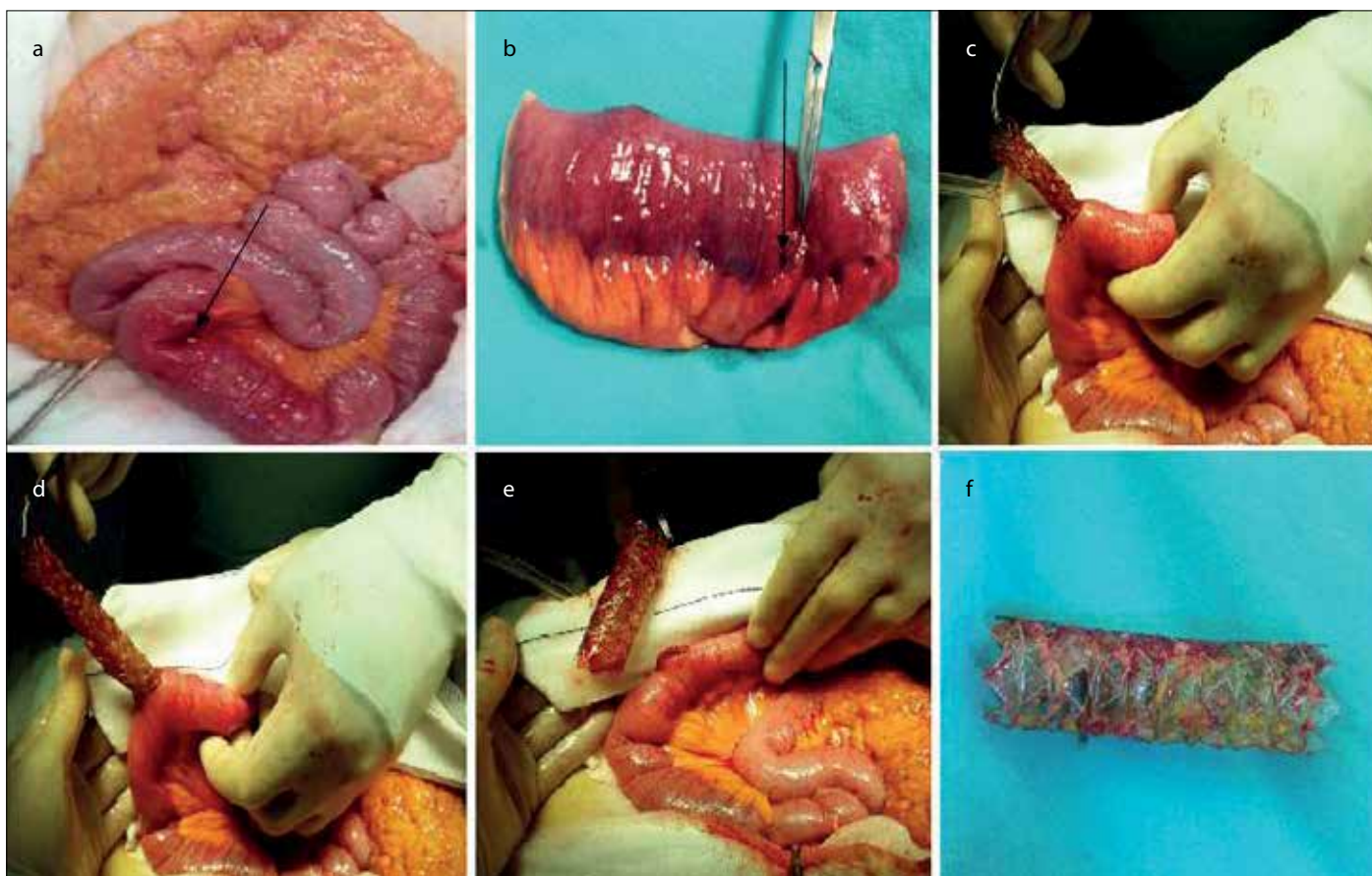


Figure 1. a-f. Perforated part of the ileum (a, b), and migrated pyloric stent (c-f)

Informed Consent: Informed consent was obtained from the patient who participated in this case.

Author Contributions: Concept - M.T.K.; Design - M.T.K., A.I.; Supervision - M.T.K., A.I.; Resources - M.T.K., G.D.; Materials - M.T.K., G.D.; Data Collection and/or Processing - M.T.K., G.D.; Analysis and/or Interpretation - M.T.K.; Literature Search - M.T.K.; Writing Manuscript - M.T.K.; Critical Review - M.T.K., A.I.

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