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# Intoxication with therapeutic and illicit drug substances and hospital admission to a Dutch University Hospital

**A. Vermes[1*], E.E. Roelofsen[1†], G. Sabadi[1‡], B. van den Berg[2], M. de Quelerij[3], A.G. Vulto[1]**

[1]Hospital Pharmacy, [2]Intensive Care Unit Internal Medicine and [3]Department of Anaesthesiology, Erasmus Medical Centre, PO Box 2040, 3000 CA Rotterdam, the Netherlands, tel.: +31 (0)10-463 32 02, fax: +31 (0)10-436 66 05, e-mail: a.vermes@erasmusmc.nl, [†] current address: Hospital Pharmacy, De Heel Hospital, PO Box 210, 1500 EE Zaandam, the Netherlands, [‡] current address: Department of Clinical Pharmacy, Rijnmond-Zuid Medical Centre, Location Clara, Olympiaweg 350, 3078 HT Rotterdam, the Netherlands, [*] corresponding author

## ABSTRACT

**Background: This article describes the retrospective analysis of the patients who presented with a drug-related intoxication to the emergency department of the Erasmus Medical Centre in 2000.**

**Methods: Data were collected from the emergency department's electronic database and the medical charts of the patients.**

**Results: A total of 243 patients were seen with a drug-related intoxication caused by ingestion of one or more medical substances, drugs of abuse (DOA) or combinations with alcohol. Mono-intoxication occurred in 58% of the patients, predominantly caused by DOA (56 patients), analgesics (17 patients) or benzodiazepines (14 patients). Benzodiazepines (55 patients), analgesics (42 patients), alcohol (42 patients), DOA (40 patients) and antidepressants (23 patients) were predominant in combined intoxications. More than half of the patients (142) were discharged after being treated in the emergency department and 80 patients were admitted to the wards. Eighteen patients were admitted elsewhere and three patients were lost to follow-up. Eventually, 70 patients were discharged after having been admitted, five patients were admitted to other institutions, two patients died and three patients were lost to follow-up.**

**Conclusions: DOA, benzodiazepines, analgesics, alcohol and antidepressants accounted for approximately 65% of the drug-related intoxications in 2000 and in a third of the presenting patients, toxicity was such that admission to the wards was warranted.**

## INTRODUCTION

Several papers in the international literature have dealt with drug-related intoxication, in some cases in relation to hospital admission.[1-7] Intoxication with medical substances or drugs of abuse (DOA) accounts for approximately 1% of the patients who present to emergency departments.[1,5] Although there are differences between countries, DOA, analgesics, antidepressants, anxiolytics, and sedatives are the most frequently occurring substances in case of (auto)intoxication.[1,6] In the Dutch medical literature, several case reports have been described regarding a broad range of intoxications. Furthermore, there have been a small number of studies outlining the relationship between intoxication with specific substances and hospital admission[8,9] as well as the topic of intoxication in children.[10] However, more comprehensive studies on the topic of drug-related intoxication seen in an emergency department and the relationship with hospital admission are lacking. The Erasmus Medical Centre is a large university hospital complex. The hospital complex has a capacity of approximately 1240 beds, divided over three locations.
This article describes the results of the retrospective analysis of the patients who were seen in the central emergency

department of the Erasmus Medical Centre in 2000. The focus is particularly on the role of medical substances, follow-up of the patients and final outcome. Furthermore, this study aims to compare data from literature on drug-related intoxication with the specific situation at a large Dutch university hospital.

## MATERIALS AND METHODS

The time frame of this study was 1 January to 31 December 2000. An admission database is maintained electronically in the central emergency department of the Erasmus Medical Centre of all presenting patients. Recorded data included demographic status, reason for presentation (i.e. nature of the intoxication, whether or not the intoxication was a suicide attempt, which substances were involved) and outcome. Our study is based on data extracted from this database, combined with data from the patients' medical records. The patients seen in the emergency department of the Sophia Children's Hospital are not included in this analysis.
The locations to which the patients were discharged from the emergency department were collected from the automated hospital system and a specific database maintained at the intensive care unit (ICU) for internal medicine. Unfortunately, due to the way laboratory results are documented in the automated hospital system, it is not possible to identify the specific lab tests that are carried out as part of the medical care of patients who present to the central emergency department of the Erasmus Medical Centre. Consequently, the analysis performed in this study is based on the electronic admission database of the emergency department and not on toxicological analysis.

## RESULTS

In 2000 a total of 576 patients presented to the central emergency department of the Erasmus Medical Centre with the indication 'intoxication', accounting for 2.4% of all presentations (23,995 patients) (*figure 1*).
Fifty-eight percent of these cases (333 patients) were due to mono-intoxications (intoxication with only one substance) involving alcohol (277 patients; 213 males, 64 females), carbon monoxide (27 patients; 14 males, 13 females), chemicals (one male patient) or unknown substances (28 patients). In the remaining 243 cases, intoxication was

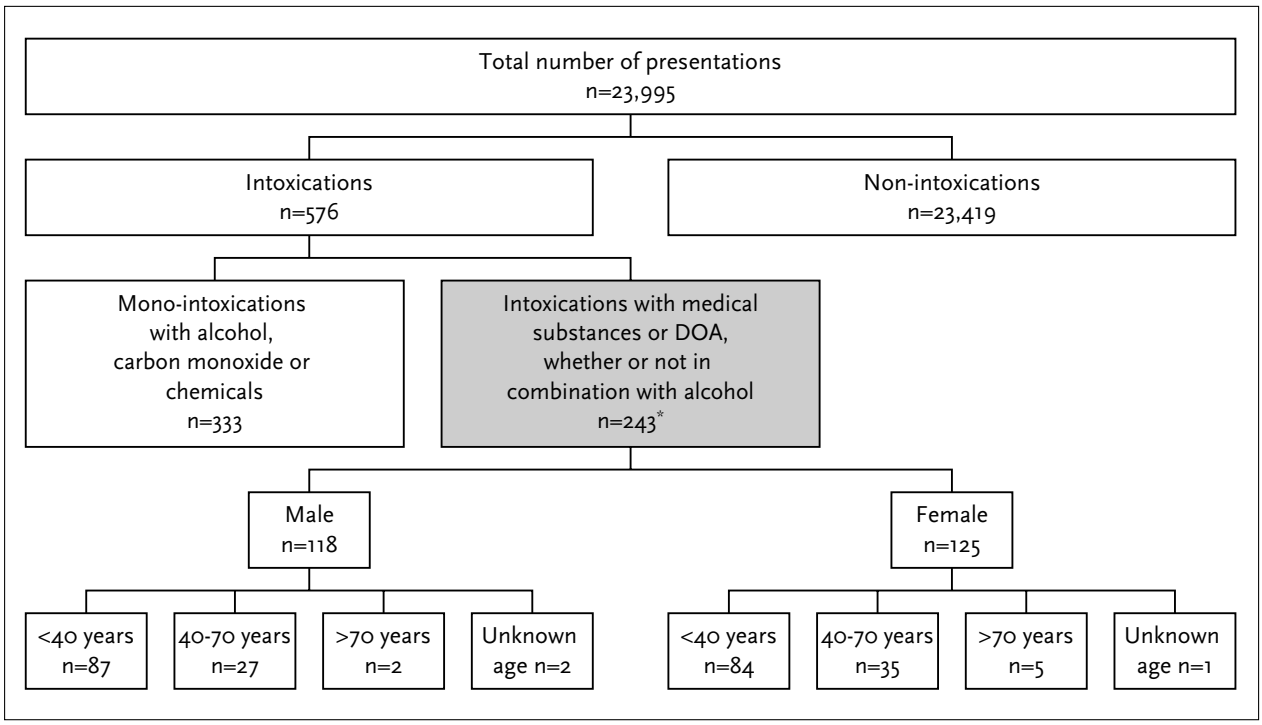


**Figure 1**
*The caseload presenting to the central emergency department of the Erasmus Medical Centre in 2000*
* **The analysed population, DOA = drugs of abuse.**

due to one or more medical substances or DOA (including recreational drugs such as 'XTC'), and combinations thereof with alcohol. The patients who presented with a mono-intoxication with alcohol, carbon monoxide or chemicals have been excluded from the analysis because the primary focus of this study was on drug-related intoxication.
There are no significant differences in sex distribution of the analysed patients but there is an uneven age distribution of the patients (*figure 1*). Over 70% of the patients were below the age of 40 (171 patients).
Intoxication with a single substance occurred in 140 of the 243 studied patients (*figure 2*). The other patients used combinations of two (57 patients), three (14 patients), four (13 patients), five (five patients) or six (one patient) drugs, and in 13 cases the cause of the intoxication was unknown. The drugs most frequently involved in cases of combined intoxication are shown in *figure 3*.
Nearly 60% of the patients were discharged home after presentation to the emergency department (142 patients). A total of 80 patients were admitted to the wards (*figure 4*). Fifteen patients were admitted elsewhere (i.e. police station, Salvation Army) and three patients were treated outside the Erasmus Medical Centre (crisis centre, psychiatric hospital). The necessary data are missing for the remaining three patients.
The patients who were discharged home were significantly younger than patients admitted to the Erasmus Medical Centre (mean age: 32.5 years and 40.5 years for patients discharged home and admitted, respectively; $p<0.05$; student's T test). There were no age differences between males and females within both of these groups (discharged: males 33.2 years, females 31.6 years; admitted: males 39.6 years, females 41.1 years). Furthermore, more females were admitted (33 males, 47 females), whereas more males were discharged home (76 males, 66 females).
Eventually, 86% of the patients who had been admitted to the wards of the Erasmus Medical Centre were discharged home (70 patients), five patients were referred to other institutions, two patients died and three patients were lost to follow-up. The mean duration of stay on the wards was 4.5 days (SD = 7.8 days, range = 1-45 days, median = 2 days).
One of the deceased patients was an 88-year-old male who attempted suicide due to the poor prognosis of a disseminated solid tumour. The other patient who died was a 32-year-old woman who attempted suicide with unknown substances. The patient suffered from renal failure due to extensive misuse of drugs in her medical history and refused haemodialysis.

## DISCUSSION

The results of this study show that approximately 1% of the patients presenting to the central emergency department of the Erasmus Medical Centre have intoxications from medical substances or DOA and combinations thereof

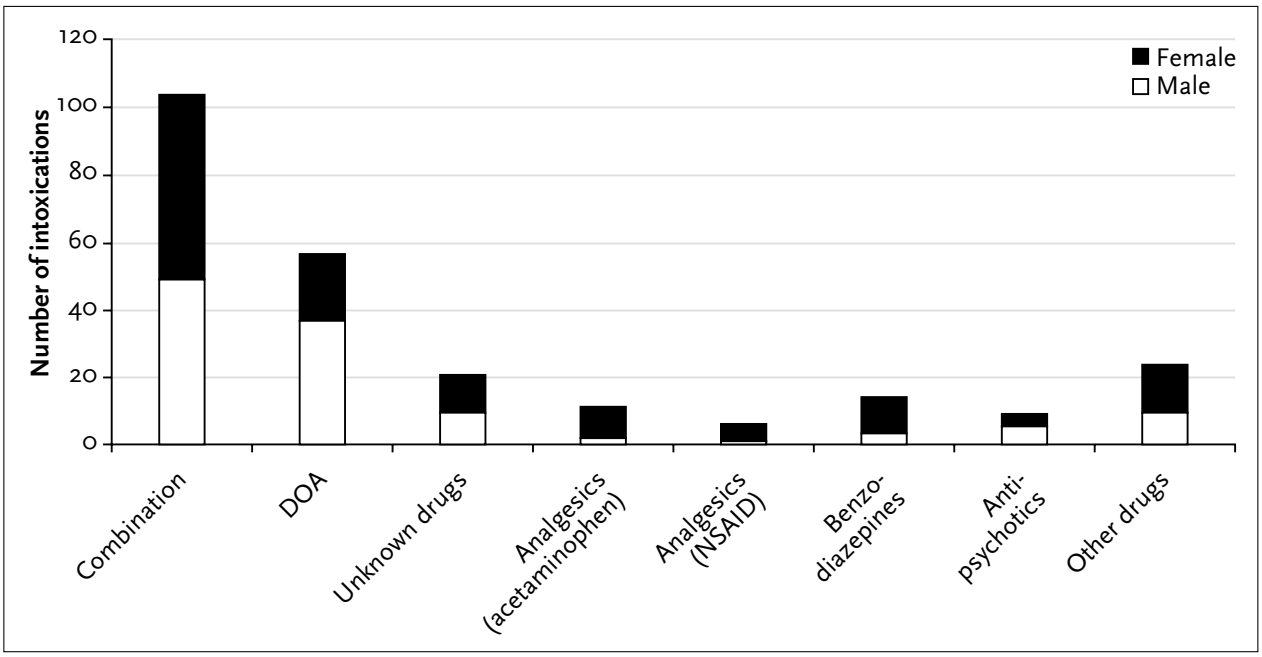


**Figure 2**
*The investigated population categorised by involved substance*
**DOA = drugs of abuse, other drugs = <4 presentations/category, including antidepressants, antihistamines, antibiotics, antiepileptics, anticoagulants, β-blockers, calcium channel blockers, antineoplastic drugs, digoxin, hypnotics, lithium, parasympathomimetics, and vitamins.**

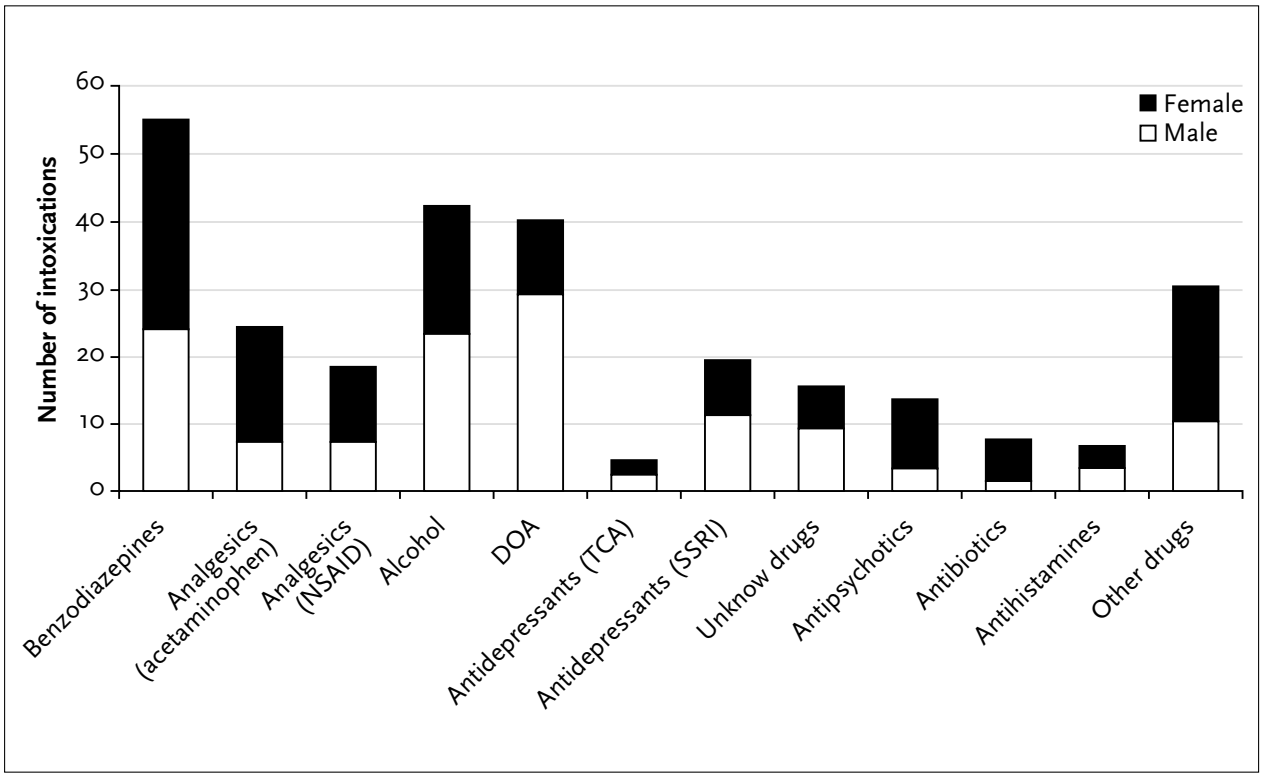


**Figure 3**

*Categorisation of the patients with a combined intoxication by involved substance*

**DOA = drugs of abuse, other drugs = <4 presentations/category, including ACE inhibitors, antiemetics, antiepileptics, anticoagulants, β-blockers, calcium channel blockers, folic acid, hormonal substances, lithium, nitrates, parasympathomimetics, proton pump inhibitors, iron and vitamins.**

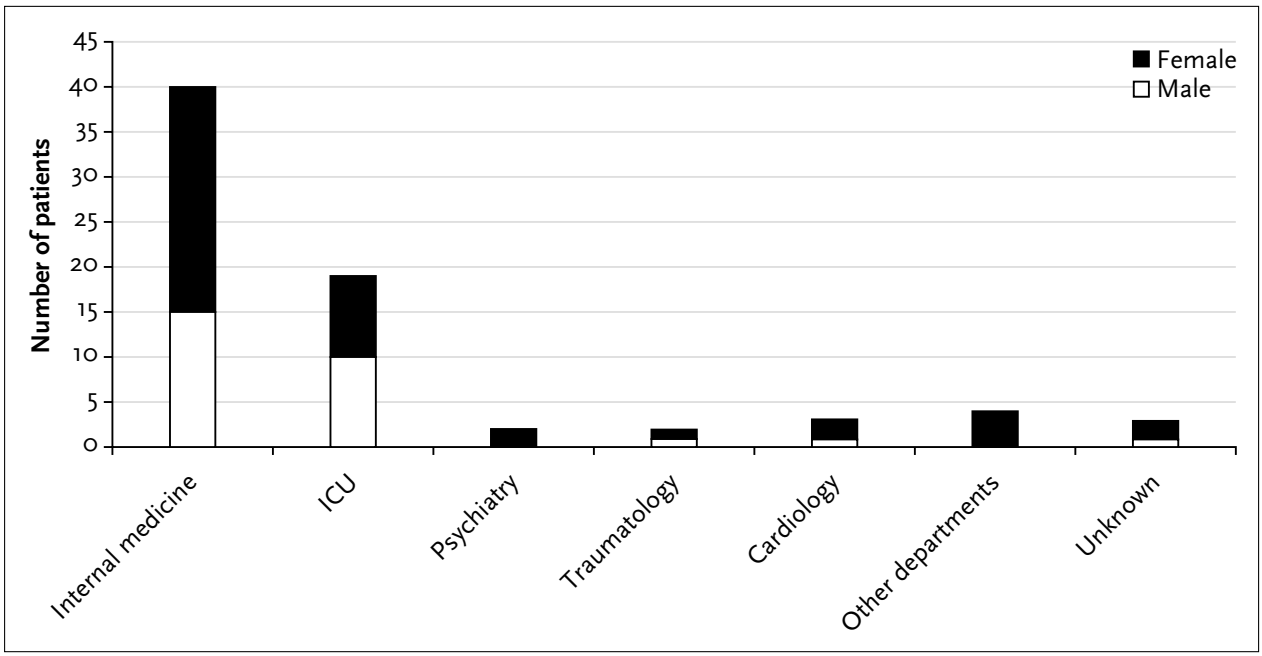


**Figure 4**

*Categorisation of the patients who were admitted to the in-patient facilities of the Erasmus Medical Centre by involved department*

**Intensive care unit (ICU) = ICU internal medicine (19 patients), ICU surgery (5 patients) and ICU neurology (2 patients). Other departments = one patient admitted to each of the departments of neurology, geriatrics, general medicine and gastroenterology.**

with alcohol. Over 40% of the patients had ingested a combination of substances and in 65% of the cases DOA, benzodiazepines, analgesics, alcohol or antidepressants were involved.
Strikingly, during the study period no mono-intoxications with antidepressants were seen in the emergency department. In the group of combined intoxications, antidepressants ranked five, after benzodiazepines, analgesics, alcohol, and DOA.
Our findings are in line with those from other studies regarding the percentage that intoxications account for in the total number of patients presenting to an emergency department (approximately 1%).[1,5] Of our patients, 33% were admitted to the hospital wards, which is consistent with data from literature (24 to 86.5%).[1,2,5] Despite the differences between countries, in most reported studies analgesics, antidepressants, anxiolytics and sedatives account for the majority of drugs involved in (auto)intoxications, which is consistent with our findings.[1,6]
After presentation and in some cases treatment in the emergency department, more than half of the patients were discharged home, a third of the patients were admitted to the wards and the remaining patients were referred to other institutions. Patients who were discharged home were significantly younger than patients who were admitted. Furthermore, relatively more females were admitted, whereas more males were discharged home.
A shortcoming in this study is the fact that the majority of the presented data were not obtained from toxicological analysis but from an electronic admission database, which is less reliable. Furthermore, follow-up is not complete as data on the undertaken action after presentation as well as after admittance to the hospital are lacking (three patients in both cases).
It can be concluded from this study that DOA, benzodiazepines, analgesics, alcohol and antidepressants were involved in approximately 65% of the drug-related intoxications seen at the central emergency department of the Erasmus Medical Centre in 2000. More than half of the patients were discharged home from the emergency department, while in a third of the patients the toxicity was such that admission to the wards of the Erasmus Medical Centre was warranted. The remaining patients were referred to other institutions or the exact follow-up could not be constructed due to a lack of information.

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## NOTE

Part of the results of this study were presented at the annual meeting of the Dutch Society for Clinical Pharmacology and Biopharmacy (10 October 2002, Lunteren, the Netherlands).

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