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The cost analysis and the assessment of intoxicated patients in the Emergency Unit of the Child Jesus Clinical Hospital in Warsaw in 2013

Analiza kosztów a ocena pacjentów w stanie nietrzeźwości w Szpitalnym Oddziale Ratunkowym Szpitala Klinicznego Dzieciątka Jezus w Warszawie w 2013 roku

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alcohol, patient, accident and emergency department, medical procedure

Słowa kluczowe

alkohol, pacjent, szpitalny oddział ratunkowy, procedura medyczna

Conflict of interest

Konflikt interesów

None
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Summary

Introduction. Intoxicated patients are the major diagnostic challenge both in pre-hospital and in-hospital environment. They are also a serious cost burden for the healthcare system due to the necessity of performing the highly specialized diagnostic procedures, including computer tomography.

Aim. The aim of our study was the assessment of intoxicated patients who were treated in the Emergency Unit of Child Jesus Clinical Hospital in Warsaw in 2013.

Material and methods. The study was based on the medical records of 519 intoxicated patients who were treated in the Emergency Unit of the hospital. The study included: sociodemographic status, the Glasgow Coma Scale (GCS) score, sustained injuries and the per capita cost analysis for an intoxicated patients.

Results. Statistical analysis showed a correlation between blood alcohol content and GCS scoring ($R = -0.339$, $P < 0.001$). 45.9% of intoxicated patients did not have health insurance. People who did not have health insurance had statistically significant higher levels of blood alcohol content than those who had insurance (2.57 ± 1.07 vs. 2.97 ± 1.16 ‰, $P < 0.001$). The most common diagnosis, among intoxicated people who were treated in the hospital's Emergency Unit, included blunt head trauma (30.8%), alcohol poisoning (22.7%), and cut wounds of the head (17.2%).

Conclusions. Head trauma is the most common diagnosis found in intoxicated patients who are treated in the hospital's Emergency Unit, requiring costly diagnostic procedures and therefore generating the highest costs for the ward.

Streszczenie

Wstęp. Pacjent pod wpływem alkoholu stanowi duże wyzwanie diagnostyczne zarówno w warunkach przedszpitalnych, jak i szpitalnych. Jest również dużym obciążeniem dla systemu ochrony zdrowia z uwagi na konieczność wykonywania wysokospecjalistycznych procedur diagnozowania, w tym tomografii komputerowej.

Cel pracy. Celem pracy była ocena pacjentów pod wpływem alkoholu leczonych w Szpitalnym Oddziale Ratunkowym Szpitala Klinicznego Dzieciątka Jezus w Warszawie w 2013 roku.

Materiał i metody. Badanie przeprowadzono na podstawie analizy dokumentacji medycznej 519 pacjentów leczonych w ramach SOR-u, którzy byli pod wpływem alkoholu. W badaniu uwzględniono: dane socjodemograficzne, skalę GCS, doznane urazy oraz dokonano analizy kosztów leczenia pacjentów będących w stanie nietrzeźwości *per capita*.

Wyniki. Analiza statystyczna wykazała korelację pomiędzy stężeniem alkoholu a skalą świadomości Glasgow ($R = -0.339$, $P < 0,001$). 45,9% pacjentów pod wpływem alkoholu nie posiadało ubezpieczenia zdrowotnego. Osoby nieposiadające ubezpieczenia zdrowotnego miały istotnie statystycznie wyższe poziomy stężenia alkoholu aniżeli osoby posiadające ubezpieczenie ($2,57 \pm 1,07$ vs. $2,97 \pm 1,16$ ‰; $P < 0,001$). Najczęstszymi rozpoznaniem u osób będących pod wpływem alkoholo-

lu leczonych w ramach SOR-u były: tępe urazy głowy (30,8%), zatrucie alkoholem (22,7%) oraz rany cięte głowy (17,2%).

Wnioski. Urazy głowy to najczęstsze rozpoznanie stwierdzone u pacjentów pod wpływem alkoholu leczonych w ramach SOR-u, wymagające kosztownych procedur diagnostycznych i generujące najwyższe koszty dla oddziału.

INTRODUCTION

Each year, intoxicated patients are admitted to the emergency units (EU) in Poland. For most of them this is a one-time situation, however there is also a group of patients for whom it is an established part of life (1, 2). These patients most often are brought in by Medical Rescue Teams, who are dispatched to a patient under the influence of alcohol or other drugs (3, 4). In Poland, there is still a lack of clear legal regulations that would comprehensively describe the rules of hospitalization of intoxicated people. The hospital and mostly all of the Emergency Department personnel (mainly an admitting doctor) cannot refuse hospitalization of an intoxicated person, who is brought in by the police or the Medical Rescue Team, until they carry out a basic diagnosis which will allow for ruling out the immediate life threatening condition of said person. Personnel and people who work in the hospitals are more and more often becoming victims of aggression while performing examination of this kind of special patient (5). Knowing that the patient is drunk with alcohol does not release the personnel from the proper examination of the patient, carrying out the tests or the necessary diagnosis and obliges to pay special attention, because especially in mental disorders, it is difficult to unambiguously assess whether there is an underlying mental illness requiring hospitalization or the behavior is the result of excessive alcohol consumption (6, 7). It should also be noted that, when a patient is admitted in the EU, the doctor or the coordinator of the triage may decide on the use of so-called "use of force", which means that such patients might be hospitalized without their consent. This regulation applies to the people who pose a threat to themselves, others or public safety, violently damage objects in their surroundings or interrupt with the functioning of the hospital (8, 9). When an intoxicated person shows such symptoms, the doctor should not only decide to not refuse the admission, but first and foremost should determine whether these symptoms are the result of a mental illness or abuse of alcohol alone (6, 10). Acting according to the rules of examination and diagnosis of the patient will ensure his safety, however we cannot forget about ensuring the safety of the personnel who works in the hospital (11). The number of intoxicated patients who are admitted to EU is growing and changes depending on the place and days of the week. The majority of alcohol intoxicated patients are treated within EU around the weekend

days and in the large cities. Intoxicated patients account for over 10% of all patients admitted to the EU.

AIM

The aim of our study was the assessment of intoxicated patients who were treated in the Emergency Unit of Child Jesus Clinical Hospital in Warsaw in 2013.

MATERIAL AND METHODS

This study was based on the retrospective analysis of medical records of the patients who were admitted to the EU of the Child Jesus Clinical Hospital in Warsaw. After gaining the approval of ethics board of Warsaw Medical University and the approval of the Hospital Management the analysis of intoxicated patients, who were admitted to the EU of this hospital from 1st January 2013 until 31st December 2013, was performed.

We assessed the following variables: sex, age, hour and day of the admission to the EU, reason for hospitalization, degree and level of injuries, mechanism of injury, comparison of Glasgow Coma Scale based on the records from Medical Rescue Teams as well as further procedures with the patient. Additionally, an analysis of the costs of treatment of intoxicated patients per capita was performed.

RESULTS

The characteristics of the study group

The study included 624 intoxicated patients who received treatment in the EU. Among women the largest group was aged 17-30, which amounted for 48.51%. For men the largest group was in the age of 31-51, which amounted for 49.16%.

There was a statistically significant correlation between the amount of alcohol in the body and the GCS score ($R = -0.339$; $P < 0.001$) (fig. 1). There were no statistically significant differences between amount of alcohol and occurrence of injuries (2.77 ± 1.28 vs. $2.75 \pm 1.03\%$; $P = 0.768$) (fig. 2). The study revealed a high statistical significance between a probability of traumatic patient and blood alcohol content. Among the traumatic men, 36.94% were people whose blood alcohol content was between two and three promil. The non-traumatic patients with the same amount blood alcohol content accounted for 25.81%. The blood alcohol content ranging from three and four promil accounted for 32.8% of non-traumatic patients and 23.83% of traumatic patients. The total number of trauma patients is 333 and not-traumatic is 186. Among women, the results are evenly distributed and do not show statistically significant variability. Among the

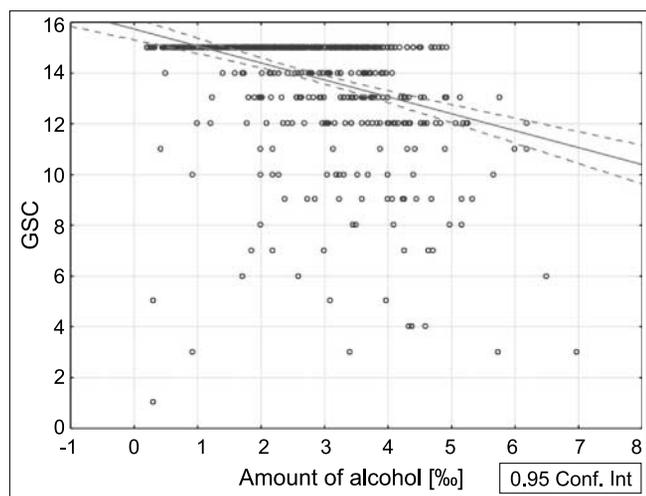


Fig. 1. Simple linear regression analysis (Pearson) between GCS and amount of alcohol

most common diagnoses within analyzed patients were: blunt head trauma (30.8%), alcohol poisoning (22.7%), cut wounds of the head (17.2%). A detailed list of diagnoses within the analyzed group is shown in figure 3.

In the analyzed group of patients, no statistically significant differences were found between a GCS score and occurrence of injuries (14 ± 2 vs. 14 ± 2 ; $P = 0.939$) (fig. 4). A vast majority of patients without insurance are found in the age group of 31-55. 52.36% of all uninsured patients are found in this age group.

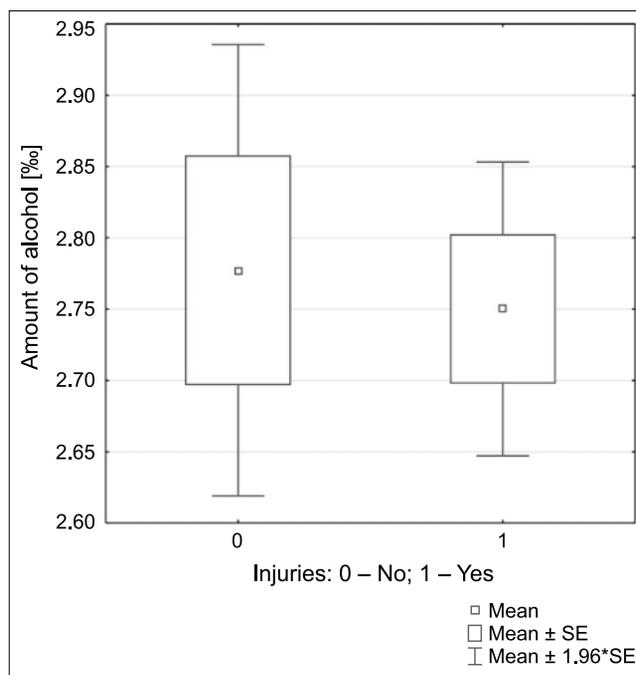


Fig. 2. Univariate comparison of amount of alcohol and the occurrence of injuries

Among men the age group 31-55 was the largest and amounted for around 50% of all men.

There were statistically significant differences between amount of alcohol in the body and having insurance (2.57 ± 1.07 vs. $2.97 \pm 1.16\%$; $P < 0.001$) (fig. 5).

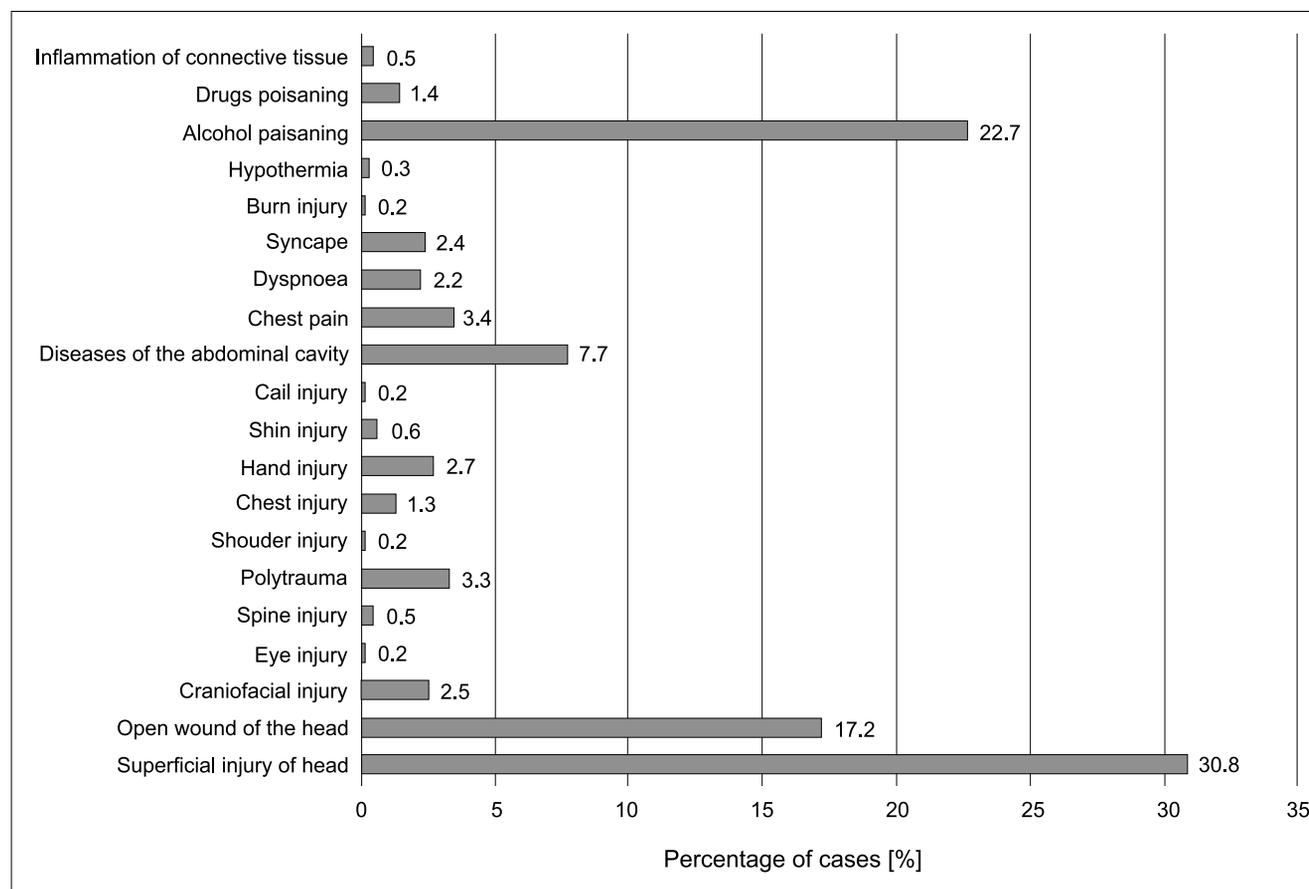


Fig. 3. Characteristics of diagnoses

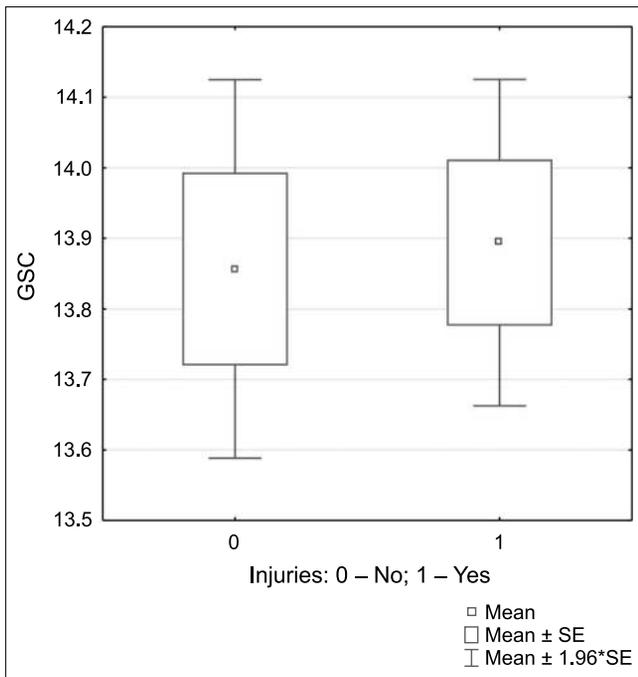


Fig. 4. Univariate comparison of GCS and the occurrence of injuries

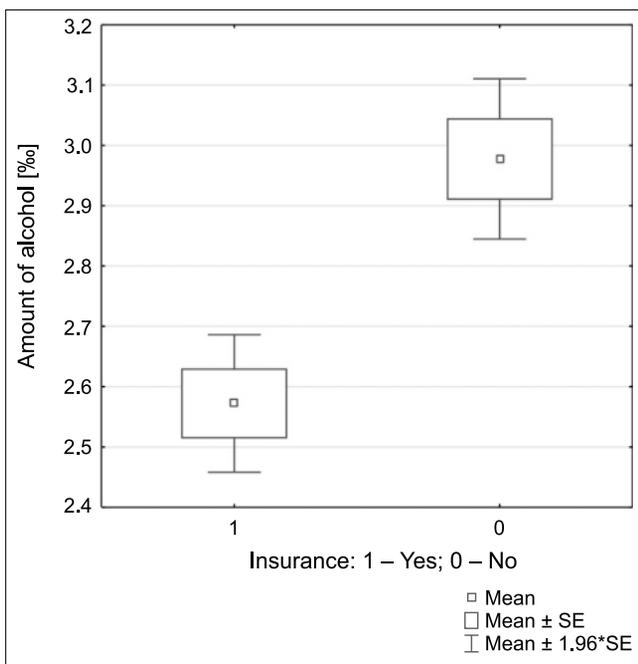


Fig. 5. Univariate comparison of amount of alcohol and the insurance

There was a statistically significant correlation between age and blood alcohol content ($R = 0.145$; $P < 0.001$) (fig. 6). The correlation between blood alcohol content and age has been presented in a compartmentalized way and was divided in three age groups. The blood alcohol content was divided and presented in five intervals. Among men in the 3-4 promil range there were 85 people aged 31-55 who constituted for 36.48% of this age group. Another interval of this age group is 2-3 promil, which includes 59 patients and amounts for 25.32% in this age group. The highest

number in the 17-30 age group falls for the 2-3 promil range and includes 64 patients, which translates to 47.76% within this age group. Among women, the largest group is in the age of 17-30. Within the group of 1-2 promil blood alcohol content it is 16 people, which amounts for 32.65% of this age group. In the group with blood alcohol content of 2-3 promil we found 22 people, which translate to 44.9% of this age group (tab. 1).

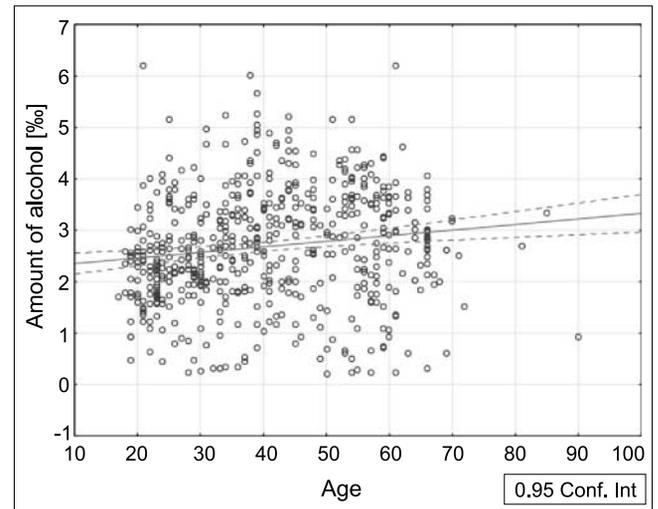


Fig. 6. Simple linear regression analysis (Pearson) between age and amount of alcohol

Tab. 1. Dependence between age, sex and alcohol concentrations in study group

Age	Alcohol concentration					
	0-1	1-2	2-3	3-4	4-5	> 5
Men						
17-30	7 5.22%	36 26.87%	64 47.76%	22 16.42%	4 2.99%	1 0.75%
31-55	16 6.87%	36 15.54%	59 25.32%	85 36.48%	31 13.30%	6 2.58%
55-90	10 9.35%	16 14.95%	36 33.64%	35 32.71%	9 8.41%	1 0.93%
Women						
17-30	4 8.16%	16 32.65%	22 44.90%	6 12.24%	-	1 2.04%
31-55	4 11.11%	7 19.44%	10 27.78%	10 27.78%	4 11.11%	1 2.78%
55-90	-	3 18.75%	6 37.50%	7 43.75%	-	-

The cost of treatment of intoxicated patients

Among the men, the youngest patient was 17, while the oldest was 90. The average age of men in the analyzed sample is 42 years. The average duration of men's stay in the EU was 5.4 hours, with the minimum time of 12 minutes and the maximum time of 23.9 hours. The average fee for imaging diagnostics was 326.5 PLN. The average blood alcohol content in men was 2.8‰ with minimum 0.22‰ and maximum 7‰. The average age of women in the study group was 36 years and the average duration

of stay in the EU was 5 hours. The average blood alcohol content in women was 2.4‰. The average fee for the procedures was 263.4 PLN with the maximum fee of 1257 PLN and the average overall fee of 593.4 PLN.

The average fee for blood tests was 51 PLN with the minimum of 14 PLN and the maximum of 330 PLN. The average fee for the procedures was 294.5 PLN with the maximum of 1218 PLN. The average fee for drugs was 7.3 PLN with the maximum of 161.33 PLN. The average fee for supplies was 9 PLN with the minimum of 1.91 PLN and the maximum of 93 PLN. In summary, the average overall fee was 688.4 PLN with the minimum fee of 141.56 PLN and the maximum fee of 2274 PLN (tab. 2). As the duration of stay prolonged the blood tests cost increased with it. The rest of the results were not statistically significant. The total cost of treatment of intoxicated patients in the analyzed period amounted to over 420,000 PLN (tab. 3).

Patients diagnosed with a surface head trauma cost 168 thousand PLN (fig. 7). The patients with open wound of the head cost 93.5 thousand PLN. Alcohol poisoning which was diagnosed in 22.66% of the patient cost 57.2 thousand PLN. Patients with multi-trauma cost 23.2 thousand PLN. The patients with abdominal diseases cost 22.2 thousand PLN. The average cost per patient depending on the diagnosis ranged from 141.6 PLN to 1225.4 PLN. The smallest cost per capita was generated by patients who had a diagnosis of eye injury. They cost on average 141.6 PLN. A group of pa-

Tab. 2. Characteristics of medical procedures among study group

Parameter	Mean	Min.	Max.
Age	42	17	90
Time of hospitalization	5.4	0.2	23.9
The amount of promil	2.8	0.22	7
The fee for the diagnosis imaging	326.5	0	1092
Fee for blood tests	51	14	330
Fee for the procedure	294.5	0	1218
Fee for the medicaments	7.3	0	161.33
Fee for materials	9	1.91	93
Fee totality	688.4	141.56	2274

Tab. 3. Fees total for all respondents

	Men	Women	Total
The fee for the diagnosis imaging	102 047 PLN	98 165 PLN	200 212 PLN
Fee for blood tests	17 441 PLN	14 893 PLN	32 334 PLN
Fee for the procedure	96 200 PLN	88 517 PLN	184 357 PLN
Fee for the medicaments	2425 PLN	2189.8 PLN	4615.5 PLN
Fee for materials	2964.1 PLN	2691.3 PLN	5117 PLN
Fee totality	221 077.8 PLN	206 096 PLN	427 173.8 PLN

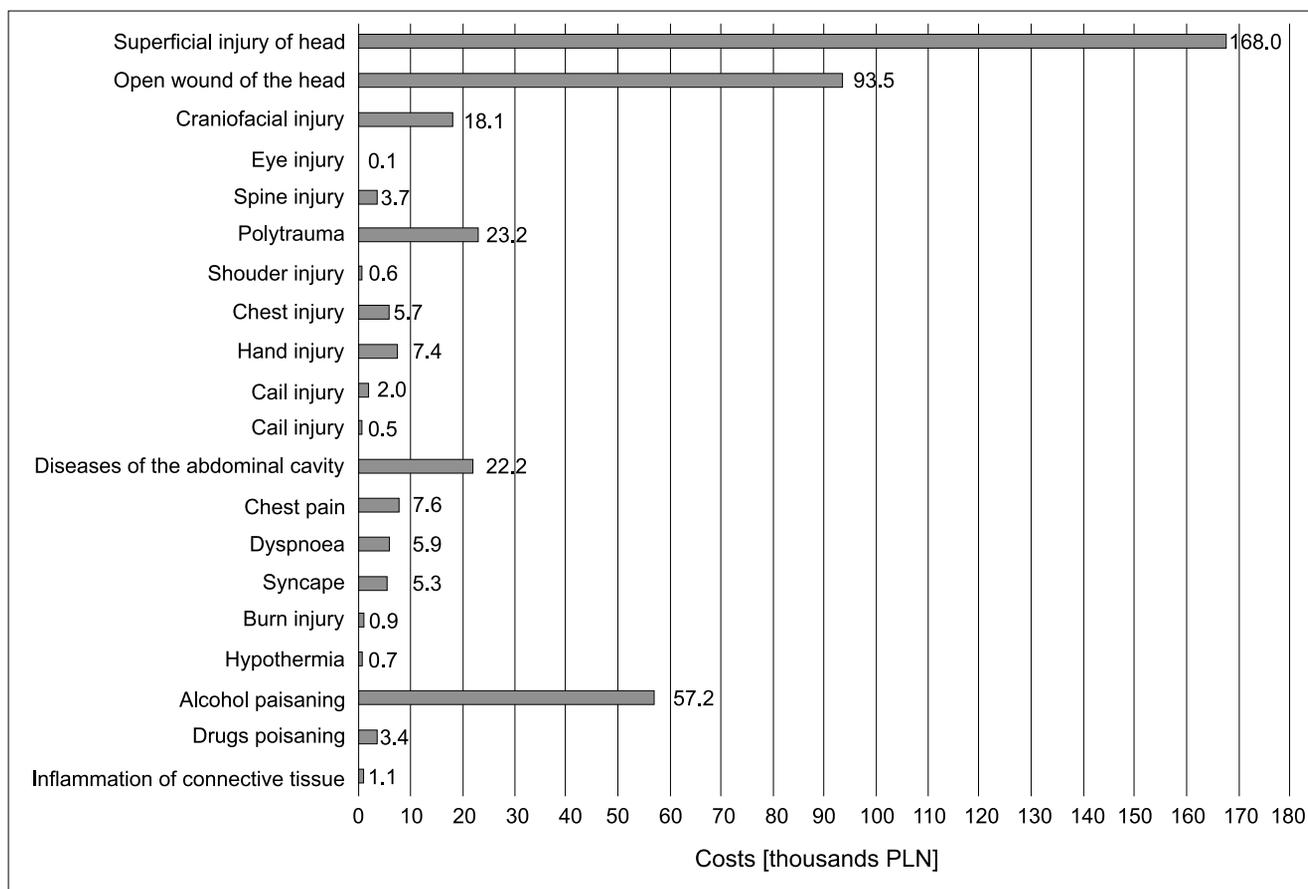


Fig. 7. Characterization of treatment costs

tients with average cost of treatment above 1,000 PLN included those who were diagnosed with craniofacial trauma, spinal injury, and multi-trauma. Patients who represented injuries that amounted for the two largest groups were: patients with superficial head trauma and patients with an open head wound who cost an average of 852.6 PLN and 849.7 PLN, respectively. Patients who represented the third largest group of diagnoses were diagnosed with alcohol poisoning, which on average cost 394.5 PLN.

DISCUSSION

Similarly, to other Eastern European countries, Poland is a place where the problem of excessive alcohol consumption is the reason for numerous interventions of Medical Rescue Teams, as well as the treatment and diagnosis of patients in the hospital EU (12). In the last two decades in Poland, there has been a trend of closing the sobering-up chambers or to limit their functioning, which undoubtedly resulted into an increase of this group of patients who are now treated by the emergency medicine. A recent meta-analysis performed by Di Castelnuovo et al. linked light ethanol consumption to a dose-dependent increase in lifespan (13, 14). In the authorial study the men amounted for the majority of patients. This trend was also found by other authors (15). United States Centers for Disease Control and Prevention indicated that in 2010 over 80,000 deaths occur annually in the U.S. as a consequence of excessive alcohol use with an estimated cost to the U.S. economy of 249 billion USD (16).

The intoxicated patient is often a diagnostic challenge. In the conducted study, the authors were assessing the awareness with the Glasgow Coma Scale (17), however in the intoxicated patients this tool is unreliable due to the effects of alcohol on the body as well as the potential impairment of cognitive functions (18). Therefore, it is reasonable to use this scale only when assessing the sober patients (19).

In the authorial study, the main diagnoses in the analyzed sample of patients were: blunt head trauma (30.8%), alcohol poisoning (22.7%) and cut wound of the head (17.2%). In study conducted by Szarpak and Madziala in pre-hospital conditions patients with a head injury accounted for 35% of all trauma patients (20). When there is a suspicion of head injury in intoxicated patient an extended diagnostic is required, including computer tomography (20). It is the patients with head injuries, that immediately after patients with multi-organ injuries, generate the largest cost and are the biggest burden for the healthcare system. The confirmation of aforementioned results are found in the study by Gómez-Restrepo et al., who found that alcohol is identified as a possible factor associated with the increased use of direct health care resources (21). Additionally, in another study analyzing the Columbian population Gómez-Restrepo et al. indicated that alcohol consumption increases the risk of traffic accidents as well as increase direct medical health costs (22).

The conducted study has its limitations. The main limitation is that the analyzed sample was collected from one EU and we have not conducted a population study. The second limitation is the one-year timeframe. However, the conducted study aims to indicate the issues regarding the medical treatment of the intoxicated patients and is a starting point for further studies regarding this group of patients.

CONCLUSIONS

In summary, the issues, regarding diagnosis in intoxicated patients, remain a challenge for medical personnel. The head traumas are the most common diagnosis among intoxicated patients who are treated within EU, which further require costly diagnostic procedures which generate the highest costs for the department.

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