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Summary of hospitalizations related to medicational poisoning groups in a cardiological and toxicological department from 04.2013 to 12.2021

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Abstract

Introduction and purpose: Drug poisoning is one of the more common reasons for patients being hospitalized in toxicology wards. The wide availability and ease of obtaining a wide variety of drugs and supplements are the cause of adverse reactions associated with their use. Increasing life expectancy and emerging chronic diseases also require the use of sometimes many drugs to control people's health. This can lead to poly-pragmasy, which is an undesirable condition and leads to poisoning. The purpose of our work is to demonstrate the most common causes of drug poisoning considering the criterion of division according to ICD-10.

Brief description of the state of knowledge: Any preparation, drug, supplement can cause negative effects on the organism. This depends on the dose, improper use, or cross-reactions of the relevant substances. The study compiled statistics on the cause of hospitalization of drug-poisoned patients based on ICD-10. 5433 patients were included in the study.

Conclusions: Our work shows that the most common causes of hospitalization due to drug poisoning are those caused by antiepileptic drugs, sedative-hypnotics and antiparkinsonism medications. The data compiled in this article agree with scientific reports from different countries compiling the most common reason for hospitalization related to drug poisoning.

Keywords: poisoning, medicational poisoning, drug overdose, beta-blockers

1. Introduction

Poisonings are one of the most common reasons for hospitalization and provide a major clinical and financial challenge. Drugs are the most common cause of intoxication in both adults[1] and children[2]. They occur for a variety of reasons: attempted suicide, lack of control in taking medication on a regular basis, addiction, and low patient awareness of the harm of using higher than maximum doses of drugs, supplements, or other preparations. Poisoning cases differentiate by intent to take the medications: in adults occur mostly intentionally and in children accidentally[3]. Overdose patterns vary considerably between European countries (among sixteen of them), but no sex or age-specific differences in drug choice patterns were observed within individual countries[4]. Costs of hospitalization for alcohol overdoses, drug overdoses, or their combination are constantly increasing; for example in the United States now exceeds \$1.2 billion per year among 18-24-year-old patients [5].

In the ICD-10 classification, drug poisoning diagnoses include codes from T36-T50. This study has summarised the number of patients hospitalized in a cardiological and

toxicological department in 04.2013-12.2021 due to a specific drug poisoning in relation to individual medicational poisoning groups based on ICD-10 classification.

2. Methods

The statistics, collected on the basis of which the present study was made, are based on a database of 5433 hospitalized patients in the toxicology and cardiology department of Cardinal Stefan Wyszyński Regional Hospital in Lublin, Poland. The data collection period is from April 2013 to December 2021.

The selection of patients was based on the reason of hospitalization. The subjects of interest were patients admitted to the hospital due to poisoning with drugs from different groups. Abuse or poisoning with narcotics and hallucinogens was not included in the study. The division of patients and analysis was based on the assigned statistical number according to ICD-10 to each patient. The first diagnosis was taken into account, presumably poisoning with the substance that had the most significant effect on the patient's clinical condition or was taken in the largest quantity. It should be mentioned that it is very common for poisoning to occur with several different preparations, sometimes with several substances in the same range, for example several cardiovascular drugs or several antidepressants or antipsychotics. The main diagnosis was considered in the study.

3. Statistics

Data collected from the analysed toxicology and cardiology department include a group of 5433 hospitalized patients.

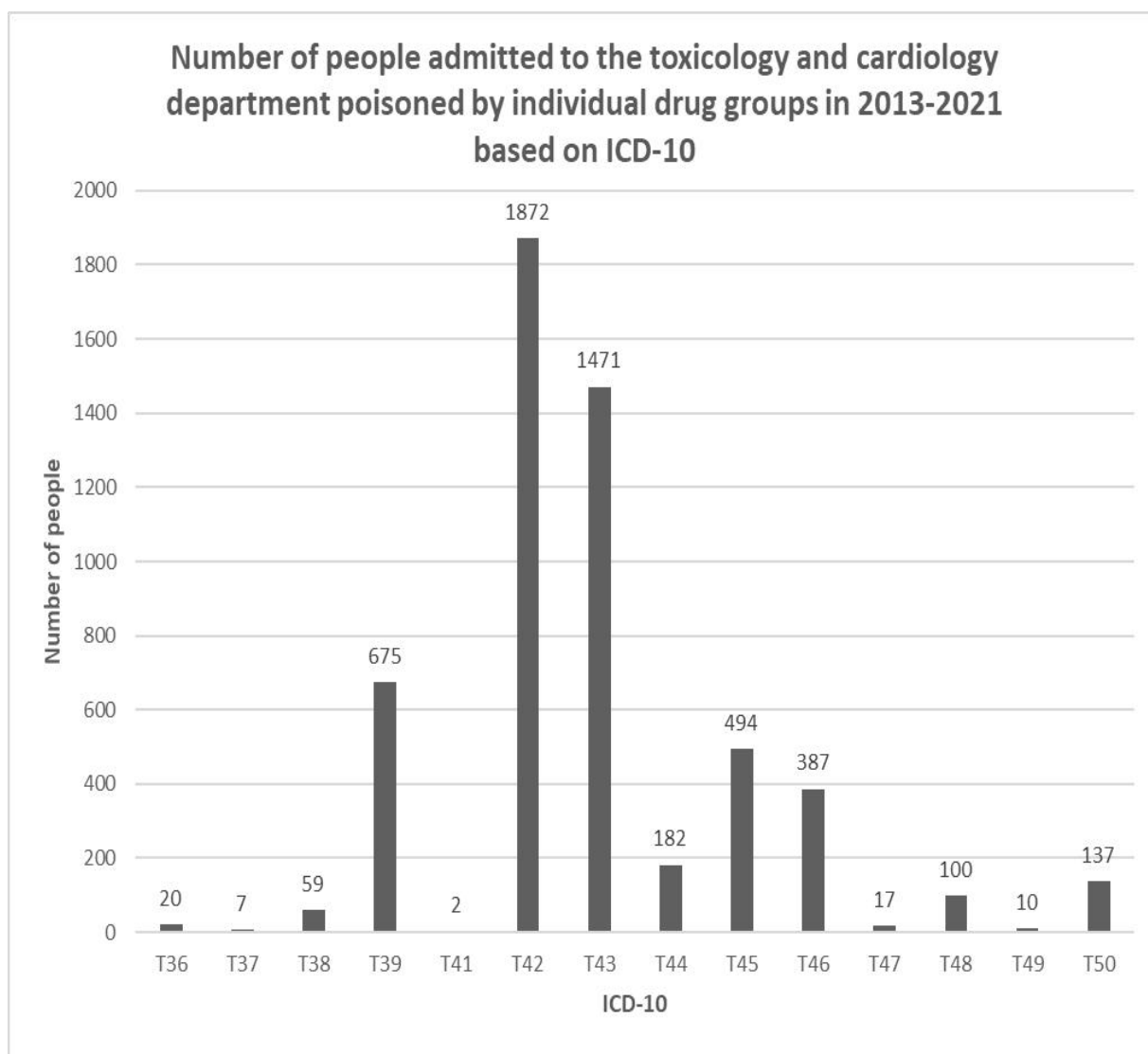
Statistics of the number of people admitted to the toxicology and cardiology department poisoned by individual drug groups based on ICD-10 are presented in the table below.

ICD-10	Group of medications	Number of people
T36	Poisoning by, adverse effect of and underdosing of systemic antibiotics	20
T37	Poisoning by, adverse effect of and underdosing of other systemic anti-infectives and antiparasitics	7
T38	Poisoning by, adverse effect of and underdosing of hormones and their synthetic substitutes and antagonists, not elsewhere classified	59
T39	Poisoning by, adverse effect of and underdosing of nonopioid analgesics, antipyretics and antirheumatics	675

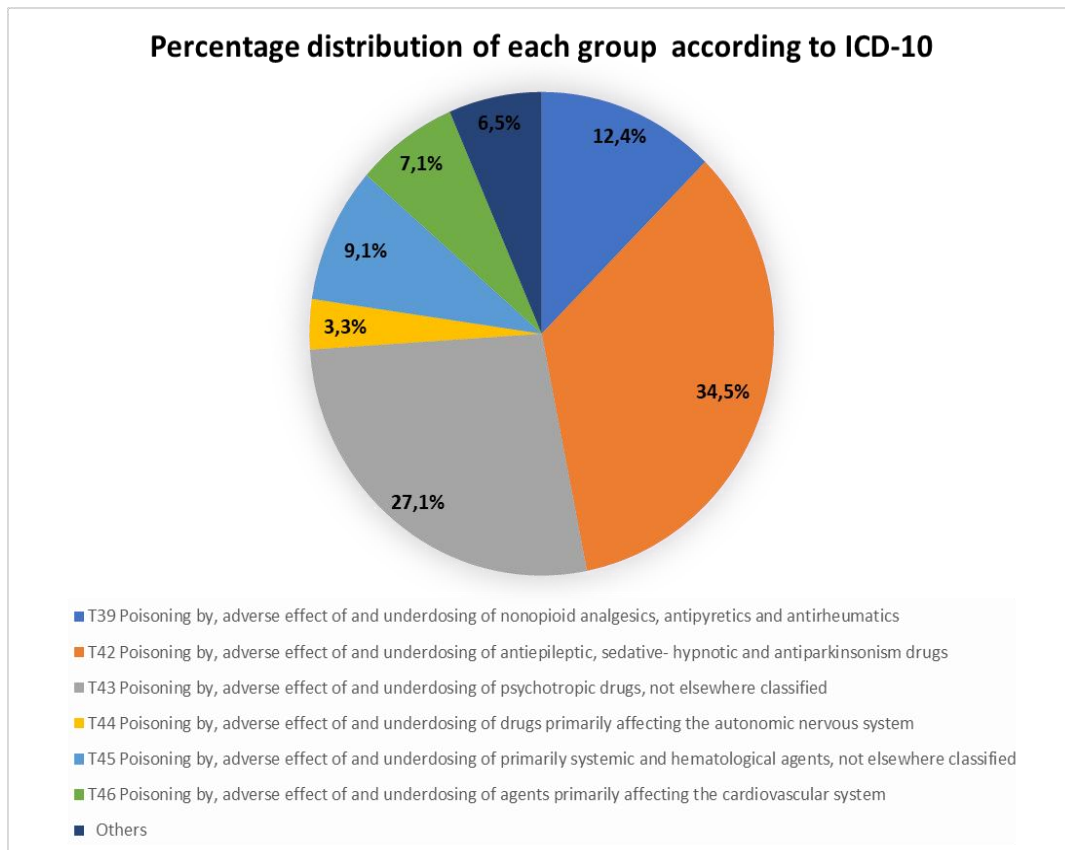
T41	Poisoning by, adverse effect of and underdosing of anaesthetics and therapeutic gases	2
T42	Poisoning by, adverse effect of and underdosing of antiepileptic, sedative- hypnotic and antiparkinsonism drugs	1872
T43	Poisoning by, adverse effect of and underdosing of psychotropic drugs, not elsewhere classified	1471
T44	Poisoning by, adverse effect of and underdosing of drugs primarily affecting the autonomic nervous system	182
T45	Poisoning by, adverse effect of and underdosing of primarily systemic and hematological agents, not elsewhere classified	494
T46	Poisoning by, adverse effect of and underdosing of agents primarily affecting the cardiovascular system	387
T47	Poisoning by, adverse effect of and underdosing of agents primarily affecting the gastrointestinal system	17
T48	Poisoning by, adverse effect of and underdosing of agents primarily acting on smooth and skeletal muscles and the respiratory system	100
T49	Poisoning by, adverse effect of and underdosing of topical agents primarily affecting skin and mucous membrane and by ophthalmological, otorhinolaryngological and dental drugs	10
T50	Poisoning by, adverse effect of and underdosing of diuretics and other and unspecified drugs, medicaments and biological substances	137

**The table does not include drugs from the group T40 - poisoning by, adverse effect of and underdosing of narcotics and psychodysleptics [hallucinogens].*

Below is a chart showing the distribution of which drug groups are the main causes of hospitalization due to drug poisoning.



The chart below shows the percentage of each type of poisoning according to ICD-10. Due to the small number of some types of poisoning (T36, T37, T38, T41, T47, T48, T49, T50), they have been grouped together.



4. Discussion

From April 2013 to December 2021, there were 5433 hospitalized patients due to medication poisoning in a cardiological and toxicological department. Over one-third (34,5%) of those poisonings were caused by the use of antiepileptic, sedative–hypnotic and antiparkinsonism drugs. The second most common substances were psychotropic drugs, not elsewhere classified as a number of 1471 patients (27,1%). Other most common substances resulting in poisoning hospitalizations were nonopioid analgesics, antipyretics, and antirheumatics (12,4%) and primarily systemic and hematological agents, not elsewhere classified (9,1%).

We found that the highest rates of poisonings involved antiepileptic, sedative–hypnotic and antiparkinsonism drugs. This is parallel to findings from other studies. A nationwide study of patients hospitalized for poisoning in Korea[6] also classified sedative-hypnotic and antiparkinsonism drugs and psychotropic drugs, not elsewhere classified as the most common medicational poisoning. Among the causative drugs defined in Japan study from 2017 written by Yasuyuki Okumura et al. [7] using the ICD-10 diagnostic codes, unspecified drugs were responsible for the highest proportion of overdose admissions (T50, 64.0%), they were followed by anticonvulsants, sedatives-hypnotics, and antiparkinson drugs (T42, 21.9%).

The results of a 2020 study analyzing the epidemiology of poisoning in Iran in 2012-2018 show a certain trend. Out of 84,242 patients hospitalized at that time, the most common reasons for admission were, in order: poisoning with antiepileptic, sedative-hypnotic and antiparkinson drugs (T42, 29.51%), poisoning with drugs and psycholeptics (T40, 26.46%), poisoning with non-opioid analgesics, antipyretic and antirheumatic drugs (T39, 21.57%) and intoxication with psychotropic drugs, n.e.c. (T43, 14.34%)[8].

In a 2014 article about the characteristics of acute poisonings in two Botswana hospitals, we can also see similar statistics. Among all hospitalizations (22.4%) were due to drug poisoning. The most common were: unspecified medicine overdose (13.8%), Paracetamol (T39, 4.3%), Amitriptyline (T43, 0.9%), Chlorpromazine (T43, 0.9%), Diazepam (T42, 0.9%) [9].

The article presents the problem of poisoning with drugs and active substances from various groups. Retrospective analysis of data from our clinic and comparison with statistical data from other centers in the world allows us to conclude that poisoning with drugs and psychoactive substances is a common problem, regardless of country, culture, or tradition. In all the cited studies, as in the case of our analysis, one of the most common reasons for hospitalization was poisoning with antiepileptic drugs, sedatives, hypnotics, and antiparkinson drugs. It is puzzling that all these drugs in Poland are dispensed only by medical prescription. The availability of these drugs is therefore limited, and detailed recommendations should be issued individually to each patient. So what is the reason for so many poisonings with drugs from this group? Non-compliance and drug overdose can result from several causes. The high addictive potential, the general availability of prescription drugs on the internet [10], and relatively quick dose tolerance, especially of BDA (benzodiazepines) drugs, may be the main ones. At the same time, the side effect, which is the deterioration of cognitive functions, may be the cause of accidental overdose in the mechanism of repeating the already taken dose that the patient forgot about. In addition, these drugs are taken by people with all kinds of mental disorders, from personality disorders, depression, bipolar disorder to schizophrenia. Many times overdoses result from suicide attempts and are carried out with their own medication. In addition, the quality and, in fact, the availability of psychiatric care can lead to such situations. Firstly, infrequent visits somehow force the prescription of medication for longer periods of time, and thus the possibility for the patient to have more medication at home. Secondly, infrequent visits make it difficult for the doctor to grasp the moment when the patient's mental state is deteriorating and patient is in danger of making a suicide attempt by misusing medication.

The second group of drugs, which causes poisoning in nearly one-third of patients hospitalized in a toxicology ward, are psychotropic drugs. Together with anti-epileptic, sedative-hypnotic, and antiparkinsonism drugs, they constitute more than 60% of all cases of patients hospitalized due to drug poisoning. The considerable diversity of active substances within the group referred to as psychotropic drugs make it difficult to identify the most common causes of an overdose of these drugs. Due to the fact that some of them have a psycho-activating effect, it can be assumed that the overdose is not accidental but is a

deliberate action.

The third group includes drugs from the group of non-opioid analgesics, non-steroidal anti-inflammatory drugs, and antipyretics. In the Polish population, there is a belief that drugs available without a prescription are very safe. Their widespread availability without a prescription, also outside pharmacies, at petrol stations, grocery stores, and numerous advertisements favor the use of drugs from this group in a way that is not subject to medical supervision. In addition, it is not without significance that some patients will reach for these drugs independently, regardless of whether there is a justification for using them in a given situation. The use of drugs from the first step of the analgesic ladder in the case of moderate and severe pain, requiring much stronger drugs, e.g. opioids, will inevitably lead to their overdose. A very high percentage of patients, when it comes to drug intoxication, do so intentionally. Painkillers are quite often abused, not only in Poland, but when it comes to patients admitted to the cardiology and toxicology department, it is rather related to the availability of these preparations and suicide attempts made in this way. Young people in particular, who usually do not take drugs on a regular basis, are observed to reach for painkillers for suicidal purposes.

It should be mentioned that many more poisonings are observed after the COVID-19 pandemic. The reason for this is that young people cannot deal with going back to school, interpersonal contacts. This problem also affects people who work in stationary jobs. In addition, in the context of poisoning and drug overdose, the reduction of control over prescribed medicines has become a significant problem. The introduction of digital systems and e-prescribing simplifies the work, but at the same time involves certain abuses that encourage the misuse of medicines. Work is currently underway to systematise, reduce and have greater control over such services, if only by prohibiting the dispensing of psychotropic drugs without a medical examination.

5. Conclusions

The research work showed that most people hospitalized for drug poisoning were caused by antiepileptic, sedative-hypnotic, and antiparkinsonism drugs. The next most common group of substances was psychotropic drugs and medications not elsewhere classified. Just because a group says, unclassified, other drugs, does not necessarily mean that it is not known which substance caused the poisoning in a particular patient. We are conscious of the fact that the ICD-10 classification, in its subsections, distinguishes some groups of drugs within the scope and others simply do not. Another reason for the occurrence of this group as one of the most frequent, on the other hand, may be due to the difficulty of classifying poisoning into a specific group according to ICD-10 for example by the poisoning of more than one substance. It Also happens that it is not easy to determine what etiological factor specifically affected the patient's condition. Interactions between different substances are very diverse, and it must be taken into account that each organism shows metabolic individual variability. The results of our study are consistent with those of other scientific work carried out on patients hospitalised for drug poisoning.

Author Contributions

Conceptualization, D.G., and M.T.; methodology, D.G; formal analysis, M.W., K.A., D.G., M.Z.; investigation, M.W., M.Z.; resources, M.T.; writing - rough preparation, M.W., K.A., D.G., M.Z.; writing - review and editing, M.Z., M.T.; visualization, D.G.; supervision, M.T.; project administration, M.T. All authors have read and agreed with the published version of the manuscript.

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Data Availability Statement

The data presented in this study are available on request from the corresponding author.

Conflicts of Interest

The authors declare no conflict of interest.

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