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SOURCES OF POISONING EXPOSURES IN CHILDREN DURING 1990 – 1995. AN ANALYSIS OF THE NATIONAL POISON INFORMATION CENTRE FILES

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Abstract. Information protocols on the causes of acute poisoning exposures with chemicals in children up to 14 years old collected during 1990 – 95 at the National Poison Information Centre have been analyzed.

Approximately 96% of intoxication were accidental, 44% of patients were poisoned with drugs, 22% with household products and 14% with pesticides. Almost 25% of drug poisonings were due to sedative and to psychotropic drugs, and 17% to drug mixtures.
The frequency of mushrooms and plants poisonings were low – 6%.

In Poland there are practicaly no acute poisoning departments which treat children (actually, there is only one Poison Unit in Kraków at Polish-American Children's Hospital), and thus these patients are treated in paediatric wards and paediatric hospitals, so complete data on the poisonings in children from over the whole territory of Poland are not available.

However, we believe that the frequency of causes of children's intoxication in our country is properly reflected in our material. This allows us to draw conclusions of the prevention of poisoning in this age group.

INTRODUCTION

The first-in-the-world Poison Information Service was set up in the Netherlands in 1949 (22). Subsequently, poison information organizations were established in the U.S.A. in the 1950s. In 1953, the American Academy of Pediatrics instituted the Poison Information Center in Chicago (22).

It became known that the information collected at the Chicago centre helped to identify the toxic substance in cases of poisonings with chemicals and, consequently, enabled appropriate medical treatment. The remarkable success of the Chicago centre resulted in a proliferation of similar centres throughout the U.S.A.

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In 1958, U.S. Health, Education and Welfare Department instituted a structure to link all U.S. poison information centres (now there are 85 Poison Control Centres in the U.S.).

Since 1957, poison information units were established in Canada. Currently, poison information centres are run in many countries of the world ("The Yellow Tox Directory of Poisons Centres in the World" lists approximately 290 poison centres).

Poland also has its Poison Information Centre (since 1991 – National Poison Information Centre). The Centre, established in 1967 by Ministry of Health and Social Welfare, has been located at the Nofer Institute of Occupational Medicine, Łódź.

The primary tasks of the National Poison Information Centre include:

– developing databases of popular chemical products (such as drugs, cleaning agents, pesticides) including information on their chemical composition, toxicity, and treatment in cases of acute poisoning,

– running information service on identification of chemicals, their toxic effects, first aid and medical treatment of acute poisoning cases,

– collecting and analysing data on patients admitted to the acute poisoning treatment centres in Poland,

– preparing and publishing information materials such as posters, brochures etc. to prevent acute poisonings.

OBJECTIVE

Poland has a network of centres (Gdańsk, Kraków, Lublin, Łódź, Poznań, Rzeszów, Sosnowiec, Warszawa, Wrocław) which specialize in the treatment of acutely poisoned patients. Unfortunately, only patients above 14 years old are treated at these centres. Acutely poisoned children under 14 years old are treated in paediatric wards all over Poland. As a result, the problem of acute poisoning in children tends to be neglected in spite that it is quite serious; this has become evident from the analysis of the protocols of the answers to the telephone calls filed at the National Poison Information Centre (NPIC) in 1990–95. Unfortunately, complete data on the poisonings in children from the whole territory of Poland are not available (due to the great number of paediatric wards in Poland and to the lack of a computer network, collection of such complete data is practically impossible). Nevertheless, the data which are currently available seem sufficient to indicate that a problem exists and to draw conclusions in order to reduce the incidence of acute poisonings in children.

MATERIALS AND METHODS

The personnel of the National Poison Information Centre operate a telephone poison information service which is available to the representatives of the occupational safety and work hygiene services, health care workers, and to the general public from 8 am to 4 pm and 4 pm to 8 am, the information is provided by the physicians from Clinic of Acute Poisonings of the Nofer Institute of Occupational Medicine. All answers are written on special forms, and the files are stored in NPIC (Fig. 1 shows an example of a form). Only forms that address the treatment of acute poisonings in children under 14 years of age (1990–95) were analyzed.

TELEPHONE INQUIRY

Date	Hour	Recall hour	Initials of information provider	Initials of consultant

Inquirer			Inquirer name
physician	nurse	other	

Inquiry from:

City:..... Hospital..... Ward..... Phone.....

Patient name	Sex M F	Age
Product/substance name		

Type of poisoning

selfpoisoning	overdosage	accident at work	other
accidental	* at home	* breakdown/leak	
occupational	* at hospital	* fire	

Quantity / exposure route

Time from exposure

Symptoms and action taken:
.....
.....
.....

The inquiry refers to:

* chemical composition	* poisoning course	* treatment
* toxicological test	* transportation to the Clinic	* other

Reply / ATTENTION! All information on chemical preparations is confidential
.....
.....
.....

Fig. 1. An example of a form used by the National Poison Information Centre.

RESULTS

Our analysis of the records revealed that almost half (46.6%) of all poisoning exposures during the period 1990–95 involved children up to 14 years old (Table 1, Fig. 2).

Table 1. Number of toxicological information provided in 1990–94 on acute poisonings in children under 14 years of age

Year	No. of poisoning exposures	No. of poisoning exposures in children < 14 years	% of total (children, juveniles and adults)
1990	1644	730	44.4
1991	1248	539	43.2
1992	1189	541	45.5
1993	1294	604	46.7
1994	1535	752	49.0
1995	1686	855	50.7
Total	8596	4021	46.6

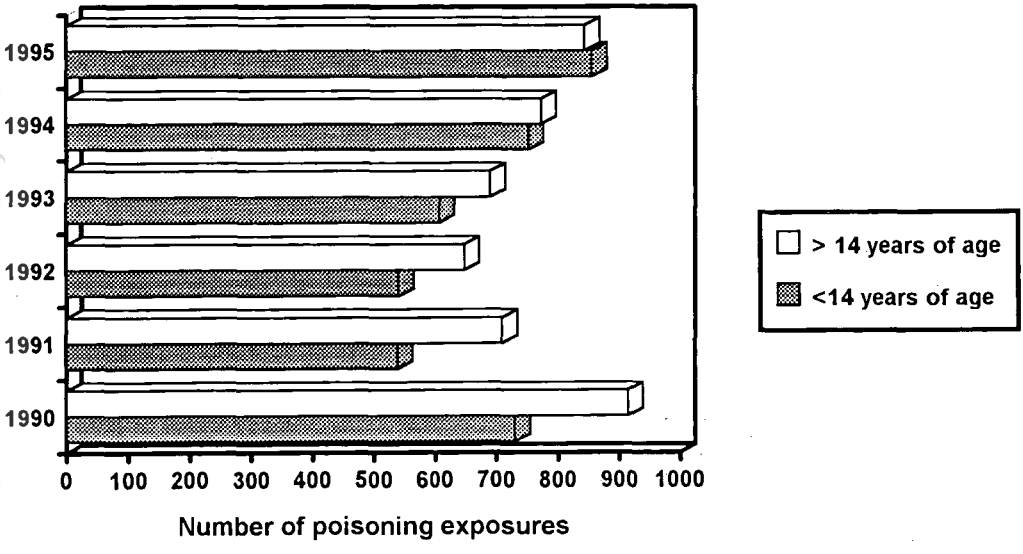

Fig. 2. Number of inquiries in 1990–95 according to patient's age.

Poisonings were predominantly accidental (96%) and resulted from the lack of care of adults, who stored drugs, household products (such as detergents, cleaning liquids and powders, paints, lacquers, organic solvents) or pesticides in easily accessible, unprotected places at home, in the garage or other similar places. A child is apt to swallow colourful pills and tablets, drink fragrant liquids left within the reach of its hands.

As indicated by our analysis of the records (Fig. 3) children under 14 years of age are most often poisoned with:

1) drugs (44.0% of total inquiries) (1,2,3,6,8,9,11,12,14,17,20),
2) household products (22.0%) (3,6,8,9,17,20),
3) pesticides (14.0%).

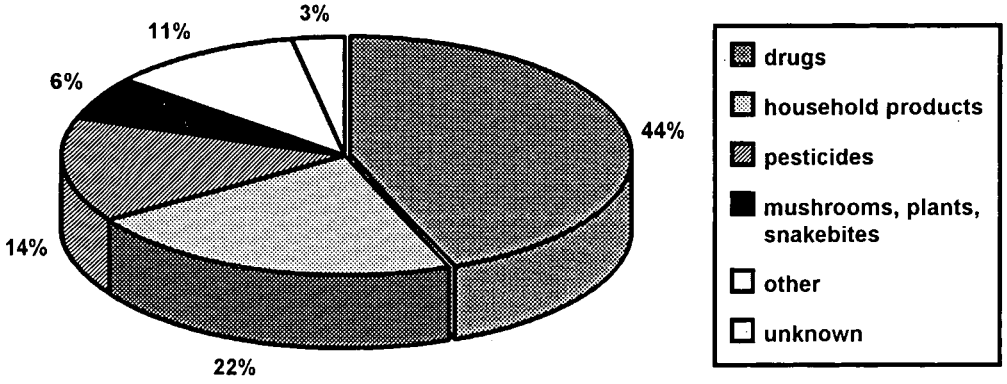

Fig. 3. Categories of agents responsible for poisonings in children up to 14 years old according to the analysis of telephone calls received in 1990–95.

Among the drug-poisoning category, poisonings with sedative and psychotropic drugs are the most frequent (25.1% of all inquiries on drug poisonings), of which phenothiazine derivatives account for 12%. There has been a growing trend of the poisonings with drug mixtures, from 12.2% in 1990 to 20.4% in 1995. The mixtures often include sedative and psychotropic drugs (usually derivatives of benzodiazepine and phenothiazine, tricyclic antidepressants, barbiturates), circulatory and antiepileptic drugs.

Table 2 gives the number of information provided in 1990–95 on poisonings by individual drug categories.

The next most important group of substances swallowed accidentally by children includes household products which contain ethanol, ethylene glycol, organic solvents, sodium hydroxide, hypochlorites, peroxides, detergents. Among these

Table 2. Number of drug poisonings divided into groups

Groups of drugs	1990	1991	1992	1993	1994	1995
Sedative and psychotropic drugs	69	62	60	60	89	91
Salicylates	5	4	2	3	3	1
Analgesics	27	12	10	20	26	41
Phenytoin and other anticonvulsants	6	9	9	10	12	13
Drugs containing iron	8	8	5	8	9	11
Mixtures	36	35	51	45	59	79
Other drugs	143	120	101	120	124	151
Total	294 (40.3%)	251 (46.6%)	237 (44.0%)	266 (43.4%)	322 (42.8%)	387 (45.3%)

chemical compounds, most frequently responsible for the poisonings are: organic solvents contained in paints and lacquers, (from 37.3% to 50.8%), and corrosives (liquids and powders for sanitary appliance cleaning, bleaching liquids for textiles) which account for 31.8% to 44.3% of all poisoning exposures from household products.

The percentage of poisonings with ethyl alcohol is rather low (1.6%), nevertheless that category of the poisonings constitutes a source of particularly great concern. There were single cases of the poisonings with other alcohols (mainly isopropanol contained in room thermometers) and with glycols (contained in liquids used to prevent ice in car locks).

Table 3 shows data on the number of information provided in 1990–95, in relation to the poisonings with household products.

Table 3. Number of household product poisonings

Household products containing	1990	1991	1992	1993	1994	1995
Ethanol	14	17	9	7	5	13
Other alcohols	0	5	1	1	1	5
Glycols	1	1	2	2	0	2
Organic solvents	50	46	63	65	77	78
Corrosives	53	34	43	65	78	89
Detergents	12	4	6	13	14	22
Total	130 (17.8%)	107 (19.9%)	124 (22.9%)	153 (25.5%)	176 (23.3%)	209 (24.4%)

Pesticides are another group of chemicals which are easily accessible to children. In 1990–95, pesticides constituted the third largest group of chemical agents responsible for acute poisonings in children up to 14 years old (16.4% in 1990 and 12.7% in 1995 of the total number of the inquiries). There has been a change in which chemicals are responsible for poisoning exposures from pesticides. In 1990 poisonings with organophosphorous compounds were dominant among the pesticide poisoning group, but there has been a reduction in the number of the poisonings with those compounds from 21.7% in 1990 to 10.1% in 1995. Currently, organophosphorous pesticides are being replaced by less toxic pyrethroides. There have been only single cases of poisonings with pesticides comprising dipyridyl derivatives, but the percentage of the poisonings with pesticides containing coumarin derivatives (from 12.5% to 21.1% of all inquiries on the poisonings with pesticides) continues to be high.

Table 4 gives the number of inquiries on poisonings with pesticides classified according to pesticide groups.

Poisonings with plants, mushrooms or snakebites constitute a small proportion of the poisonings in children (6.0% of all inquiries, Fig. 4). It should be remembered, that poisonings with some plants or with mushrooms (for example *Amanita*) are very dangerous. The symptoms of the poisoning with the particularly toxic *Amanita phalloides* may sometimes become evident as late as 48 hours after ingestion. Parents usually fail to associate these symptoms with consumption of the mushrooms.

Table 4. Number of poisonings by pesticides classified according to pesticide types

Pesticides	1990	1991	1992	1993	1994	1995
Organophosphorous compounds	26	19	10	12	13	11
Carbamates	11	13	6	6	7	9
Dipyridyl derivatives	2	2	0	0	1	0
Coumarin derivatives	15	19	17	14	17	23
Other, mainly pyrethroides	66	40	51	40 (24)*	60 (40)*	66 (37)*
Total	120 (16.4%)	93 (17.3%)	83 (15.5%)	74 (11.9%)	98 (13.0%)	109 (12.7%)

*In 1993, 1994, and 1995 pyrethroides were separated from the "Other" group.

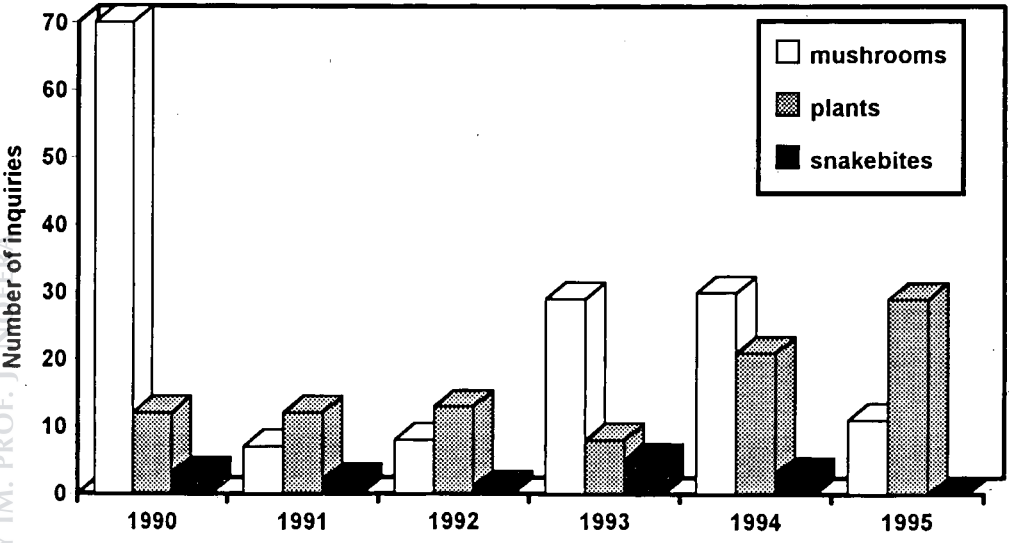

Fig. 4. Poisonings with mushrooms, plants and snakebites in children up to 14 years old (1990–95).

The remaining cases, shown in Fig. 3 as „other", included poisonings with: carbon monoxide, street drugs, metals and their compounds, tear gas, and all other substances which do not belong to any of the above groups. Those poisonings constituted 11.0% of all acute poisoning exposures in children ⩽ 14 years of age.

DISCUSSION AND CONCLUSIONS

There are no special acute poisoning wards in Poland which treat poisoned children under 14 years of age. Children poisoned with drugs, pesticides, or household products are treated in paediatric hospitals or paediatric wards throughout Poland. For this reason, this is not feasible to get precise records of all acute poisonings.

In this paper, the personnel of the National Poison Information Centre have attempted to analyze the sources of acute poisonings in children under 14 years of age, based on the records of telephone calls. The authors are aware that these records cover only a part of acute poisoning cases in this age group. However, it is reasonable to assume, that the structure of acute poisoning cases in the general Polish population of children under 14 years of age is similar to that presented in this paper. The analysis of the NPIC advice offered by phone shows that the most frequent causes of accidental poisonings in Polish children aged below 14 years are drugs, household products, and pesticides.

Results of a similar analysis prepared by the London National Poisons Information Service, show that, like in Poland, drugs and household products are responsible for the greatest number of acute poisonings in children (20,21).

The data contained in a report prepared by the Portuguese Poison Information Centre (1) also indicate that drugs, such as benzodiazepine derivatives, tricyclic antidepressants and phenothiazine derivatives constitute the major source of the acute poisonings. Poisoning with drugs, benzodiazepine derivatives particulary, dominate also in Italy (12). A report prepared by the American Association of Poison Control Centers (9) also points to drugs (40%) (chiefly analgesics) as the main source of the poisonings in children, followed by household products, cosmetics, plants, and pesticides.

The data show that the causes of acute poisonings in children under 14 years old are similar in many countries: drugs come first, followed by household products.

The results of our analysis provide grounds to undertake steps in order to limit the number of acute poisonings in Polish children (7,18).

Thus, it is necessary to:

– encourage the drug industry to use "child-resistant" packagings for their products to make drugs difficult to access by children,

– oblige the manufacturers of particularly dangerous household products, such as those containing caustic chemicals, to use "child-resistant" packagings,

– provide all manufactured chemicals with a symbol easily recognizable by children, indicating that the drug or chemical compound is poisonous,

– conduct continuous education (through special information and instruction materials and mass media) for parents on the probability of poisonings with chemicals kept at homes and on methods of their proper storage (chemicals at places inaccessible to children, in original packagings, and drugs preferably in a special boxes),

– to create awareness about poisons information centres and to encourage individuals to use poison centres if a child is exposed to a poison.

The literature (13,15,19) indicate that the use of "child-resistant" packagings, especially for drugs, is controversial because, in addition to preventing unauthorized access by children, "child-resistant" packagings make drug difficult to access by older people. It often happens that adults who have difficulties with opening a packaging, do not close it entirely. Despite the controversy about the use of the "child-resistant" packagings it seems obvious that the law which will oblige manufacturers of drugs and household chemicals to use "child-resistant" packagings will make access to drugs more difficult for children, thereby reducing the risk of accidental poisonings.

Legal regulations exist in many Western countries, and these could be used as a guideline for Polish legislators. For example, in 1974 the U.S. Consumer Product Safety Commission (CPSC) implemented the Poison Prevention Packaging Act which resulted in the reduction of fatal poisoning cases in up to 5 year-old children in the U.S.A. from 4 cases per million children in 1972 to 1.6 cases per million in 1986 (16).

CPSC estimates that during 1974–86 about three hundred forty children could have avoided fatal drug poisoning if "child-resistant" packagings had been employed.

It is estimated that about 120 children die annually in Poland of acute poisonings. If the use of "child-resistant" packagings would result in a reduction in that number, steps should be taken to make "child-resistant" packagings obligatory.

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