

# GEORGIAN MEDICAL NEWS

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ЕЖЕМЕСЯЧНЫЙ НАУЧНЫЙ ЖУРНАЛ

Медицинские новости Грузии  
საქართველოს სამედიცინო სიახლენი

## GEORGIAN MEDICAL NEWS

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**GMN: Georgian Medical News** is peer-reviewed, published monthly journal committed to promoting the science and art of medicine and the betterment of public health, published by the GMN Editorial Board since 1994. GMN carries original scientific articles on medicine, biology and pharmacy, which are of experimental, theoretical and practical character; publishes original research, reviews, commentaries, editorials, essays, medical news, and correspondence in English and Russian.

GMN is indexed in MEDLINE, SCOPUS, PubMed and VINITI Russian Academy of Sciences. The full text content is available through EBSCO databases.

**GMN: Медицинские новости Грузии** - ежемесячный рецензируемый научный журнал, издаётся Редакционной коллегией с 1994 года на русском и английском языках в целях поддержки медицинской науки и улучшения здравоохранения. В журнале публикуются оригинальные научные статьи в области медицины, биологии и фармации, статьи обзорного характера, научные сообщения, новости медицины и здравоохранения. Журнал индексируется в MEDLINE, отражён в базе данных SCOPUS, PubMed и ВИНТИ РАН. Полнотекстовые статьи журнала доступны через БД EBSCO.

**GMN: Georgian Medical News** – საქართველოს სამედიცინო სიახლენი – არის ყოველთვიური სამეცნიერო სამედიცინო რეცენზირებადი ჟურნალი, გამოიცემა 1994 წლიდან, წარმოადგენს სარედაქციო კოლეგიისა და აშშ-ის მეცნიერების, განათლების, ინდუსტრიის, ხელოვნებისა და ბუნებისმეტყველების საერთაშორისო აკადემიის ერთობლივ გამოცემას. GMN-ში რუსულ და ინგლისურ ენებზე ქვეყნდება ექსპერიმენტული, თეორიული და პრაქტიკული ხასიათის ორიგინალური სამეცნიერო სტატიები მედიცინის, ბიოლოგიისა და ფარმაციის სფეროში, მიმოხილვითი ხასიათის სტატიები.

ჟურნალი ინდექსირებულია MEDLINE-ის საერთაშორისო სისტემაში, ასახულია SCOPUS-ის, PubMed-ის და ВИНТИ РАН-ის მონაცემთა ბაზებში. სტატიების სრული ტექსტი ხელმისაწვდომია EBSCO-ს მონაცემთა ბაზებიდან.

### WEBSITE

[www.geomednews.com](http://www.geomednews.com)

## К СВЕДЕНИЮ АВТОРОВ!

При направлении статьи в редакцию необходимо соблюдать следующие правила:

1. Статья должна быть представлена в двух экземплярах, на русском или английском языках, напечатанная через **полтора интервала на одной стороне стандартного листа с шириной левого поля в три сантиметра**. Используемый компьютерный шрифт для текста на русском и английском языках - **Times New Roman (Кириллица)**, для текста на грузинском языке следует использовать **AcadNusx**. Размер шрифта - **12**. К рукописи, напечатанной на компьютере, должен быть приложен CD со статьей.

2. Размер статьи должен быть не менее десяти и не более двадцати страниц машинописи, включая указатель литературы и резюме на английском, русском и грузинском языках.

3. В статье должны быть освещены актуальность данного материала, методы и результаты исследования и их обсуждение.

При представлении в печать научных экспериментальных работ авторы должны указывать вид и количество экспериментальных животных, применявшиеся методы обезболивания и усыпления (в ходе острых опытов).

4. К статье должны быть приложены краткое (на полстраницы) резюме на английском, русском и грузинском языках (включающее следующие разделы: цель исследования, материал и методы, результаты и заключение) и список ключевых слов (key words).

5. Таблицы необходимо представлять в печатной форме. Фотокопии не принимаются. **Все цифровые, итоговые и процентные данные в таблицах должны соответствовать таковым в тексте статьи**. Таблицы и графики должны быть озаглавлены.

6. Фотографии должны быть контрастными, фотокопии с рентгенограмм - в позитивном изображении. Рисунки, чертежи и диаграммы следует озаглавить, пронумеровать и вставить в соответствующее место текста **в tiff формате**.

В подписях к микрофотографиям следует указывать степень увеличения через окуляр или объектив и метод окраски или импрегнации срезов.

7. Фамилии отечественных авторов приводятся в оригинальной транскрипции.

8. При оформлении и направлении статей в журнал МНГ просим авторов соблюдать правила, изложенные в «Единых требованиях к рукописям, представляемым в биомедицинские журналы», принятых Международным комитетом редакторов медицинских журналов - <http://www.spinesurgery.ru/files/publish.pdf> и [http://www.nlm.nih.gov/bsd/uniform\\_requirements.html](http://www.nlm.nih.gov/bsd/uniform_requirements.html) В конце каждой оригинальной статьи приводится библиографический список. В список литературы включаются все материалы, на которые имеются ссылки в тексте. Список составляется в алфавитном порядке и нумеруется. Литературный источник приводится на языке оригинала. В списке литературы сначала приводятся работы, написанные знаками грузинского алфавита, затем кириллицей и латиницей. Ссылки на цитируемые работы в тексте статьи даются в квадратных скобках в виде номера, соответствующего номеру данной работы в списке литературы. Большинство цитированных источников должны быть за последние 5-7 лет.

9. Для получения права на публикацию статья должна иметь от руководителя работы или учреждения визу и сопроводительное отношение, написанные или напечатанные на бланке и заверенные подписью и печатью.

10. В конце статьи должны быть подписи всех авторов, полностью приведены их фамилии, имена и отчества, указаны служебный и домашний номера телефонов и адреса или иные координаты. Количество авторов (соавторов) не должно превышать пяти человек.

11. Редакция оставляет за собой право сокращать и исправлять статьи. Корректур авторам не высылаются, вся работа и сверка проводится по авторскому оригиналу.

12. Недопустимо направление в редакцию работ, представленных к печати в иных издательствах или опубликованных в других изданиях.

**При нарушении указанных правил статьи не рассматриваются.**

## REQUIREMENTS

Please note, materials submitted to the Editorial Office Staff are supposed to meet the following requirements:

1. Articles must be provided with a double copy, in English or Russian languages and typed or computer-printed on a single side of standard typing paper, with the left margin of 3 centimeters width, and 1.5 spacing between the lines, typeface - **Times New Roman (Cyrillic)**, print size - 12 (referring to Georgian and Russian materials). With computer-printed texts please enclose a CD carrying the same file titled with Latin symbols.

2. Size of the article, including index and resume in English, Russian and Georgian languages must be at least 10 pages and not exceed the limit of 20 pages of typed or computer-printed text.

3. Submitted material must include a coverage of a topical subject, research methods, results, and review.

Authors of the scientific-research works must indicate the number of experimental biological species drawn in, list the employed methods of anesthetization and soporific means used during acute tests.

4. Articles must have a short (half page) abstract in English, Russian and Georgian (including the following sections: aim of study, material and methods, results and conclusions) and a list of key words.

5. Tables must be presented in an original typed or computer-printed form, instead of a photocopied version. **Numbers, totals, percentile data on the tables must coincide with those in the texts of the articles.** Tables and graphs must be headed.

6. Photographs are required to be contrasted and must be submitted with doubles. Please number each photograph with a pencil on its back, indicate author's name, title of the article (short version), and mark out its top and bottom parts. Drawings must be accurate, drafts and diagrams drawn in Indian ink (or black ink). Photocopies of the X-ray photographs must be presented in a positive image in **tiff format**.

Accurately numbered subtitles for each illustration must be listed on a separate sheet of paper. In the subtitles for the microphotographs please indicate the ocular and objective lens magnification power, method of coloring or impregnation of the microscopic sections (preparations).

7. Please indicate last names, first and middle initials of the native authors, present names and initials of the foreign authors in the transcription of the original language, enclose in parenthesis corresponding number under which the author is listed in the reference materials.

8. Please follow guidance offered to authors by The International Committee of Medical Journal Editors guidance in its Uniform Requirements for Manuscripts Submitted to Biomedical Journals publication available online at: [http://www.nlm.nih.gov/bsd/uniform\\_requirements.html](http://www.nlm.nih.gov/bsd/uniform_requirements.html)  
[http://www.icmje.org/urm\\_full.pdf](http://www.icmje.org/urm_full.pdf)

In GMN style for each work cited in the text, a bibliographic reference is given, and this is located at the end of the article under the title "References". All references cited in the text must be listed. The list of references should be arranged alphabetically and then numbered. References are numbered in the text [numbers in square brackets] and in the reference list and numbers are repeated throughout the text as needed. The bibliographic description is given in the language of publication (citations in Georgian script are followed by Cyrillic and Latin).

9. To obtain the rights of publication articles must be accompanied by a visa from the project instructor or the establishment, where the work has been performed, and a reference letter, both written or typed on a special signed form, certified by a stamp or a seal.

10. Articles must be signed by all of the authors at the end, and they must be provided with a list of full names, office and home phone numbers and addresses or other non-office locations where the authors could be reached. The number of the authors (co-authors) must not exceed the limit of 5 people.

11. Editorial Staff reserves the rights to cut down in size and correct the articles. Proof-sheets are not sent out to the authors. The entire editorial and collation work is performed according to the author's original text.

12. Sending in the works that have already been assigned to the press by other Editorial Staffs or have been printed by other publishers is not permissible.

**Articles that Fail to Meet the Aforementioned  
Requirements are not Assigned to be Reviewed.**

## ავტორთა საქურაღებოლ!

რედაქციაში სტატიის წარმოდგენისას საჭიროა დაიცვათ შემდეგი წესები:

1. სტატია უნდა წარმოადგინოთ 2 ცალად, რუსულ ან ინგლისურ ენებზე დაბეჭდილი სტანდარტული ფურცლის 1 გვერდზე, 3 სმ სიგანის მარცხენა ველისა და სტრიქონებს შორის 1,5 ინტერვალის დაცვით. გამოყენებული კომპიუტერული შრიფტი რუსულ და ინგლისურენოვან ტექსტებში - **Times New Roman (Кириллица)**, ხოლო ქართულენოვან ტექსტში საჭიროა გამოვიყენოთ **AcadNusx**. შრიფტის ზომა – 12. სტატიას თან უნდა ახლდეს CD სტატიით.

2. სტატიის მოცულობა არ უნდა შეადგენდეს 10 გვერდზე ნაკლებს და 20 გვერდზე მეტს ლიტერატურის სიის და რეზიუმეების (ინგლისურ, რუსულ და ქართულ ენებზე) ჩათვლით.

3. სტატიაში საჭიროა გაშუქდეს: საკითხის აქტუალობა; კვლევის მიზანი; საკვლევი მასალა და გამოყენებული მეთოდები; მიღებული შედეგები და მათი განსჯა. ექსპერიმენტული ხასიათის სტატიების წარმოდგენისას ავტორებმა უნდა მიუთითონ საექსპერიმენტო ცხოველების სახეობა და რაოდენობა; გაუტკივარებისა და დაძინების მეთოდები (მწვავე ცდების პირობებში).

4. სტატიას თან უნდა ახლდეს რეზიუმე ინგლისურ, რუსულ და ქართულ ენებზე არანაკლებ ნახევარი გვერდის მოცულობისა (სათაურის, ავტორების, დაწესებულების მითითებით და უნდა შეიცავდეს შემდეგ განყოფილებებს: მიზანი, მასალა და მეთოდები, შედეგები და დასკვნები; ტექსტუალური ნაწილი არ უნდა იყოს 15 სტრიქონზე ნაკლები) და საკვანძო სიტყვების ჩამონათვალი (key words).

5. ცხრილები საჭიროა წარმოადგინოთ ნაბეჭდი სახით. ყველა ციფრული, შემაჯამებელი და პროცენტული მონაცემები უნდა შეესაბამებოდეს ტექსტში მოყვანილს.

6. ფოტოსურათები უნდა იყოს კონტრასტული; სურათები, ნახაზები, დიაგრამები - დასათაურებული, დანომრილი და სათანადო ადგილას ჩასმული. რენტგენოგრაფიების ფოტოასლები წარმოადგინეთ პოზიტიური გამოსახულებით **tiff** ფორმატში. მიკროფოტოსურათების წარწერებში საჭიროა მიუთითოთ ოკულარის ან ობიექტივის საშუალებით გადიდების ხარისხი, ანათალების შედეგის ან იმპრეგნაციის მეთოდი და აღნიშნოთ სურათის ზედა და ქვედა ნაწილები.

7. სამამულო ავტორების გვარები სტატიაში აღინიშნება ინიციალების თანდართვით, უცხოურისა – უცხოური ტრანსკრიპციით.

8. სტატიას თან უნდა ახლდეს ავტორის მიერ გამოყენებული სამამულო და უცხოური შრომების ბიბლიოგრაფიული სია (ბოლო 5-8 წლის სიღრმით). ანბანური წყობით წარმოდგენილ ბიბლიოგრაფიულ სიაში მიუთითეთ ჯერ სამამულო, შემდეგ უცხოელი ავტორები (გვარი, ინიციალები, სტატიის სათაური, ჟურნალის დასახელება, გამოცემის ადგილი, წელი, ჟურნალის №, პირველი და ბოლო გვერდები). მონოგრაფიის შემთხვევაში მიუთითეთ გამოცემის წელი, ადგილი და გვერდების საერთო რაოდენობა. ტექსტში კვადრატულ ფხიხლებში უნდა მიუთითოთ ავტორის შესაბამისი N ლიტერატურის სიის მიხედვით. მიზანშეწონილია, რომ ციტირებული წყაროების უმეტესი ნაწილი იყოს 5-6 წლის სიღრმის.

9. სტატიას თან უნდა ახლდეს: ა) დაწესებულების ან სამეცნიერო ხელმძღვანელის წარდგინება, დამოწმებული ხელმოწერითა და ბეჭდით; ბ) დარგის სპეციალისტის დამოწმებული რეცენზია, რომელშიც მითითებული იქნება საკითხის აქტუალობა, მასალის საკმაობა, მეთოდის სანდოობა, შედეგების სამეცნიერო-პრაქტიკული მნიშვნელობა.

10. სტატიის ბოლოს საჭიროა ყველა ავტორის ხელმოწერა, რომელთა რაოდენობა არ უნდა აღემატებოდეს 5-ს.

11. რედაქცია იტოვებს უფლებას შეასწოროს სტატია. ტექსტზე მუშაობა და შეჯერება ხდება საავტორო ორიგინალის მიხედვით.

12. დაუშვებელია რედაქციაში ისეთი სტატიის წარდგენა, რომელიც დასაბეჭდად წარდგენილი იყო სხვა რედაქციაში ან გამოქვეყნებული იყო სხვა გამოცემებში.

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## EPIDEMIOLOGICAL STUDY OF INJURIES IN THE EMERGENCY DEPARTMENT OF THE UNIVERSITY HOSPITAL OF GEORGIA

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### Abstract.

**Objectives.** Injuries represent a significant burden on societies, resulting in deaths and health care costs incurred during Emergency Department visits and hospitalizations. This research aimed to estimate the burden of traumatic injury of patients treated and evaluated in the Emergency Department of the University Hospital in Georgia.

**Method:** A retrospective study was conducted at the University Hospital of Georgia for all trauma patients from January 1, 2018 to June 30, 2018. Visits were identified from existing electronic medical records, using the iCREATE Registry as a model. Data collected included patient demographics, injury characteristics, and injury costs. To estimate the direct costs of trauma treatment, data were obtained from the cost accounting database.

**Results:** A total of 2445 injured patients aged 0 to 91 years were medically examined during the study period and about 65% of them were male. Most of the injured patients were school-age children (31%). The leading mechanism of injury in the Emergency Departments were falls (45%). Most of the patients (78%) suffered from moderate injuries and needed only outpatient treatment. The total direct costs for all patients were \$248 628. Fall-related injury costs accounted for most direct medical costs (51%), followed by road traffic crashes related costs (23%). Road traffic injured patients had the highest total mean costs (\$269).

**Conclusions:** Injuries result in a substantial number of Emergency Department visits and significant medical costs in Georgia. Understanding the characteristics of these injuries is essential for targeting injury prevention.

**Key words.** Injury, Epidemiology, Emergency Department, Injury costs, Georgia.

### Introduction.

Injury is one of the leading causes of death and disability worldwide, accounting for 10% of global mortality and 12% of global morbidity. More than 90% of injury-related deaths occur in low- and middle- income countries (LMICs) [1-4]. Injuries are associated with a significant economic burden, causing considerable losses to victims, their families, and nations as a whole [5,6]. The financial burden of injuries is enormous and unevenly distributed across countries and regions of the world. For example, road traffic injuries cost about 2% of GDP (gross domestic product) in high-income countries and about 5% of GDP in low- and middle-income countries [1,7].

Injury-related data is an essential source for identifying the underlying causes of injury and controlling them [8,9]. The high-quality data are being used as a basis for developing effective injury prevention policies and strategies [10,11]. Despite this, there is a lack of injury research in LMICs. As an example of an

opportunity to fill data gaps, injury-related costs are unknown in Georgia, as there are no comprehensive injury registration systems. An economic evaluation of injuries in the country can help to prioritize investment in injury prevention and care.

In 2018, death caused by injuries amounted to 4% and was the 5th leading cause of death in Georgia [12]. In Georgia, similar to other LMICs, data on injuries are limited. Official injury statistics are based on injury-related deaths and hospitalisations, while little is known about the epidemiology of traumatic injuries in Emergency Departments (ED). Our study aims to address this gap by describing the epidemiology of injuries for trauma patients admitted to the Emergency Department of a tertiary hospital in Tbilisi, describing trends in injury types and causes, and estimating the economic burden of traumatic injury care.

### Materials and Methods.

This study was conducted as part of the project iCREATE: Increasing Capacity in Research in Eastern Europe, funded by the United States National Institutes of Health and led by the University of Iowa and the Cluj School of Public Health (NIH/NINDS 2D43TW007261). It is a retrospective observational study of trauma patients at University Hospital in Tbilisi over six months (January 1st, 2018, to June 30st 2018). The hospital was selected based on statistical data regarding the highest admission level of injured patients for recent years. The University hospital represents a tertiary teaching hospital with 205 hospital beds, providing service for the people of Tbilisi with population 1 175 200 (2017 census) and being available for referral for different regions of Georgia (total population 3 716 900).

The data used was retrieved from the electronic medical records, using the iCREATE Registry. Registry guidelines and codes from WHO, ICD-10, IDB-JAMIE (European Injury Database) and the Iowa Trauma Registry were used to develop the iCREATE Injury Registry. The registry was pilot tested by retrospectively extracting data from 2018 patient records in three emergency departments in Yerevan, Armenia, one emergency department in Tbilisi, Georgia and two emergency departments in Chisinau, Republic of Moldova, being the first attempt to pilot test an injury surveillance system in these countries. After pilot-testing the registry in Georgia, data was collected using the same methodology, in the University Hospital in Tbilisi, as well. The patients' personal data was encrypted from the medical records and did not allow the identification of the patients. To estimate the direct costs of trauma treatment, data were obtained from the cost accounting hospital internal database. Before the start of the study, the consent of the Research Ethics Commission was obtained (IRB # 2018-049 14.12.2018). Statistical analysis



of the data was performed using version 23.0 of the SPSS software. Differences between categorical variables were tested using chi-square test for independence. Statistical significance was considered for  $p < 0.05$ .

The inclusion criteria encompassed all the acute physical injuries attending ED for diagnosis, investigation, or treatment, which fall into the nature of injury categories listed in the dataset, including acute poisonings and toxic effects, overdoses of substances and wrong substances given or taken in error.

The exclusion criteria in the research were: adverse effects and complications of therapeutic, surgical, and medical care, psychological harm, psychological consequences of injury, ED attendances associated with non-injury related health conditions, and return visits to ED.

The study included both patients of ED who were admitted to the hospital for further observation and treatment and those who were discharged home after diagnosis and treatment (ambulant care). Data included patient demographics (age, gender), injury characteristics (date of injury, place of occurrence, intent, activity during injury, mechanism of injury, type of injury, injury location, severity of injury, mode of hospital arrival, time from injury until arrival at the hospital) and injury costs.

For the analysis, focusing on the prevention potential, the study population was divided into six age groups: preschool age (0-5 years old), school-age (6-17 years old), active working-age (18-24, 25-44 and 45-64 years old), and the age of older adults (65 and more years). Injury mechanisms were defined as road traffic injuries (RTI), falls, exposure to mechanical forces, poisoning and other. The injury severity was classified as 'minor' (01 - no treatment needed), 'moderate' (02 - requires only outpatient treatment), 'serious' (03 - requires non-ICU hospital admission), 'severe' (04 - requires ICU observation and/or basic treatment), 'critical' (05 - requires intubation, mechanical ventilation or vasopressors for blood pressure support) and 'maximal' (06 - not survivable).

Age category was the primary exposure variables, and variance by age was examined for the patient sample, patient

demographics, and injury characteristics. Chi-square tests of independence were used to document differences in age by these factors. We examined the cost of treatment by sex, age, and mechanism of injury.

### Results.

Over the six months, 2445 patients visited the ED of the study hospital with a diagnosis of primary injury. Males comprised 65% (1597), and females comprised 35% (848) of patients, giving a male to female ratio of 1.9:1. The age of patients ranged from 0 to 91 years (median-21 and mode-3). Most of the injured were school-age patients ( $n=746$ ; 31%). The sex ratio varied by age group. (Figure 1). The patients were mostly from urban areas ( $n = 1921$ , 79%). The most common mode of arrival to the ED was by EMS (emergency medical service) ground ambulance (62%,  $n=1504$ ). The ratios were distributed differently between modes of transport in different age groups (Figure 1). The proportion of transportation by ambulance in case of poisoning (90%,  $n = 296$ ) and road traffic injuries (88%,  $n = 190$ ) was significantly higher compared to the rest of the mechanism of injury. In most cases, unintentional injuries were observed (87%,  $n = 2139$ ) and prevailed in all age groups. The most frequently reported places of occurrence of injury were home (38%,  $n = 930$ ), transport area - public highway, street or road (16%,  $n = 390$ ), school, educational area (5%,  $n = 121$ ) and sports and athletics area (4%,  $n = 100$ ). The occurrence of injury varied among age groups (Table 1). The common home injuries were falls (49%,  $n=457$ ) and poisonings (22%,  $n=202$ ). Most of the transport area injuries were road traffic injuries (55%,  $n = 213$ ) and falls (27%,  $n = 103$ ).

Most of trauma-related ED visits were due to falls (45%,  $n = 1103$ ), followed by poisoning (13%,  $n = 328$ ), exposure of mechanical forces (11%,  $n = 281$ ) and RTI (9%,  $n = 216$ ). Injury mechanism varied significantly by age ( $p<0.001$ ) (Table 2). The majority of injuries admitted to emergency departments were contusion/bruise (19%;  $n = 465$ ), followed by sprain/strain

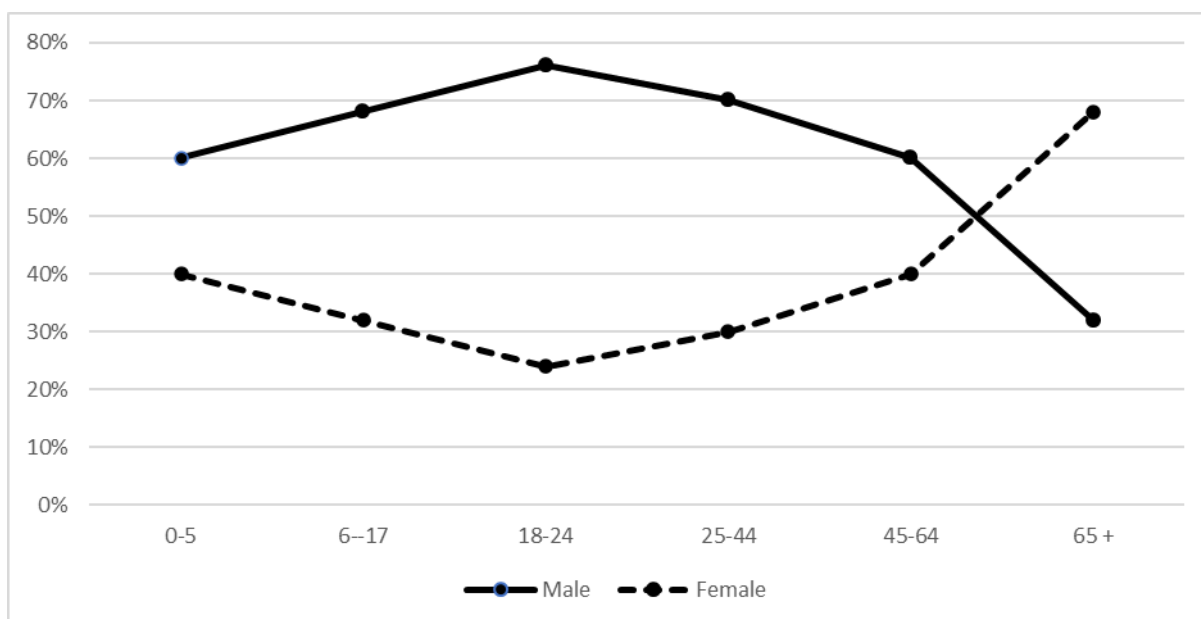


Figure 1. Sex distribution of patients with traumatic injury in age groups.

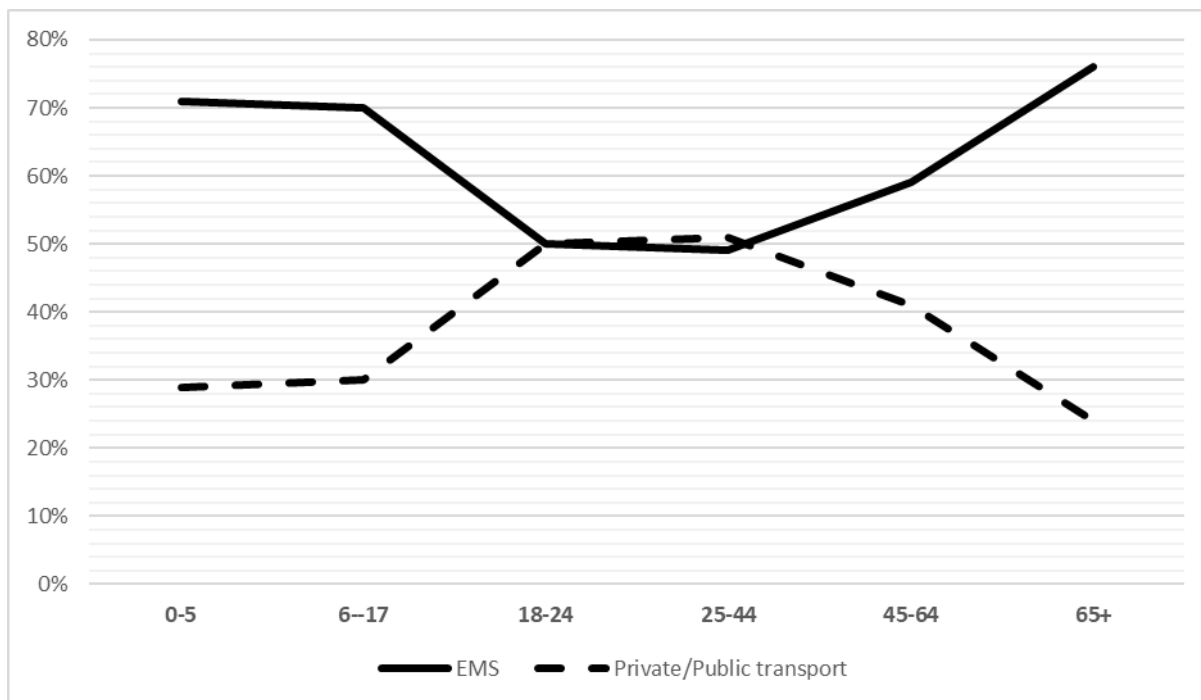


Figure 2. Mode of arrival of injured patients to the ED.

Table 1. Demographics of patients by age group.

Demographics	Patient age groups						Total:	p value
	0-5	6-17	18-24	25-44	45-64	65 +		
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	
<b>Sex</b>								
Male	230(60)	505(68)	169(76)	468(70)	188(60)	37(32)	<b>1597(65)</b>	< 0.001
Female	153(40)	241(32)	54(24)	197(30)	124(40)	79(68)	<b>848(35)</b>	
<b>Injury occurred in:</b>								
Urban	323(84)	636(85)	165(74)	487(73)	229(73)	81(70)	<b>1921(79)</b>	< 0.001
Rural	57(1)	98(2)	48(4)	157(3)	79(1)	33(2)	<b>472(19)</b>	
Unknown	3(15)	12(13)	10(22)	21(24)	4(25)	2(28)	<b>52(2)</b>	
<b>Mode of Arrival</b>								
Ambulance	272(71)	522(70)	111(50)	327(49)	184(59)	88(76)	<b>1504(62)</b>	< 0.001
Private/public transport	111(29)	224(30)	112(50)	338(51)	128(41)	28(24)	<b>941(38)</b>	
<b>Intent</b>								
Unintentional	382(100)	687(92)	186(83)	541(81)	237(76)	106(91)	<b>2139(87)</b>	< 0.001
Intentional self-harm	0(0)	4(1)	5(2)	12(2)	5(2)	0(0)	<b>26(1)</b>	
Assault	0(0)	1(0)	3(1)	5(1)	2(1)	0(0)	<b>11(0)</b>	
Other violence	1(0)	28(4)	6(3)	20(3)	11(4)	1(1)	<b>67(3)</b>	
Other specified intent	0(0)	16(2)	15(7)	74(11)	52(17)	4(3)	<b>161(7)</b>	
Undetermined intent	0(0)	10(1)	8(4)	13(2)	5(2)	5(4)	<b>41(2)</b>	
<b>Place of occurrence</b>								
Home	275(72)	250(34)	51(23)	173(26)	98(31)	83(72)	<b>930(38)</b>	< 0.001
Transport area: public highway, street or road	34(9)	97(13)	49(22)	139(21)	62(20)	9(8)	<b>390(16)</b>	
School, educational area	1(0)	119(16)	1(0)	0(0)	0(0)	0(0)	<b>121(5)</b>	
Sports/athletics area	2(1)	61(8)	14(6)	21(3)	2(1)	0(0)	<b>100(4)</b>	
Industrial /construction area	0(0)	0(0)	9(4)	34(5)	10(3)	6(5)	<b>59(2)</b>	
Recreational area	11(3)	17(2)	3(1)	4(1)	0(0)	0(0)	<b>35(1)</b>	
Commercial area	3(1)	5(1)	3(1)	6(1)	0(0)	0(0)	<b>17(1)</b>	
Other	1(0)	8(1)	3(1)	6(1)	1(0)	0(0)	<b>19(1)</b>	
Unspecified	56(15)	189(25)	90(40)	282(42)	139(45)	18(16)	<b>774(32)</b>	
<b>Total</b>	<b>383(16)</b>	<b>746(31)</b>	<b>223(9)</b>	<b>665(27)</b>	<b>312(13)</b>	<b>116(5)</b>	<b>2445(100)</b>	

**Table 2.** Distribution of injury characteristics by age group.

Injury characteristics	Age groups						Total	P value
	0-5 n (%)	6--17 n (%)	18-24 n (%)	25-44 n (%)	45-64 n (%)	65 + n (%)		
<b>Mechanism of Injury</b>								
Fall	206(54)	380(51)	80(36)	224(34)	133(43)	80(69)	1103(45)	< 0.001
Poisoning	52(14)	50(7)	32(14)	112(17)	69(22)	13(11)	328(13)	
Exposure of mechanical forces	41(11)	163(22)	42(18)	120(18)	37(12)	9(8)	412(16)	< 0.001
RTI	17(4)	60(8)	27(12)	79(12)	28(12)	5(9)	216(9)	< 0.001
Other	67(17)	82(11)	35(16)	111(17)	44(14)	9(8)	348(14)	
Unknown	0(0)	11(1)	7(3)	19(3)	1(0)	0(0)	38(2)	
<b>Type of injury</b>								
Contusion, bruise	92(24)	147(20)	33(15)	109(16)	59(19)	25(22)	465(19)	< 0.001
Sprain and strain	21(5)	146(20)	55(25)	134(20)	40(13)	15(13)	411(17)	
Open wound and abrasion	104(27)	128(17)	34(15)	94(14)	35(11)	10(9)	405(17)	
Fracture	21(5)	125(17)	28(12)	94(14)	66(21)	38(32)	372(15)	
Poisoning	56(15)	54(6)	32(14)	116(17)	71(23)	13(11)	342(14)	
Concussion/brain injury	41(11)	125(17)	27(12)	87(13)	28(9)	14(12)	322(13)	
Dislocation and subluxation	37(10)	3(0)	4(2)	5(2)	3(1)	0(0)	52(2)	
Multiple injuries	2(1)	8(1)	4(2)	12(2)	4(1)	0(0)	30(1)	
Injury to muscle and tendon, blood vessels and nerves	1(0)	5(1)	2(1)	3(0)	2(1)	0(0)	13(1)	
Other	7(2)	5(1)	4(2)	11(2)	4(1)	1(1)	32(1)	
Unknown	1(0)	0(0)	0(0)	0(0)	0(0)	0(0)	1(0)	
<b>Part of the body injured</b>								
Head/skull	153(40)	206(28)	35(16)	112(17)	42(13)	25(22)	573(23)	
Face	54(14)	57(8)	16(7)	39(6)	18(6)	6(5)	190(8)	
Neck	0(0)	2(0)	0(0)	6(1)	1(0)	0(0)	9(0)	
Thoracic/lumbar spine	1(0)	12(2)	5(2)	18(3)	9(3)	7(6)	52(2)	
Chest wall	2(1)	29(4)	10(4)	37(6)	29(9)	8(7)	115(5)	
Abdominal wall	2(1)	10(1)	0(0)	6(1)	1(0)	1(1)	20(1)	
Upper extremity	85(22)	222(30)	59(26)	155(23)	68(22)	21(18)	610(25)	
Lower extremity	22(6)	125(17)	53(24)	152(23)	65(21)	34(29)	451(18)	
Internal organs	0(0)	2(0)	1(0)	3(0)	1(0)	1(1)	8(0)	
Multiple body parts	2(1)	8(1)	3(1)	8(1)	3(1)	0(0)	24(1)	
Other	61(15)	73(10)	41(18)	129(19)	75(24)	13(11)	392(16)	
Unknown	1(0)	0(0)	0(0)	0(0)	0(0)	0(0)	1(0)	
<b>Total</b>	<b>383(16)</b>	<b>746(31)</b>	<b>223(9)</b>	<b>665(27)</b>	<b>312(13)</b>	<b>116(5)</b>	<b>2445(100)</b>	

**Table 3.** Direct hospital costs in US dollars by mechanism of injury and the distribution of mean costs.

Demographics	Mechanism of injury						
	RTI	Fall	Poisoning	EMF	Other	Unknown	Total
<b>SEX</b>							
Male	\$40,914.00	\$70,633.00	\$10,054.00	\$21,606.00	\$12,443.00	\$2,355.00	\$158,003.00
Female	\$16,961.00	\$55,429.00	\$4,591.00	\$ 6,003.00	\$4,368.00	\$3,277.00	\$90,626.00
<b>AGE</b>							
0-5	\$4,032.00	\$11,747.00	\$1,975.00	\$2,455.00	\$1,715.00	\$ -	\$21,924.00
6--17	\$12,276.00	\$34,210.00	\$2,241.00	\$8,295.00	\$ 3,661.00	\$227.00	\$60,910.00
18-24	\$9,089.00	\$12,133.00	\$ 951.00	\$2,260.00	\$ 2,600.00	\$387.00	\$27,420.00
25-44	\$18,388.00	\$30,954.00	\$6,443.00	\$10,050.00	\$4,656.00	\$2,227.00	\$72,718.00
45-64	\$13,099.00	\$18,278.00	\$2,558.00	\$2,891.00	\$3,409.00	\$2,791.00	\$43,026.00
65+	\$991.00	\$18,738.00	\$477.00	\$1,654.00	\$770.00	\$ -	\$22,630.00
<b>Mean (\$)</b>	<b>269</b>	<b>114.3</b>	<b>67</b>	<b>44.7</b>	<b>48.3</b>	<b>148.2</b>	<b>101.7</b>
<b>Total (%)</b>	<b>51</b>	<b>23</b>	<b>11</b>	<b>6</b>	<b>7</b>	<b>2</b>	<b>100</b>
<b>Total</b>	<b>\$57,875.00</b>	<b>\$126,060.00</b>	<b>\$14,645.00</b>	<b>\$27,605.00</b>	<b>\$16,811.00</b>	<b>\$5,632.00</b>	<b>\$248,628.00</b>

(17%; n = 411) and open wound/abrasion (17%; n = 405). The most frequent site of injury was upper extremity (25%; n = 610), followed by head (23%; n = 573) and low extremity (18%; n = 451) (Table 2).

Most patients (80%; n=1947) were treated and discharged within 24 hours, while 20% (n = 493) were treated and admitted to this hospital. One patient was treated and transferred to another hospital and two patients died at ED. Among male patients 19% (n=304), and among female patients 22% (n=189) required hospitalization. The highest share of hospitalization was observed in the age group 65+ years injured patients (33%), while the lowest share was found in 0-5 injured patients (13%). According to the mechanism of injury, the largest proportion of hospitalizations was among patients injured due to RTIs (43%, n = 93) and falls (26%, n = 282).

Most of the patients (78.12%, n = 1910) were classified as having moderate (injury severity score – 02) injuries and needed only outpatient treatment. Serious injuries (ISS – 03) requiring hospitalisation without an intensive care unit were observed in 18.12% (n = 443) of patients, while 1.88% (n = 46) injuries were minor (ISS – 01) and did not require treatment. A percentage of 1.10% (n = 27) were severe injuries and required ICU observation and/or basic treatment (ISS-04), and 0.65% (n = 16) were critical and required intubation, mechanical ventilation, or vasopressors for blood pressure support (ISS-5). Only 0.12% (n = 3) were not survivable (ISS-06). The relationships between the severity of injury and injury mechanism were analyzed through linear regression analysis. The injury severity score was set as the dependent variable, while the injury mechanisms were independent variables. There was a statistically significant correlation between the injury severity score and road traffic injuries ( $r = 0.18$ ;  $p < 0.001$ ). Most patients injured in road accidents were men (gender ratio 1.8: 1).

Almost half of the patients (46.5%, n = 1138) were admitted to the ED in less than an hour; 21.5% (n = 525) - within 1-2 hours, 6.8% (n = 107) - between 2 and 4 hours, and 25.2% (n = 615) of patients arrived more than four - hours after injury. Injuries occurring in urban areas were mostly admitted to the ED within 1 hour (56%, n = 1067), while injuries occurring in rural areas were mostly admitted to ED after 4 hours post-injury (73%, n= 38). Patients were more likely to arrive by EMS within 1 hour compared to arrivals by private/public transport (76%, n=867).

In adult patients, 4% (n = 58) injuries were associated with workplace injuries, and for 35% of cases (n = 461), information about occupational status was unknown. In work-related injuries, the male to female ratio was 4.3: 1. Patient activity at the time of injury was unknown in 55% of cases (n = 1 354). In 14% of cases, injuries occurred during leisure / entertainment (n = 336), 6% during vital activity (food, sleep, etc.) (n=119), 5% during education (n = 115), 20% - other type of activities.

The direct hospital cost of all injury-related treatment during the study period was \$ 248,628, out of which 78% (\$193 930) was spent on treating the hospitalised patients. The treatment costs varied between \$7-\$3258 depending on the mechanism of injury and required service. The highest cost was allocated for treating patients with injuries: falls (51%; \$ 126 060) and RTIs (23%; \$ 57 875) (Table 3). By age groups, 29% of total charges

were spent for 25-44 years (\$ 72 718) and 24% (\$ 60 910) - for 6-17 years patients. The mean cost for treating patients admitted to EMS due to RTIs was the highest among all types of injuries (\$269) (Table 3).

## Discussion.

To our knowledge, the present study is the first to analyse the epidemiological characteristics of injury at the Emergency Department level in Georgia. Moreover, this is the first study to estimate the economic costs of injury treatment in Georgia. According to this study, injuries are more prevalent for males than females. This finding is in line with most studies conducted in other countries [13-15]. This could be explained by greater exposure to high risk activities, such as through driving and work, and more frequent high-risk behaviors in males [16,17]. Among older adults, females comprised a higher proportion of injuries. These trends indicate a need to prioritize prevention within high-risk activities as well as for older women. However, our study found that more female patients need to be hospitalised than male patients. Earlier studies investigating the association between gender and injury suggest that different biological features of males and females might impact trauma survival [18-20]. The possible explanation for this heterogeneity is the differential effects of sex steroids such as anabolic or catabolic steroids [16,21]. Further research should highlight the differences in treatment, complications and outcomes between the sexes.

Consistent with previous studies, our data show that most of the injured patients (80%) were treated in the ED and released within 24 hours [22,23,21]. More than 78% of ED injury-related visits were due to four major external causes: falls, poisoning, exposure to mechanical forces and road traffic injuries. We have identified specific age groups at high risk for specific injuries. Falls are the leading cause of injury among senior adults (65 + years), especially women. The incidence of poisoning is prevalent in the age group 44-64 years old, while exposure to mechanical forces is higher in the 6-17 years old population. RTIs account for most injuries in patients aged 18-44 years. These finding highlights that the most productive age group of the population is heavily affected by road traffic injuries. These findings are consistent with previous research results [24-27]. Present study demonstrated that RTIs victims have the highest prevalence of hospitalization. These results are in line with previous studies in this field [26,25]. Among RTIs cases, injuries predominantly occurred in the male populations, which is consistent with other similar studies [27,28]. The data confirmed that frequent types of injuries were contusions, sprains, and abrasions, similar with results reported in previous papers [29,30]. The places of injury occurrence were homes followed by public highway, street, or road. This finding is consistent with previous studies from developing countries [31-33]. According to the Practical Guide and previous research, the recommended time for starting emergency care is 60 minutes. This time is called the 'Golden Hour' and significantly affects the chances of survival of the injured person [34,35,26]. Our study revealed that the time elapsed between the injury and the first care measure for most of the patients was less than 60 minutes. This result differs from previous studies in developing countries

but is consistent with studies in developed countries [11,36,37]. This may be due to the improved quality of prehospital care and EMS service in Georgia in recent years. Since the reform of the emergency service started in 2013, the efficiency of the system has increased. Management and coordination of emergency calls through a single central dispatch system has been provided. As a result of the reform, call response times have been significantly reduced and the quality of service has improved [38]. Free ground ambulance transport may also have contributed to the higher proportion of EMS use observed in the current study. The cost of EMS has been perceived as a barrier to usage in previous papers [26,39,40]. The data confirm that injured patients arriving by EMS were more likely to arrive within 1 hour than by other modes of transport. The results align with previous studies from Georgia, the Republic of Moldova, and the Republic of Armenia [41]. RTIs and poisoning patients were mostly arriving by EMS. In our study, high-risk areas outside the 'Golden Hour' were identified in rural areas of the country. This finding is similar to previous studies [35]. The rural areas of Georgia are still characterized by poor infrastructure and poor access to healthcare. These circumstances prevent equal access to health care for the rural population. The rural areas of Georgia are still characterized by poor infrastructure and unsafe roads. Accordingly, the EMS need much more time to transport the patient. These circumstances prevent equal access to health care across the country, with huge discrepancies between rural areas and Tbilisi [38,42].

The study illustrated that the mean cost for admissions was \$102 per injured patient. The most expensive injuries were RTIs and falls. These findings were consistent with previous studies from LMICs, where RTIs were the most expensive to treat as inpatients [43]. The results indicate that the economic burden of injury can be catastrophic for families due to high direct costs. The economic costs of trauma are valuable data used for public health measures. Our study made it possible to determine direct costs related to emergency medical care and hospitalization services. This study did not consider the direct costs associated with post-hospital treatment, medicines, and rehabilitation. Future researchers should focus on injury-related direct and indirect costs to better understand the economic burden of injury.

### Limitations.

The study has limitations that could affect the generalization of the results. The current study was carried out in a single medical center in Georgia and is not representative for the entire population. Large multicenter studies are needed to better understand the burden of injury in the country. This study did not record prehospital deaths, thus potentially skewing the type and mechanism of injuries that contributed most to mortality. It should be noted that burns were not included in the present study as burn related patients are usually admitted to The Burn Center in Tbilisi. Since our study was retrospective, it was limited in the number and depth of variables considered available in the medical records.

### Conclusion.

We observed that injuries are responsible for a substantial

number of ED visits and high medical costs in Georgia. Understanding the characteristics of these injuries could be useful in elaborating preventive measures. Further research is needed to assess the economic burden of injury in the country. The results can assist policymakers in identifying priority areas. The cost estimate can serve as a baseline for the economic assessment of preventing initiatives.

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Травматизм представляет собой значительное бремя для общества, которое приводит к гибели людей и материальными расходам связанные с госпитализации больного. Настоящая статья призвана оценить затраты, связанные с травматизмом у лиц, которые обратились в отделение неотложной помощи университетской клиники Грузии для обследования и лечения. **Методология:** Ретроспективное исследование было проведено в отделении неотложной помощи университетской клиники г. Тбилиси для всех пациентов с травматизмом, которые получили медицинское обслуживание с 1 Января 2018г по 30 Июня 2018г. Пациенты были идентифицированы на основании медицинских историй используя регистр травмы проекта iCREATE. Данные пациентов включают демографию пациентов, характеристику травм и затрат на медицинское обслуживание связанные с травматизмом. **Результаты:** В течение периода исследования всего 2445 пациентов, возраста от 0 до 91 лет, прибыли в отделение неотложной помощи. Мужчины составляют 65% всех пострадавших. Пик наибольшей травматизации (31%) наблюдался в школьном возрасте. 45% травм было вызвано падением. Большинство пациентов (78%) имели травмы средней тяжести и нуждались только амбулаторным лечением. Материальные затраты, связанные с падением, составляли основную часть (51%) прямых медицинских расходов, а на втором месте, затраты связанные с дорожно-транспортных происшествий 23%. Самое высокое среднее значение затрат было обнаружено в случае дорожно-транспортных происшествий (\$269).

**Вывод:** Травмы приводят к значительному количеству посещений отделений неотложной помощи и значительным медицинским расходам в Грузии. Понимание характеристик этих травм имеет важное значение для принятия мер по их профилактике.

**Keywords:** Травма, Эпидемиология, Отделение неотложной помощи, затраты травматизма, Грузия

მიზანი: ტრავმატიზმი წარმოადგეს საზოგადოებრივი ჯანდაცვის მზარდ პრობლემას და სიკვდილიანობის გამომწვევ ერთ-ერთ ძირითად მიზეზს გლობალურად. დიდია ტრავმატიზმით გამოწვეული ფინანსური ტვირთი. აღნიშნული კვლევის მიზანს წარმოადგენს, სწორედ ტრავმული დაზიანებების ეპიდემიოლოგიური მახასიათებლების შესწავლა და ტრავმულ დაზიანებებთან დაკავშირებული პირდაპირი სამედიცინო ხარჯების შეფასება საუნივერსიტეტო ჰოსპიტლის გადაუდებელი სამედიცინო დახმარების დეპარტამენტის მაგალითზე. მეთოდოლოგია: კვლევის მეთოდოლოგია გულისხმობს საუნივერსიტეტო ჰოსპიტლის გადაუდებელი დახმარების განყოფილებაში ექვსი თვის განმავლობაში მოხვედრილი ტრავმული დაზიანებების ყველა შემთხვევის შესწავლას iCREATE-ის პროექტის

ფარგლებში სპეციალურად შემუშავებული კითხვარის მიხედვით. კვლევა მოიცავდა 2018 წლის 1 იანვრიდან 2018 წლის 1 ივლისამდე პერიოდს. შედეგები: კვლევის პერიოდში სულ 2445 პირმა, მიმართა თბილისის საუნივერსიტეტო კლინიკის გადაუდებელი დახმარების განყოფილებას ტრავმული დაზიანების გამო. მათი ასაკი მერყეობდა 0-დან 91 წლამდე. მამრობითი სქესის პაციენტთა წილი შეადგენდა 65%-ს. პრევალენტურ ასაკობრივ ჯგუფს წარმოადგენდა 6-17 წელი. დაზიანების მთავარ მექანიზმი (45% შემთხვევებისა) იყო ვარდნა. საერთო ხარჯების ნახევარზე მეტი, 51% დაკავშირებული იყო ვარდნასთან, 23% კი - საგზაო-სატრანსპორტო ტრავმატიზმთან. დანახარჯების ყველაზე მაღალი საშუალო რაოდენობა მოდიოდა ავტოსაგზაო შემთხვევებზე. დასკვნა: ტრავმული დაზიანებები მნიშვნელოვან ფინანსურ ტვირთად აწევს, როგორც სახელმწიფოსთვის, ასევე ცალკეული ოჯახებს. ტრავმული დაზიანების მახასიათებლების შესწავლა მნიშვნელოვანია, პრევენციული ღონისძიებების დასაგეგმად. **Keywords:** ეპიდემიოლოგია, ტრავმა, ფინანსური ტვირთი, საქართველო