

EPIDEMIOLOGY OF ACUTE POISONINGS DURING 2003–2007 IN TOXICOLOGY UNIT, DEPARTMENT OF OCCUPATIONAL MEDICINE AND TOXICOLOGY, NOFER INSTITUTE OF OCCUPATIONAL MEDICINE, ŁÓDŹ, POLAND

ANNA KRAKOWIAK¹, MAŁGORZATA KOTWICA², KONRAD ŚLIWKIEWICZ¹,
and ANNA PIEKARSKA-WIJATKOWSKA²

¹ Nofer Institute of Occupational Medicine, Łódź, Poland

Toxicology Unit, Department of Occupational Diseases and Toxicology

² Nofer Institute of Occupational Medicine, Łódź, Poland

National Poison Information Centre

Abstract

Objectives: The epidemiology of acute poisonings, observed in Toxicology Unit in Łódź, is the main objective of the study. The authors present frequency of respective kinds of poisoning cases and associated mortality. They discuss also the structure of poisonings with regard to type and causative agents over a period between 2003 and 2007. **Materials and methods:** The data used for the analysis were obtained from National Poison Information Center in Łódź. They were divided into two groups. The first one comprised information about patients treated at the Toxicology Unit (TU), whereas the other one included cases treated in other hospitals and only consulted by TU staff. **Results:** Analysis of the data shows that overdose of medications was the most frequent cause of hospitalization during 2006–2007. It constituted also the leading cause of deaths due to poisoning during 2003–2005. However, it was superseded during the subsequent period of 2006–2007 by intoxication with alcohols which was associated with the highest number of deaths in the latter period. Situation changed dynamically also with regard to the intention of poisoning. Suicidal poisonings constituted the largest group in 2003, whereas poisonings caused by abuse, including dependence-related abuse, were the most frequent in subsequent years. Patients between 15 and 30 years old formed the largest group among the total number of poisonings. **Conclusions:** The results of our study on epidemiology of acute poisoning in Łódź between 2003–2007 show that poisoning is a frequent cause of admission to hospital and constitutes a major health problem in Łódź district because of large number of hospital admissions, associated mortality and the high proportion of patients at young age.

Key words:

Poisonings, Epidemiology, Statistics, Łódź, Poland

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Address reprint request to A. Krakowiak, Toxicology Unit, Department of Occupational Diseases and Toxicology, Nofer Institute of Occupational Medicine, św. Teresy 8, 91-348 Łódź, Poland (e-mail: annakrak@imp.lodz.pl).

INTRODUCTION

Poisonings are responsible for a significant part of hospital admissions and therefore, but also due to associated mortality and their high prevalence in the population of young people, they are considered to be a major health problem. Results of other epidemiologic studies show that problem clearly.

Poisonings only accounted for 924 626 Emergency department (ED) admissions in USA during 2006 [1]. Brvar et al. revealed that the percentage of patients treated in ED due to intentional medication overdosage was as high as 1.3% (13/1000) [2]. A study carried out in Oslo in 1980 showed that incidence of hospitalizations caused by self-poisonings was 280 per 1 000 000 [3]. Authors from Milan Poison Control Center, which handles about 60% of enquiries in the area of human intoxications from Italy, registered 42 483 new cases of human exposure to poisons in 2005 [4]. Eighty three per cent of poisonings reported in this study was caused by pharmaceuticals and 14% by non pharmaceuticals. Important

finding in this report is the significant proportion of suicidal attempts that reached 19% of total cases.

The present study presents epidemiology of acute poisonings during 2003–2007 in Łódź. The authors show the frequency of poisonings and their distribution with reference to particular groups of toxic agents, patients' gender and age.

MATERIALS AND METHODS

This work is based on the statistical data gathered by staff of National Poison Information Center (NPIC) during 2003–2007. The data may be classified into two categories. The first category applies to patients treated at the Toxicology Unit (TU), whereas the other one refers to TU staff-consulted cases treated in other hospitals without dedicated toxicology units.

RESULTS

The number of patients treated in TU showed a rising tendency during first three years of the reported

Table 1. Statistical data, Łódź, 2003

Toxic factor	Deaths (n)	Consulted patients (n)	Patients treated in TU (n)	Total (n)
Medications	5	353	1 158	1 511
Pesticides	–	93	6	99
Alcohols	1	38	488	526
Glycols	–	8	13	21
Gases (including CO)	1	24 (14)	155 (138)	179 (152)
Drugs of abuse	–	22	123	145
Solvents	–	70	29	99
Corrosives	–	67	27	94
Detergents	–	12	2	14
Metals	–	12	–	12
Mushrooms (including <i>Amanita phalloides</i>)	–	19 (3)	13	32 (3)
Toxic plants	–	10	1	11
Venoms	–	2	2	4
Others	2	38	8	46
Unknown	–	–	131	131
Suspicion of poisoning	–	44	–	44
Poisoning ruled out	–	3	76	79
Total	9	815	2 232	3 047

Table 2. Statistical data, Łódź, 2004

Toxic factor	Deaths (n)	Consulted patients (n)	Patients treated in TU (n)	Total (n)
Medications	8	262	1 174	1 436
Pesticides	–	56	3	59
Alcohols	1	29	613	642
Glycols	2	13	16	29
Gases (including CO)	2 (2)	17 (8)	189 (184)	206 (192)
Drugs of abuse	–	15	133	148
Solvents	–	37	23	60
Corrosives	1	45	19	64
Detergents	–	4	–	4
Metals	–	3	8	11
Mushrooms (including <i>Amanita phalloides</i>)	–	26 (2)	11	37 (2)
Toxic plants	–	10	–	10
Venoms	–	6	2	8
Others	–	25	5	30
Unknown	–	–	131	131
Suspicion of poisoning	–	43	–	43
Poisoning ruled out	–	–	43	43
Total	14	591	2 370	2 961

Table 3. Statistical data, Łódź, 2005

Toxic factor	Deaths (n)	Consulted patients (n)	Patients treated in TU (n)	Total (n)
Medications	4	298	1 205	1 503
Pesticides	–	83	7	90
Alcohols	1	52	870	922
Glycols	1	7	14	21
Gases (including CO)	–	19 (10)	174 (171)	193 (181)
Drugs of abuse	–	22	138	160
Solvents	–	49	20	69
Corrosives	–	57	10	67
Detergents	–	4	3	7
Metals	–	10	1	11
Mushrooms (including <i>Amanita phalloides</i>)	–	14 (3)	17	31 (3)
Toxic plants	–	4	–	4
Venoms	–	2	–	2
Others	–	34	11	45
Unknown	–	–	160	160
Suspicion of poisoning	–	61	–	61
Poisoning ruled out	–	5	24	29
Total	6	721	2 654	3 375

Table 4. Statistical data, Łódź, 2006

Toxic factor	Deaths (n)	Consulted patients (n)	Patients treated in TU (n)	Total (n)
Medications	6	268	943	1 211
Pesticides	1	68	5	73
Alcohols	8	54	523	577
Glycols	1	14	12	26
Gases (including CO)	–	18 (14)	177 (173)	195
Drugs of abuse	1	10	83	93
Solvents	–	43	19	62
Corrosives	–	56	21	77
Detergents	–	3	2	5
Metals	–	3	–	3
Mushrooms (including <i>Amanita phalloides</i>)	–	32 (1)	35 (1)	67
Toxic plants	–	4	–	4
Venoms	–	3	4	7
Others	–	18	9	27
Unknown	–	–	53	53
Suspicion of poisoning	–	50	–	50
Poisoning ruled out	–	2	3	5
Total	17	646	1 889	2 535

Table 5. Statistical data, Łódź, 2007

Toxic factor	Deaths (n)	Consulted patients (n)	Patients treated in TU (n)	Total (n)
Medications	1	220	635	855
Pesticides	1	54	3	57
Alcohols	3	50	339	389
Glycols	–	4	11	15
Gases (including CO)	–	11 (3)	130 (128)	141
Drugs of abuse	–	12	50	62
Solvents	–	37	9	46
Corrosives	–	36	10	46
Detergents	–	8	1	9
Metals	–	9	–	9
Mushrooms (including <i>Amanita phalloides</i>)	–	20 (1)	31	51
Toxic plants	–	9	–	9
Venoms	–	3	2	5
Others	–	12	–	12
Unknown	2	–	20	20
Suspicion of poisoning	–	42	–	42
Poisoning ruled out	–	4	3	7
Total	7	531	1 244	1 775

period, with 2232 hospital admissions in 2003, 2370 in 2004 and 2654 in 2005, respectively. Surprisingly, it fell abruptly during the next two years to 1889 admissions in 2006 and 1244 in 2007 (Table 1–5).

The number of telephone enquiries changed during the reported period, showing a declining tendency, with 815 information pieces in 2003, 591 — in 2004, 721 — in 2005, 646 — in 2006 and 531 — in 2007 (Table 1–5).

Total number of poisoned patients (pts) during 2003–2004, including those treated in TU and the ones only consulted by phone, remained at rather steady level with 3047 pts in 2003 and 2961 in 2004, respectively. It increased up to 3375 in 2005, whereas during 2006–2007 subsequently decreased to 2535 pts in 2006 and 1775 in 2007. Number of cases treated in TU is shown in Figure 1. Causes of acute poisonings in TU during 2003–2007 are presented in Tables 1–6.

Table 6. Statistical data, Łódź, 2003–2007

Toxic factor	2003		2004		2005		2006		2007	
	n	%	n	%	n	%	n	%	n	%
Medications	1 511	49.6	1 436	48.5	1 503	44.6	1 211	47.8	855	48.2
Pesticides	99	3.2	59	2.0	90	2.7	73	2.9	57	3.2
Alcohols	526	17.3	642	21.7	922	27.4	577	22.8	389	21.9
Glycols	21	0.7	29	1.0	21	0.6	26	1.0	15	0.8
Gases (including CO)	179	5.9	206	7.0	193	5.7	195	7.7	141	7.9
Drugs of abuse	145	4.8	148	5.0	160	4.7	93	3.7	62	3.5
Solvents	99	3.2	60	2.0	69	2.0	62	2.4	46	2.6
Corrosives	94	3.1	64	2.1	67	2.0	77	3.0	46	2.6
Detergents	14	0.5	4	0.1	7	0.2	5	0.2	9	0.5
Metals	12	0.4	11	0.4	11	0.3	3	0.1	9	0.5
Mushrooms (including <i>Amanita phalloides</i>)	32	1.1	37	1.2	31	0.9	67	2.6	51	2.8
Toxic plants	11	0.4	10	0.3	4	0.1	4	0.2	9	0.5
Venoms	4	0.1	8	0.3	2	0.1	7	0.3	5	0.3
Others	46	1.5	30	1.0	45	1.3	27	1.0	12	0.7
Unknown	131	4.3	131	4.4	160	4.7	53	2.1	20	1.1
Suspition of poisoning	44	1.4	43	1.5	61	1.8	50	2.0	42	2.5
Poisoning ruled out	79	2.6	43	1.5	29	0.9	5	0.2	7	0.4
Total	3 047	100.0	2 961	100.0	3 375	100.0	2 535	100.0	1 775	100.0

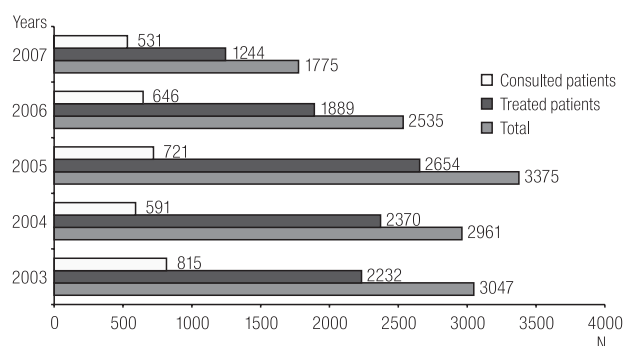


Fig. 1. Poisonings in Łódź, 2003–2007.

Analysis of registered data revealed that medications were the most frequent causative agents, accounting for 49.6% of total cases of recorded poisonings in 2003, 48.5% in 2004, 44.6% in 2005, 47.8% in 2006 and 48.2% in 2007 (Table 6).

They were followed by poisonings with alcohols, that were responsible for 17.3% of registered cases in 2003,

21.7% in 2004, 27.4% in 2005, 22.8% in 2006 and 21.9% in 2007 (Table 6).

Poisonings with gases, including carbon monoxide, were the third most frequent cause, accounting for 5.9% of total number of poisonings in 2003, 7.0% in 2004, 5.7% in 2005, 7.7% in 2006, and 7.9% in 2007 (Table 6).

Poisonings with street drugs and pesticides should be mentioned as the significant causes of poisoning in the analyzed material. Figure 2 shows poisonings in 2003–2007 arranged according to substance responsible for the event. Causes of poisonings according to underlying circumstances of event are illustrated by Figure 3. Suicidal attempts were the most frequent condition during 2003. They were followed by poisonings associated with substance abuse, including dependence-related abuse and constituted 23.7% of total number of the cases.

The accidental poisonings were situated on the third place with 14.1%.

During 2004–2007, the poisonings were most frequently due to drug abuse or dependence and accounted for 32.9% of total number of pts in 2004; 36.8% in 2005; 33.2%

in 2006; 35.9% in 2007, respectively. Suicidal poisonings occurred less frequently, with a percentage of 29.4% in 2004; 28.0% in 2005; 28.4% in 2006; 26.5% in 2007 (Figure 3). Accidental poisonings, similarly as in the 2003, were third in frequency, with 12.0% in 2004; 10.9% in 2005; 17.9% in 2006 and 18.0% in 2007, respectively (Figure 3).

Nine deaths due to poisonings were recorded in TU during 2003, whereas 14 fatal cases were noted in 2004, 6 in 2005, 17 in 2006 and 7 in 2007, respectively. Poisoning with pharmaceuticals constituted the most frequent cause of death in 2003–2005 and remained an important etiologic factor of mortality during 2006–2007, when it was responsible for the second highest number of deaths. Intoxication with alcohols was the most frequent event leading to death during that period. Other fatalities resulted from glycols, pesticides and carbon monoxide (Table 1–5).

The age of patients constitutes another parameter evaluated in this study. During examined period, the largest age group consisted of the patients at the age

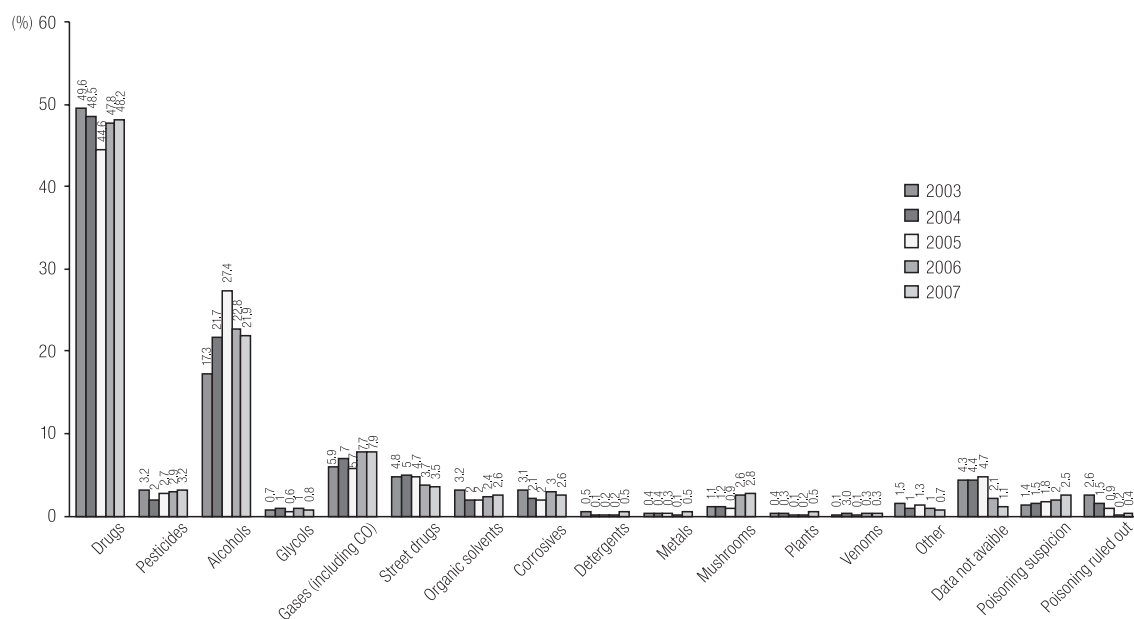


Fig. 2. Distribution of poisonings according to the toxic agent in Łódź, 2003–2007.

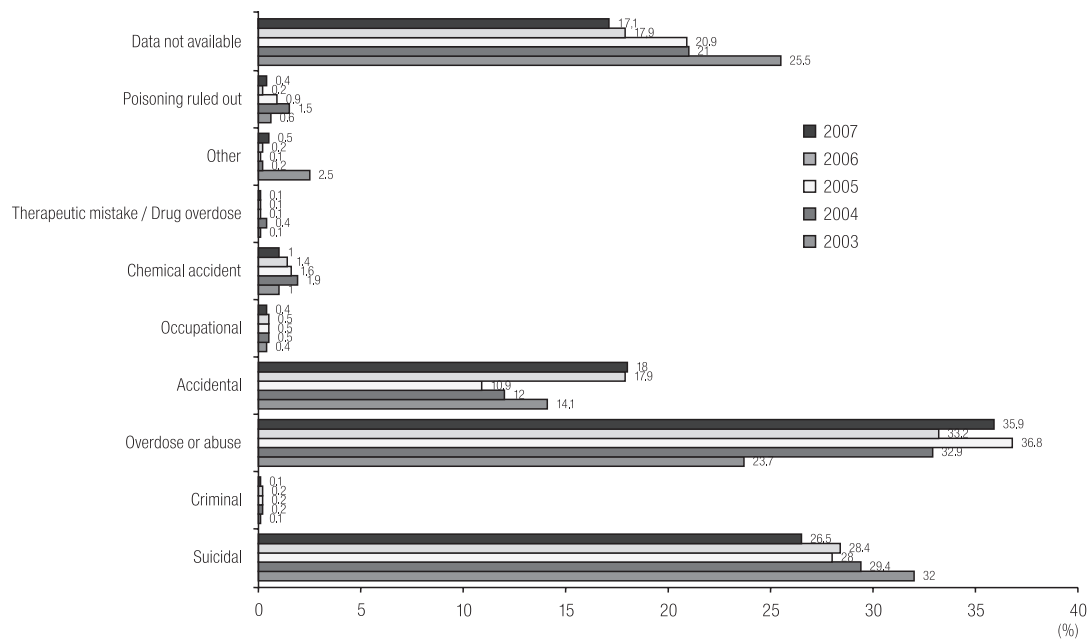


Fig. 3. Types of poisonings in Łódź, 2003–2007.

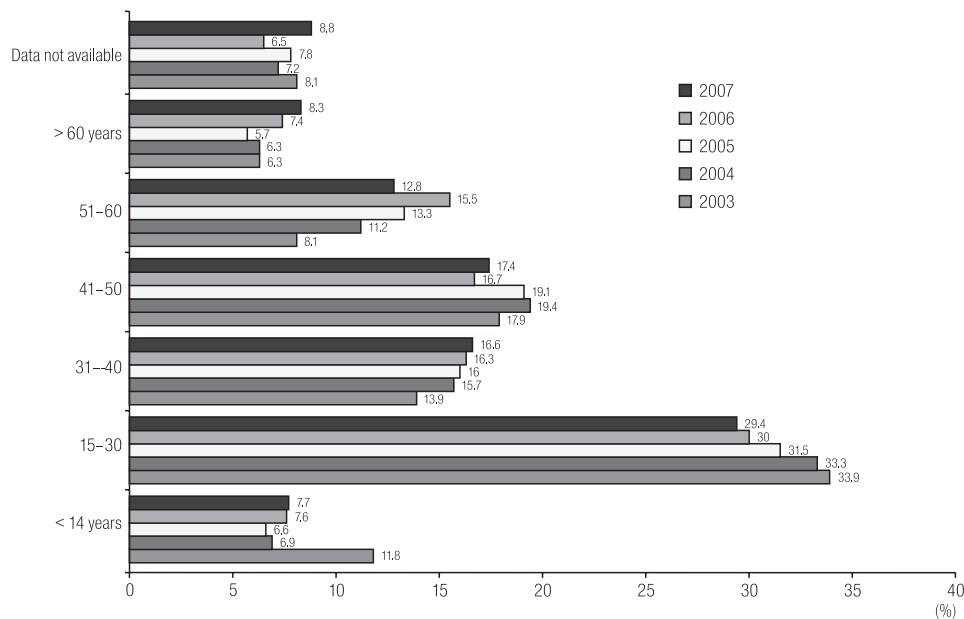


Fig. 4. Distribution of poisonings according to the patients' age in Łódź, 2003–2007.

of 15–30 years: 2003 — 33.9%; 2004 — 33.3%; 2005 — 31.5%; 2006 — 30%; 2007 — 29.4%. The second largest age bracket 41–50 years was represented in the 17.9% of cases during 2003, in 19.4% during 2004, in 19.1% during 2005, in 16.7% during 2006 and in 17.4% during 2007,

respectively. Age group of 31–40 years composed the third most frequent category with 13.9% of all cases in 2003, 15.7% in 2004, 16.0% in 2005, 16.3% in 2006 and 15.6% in 2007, respectively. Figure 4 shows total number of recorded cases classified according to age.

DISCUSSION

Our results show that both the number of patients treated in TU in Łódź and the number of phone enquiries decreased during the analyzed period. In our opinion, a significant part of patients, presenting with mild symptoms of acute poisoning (without any complications), is managed within other hospitals each year. This assumption may explain the fall in number of patients treated directly in TU. Additionally, unknown precisely number of toxicology phone enquiries are served by regional toxicology information centers, geographically corresponding with respective district hospitals. Analysis of registered data revealed that medications were the most frequent etiologic factors underlying hospitalizations due to poisonings during the period 2003–2007. A prospective study on the incidence of acute poisoning in South Africa also confirmed that pharmaceuticals accounted for the majority of hospitalized cases, being responsible for 76% of all admissions (the total number of patients was 662) [5]. The study from Bulgaria, describing the epidemiology of self-poisoning in that country, confirmed that medicines made up the leading type of toxic agent in this cohort with 350 patients (97.2%) after ingestion of multiple medicines [6]. Similar conclusions come from epidemiological study about acute poisonings in Azerbaijan. It revealed that in 31.9% of all acute poisoning cases, the patients were poisoned by pharmaceuticals [7]. Medicines also proved to be the most frequent group of chemical substances responsible for more than 50% of all hospital admissions due to acute poisonings in a large retrospective study on acute poisonings in Poland during 1970–2000 [8]. Data collected for the purpose of this work by Kotwica and Czerczak from NPIC were obtained from individual concerned institutions (hospitals), and also from the regional Poison Information Centers in towns such as Łódź, Kraków, Gdańsk, Poznań, Sosnowiec, Rzeszów, Warszawa, Wrocław [8].

Other toxic substances such as alcohol and carbon monoxide constitute also important causes of poisonings during

evaluated period. According to the literature data published by Nofer Institute of Occupational Medicine in the following years: 1980; 1995; 1984; 1994; 2002 [9–12], the contribution of alcohol poisonings increased from 10.5% of total number of cases in 1987 to the value above 20% after 1990. Alcohol is a factor that not only encourages people to intentional self poisoning but is also perceived by the patients as a way of escaping from problems. In Suokas and Lonnqvist's data, 62% of parasuicides were related to alcohol abuse [13]. Furthermore, some authors show that there is an association between alcoholism and depressive disorders that may contribute to suicidal behavior [14]. Poisonings with carbon monoxide ranged from 5.7% in 2005 to 7.9% in 2007.

The main event underlying carbon monoxide poisoning was dysfunction of ventilation systems in dwelling houses. Street drugs and pesticides continue to be the significant causes of acute poisonings. According to the authors, the changes in society and family resulting from urbanization for over the last century may be responsible for the increase in the drug street abuse within the modern community.

Pesticides are still an important cause of acute poisonings; however, it is important to mention that, recently, organophosphorous pesticides, associated usually with high mortality, have been replaced by less toxic pyrethroids. Unlike in Poland, pesticides in developing world are still a big problem; frequency of pesticide poisonings in that region continues to be high [15].

Suicidal poisonings formed the largest group in 2003, whereas during 2004–2007, poisonings related to the abuse, including dependence-related abuse, were most frequent. The dramatic increase in the number and availability of therapeutic drugs may have contributed to the high proportion of drug dependence.

An analysis of the poisoning-related mortality indicated that medicines and alcohol were responsible for the majority of fatal cases.

Patients between 15 and 30 constituted the largest group in comparison with other age brackets. Young people are the group of patients that are more prone to practise risk-seeking behaviours. We have also noticed that poor school performance may be partially associated with the higher frequency of acute poisoning among these patients.

CONCLUSIONS

The number of patients treated in TU in Łódź increased during 2003–2005, then subsequently decreased during 2006–2007; the number of consultations given by phone systematically decreased during the analyzed period; the most frequent causes of poisonings were as follows: medications, alcohols, gases (including CO), drugs of abuse and pesticides; suicidal poisonings constituted the largest group in 2003, whereas during 2004–2007 poisonings caused by abuse, including dependence-related abuse were most frequent; patients between 15 and 30 years old constituted the largest age group within the evaluated cohort.

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