Utilization of Emergency Care – A Retrospective Study at the University of Szeged, Hungary

Agnes Maroti-Nagy[1], Zoltan Peto[2], Péter Kanizsai[3], Katalin Virag[4] and Edit Paulik[1*]

[1]*Department of Public Health, University of Szeged, Szeged, Hungary.*
[2]*Department of Emergency Medicine, University of Szeged, Szeged, Hungary.*
[3]*Department of Emergency Medicine, Semmelweis University, Budapest, Hungary.*
[4]*Bolyai Institute, University of Szeged, Szeged, Hungary.*

Authors' contributions

This work was carried out in collaboration between all authors. Authors ZP, EP and AMN designed the study. Author KV managed data and performed the statistical analysis. Authors AMN and PK wrote the first draft of the manuscript. Authors ZP, PK and EP contributed to the manuscript results and conclusions. All authors read and approved the final manuscript.

Article Information

Original Research Article

ABSTRACT

Aims: In Hungary, there are limited data available on the demographic data and disease characteristics of patients requiring emergency care. The aim of this study was to explore disease distribution by age and sex of inpatient casualty admissions in Hungary.
Study Design: Retrospective cross-sectional study.
Place and Duration of Study: Department of Emergency Medicine (DEM), University of Szeged, from June 2014 to June 2015.
Methods: Data were retrieved from the hospital's information system. Altogether the data of 2344 adult inpatients were involved into our analysis. Patients' data were analyzed without the possibility of identification. The study protocol was approved by the Medical Research Council, Scientific and Research Committee of Hungary (No. 578/2014).
Results: The number of female patients (54%) exceeded the number of male (46%) patients. The

_____

*Corresponding author: E-mail: paulik.edit@med.u-szeged.hu;

mean age was 64.06 years (range: 20–103 years); the largest proportion of the sample (42.8%) came from the "above 70 years" age group. The most frequent conditions of admission were non-specific chest pain (18.2%), hypertensive crisis (7.9%), alcohol abuse (6.6%), pain in the lower abdomen (5.0%), and syncope (4.5%). 12.8% of the patients were transferred to other health care units; the leading causes were decrease in body fluids (11.7%) and septicemia (7.3%). Complications occurred in 6.0% of the patients; anemia (5.7%) and volume depletion (5.7%) occurred most frequently.

Conclusion: The majority of the patients presenting to the DEM in Szeged, Hungary were mainly elderly women and the most frequent causes of the admission were diseases of the circulatory system.

1. INTRODUCTION

"Emergency medicine is the medical specialty dedicated to the diagnosis and treatment of unforeseen illness or injury. It encompasses a unique body of knowledge as set forth in the 'Model of the Clinical Practice of Emergency Medicine'. The practice of emergency medicine includes the initial evaluation, diagnosis, treatment, coordination of care among multiple providers, and disposition of any patient requiring inpatient hospital care. Emergency medicine is not defined by location but may be practiced in a variety of settings including hospital-based emergency departments (EDs), emergency care clinics, observation medicine units, emergency medical response vehicles at disaster sites or via telemedicine" [1].

The number of visits of EDs per 100 inhabitants is 44.5 in the United States of America (US), and the percentage of visits resulting in transfer to a different hospital is 2.1 percent [2]. Among the ED attendances, the number of re-admitted patients is estimated between to be 1.4–4.0% in different countries [3–6].

In the US, the most common reasons for ED visits is differently in the various age groups: superficial injury (all age groups except for infants), non-specific chest pain (adults aged 45 years and older), abdominal pain and back pain (all adult age groups except for those aged 85 years and older), and in general, adults aged 85 years and older had the highest rate of ED visits [7].

In June 2014, after the reorganization of the inpatient emergency services in Szeged, Hungary, a newly established ED started to provide medical care for patients with acute conditions. The structure of the department was specified according to the functioning concepts of the EDs in the Anglo-Saxon countries. It has the highest progressivity level [8], within one-hour reach for patients in 50–70 kilometers. It is a regional center with a responsibility to provide care for 200 thousand people, and to ensure the acute treatment for over 40 thousand patients per year [9]. The ED is responsible for the treatment of adult patients (aged 18 years and over) and for the treatment of trauma patients over the age of 14 years. The ED serves as the entry point for patients with major injuries from the region regardless of age, and the primary care of these patients along with the stabilization of their condition are carried out there. The ED has an inpatient unit as well as an outpatient one. In its first year of operation, the number of admitted outpatients was above 30 thousand, and the number of inpatients was over two thousand.

In Hungary, there are limited data available regarding the demographics and disease characteristics of patients requiring emergency care. The aim of this study was to explore the disease distribution by age and sex of inpatient casualty admissions in Hungary.

2. MATERIALS AND METHODS

2.1 Study Design and Setting

This retrospective cross-sectional study was carried out with the cooperation between the Department of Emergency Medicine (DEM) and the Department of Public Health, University of Szeged.

2.2 Study Sample

Data were collected from the e-MedSolution system, which is a hospital information system containing data about all the patients attending the health care system in Szeged. The data of

the first year of the DEM inpatient unit (between June 2014 and June 2015) were downloaded. Altogether the data of 2344 patients aged 18 years or older were involved in our analysis. Patients' data were anonymously processed.

2.3 Variables

The database contained some socio-demographic characteristics (age, and sex), and information on the different types of diagnoses that resulted in the need for emergency care, as well as on complications and accompanying diseases.

With regard to socio-demographic characteristics, age was measured in years according to the date of birth.

The diagnoses of the patients were collected as: 1. referral diagnosis, 2. disease justifying the principal diagnosis necessitating medical care, 3. principal diagnosis requiring transfer to another health care unit, 4. principal diagnosis indicating medical care, 5. complications and 6. accompanying diseases. Among these, the principal diagnosis indicating medical care, principal diagnosis requiring transfer to another health care unit and the complications were analyzed in details.

The classification of the diagnoses was based on the International Statistical Classification of Diseases and Related Health Problems (ICD-10), a classification list by the World Health Organization (WHO), which has 22 main chapters [10]. Data on diagnoses were categorized according to the main chapters, and the most frequent main groups of causes of diseases were divided into subgroups, and analyzed further on in details.

2.4 Statistical Analyses

Statistical analysis was carried out by using SPSS 20.0 for Windows. Simple descriptive statistics were used to assess the socio-demographic characteristics, the two different types of diagnoses, and the complications.

3. RESULTS

The number of female patients (54%) exceeded the number of male (46%) ones. The mean age of the examined population was 64.06±18.76 years (range: 20–103 years), the median was 66.0 years. The mean age of women (67.26±18.16) was somewhat higher than the average age of men (60.32±18.76). The largest proportion of the sample was formed by patients in the "above 70 years" age group (42.8%); in men this value was 34.1%, and in women 50.2%; 20.9% of the patients were 60–69 years old, and 13.9% of them were 50–59 years old. According to sex, these values were 21.5% and 16.0% in men, and 20.5% and 12.2% in women, respectively.

The characteristics of the sample according to the different types of principle diagnoses indicating medical care, requiring transfer to another health care unit, and complications categorized by the ICD-10 main groups are presented in Figs. 1–3.

The most frequent principle diagnosis indicating medical care were Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified (XVIII), Diseases of the circulatory system (IX), along with Injury, poisoning and certain other consequences of external causes (XIX) (Fig. 1).

The most frequent causes of transfer were Diseases of the circulatory system (IX), Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified (XVIII), and Endocrine, nutritional and metabolic diseases (IV) (Fig. 2).

The most frequent complications among inpatients were Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified (XVIII), Endocrine, nutritional and metabolic diseases (IV), and Diseases of the respiratory system (X) (Fig. 3).

The main reason for requiring medical care was non-specific chest pain, the most common reason for transfer to another health care unit was volume depletion, and the most common complication occurred was anemia (Table 1).

Approximately one-tenth (12.8%) of the patients was transferred to another health care unit, 44% of them were men and 56% women. Transfer was required most frequently (58.9%) in the age group above 70 years both in men (59.1%) and in women (70.8%). The ten most frequent causes of requiring medical care and transfer are shown in Table 1.

Complications occurred in 6.01% of the patients. The distribution of the sample according to complications by sex was the same as that of the

transfer (44% men and 56% women). The highest occurrence of complications (58.9%) was seen in the age group above 70 years: in men 48.4% and in women 67.1%. The ten most frequent complications are shown in Table 1.
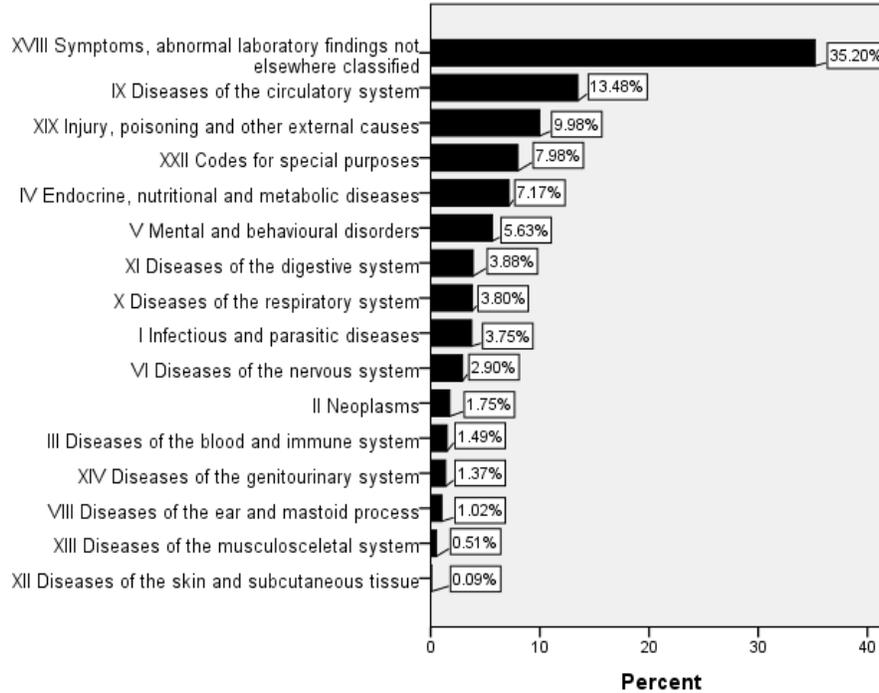
Fig. 1. Disease justifying the principal diagnosis necessitating medical care (ICD-10)
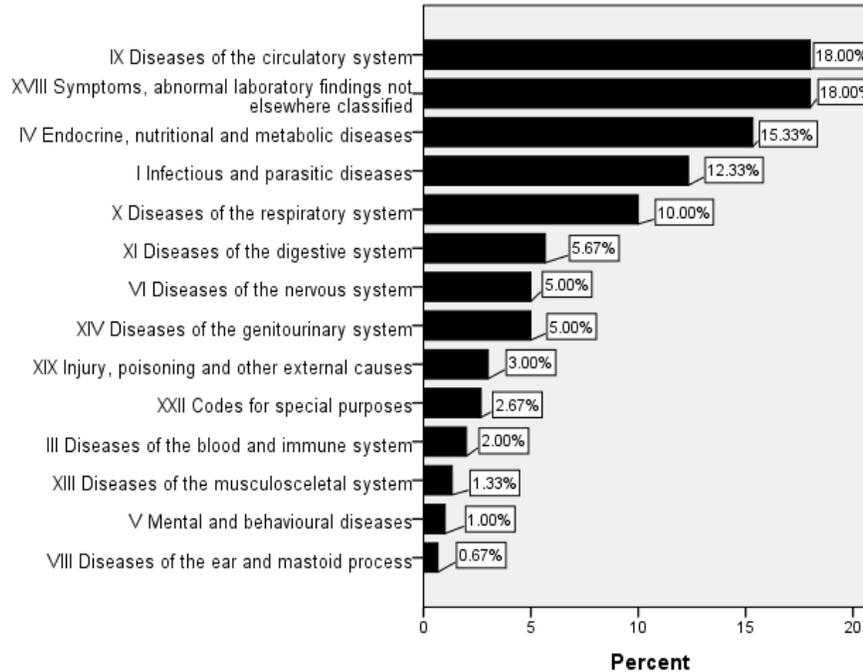
Fig. 2. Principal diagnosis requiring transfer to another health care unit (ICD-10)

4
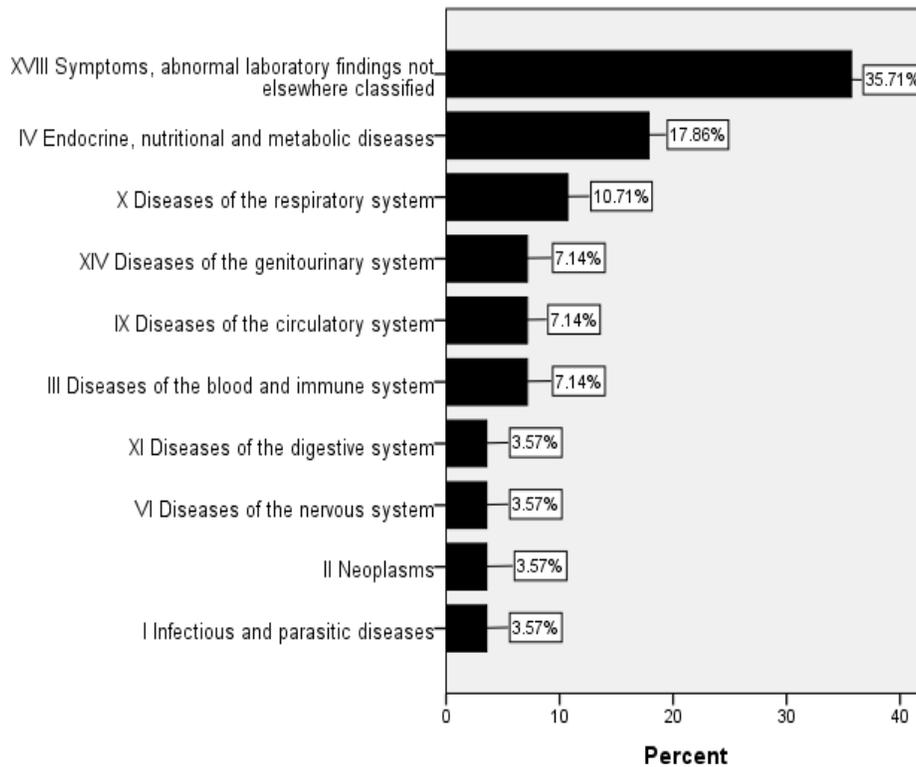
Fig. 3. Complications (ICD-10)

Table 1. The ten most frequent diseases which served as a principal diagnosis necessitating admission to medical care and transfer to another health care unit, and complications in the sample

Condition requiring admission to medical care		Condition of transfer		Complications	
Diseases	N (%)	Diseases	N (%)	Diseases	N (%)
Non-specific chest pain	425 (18.2)	Volume depletion	35 (11.7)	Anemia	8 (5.7)
Hypertensive crisis	186 (7.9)	Septicemia	22 (7.3)	Volume depletion	8 (5.7)
Toxic effects of other alcohols	154 (6.6)	Non-specific chest pain	15 (5.0)	Congestive heart failure	5 (3.5)
Lower abdominal pain	117 (5.0)	Congestive heart failure	11 (3.7)	Dyspnea	5 (3.5)
Syncope and collapse	105 (4.5)	Atrial fibrillation and flutter	10 (3.3)	Fever of unknown origin	5 (3.5)
Volume depletion	105 (4.5)	Gastroenteritis	9 (3.0)	Vertigo	4 (2.8)
Primary hypertension	80 (3.4)	Acute bronchitis	7 (2.3)	Acute alcohol intoxication	3 (2.1)
Atrial fibrillation and flutter	66 (2.8)	Hypertensive crisis	7 (2.3)	Acute respiratory failure	3 (2.1)
Alcohol abuse	58 (2.5)	Acute renal failure	5 (1.7)	Chest pain of unknown origin	3 (2.1)
Epilepsy	46 (2.0)	Epilepsy	5 (1.7)	Syncope and collapse	3 (2.1)

The distribution according to the principal diagnoses justifying medical care, principal diagnoses requiring transfer to another health care unit, and complications by gender and age group can be seen in the Appendix (Tables 2 and 3). In men considering all age groups, the most frequent conditions requiring medical care were hyperglycemia, chest pain of unknown origin, hypertensive crisis, syncope, lower abdominal pain, and alcohol abuse. The most frequent causes of transfer to another health care unit were septicemia and volume depletion. Among the complications, anemia occurred the most frequently in men, considering all age groups (Table 2 in Appendix).

In women considering all age groups, the most frequent diseases leading to admission were chest pain of unknown origin, hypertensive crisis, lower abdominal pain, syncope, and primary hypertension. The most frequent causes of transfer to another health care unit were chest pain of unknown origin, volume depletion, and septicemia. Among the complications, anemia and dyspnea occurred the most frequently in women, considering all age groups (Table 3 in Appendix).

4. DISCUSSION

To our knowledge, this is the first report that analyzes the utilization of hospital emergency services in terms of international standards in Hungary.

Our goal was to assess the utilization of the inpatient unit of the DEM in Szeged, Hungary. Female patients attended to the emergency care more often than men, and their age was also higher. We analyzed two sets of diagnosis (disease justified as a basis for the principal diagnosis related to admission to medical care, and principal diagnosis requiring transfer to another health care unit) and the complications developed in inpatients.

Our results showed that the most frequent diagnosis on admission as well as the most frequent complication was Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified. The most frequent causes of transfer to another health care unit were the Diseases of the circulatory system. The main reason for admission to medical care was Non-specific chest pain, the most common reason for transfer to another health care unit was volume depletion, and anemia was the most common complication.

Our findings are consistent with that of Weiss et al. [7] who have found that women had about 20 percent higher rate of ED visits than men, although in our study, the difference was not so high as it was only 12 percent. The majority of the patients are in the elderly (85 years or older) age group in a study of Weiss et al. [7], while in our analysis, patients were mainly in the age group of 70 years or over.

The five leading principal reasons for ED visits in the US in 2011 were: 1. stomach and abdominal pain, 2. chest pain and related symptoms, 3. fever, 4. headache, and 5. cough [2]. According to our data, the main causes of admission in Szeged, Hungary were: 1. non-specific chest pain, 2. hypertensive crisis, 3. toxic effect of other alcohols, 4. lower abdominal pain, and 5. syncope and collapse. Chest and abdominal pains are the most common and frequent reasons for attending to ED care in both countries.

Among the adults aged 45–84 years, the most common cause of admission to the same or another hospital was septicemia, and in 2009 in the US, approximately half of all hospital admissions were performed at the ED, according to a report of Morganti-Gonzalez et al. [11]. In our study, the most frequent cause of transfer to another health care unit was volume depletion, and the second most common cause was septicemia. According to Weiss et al. [7] in age groups 45–64 years and 65–84 years, the most frequent reason for transfer to another health care unit was septicemia, which finding is consistent with our data analyzing male patients, but in female patients, these causes were congestive heart failure (age group 40–49 years), volume depletion (age group 50-59 years), and chest pain of unknown origin (age group 60–69 years).

Approximately one-tenth (12.79%) of the Hungarian DEM inpatients were transferred to another health care unit. The main reasons for the transfer were out-of-region patient relocation and the need for specialist care requiring transfer to a specialist center. In a study of Pines et al., it has been revealed that the mean admission rate in the US considering direct admissions and from one ED to another hospital was 17.5% (varied from 9.8% to 25.8%) [12], while according to data in 2011, the percentage of visits resulting in hospital admission in the US were 11.9% [2]. In England, the admission rate to hospital after a visit to the Accident and Emergency Department

was approximately 21% for all attendances in the years 2012 and 2013 [13].

Complications after an acute admission to ED were analyzed by an internist in a study of Magdelijns et al. [14], who have found that the most common complications were related to medication (e.g., bleeding while using anticoagulants). There are several studies stating that the administration of medication interfering with blood coagulation is the most common cause of ED-related complications [15–17]. According to our data, anemia and volume depletion were the most common complications among inpatients along with pain and emphysema in male patients, and atrial fibrillation and flutter, epistaxis, and vertigo in female patients.

Nevertheless, our study has some limitations. Firstly, it is a small-scale study including only one university department in Hungary and only for a period of one year. Secondly, as any study using administrative data, potential errors could occur in recording the diagnosis at the ED visits; misclassifications could have happened in some cases. Thirdly, as the clinicians' proper diagnoses were not always available because of missing or not correlating clinical symptoms and laboratory findings, a bias could have occurred in coding. This fact could have led to the high number of codes in the ICD-10 Chapter XVIII (Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified), regarding the two analyzed diagnoses and in terms of complications as well. It is noteworthy to acknowledge that making an exact or final diagnosis is not the criterion of efficacy of an emergency decision. Finally, the retrospective design of the study limited the collection of further variables to compare the groups.

5. CONCLUSION

The DEM, University of Szeged was established as part of the reorganization of inpatient hospital emergency services in Hungary. During the first year of its operation, there were mainly elderly women patients admitted, and the most frequent causes of admission were Diseases of the circulatory system. Our findings are shedding light on the importance of prevention of heart diseases, which are the main causes of death in Hungary; and it can also provide a basis for future comparative research of the emergency care in different regions of our country, as well as

in the long run it can give a view about the preventive efficacy of public health organizations.

CONSENT

It is not applicable.

ETHICAL APPROVAL

The study protocol was approved by the Medical Research Council, Scientific and Research Committee of Hungary (No. 578/2014).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Definition of Emergency Medicine. Revised and approved by the ACEP board of directors June 2015, April 2008, April 2001.
    (Accessed 23 May 2016)
    Available:https://www.acep.org/Clinical---Practice-Management/Definition-of-Emergency-Medicine/#sthash.3PJOcCbS.dpuf
2. Emergency department visits in the US; 2011.
    (Accessed 23 May 2016)
    Available:http://www.cdc.gov/nchs/fastats/emergency-department.html
3. Helliwell PE, Hider PN, Ardagh MW. Frequent attenders at Christchurch Hospital's emergency department. NZ Med J. 2001;114(1129):160-1.
4. Kennedy D, Ardagh M. Frequent attenders at Christchurch Hospital's emergency department: A 4-Year study of attendance patterns. NZ Med J. 2004;117(1193): U871.
5. La Calle E, Rabin E. Frequent users of emergency departments: The myths, the data, and the policy implications. Ann Emerg Med. 2010;56(1):42-8.
6. Sandoval E, Smith S, Walter J, Schuman SA, Olson MP, Striefler R, et al. A comparison of frequent and infrequent visitors to an urban emergency department. J Emerg Med. 2010;38(2): 115-21.
7. Weiss AJ, Wier LM, Stocks C, Blanchard J. Overview of emergency department visits in the United States, 2011: Statistical Brief #174; 2014.

8. New Emergency Department in University of Szeged (in Hungarian); 2014. (Accessed 12 March 2016) Available:http://www.klinikaikozpont.u-szeged.hu/hu/?option=com_content&view=article&id=202:sbo&catid=2:uncategorised

9. Dózsa Cs, Belicza É, Berényi T, Burány B, Engelbrecht I, Mezőfi M, et al. Program about the improvement of the Hungarian emergency services (in Hungarian); 2006.

10. The International conference for the tenth revision of the international classification of diseases. Strengthening of epidemiological and statistical services Unit. World Health Organization Geneva. World Health Statistics Quarterly Rapport Trimestriel de Statistiques Sanitaires Mondiales. 1990; 43(4):204-45.

11. Morganti KG, Bauhoff S, Blanchard JC, Abir M, Iyer N, Smith A, et al. The evolving role of emergency departments in the United States. RAND RR 280-ACEP; 2013.

12. Pines JM, Mutter RL, Zocchi MS. Variation in emergency department admission rates across the United States. Med Care Res Rev. 2013;70(2):218-31.

13. Centre HaSCI. Accident and emergency attendances in England—2012–13; 2014. (Accessed: 12 March 2016) Available:http://www.hscic.gov.uk/searchcatalogue?productid=14120&q=Accident+and+Emergency+Attendances+in+England+&sort=Relevance&size=100&page=1#top

14. Magdelijns FJ, Gulikers D, Pijpers E, Koopmans RP, Stassen PM. Registering complications at admission via the emergency department: An opportunity for improvement. Neth J Med. 2013;71(1): 44-9.

15. Schneeweiss S, Hasford J, Gottler M, Hoffmann A, Riethling AK, Avorn J. Admissions caused by adverse drug events to internal medicine and emergency departments in hospitals: A longitudinal population-based study. Eur J Clin Pharmacol. 2002;58(4):285-91.

16. van der Hooft CS, Sturkenboom MC, Van Grootheest K, Kingma HJ, Stricker BH. Adverse drug reaction-related hospitalisations: A nationwide study in The Netherlands. Drug Saf. 2006;29(2): 161-8.

17. Brvar M, Fokter N, Bunc M, Mozina M. The frequency of adverse drug reaction related admissions according to method of detection, admission urgency and medical department specialty. BMC Clin Pharmacol. 2009;9:8.

APPENDIX

Table 2. Sample distribution according to the 5 most frequent diseases that served as a basis for the principal diagnosis necessitating admission to medical care (I) and transfer to another health care unit (II), and complications (III) in men by age groups

	Age groups (years)											
	20–29		**30–39**		**40–49**		**50–59**		**60–69**		**Over 70**	
	Diagnosis	**N=62 N (%)**	**Diagnosis**	**N=75 N (%)**	**Diagnosis**	**N=91 N (%)**	**Diagnosis**	**N=160 N (%)**	**Diagnosis**	**N=223 N (%)**	**Diagnosis**	**N=468 N (%)**
I	Hyperglycemia	9(14.5)	Chest pain of unknown origin	10(13.3)	Chest pain of unknown origin	18(19.8)	Chest pain of unknown origin	28(17.5)	Chest pain of unknown origin	31(13.9)	Chest pain of unknown origin	88(18.8)
	Hypertensive crisis	8(12.9)	Hyperglycemia	8(10.7)	Hyperglycemia	12(13.2)	Hyperglycemia	16(10.0)	Hyperglycemia	22(9.9)	Hyperglycemia	51(10.9)
	Chest pain of unknown origin	7(11.3)	Pain in the lower abdomen	6(8.0)	Syncope	5(5.5)	Hypertensive crisis	9(5.6)	Volume depletion	13(5.8)	Alcohol abuse	22(4.7)
	Syncope	4(6.5)	Atrial fibrillation and flutter	5(6.7)	Alcohol abuse	4(4.4)	Alcohol abuse	7(4.4)	Hypertensive crisis	13(5.8)	Epilepsy	21(4.5)
	Septicemia	2(3.2)	Primary hypertension	4(5.3)	Epilepsy	3(3.3)	Pain in the lower abdomen	6(3.8)	Syncope	12(5.5)	Pain in the lower abdomen	18(3.8)
	Diagnosis	**N=7 N (%)**	**Diagnosis**	**N=9 N (%)**	**Diagnosis**	**N=3 N (%)**	**Diagnosis**	**N=24 N (%)**	**Diagnosis**	**N=26 N (%)**	**Diagnosis**	**N=63 N (%)**
II	Decrease in body fluids	2(28.6)	Acute pancreatitis	2 (22.2)	Septicemia	1(33.3)	Septicemia	3(12.5)	Septicemia	3(11.5)	Decrease in the body fluids	7(11.1)
	NIDDM	1(14.3)	Septicemia	1(11.1)	AMI	1(33.3)	Atrial fibrillation and flutter	2(8.3)	Volume depletion	3(11.5)	Congestive heart failure	5(7.9)
	AMI	1(14.3)	Volume depletion	1(11.1)	Cholangitis	1(33.3)	Anemia	2(8.3)	Acute gastroenteritis	2(7.7)	Epilepsy	4(6.3)
	COPD	1(14.3)	Congestive heart failure	1(11.1)	-	-	Bleeding in the GI tract	2(8.3)	Fever	2(7.7)	Septicemia	3(4.8)
	Ileus paralytica	1(14.3)	Syncope	1(11.1)	-	-	Disorientation	1(4.2)	Hypertensive crisis	2(7.7)	Chest pain of unknown origin	3(4.8)
	Diagnosis	**N=8 N (%)**	**Diagnosis**	**N=8 N (%)**	**Diagnosis**	**N=4 N (%)**	**Diagnosis**	**N=13 N (%)**	**Diagnosis**	**N=9 N (%)**	**Diagnosis**	**N=20 N (%)**
III	Anemia	1(12.5)	Anemia	1(12.5)	Emphysema	1(25.0)	Pain	2(15.4)	Metastasis in liver	1(11.1)	Acute alcohol intoxication	2(10.0)

	Diagnosis	N=8 N (%)	Diagnosis	N=8 N (%)	Diagnosis	N=4 N (%)	Diagnosis	N=13 N (%)	Diagnosis	N=9 N (%)	Diagnosis	N=20 N (%)
III	Alcohol withdrawal syndrome	1(12.5)	Mitral regurgitation	1(12.5)	Ascites	1(25.0)	Anemia	1(7.7)	Metastasis in bones	1(11.1)	Vomiting	2(10.0)
	Cardiac arrest	1(12.5)	COPD with acute symptoms	1(12.5)	Vertigo	1(25.0)	Polyneuropathy in DM	1(7.7)	Anemia due to acute bleeding	1(11.1)	Disorientation	2(10.0)
	Dyspnea	1(12.5)	Alcoholic gastritis	1(12.5)	Hyperglycemia	1(25.0)	Fever	1(7.7)	Discitis	1(11.1)	Erysipelas	1(5.0)
	Abnormal renal function	1(12.5)	Epistaxis	1(12.5)	-	-	Shock	1(7.7)	Contusion of the cranium	1(11.1)	Volume depletion	1(5.0)

AMI = Acute myocardial infarction, COPD = Chronic obstructive pulmonary disease, DM = Diabetes mellitus, GI = Gastrointestinal, NIDDM = Non-insulin-dependent diabetes mellitus

Table 3. Sample distribution according to the 5 most frequent diseases that served as a basis for the principal diagnoses necessitating admission to medical care (I) and transfer to another health care unit (II), and complications (III) in women by age group

	Age groups (years)											
	20–29		30–39		40–49		50–59		60–69		Over 70	
	Diagnosis	N=97 N (%)	Diagnosis	N=90 N (%)	Diagnosis	N=108 N (%)	Diagnosis	N=167 N (%)	Diagnosis	N=268 N (%)	Diagnosis	N=535 N (%)
I	Chest pain of unknown origin	14(14.4)	Chest pain of unknown origin	17(18.9)	Chest pain of unknown origin	20(18.5)	Chest pain of unknown origin	26(15.6)	Chest pain of unknown origin	39(14.6)	Chest pain of unknown origin	90(16.9)
	Hypertensive crisis	11(11.3)	Hypertensive crisis	11(12.2)	Hypertensive crisis	15(13.9)	Hypertensive crisis	24(14.4)	Hypertensive crisis	36(13.4)	Hypertensive crisis	41(7.7)
	Syncope	10(10.3)	Primary hypertension	11(12.2)	Pain in the lower abdomen	7(6.5)	Syncope	14(8.4)	Volume depletion	17(6.3)	Volume depletion	40(7.5)
	Pain in the lower abdomen	7(7.2)	Alcohol abuse	4(4.4)	Atrial fibrillation and flutter	6(5.6)	Pain in the lower abdomen	10(6.0)	Pain in the lower abdomen	12(4.5)	Pain in the lower abdomen	37(6.9)
	Primary hypertension	5(5.2)	Pain in the lower abdomen	4(4.4)	Primary hypertension	5(4.6)	Atrial Fibrillation and flutter	7(4.2)	Syncope	12(4.5)	Syncope	21(3.9)

	Diagnosis	N=11 N (%)	Diagnosis	N=8 N (%)	Diagnosis	N=10 N (%)	Diagnosis	N=26 N (%)	Diagnosis	N=42 N (%)	Diagnosis	N=71 N (%)
II	Chest pain of unknown origin	2(18.2)	Acute gastroenteritis	1 (12.5)	Congestive heart failure	2(20.0)	Volume depletion	4(15.4)	Chest pain of unknown origin	5(11.9)	Volume depletion	12(16.9)
	Volume depletion	1(9.1)	AMI	1 (12.5)	Volume depletion	1(10.0)	Septicemia	3(11.5)	Decrease in body fluids	4(9.5)	Septicemia	5(7.0)
	Stroke	1(9.1)	Melena	1 (12.5)	Viral pneumonia	1(10.0)	Chest pain of unknown origin	2(7.7)	Hypertensive crisis	3(7.1)	Acute bronchitis	5(7.0)
	COPD with acute symptoms	1(9.1)	Myelopathy	1 (12.5)	Dermatomyositis	1(10.0)	St. epilepticus	1(3.8)	Hyperglycemia	2(4.8)	Chest pain of unknown origin	5(7.0)
	Syncope	1(9.1)	Fracture of the femur	1 (12.5)	Hemoptysis	1(10.0)	Acute bronchitis	1(3.8)	Urinary tract infection	2(4.8)	Gastro-enteritis	4(5.6)
	Diagnosis	N=9 N (%)	Diagnosis	N=6 N (%)	Diagnosis	N=5 N (%)	Diagnosis	N=7 N (%)	Diagnosis	N=13 N (%)	Diagnosis	N=39 N (%)
III	Vertigo	2(22.2)	Atrial fibrillation and flutter	1(16.7)	Epistaxis	2(40.0)	Anemia	1(14.3)	Gastroenteritis	1(7.7)	Volume depletion	4(10.3)
	Atrial fibrillation and flutter	1(11.1)	Congestive heart failure	1(16.7)	Metastasis of the bones	1(20.0)	Volume depletion	1(14.3)	Anemia	1(7.7)	Anemia	3(7.7)
	Cardiac decompensation	1(11.1)	Dyspnea	1(16.7)	Volume depletion	1(20.0)	Dyspnea	1(14.3)	Acute bronchitis	1(7.7)	Acute respiratory failure	2(5.1)
	Fever	1(11.1)	Chest pain of unknown origin	1(16.7)	Congestive heart failure	1(20.0)	Vomiting	1(14.3)	Constipation	1(7.7)	Abdominal pain of unknown origin	2(5.1)
	Headache	1(11.1)	Syncope	1(16.7)	-	-	Contusion of the chest	1(14.3)	Dyspnea	1(7.7)	Hyper-glycemia	2(5.1)

AMI = Acute myocardial infarction, COPD = Chronic obstructive pulmonary disease, St = Status

---

Peer-review history:
The peer review history for this paper can be accessed here:
http://sciencedomain.org/review-history/19409