Feasibility study of the implementation of the proposals given in the final report of REITOX sub-task 3.3 - to improve the quality and comparability of data on drug-related deaths

Final report

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Summary

Data on drug-related deaths may be useful as an epidemiological key indicator for estimating and monitoring developments in problematic drug use. The European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) is currently in the process of establishing the feasibility of implementing the drug-related death indicator at a European level. Problems arising in this context are related to differences in definition and registration methodology which hamper meaningful comparisons between the Member States of the European Union. Hence, in 1996 and 1997 the EMCDDA commissioned two studies aimed to examine and improve the quality and comparability of data on drug-related deaths. The first study (REITOX subtask 3.3) - co-ordinated by the National Board of Health in Denmark - evaluated two different sources on drug-related death data. These are General Mortality Registers providing routine statistics based on the International Classification of Diseases (ICD) and Special Registers usually held by the police or forensic institutions. One of a series of recommendations made by the task 3.3 working group comprised the extraction common ICD-9 codes from General Mortality Registries. The proposed core set included 304 (drug dependence), E850-E858 (accidental poisoning), E980.0-E980.5 (undetermined accident, suicide or homicide by poisoning) and 965 (poisoning by analgesics, antipyretics and antirheumatics).

The present study, co-ordinated by the Trimbos Institute in the Netherlands, collected data on drug-related deaths in the EU Member States and tested the feasibility of implementing the proposed standard. Proposals to improve the quality and comparability of data were developed and discussed with the WHO, Eurostat and experts of all EU Member States. It was acknowledged that the quality and comparability of statistics on drug-related deaths can be influenced at many successive levels during the data generation process. There are broadly speaking three stages: 1) identification or detection of drug-related deaths, 2) data processing and coding and 3) data collection and reporting. The involvement of the EMCDDA focuses in particular on the harmonisation of procedures and improvement of the quality of data along the lines of the second and third stage.

The main conclusions were as follows:

- As regards General Mortality Registers, an extension and further differentiation the core set of ICD-9 codes was deemed essential. The recommended changes are expected to improve the specificity and coverage of data on drug-related deaths. Data from Special Registers may be broken down into two broad categories: *overdose* and *other causes of death* with a further specification within each category. Moreover, the data should be broken down by gender and five or three broad age groups. The feasibility of implementing the revised standards has been evaluated by means of a questionnaire distributed among the experts. The results will be reported separately.
- Data collected according to the core set of ICD-9 codes proposed by subtask 3.3 confirmed previous findings regarding the wide variation in distribution of causes of death between Member States. For example, in some countries almost all cases

are categorised among code 304 whereas in other countries most cases are coded under E850. These findings are highly suggestive of differences in coding procedures. A comparative coding study would help to clarify such differences. A first informal step in this direction has been set by the WHO. This preliminary initiative should be worked out in a joint proposal for a study.

- There is as yet a lack of consensus and standardisation as regards the coding of drug-related deaths along the ICD-10. Most EU Member States will introduce the ICD-10 in the near future. This offers the opportunity to develop and implement guidelines which is particularly important in the light of the observed differences in coding procedures. This recommendation is seen as a priority area for joint actions of the EMCDDA, WHO and Eurostat.

- In general, Special Registers rely heavily on data from forensic examinations whereas use of such data for coding cases in General Mortality Registers is quite rare or occurs unsystematically. It has become increasingly clear that forensic data are of paramount importance for correctly detecting and confirming cases of drug-related deaths. Hence, actions to systematically forward information from Special Registers are expected to improve the reliability and quality of data from General Mortality Registers.

- Drug-related deaths are generally underreported in General Mortality Registers, although in some countries there is evidence that these registers are 'overinclusive'. Cross-validation of data on drug-related deaths from different sources may contribute to elucidate these issues.

- Many professionals and disciplines are involved in the process of generating data on drug-related deaths. Initiatives to promote the quality of such data can be best achieved by concerted actions. In this context multidisciplinary national working groups might be established.

Suggestions for future activities included:

- To improve and test the proposed standards for data collection
- To develop and implement guidelines for the application of the ICD-10
- To develop and carry out a comparative coding study
- To test the feasibility of exchanging information between Special Registers and General Mortality Registers
- To carry out validation studies
- To set up National Working Groups

These suggestions will be addressed in a follow-up project.

1   INTRODUCTION

Data on drug-related deaths have been suggested to be useful as an epidemiological indicator for estimating and monitoring developments in problem drug use, although the limitations have been discussed at length. Among others, differences in definition and registration methodology hamper meaningful comparisons between Member States of the European Union. Problems surrounding the quality of data on drug-related deaths have been documented repeatedly, in particular by the WHO and UNDCP, and initiatives for concerted actions in this area can be noted. In 1996 the European Monitoring Centre for drugs and Drug Addiction (EMCDDA) commissioned a study (sub-task 3.3) within the first three-years REITOX programme, that has been awarded to a consortium co-ordinated by the National Board of Health in Denmark.

In their recently published report, the working group concluded that there is rather good agreement about which codes of the International Classification of Diseases (ICD) should be extracted from national registers. Further, it was expected that the (forthcoming) transition from ICD-9 to ICD-10 would enhance the quality of data on drug-related deaths. The working group further acknowledged that different distributions of causes of deaths between Member States were likely to be the result of different coding procedures rather than reflecting actual differences in causes of deaths. Important procedural differences have been observed particularly for unnatural deaths that commonly form the core data for specific, additional registers based on forensic traditions. Several sources of data further indicated that there may be a considerable degree of underreporting of drug-related deaths in national registers as shown by validation with data from specific forensic registers. With these findings into mind, the working group formulated a series of recommendations to improve the quality and comparability of data on drug-related deaths.

Proposals relating to General Mortality Registers involved:
- the extraction of a common core set of codes from the International Classification of Diseases (9th edition) regarding drug-related causes of death,
- a study comparing differences in coding procedures in the EU Member States and
- an analysis of the possibilities of the ICD-10.

Proposals relating to other special registers held by the police, forensic institutions or others included activities to
- elucidate procedural differences between special registers and to examine the precise criteria for including cases, and
- to cross-validate data on drug-related deaths by comparing information from different sources.

Objectives

The present project aimed to examine the feasibility of implementing recommendations of the task 3.3 working group. A planning meeting held in Lisbon on February 11, 1998 with the co-ordinators and EMCDDA staff (Mr Richard Hartnoll, Mr Julian Vicente) aimed to specify the boundaries of the project. The following objectives and tasks were agreed upon:

- Collect, compile and evaluate existing information on drug-related deaths in all EU Member States from different sources, taking recommendations of the task 3.3 into account.
- Exchange information on drug-related deaths with relevant international organisations.
- Develop proposals for further improving the quality and comparability of data on drug-related deaths
- Organise a meeting with a small group of experts to discuss a preliminary draft report, and organise a general meeting with relevant experts of all EU Member States.
- Produce a final report.

The project was co-ordinated by the Trimbos Institute, Netherlands Institute of Mental Health and Addiction in Utrecht, The Netherlands.

2   METHODS

ICD-based General Mortality Registers are present in most countries, allowing data to be collected in a quite standardised way. Causes of death are listed on death certificates, which are usually filled out by local physicians or coroners; coding in the national register occurs by specialised coding professionals. The 'core set' of ICD codes proposed by the subtask 3.3 working group is listed in table 1.

Table 1 Core set of ICD-9 codes proposed bij subtask 3.3 working group

ICD-9 code	Cause of death
304	**Dependence**
304.0	morphine type
304.1	barbiturate type
304.2	cocaine
304.3	cannabis
304.4	amphetamine type and other psychostimulants
304.5	hallucinogens
304.6	other
304.7	combination of morphine-type drug with any other
304.8	combination excluding morphine-type drug
304.8	unspecified
E850-E858	**Accidental poisoning**
E850	analgesics, antipyretics, antirheumatics
E851	barbiturates
E852	other sedatives and hypnotics
E853	tranquillisers
E854	other psychotropic agents
E855	other drugs acting at nervous system
E856	antibiotics
E857	anti-infectives
E858	other drugs
E980.0-E980.5	**Undetermined accident, suicide or homicide by poisoning**
E980.0	analgesics, antipyretics, antirheumatics
E980.1	barbiturates
E980.2	other sedatives and hypnotics
E980.3	tranquillisers and other psychotropic agents
E980.4	other specified drugs and medicaments
E980.5	unspecified drug or medicament
965	**Poisoning by analgesics, antipyretics and antirheumatics**

Several validation studies have addressed the issue of underreporting of drug-related causes of death in General Mortality Registers. Hence many countries rely on other sources, such as police or forensic registers, when asked to provide data on drug-related deaths.

The first phase of the project was used to examine and compare three types drug-related data from:

- General Mortality Registers: 'own' selection ICD-codes to define drug-related deaths
- General Mortality Registers: ICD-9 codes according to task 3.3 recommendations
- Special Registers, held by the police or forensic institutions.

2.1   Data collection

Because of time limitations and intent to minimise duplication and work overload for the focal points it was decided to start analysing existing data collected earlier by the task 3.3 working group or by the EMCDDA. As the completeness and quality of information turned out to be quite variable between countries it became clear that a subsequent project should include a specific data collection exercise to examine standards for data collection by appointing (contracting) experts in country. The following sources have been used in particular:

- Set of standardised tables (see Appendix 1). These tables were sent by the end of 1997 to all REITOX national focal points as to standardise data collection for the 1998 Annual Report of the EMCDDA.
- Table on core set of ICD-9 codes (see § 3.2). This table was sent in June 1997 to the focal points as a 'try-out'.
- Information Maps and National Reports produced by the national focal points
- Questionnaires completed by experts during the task 3.3 project

An assessment has been made of the availability and quality of data on direct and indirect drug-related deaths, including data on trends, age, gender, coverage and toxicological analyses. The availability, quality and comparability of data on the core set of ICD-9 codes have been evaluated. A more detailed comparison has been made between two Member States (Sweden and the Netherlands) that both rely on their General Mortality Register for defining drug-related deaths. Finally, attention has been paid to the introduction of the ICD-10. In case the data were ambiguous or missing, focal points have been contacted for clarification.

2. 2 Expert meetings

Two expert meetings were organised. The first operative meeting took place on May 29-30, 1998 with a small group of experts to discuss an interim report on the first stage of the project, and to prepare a final meeting with experts of all Member States. Representatives of the WHO and Eurostat were invited to exchange information and discuss possibilities for future co-operation. The following participants have attended the operative meeting:

- Mrs Olivia Christopherson Representative of Eurostat (Luxembourg), UK
- Mr Martin Donoghoe   Representative of the WHO, Geneva

- Mr Henrik Saelan   Co-ordinator Task 3.3,Copenhagen, Denmark
- Mrs Anna Fugelstad   Centre for Dependency Disorders, Stockholm
- Mr Colin Taylor   National Addiction Centre, London
- Mr Julian Vicente   EMCDDA, Lisbon
- Mrs Margriet van Laar, Co-ordinators, Trimbos institute, Netherlands
- Mrs Wil de Zwart

On June 29-30, 1998 a second meeting took place with experts of the EU Member States to discuss the proposed standards for data collection and other recommendations to improve the quality and comparability of drug-related death data. The following experts have been nominated by their national REITOX focal point:

Country	Expert
Austria	Mr Rainer Eigner, Federal Ministry of Labour, Health & Social Affairs, Vienna
Belgium	Dr Mark Vanderveken, Concertacion Toxicomanies Bruxelles, Bruxelles
Denmark	Mr Henrik Saelan, Copenhagen
Finland	Prof Erkki Vuori, Helsinki University, Dept. of Forensic Medicine, Helsinki
France	Mr Eric Jougla, INSERM, Le Vesinet
Germany	Dr Heinemann, Institut für Rechtsmedizin, Hamburg
Greece	Mr Georges Kanatas, Psychiatrist, collaborator Greek Focal Point
Ireland	Dr Mary Heanue, Central Statistics Office, Cork
Italy	Mrs Teodora Macchia, Instituto Superiore di Sanita, Rome
Luxembourg	Mr Alain Origer, Ministère de la Santé Service d'Action Socio-Therapeutique
Netherlands	Mrs Margriet van Laar (focal point), Mrs W de Zwart, Trimbos Institute
Portugal	Mrs Sofia Freire, Observatorio Vida, Lisboa
Sweden	Dr Anna Fugelstad, Centre for Dependency Disorders, Stockholm
Un. Kingdom	Mrs Sue Kelly, Office for National Statistics, London

Mrs Sue Kelly also represented Eurostat during the meeting. There was no expert from Spain. Two experts from the CEEC countries (Mr Z Fulop from Hungary and Mr Navickas from Lithuania) attended the meeting within the framework of the PHARE project on Drug Information Systems.

2.3   Questionnaire

Based on the outcome of these two expert meetings a questionnaire has been developed to determine the feasibility of implementing standards for data collection from General Mortality Registers (Part A) and from Special Registers (Part B), with the final aim to reach consensus on a core data set. Part C aimed to obtain background information on past or planned initiatives in the EU Member States to examine and improve their data on drug-related deaths, for example by means of validation studies, setting up of national working groups. The results will be presented in a separate report.

3 OVERALL AVAILABILITY AND QUALITY OF DATA

Broadly speaking data on drug-related death can be obtained from national Statistics of Causes of Deaths or General Mortality Registers (GMRs) and/or from Special Registers (SR) or drug-reporting systems hold by the police or forensic institutions (see table 2). When both types of registers are available, the Special Registers are commonly seen as the most reliable and complete source. Whereas case definitions of drug-related deaths vary widely between countries as regards both systems, national registers would allow for the most standardised and comparable way of collecting data. However, underreporting is generally seen as one of the main limitations of national registers, unless specific measures have been taken, such as the addition of a specific form to the death certificate, or when the national register is fed by data from Special Registers.

Table 2 Availability of data from National Causes of Deaths Statistics (ICD-9) and Special Registers (SR)

	ICD-data	Regular ICD reporting	Special Register	Cover-age SR	SR-data available	Most reliable
Austria	Yes	no	yes	national	yes	SR
Belgium	Yes	no	yes	national	yes	SR
Denmark	Yes	no	yes	national	yes	SR
Finland	Yes	yes	yes	national	yes	SR
France	Yes	no	yes	national	partly	SR
Germany	Yes	no	yes	national	yes	SR
Greece	Yes	no	yes	national	yes	SR
Ireland	Yes	yes	no	-	no	GMR
Italy	Yes	no	yes	national	yes	SR
Luxembourg	No	no	yes	national	no	none
Netherlands	Yes	yes	yes	local	yes	GMR
Portugal	No	no	yes	national	yes	SR
Spain	Yes	no	yes	local	yes	SR
Sweden	Yes	yes	no	local	yes	GMR
Un. Kingdom	Yes	no	yes	35 juris-dictions	no	none

GMR=General Mortality register, SR= Special Register

Table 2 shows that most countries have national registers based on the ICD (9th or 10th edition) to record causes of death. However, only four use these data actively to monitor drug-related deaths: Finland, Ireland, The Netherlands and Sweden. Data from Special Registers have been obtained from some twelve countries, nine of them having a national coverage. Ten countries consider their Special Register as the

most reliable instrument in reporting data on drug-related deaths. Luxembourg has neither ICD-based data (system on vital statistics is incomplete) nor data from special registers. The UK (Home Office) had a SR until 1994, but it fell in disuse following the introduction of charges by one of the information providers. The system revived recently under management of the national programme on Substance Abuse Deaths, and data are awaited. Overdose data from France has been obtained from police records (OCRTIS), but more data is potentially available on contributory causes of death (INSERM) and AIDS (RNSP). Appendix 8 gives an overview of the authorities in charge of Special Registers.

Only few focal points have as yet used the standardised tables presented in appendix 1. The remainder did not use the specific format but included data in their national reports. No data have been obtained from Luxembourg. Data from Finland have not been provided in accessible form (graph only).

3.1 Case definitions

Case definitions appear to vary widely between countries, both with regard to the selection of ICD codes from General Mortality Registers and causes of death included in Special registers. Almost all countries include drug overdoses, drug intoxications or direct drug-related deaths in their definition but the data are not always (further) differentiated by cause of death, which reduces possibilities of comparing data. Indirect causes of death, such as traffic accidents, or natural causes of death, such as AIDS and other infectious diseases are included by Austria, Spain and Germany.

Table 3   Case definitions of drug-related deaths

Country		Case definitions relating to main source of information
Austria	SR	Direct and indirect casualties: • death by overdose of drugs or psychotropic substances • suicide of drug users/addicts • death by AIDS or other diseases caused by drug use • accidents of drug users/addicts • death of drug users/addicts by unknown causes. Overdose is differentiated into morphine overdose and pharmaceutical overdose. Since 1995, the overdose is differentiated by a) narcotic only, b) polydrug intoxication including narcotic drug and c) (multiple) drug intoxication without narcotic drug.
Denmark	SR	Deaths which have been reported to the police where the manner of death was accidental or suicide and where the death was directly or indirectly caused by: • abuse of illegal drugs • abuse of other substances where the deceased was a known drug user • abuse of substances which are not illegal but which are consumed with a view to intoxication (e.g. sniffing solvents).
Finland	SR	Sudden and unexpected deaths in which drugs are found in samples investigated by forensic toxicologists (medical examiners).

France	SR	Overdose in the strictest sense of the term and accidents directly or indirectly linked to the conditions in which the substance was administered.
Germany	SR	Register includes • deaths following intentional or non-intentional overdose • deaths following diseases (e.g. AIDS, hepatitis) as a result of long-term abuse • suicide resulting from despair about the circumstances of life or the effects of withdrawal symptoms • fatal accidents suffered by people under the influence of drugs.
Greece	SR	Direct drug-related death caused by overdose or by the synergic activity of different drugs (such as psychoactive medicines and alcohol)
Ireland	GMR	Cases included the national register on causes of death with drug dependence (ICD-9 304) or 965 (poisoning by analgesics, antipyretics and antirheumatics) as underlying cause of death. Age range 15-49 years. There is underreporting because the question as to whether the death is drug-related remains unasked in case of death due to natural causes.
Italy	SR	Deaths (presumably) caused by acute poisoning by drugs (single or poly substance). Not included are suicide, homicide, accidents or natural death as a principal cause (unless evidence for excessive amounts of drugs in body fluids).
Luxembourg	SR	Lethal intoxication, voluntary or accidental, caused directly by the abuse of illicit drugs or by any other drug in the victim is considered a regular consumer of illicit drugs.
Netherlands	GMR	Cases defined by ICD-9 codes as underlying causes of death: 292 (drugs psychosis), 304 (drug dependence), 305.2-9 (nondependent drug abuse), E850.0 (accidental poisoning by opiates and related narcotics). E854.1-E854.2 (accidental poisoning by hallucinogens and psychostimulants). Homicide and suicide are excluded.
Portugal	SR	Deaths due to drug overdose and related to drug consumption.
Spain	SR	Deaths due to acute reactions following non-medical and intentional opiate or cocaine consumption, in six major cities. From 1996 onwards, deaths due to acute reactions following consumption of any psychoactive substances are included. Age range: 15-49 years.
Sweden	SR	Cases defined by ICD-9 codes 965.0 (opiate poisoning) , 968.5 (cocaine a.o. poisoning), 969.6 (poisoning by hallucinogenics), 969.7 (poisoning by psychostimulants) and 304 (drug dependence) as underlying or contributing cause of death.

GMR = General Mortality Register, SR = Special Register. No information available for Belgium and the United Kingdom

3.2   Trends

Trend data based on the main source of information are available as of 1985 from six countries (Denmark, France, Spain, Germany, Sweden, the Netherlands), from Italy (as of 1986), from Greece and Portugal (as of 1988) and from Austria (as of 1989). The presently available data suggest that the number of drug-related deaths has risen over the past decade in most countries, sometimes rather suddenly (Austria, Greece, Italy), or more slowly (Sweden, Denmark) while no clear pattern could be observed for the Netherlands. A tendency towards a downward trend has been observed in the past few years in Austria, France, Italy and Germany. Whether these trends can be considered as 'true trends' or as random variations remains to be seen. In some countries 'overdose' cases are relatively rare events and the magnitude of the variations is too small to allow definite conclusions.

The interpretation of trends is generally difficult because of the multitude of possible explanatory factors. In Denmark, it has been questioned whether the increasing trend (among 25-49 year olds) could be attributed to an increased death rate or to an increase in drug use prevalence (Saelan, 1997). As results from cohort studies indicated that there was no significant change in annual death rates, the increasing number of drug-related deaths was seen as an indirect indicator of a rising prevalence of drug abuse. In Greece, the remarkable increase in drug-related deaths may possibly represent the consequences of the spread of the drugs epidemic in this country, which is consistent with epidemiological studies on drug use. The increase (38%) in overdose cases (mainly heroin) in Italy from 1994 to 1995 could be due to several causes, such as the distribution of high purity heroin, the progressive ageing of habitual heroin users and the use of a combination of drugs. In France the growth in mortality from 1990 to 1994 has been suggested to reflect an increasing number of drug addicts, a sign of deterioration of their health or a sign in evolution in patterns of substance use. It is also possible that the registration of drug-related deaths has improved.

Other factors that may influence trends are changes in autopsy frequency, transition from one version of the ICD to the other and variations in coding practice. Regarding the last factor, for example, it has been noted by Statistics Netherlands that E-codes were for some period recorded as underlying cause of death only, while with the change of medical examiners E-codes could be used as both underlying and contributing cause. The precise impact of these variations on trends in drug-related death rates has not yet been systematically investigated.

3.3   Age and gender breakdown

Data on gender and age have been obtained from most countries but in a quite unsystematic way. Focal points rarely provided data broken down according to the age categories recommended by the EMCDDA, and the level of breakdown varied between countries, i.e. has been given as a function of the total number only or also

specified by cause of death and gender. Improvement in this regard is expected to be relatively easily realised as far as ICD based Vital Statistics are concerned. When numbers are low, as is for example the case in Ireland, there may be problems with the level of breakdown. This is because conditions under which information is provided by national statistical centres may stipulate that categories with one case only can not be given for reasons of confidentiality. Most other registers also record age and gender but the degree of access to the register, and relationship between focal point and information source may determine the ease with which data can be obtained and analysed according to the required standards.

Male drug deaths feature in most registers (80-93%) compared to female cases. In general no specific change in sex ratio is seen over the years. In Italy a steady increase of the proportion of 'elderly' deceased has been observed in the past decade, i.e. the 'over-thirties' now represent more than half of all drug deaths. A rise in average age has also been reported by Denmark. In Austria no clear trend could be observed although older age groups tended to account for an increasing number of drug casualties in the past few years.

3.4   Toxicological data

Information on the frequency of post-mortem exams (particularly toxicological analyses) may be important in understanding possible differences in mortality rates between countries. However, the relationship between concentrations of drugs detected in bodily fluids (or hair) and 'death' is not always straightforward. Problems in this regard have been discussed repeatedly, reason why the term 'overdose' is considered ambiguous (WHO, 1993; Frischer, 1994). Still, toxicological analyses are usually seen as indispensable in all questionable drug-related deaths. Consistent with this view, a low frequency of such analyses is assumed to be associated with a high risk of underreporting. It should be noted, however, that a toxicological screening is usually not the only assessment for determining whether a case is 'drug-related' and hence whether it is included in a (special) registry. For example, external signs of addiction like needle marks, organ lesions, data from police reports on the circumstances of death, a history of drug abuse or information from relatives and hospital records may be used too to declare a death 'drug-related', even in the absence of a positive toxicological test (Fugelstad, 1997).

In most countries statutory provisions have been formulated to regulate in which cases post-mortem examinations have to be carried out (see table 4). The percentage of cases confirmed by toxicological analyses varies between countries, as far as information has been provided. In Finland and Portugal, cases are only included in the register when autopsy and toxicological analyses have been requested by legal authorities (medico-legal investigations). Confirmation is therefore near to 100%. However, this figure is only relevant for the (autopsy) cases included in the register, which may constitute only part of the total number of drug-related deaths. In Germany, the percentage of post-mortem exams increased steadily in the past year, reaching a percentage of 84% in 1996. This development has been said to

raise the proportion of certified and differentiated causes of death compared to previous years, and to enhance the visibility of the contribution of synthetic drugs and substitution drugs. A local study in Sweden (Stockholm) revealed that about 90% of *all* cases included in the national cause of death register from 1985-1994 were examined forensically, with the addition of toxicological analyses in all cases except in deaths occurring in hospital or in cases with advanced bodily decomposition. In France, toxicological data were available for 94% of all overdose deaths in 1997. The large majority of cases involved opiate overdoses (82% in total; 72% concerning heroin only). Cocaine was detected in 19% of the cases and amphetamines (excluding ecstasy) in 4%.

Table 4   Regulations for initiating post- mortem exams and proportion of cases investigated

Country		
Austria	SR	Forensic autopsies are conducted if 1) it is uncertain if the death has a natural cause or is caused by an offence, and 2) in case of suspected infectious disease. Cases included in the register are confirmed by toxicology (%?). Once a year the Ministry of health and Consumers Protection asks the Departments of Forensic Medicine for copies of autopsy and toxicology.
Denmark	SR	Almost all unnatural and unexpected deaths suspected to be connected with drugs are submitted for forensic investigations, including medico-legal autopsy and toxicological analysis. Investigations are less frequent in case of natural deaths. The police decides whether autopsy is conducted because they pay. The precise proportion of suspected drug-related deaths investigated by post-mortem exams is not known.
Finland	SR	Medico-legal investigation is police matter if: 1) death is not known to be caused by disease, 2) in case of criminal act, accident, suicide, poisoning, occupational disease, treatment, 3) sudden and unexpected death. Forensic autopsy takes place if police asks for it. Register includes only cases in which autopsies have been performed.
Germany	SR	Any hint for unnatural death, in most federal states also the statement "unclear death" on death certificate enforces involvement of police. Unnatural death, suicide or result of another persons influence/action. Forensic autopsy is a decision of public prosecutor according to suspicion of unnatural death. Each unnatural death in case of following judicial inquiries. The public prosecutor has to represent 'public interest'. The proportion of cases in register investigated by post-mortem exams (incl. toxicology) was 75% in 1995 and 84% in 1996.
Greece	SR	There is a statutory provision that a forensic autopsy should be initiated in any case of sudden and unexpected death or violent death. Everyone who dies within the Greek territory and has a toxicological screening positive for drugs is included in the register.

Ireland	GMR	There is a statutory provision (coroner's Act, 1962): the coroner can refer the case for a forensic autopsy/post mortem at his/her discretion of the need for this further examination. Histological and toxicological tests are asked for by the coroner if it is felt to be necessary. The frequency of exams in case of drug-related death is not known. Post-mortem exams are rule when death occurs under suspicious circumstances, and further investigated in case of unnatural death.
Italy	SR	Any time a clear medical cause cannot be detected, the general practicer has to inform judicial authorities of the deaths. There is no statutory provision for initiation of a forensic autopsy: it is demanded to the authority of a judge. Until 1992 cases assumed by police to be drug-related were included in register on empirical basis. Since 1992, part of the cases are verified by medico-legal data (anatomical, pathological, toxicological exams). 34% in 1995.
Netherlands	GMR	Forensic autopsies are done in all cases on un-natural death or suspicion of it, when legal authorities (public prosecutor) think it is necessary and order it by force of law. The proportion of exams in case of suspected drug-related death is not known.
Portugal	SR	Toxicological analyses are performed in 100% of the cases included.
Spain	SR	Register includes all (unnatural) deaths in which there is judicial intervention. All cases are examined by medical pathologist. Toxicological analyses are mostly conducted (percentage not known) but lack of data are no ground for exclusion.
Sweden	GMR	According to Swedish law all cases where the influence of drugs is suspected or has to be excluded have to undergo forensic examination. The police decides. Proportion of cases investigated by pm exams: 90% in Stockholm.
Un. Kingdom		According to the Coroners Act of 1867-1988, forensic autopsy is indicated in cases of sudden, unexpected or suspicious death. 140,000 forensic autopsies each year.

In summary, the large majority of overdose cases concern deaths associated with the use of heroin, whether taken alone or in combination with other drugs. An increase in deaths associated with multiple drug use has been noted in France and Austria.

3.5   Agreement between GMRs and SRs

Agreement between both types of registers may in part be determined by the degree of information exchanged. In Germany agreement at an aggregated level is relatively high although there is no regular feeding of data from special police registers into the national death registry. In Sweden close correspondence between the general and special register (at a local level) is found, which has been attributed to the fact that drug-related deaths in both registers are certified by forensic examinations. In Austria, figures from the special register are systematically higher and agreement is less clear because there is no information exchange. Differences in case definition hamper meaningful comparisons although a more differentiated approach (i.e. comparing overdose cases only) might reveal better consistency. Forensic findings are not routinely reported to the national register in Greece. Great disagreement has been reported between the registers until 1990 when a lot of cases were lost for the

national register. In the past years there is quite good agreement as far as trends are concerned. The reasons for this shift have not been indicated.

There is no Special Registers with a national coverage in the Netherlands. Yet a comparison between overdose data from local registers in the cities of Amsterdam and Rotterdam, and 'corresponding' data from the national register, suggests a serious level of underreporting. The reason is not known. Possibly cases 'disappear' somewhere in the national register. That means, they may fall outside the range of codes commonly used to report on drug-related deaths.

Despite deviations in terms of absolute numbers of drug-related deaths, trends in data from both registers are surprisingly similar in some countries. Nevertheless it remains difficult to compare data from special registers with data from causes of death statistics as long as classifications, definitions and inclusion criteria are so different. Coding of cases from Special Registers according to ICD criteria would create a basis for comparison. This would also give information on the spread of drug-related deaths over ICD-codes, and whether they would be discernible as such from the national register.

3.6 Underreporting

Various factors have been documented in the literature underlying non- or underreporting. Some examples are the illicit nature of substance use, lack of training in recognising the problem, and lack of resource and expertise in systematic data collection. Further, coroners may not mention 'drugs' on the certificate in order to spare the family, and nosologists or coding experts at national statistical centres who classify death certificates may have different 'coding conventions', giving rise to artificial variations between countries.

Precise information on the degree of underreporting of drug-related death is limited. Underreporting is commonly reported but rarely quantified unless data are available from validation studies, such as carried out in Denmark, Spain and Germany, where percentages may show considerable geographical variation. In France, the level of underreporting in of overdose cases into their Special Register has been estimated at 12%. Interestingly, in some countries the number of drug-related deaths seem to be 'overestimated' rather than underestimated in national registers. For example, in Denmark, a total of 393 drug-related deaths have been recorded in the national Death Register and the police statistics in 1992, of which 47% only appeared in the Death Register (Saelan, 1997). A closer examination revealed that just a minority belongs to the typical 'addicts population' whereas the large majority consisted of older, mainly female, deceased. Restricting the age range to an upper limit of 39 years almost totally excluded these deaths. A comparable experience has been reported in Sweden (Stockholm). That means, the official cause of death register and the special register appeared to cover to some extent different populations when concerning average age, percentage of females and causes of death. In a validation study in the Stockholm area, the population selected from the official register turned

out to be relatively heterogeneous, including also prescription drugs and non-habitual methadone and morphine intoxications, whereas the forensic register had a rather narrow range of what is registered as drug-related as only illicit drugs are included (Fugelstad, 1997).

4 DRUG-RELATED DEATHS ACCORDING ICD-9 CODES RECOMMENDED BY TASK 3.3

Apart from two countries (Sweden and Germany) none of the focal points had provided data on ICD-9 codes through the detailed set of tables sent by the second half of 1997 to standardise data collection (see Appendix 1). Hence it was decided to analyse data obtained from the table below that was sent within the framework of subtask 3.3 an attempt to test the feasibility of the standardising data collection at the level of ICD-9 codes extracted from GMRs.

Drug-related deaths in countries of the European Union, based in the National Registers of Causes of Death. 1985-1995

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
E850-E858											
E980.0-E980.5, 965											
304											
Total											

The codes correspond to the ICD-9 (International Classification of Diseases, 9[Th.] edition)

There was no request for a gender and age breakdown, so information on these items is largely missing. However, as age and gender are usually recorded in General Mortality Registers, the data are potentially available and may be assessed in a next phase. The contribution of some countries is rather outdated but it is expected that more recent figures will be provided with a new data collection round.

Eleven countries provided data, which in ten cases were suitable for comparative purposes. For France, Portugal and Spain the reasons for not providing data are not known. Portugal and Spain have a national register; information on the French situation could not be traced during this phase of the project. The register in Luxembourg seems to lack national coverage.

Problems in matching the exact task 3.3 ICD-9 codes were common. Some countries added additional codes which was only a problem when the data were not given separately, and some countries seemed to have made some typographical errors (E965 or 956 instead of 965). However, it is not known whether their data correspond to the intended or error code. Data from the UK was not used because code 304 has been combined with 305 (nondependent substance use) which may also include alcohol and tobacco. Denmark provided data on ICD-8 codes, matching ICD-9 codes as much as possible but there may be some deviations. The ICD-10 has been implemented in 1994 and a new matching problem emerges. This is also the case for the Netherlands (as of 1996), Finland (as of 1996) and Sweden (as of 1996).

Table 5   Availability of data on ICD-9 codes according to task 3.3 recommendations

Country	Data task 3.3	Years	Data provided
Austria	yes	1985-1996	304; E850-E858; E980.0-E980.5 965 (separate and conditional to E-codes)
Belgium	yes	1985-1992	304; E850-E858; E980.0-E980.5, (E)965
Denmark	yes (ICD-8,10)	1985-1993 1994-1995	E850-E859; E980; 304 (ICD-8) X40-44,Y40-57;Y10-14;F11-16,18-19 (.1)
Finland	yes	1985-1995	304; E850-E858; E980.0-E980.5,965
France	no		?
Germany	yes	1985-1995/96	304; E850-E858; E980.0-E980.5,965
Greece	yes	1985-1995	304; E850-E858; E980.0-E980.5, 965 (separate)
Italy	yes	1985-1992/1993	304; E850-E858; E980.0-E980.5, 965 (separate)
Ireland	yes	1985-1995	304; E850-E858; E980.E980.5
Luxembourg	no		incomplete register
Netherlands	yes	1985-1995	304; E850-E858; E980.0-E980.5 ICD-10 as of 1996
Portugal	no		?
Spain	no		?
Sweden	yes	1985/7-1995	304; E850-E858; E980.0-E980.5,965 (combination). E-codes: without 304 as contributing cause.
UK	yes, but not used	1988-1995	304 + total 305 E850-E858; E980.5, 965 ; E950.

Difficulties were obviously related to ambiguities about how to interpret category "E 980.0-E980.5, 965". It was not clear whether code 965 should be extracted separately and added to the E-category or whether 965 should be used as conditional. In the Netherlands this code is always combined with an E-code. When extracted without specification, cases may be double-counted with E-codes, which has also been brought up by Austria. When extracted as contributing cause, the underlying cause of death may be quite irrelevant. For example, in the Netherlands quite a lot of persons may die of cancer as underlying cause of death and 965 as contributing cause (poisoning by analgesics), usually combined with E850.

Some countries mention explicitly that they have handled double-counting (e.g. Austria, Sweden), or this was suggested by the way their data have been presented (Greece). However, for most countries it is often not known what procedure has been followed precisely. Further, as there were no instructions or guidelines sent along with the table, it can be questioned whether countries were aware of the fact that only underlying causes of death had to be included.

Conclusion: for comparative purposes data should be extracted in the same way, emphasising the need for clear instructions.

For the time being, we have ignored possible biases due to methodological imperfections, and selected data that matches the task 3.3 core set of codes best. Data and figures per country have been given in Appendix 3, both as absolute numbers and as proportions per code class from the total number. An overview of all countries has been given in Table 6a (absolute numbers) and Table 6b (rate per million of the total population). Age-specific rates will be calculated when the essential data have been collected.

The results point to an upward trend in the number of drug-related deaths in most countries. In an absolute sense drug-related deaths are most common in Germany but calculated per 1 million inhabitants, Denmark and Finland score highest. The last finding is quite interesting because Finland is known to have a very low rate of illicit drug abusers. One explanation is related to the fact that the proposed core set of ICD codes contains prescription drugs, such as benzodiazepines, that are typically used in an elderly (female) population with quite different characteristics compared to the typical illicit drug addicts population. Such an explanation is well in agreement with findings from studies in Denmark and Sweden (see §3.6).

Table 6a Number of drug-related deaths according to ICD-9 codes 304, E850-E858, E980.0-E980.5.

Note 1: the data have not yet been extracted in the same way in each country. **Note 2**: the selection of ICD codes is still under discussion. Unusual high rates (e.g. Finland) may be explained by the inclusion of drugs that are not commonly known as drugs of abuse, or by abuse of prescription drugs, such as benzodiazepines, in a typical elderly (female) population.

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Austria	64	36	63	82	65	64	90	140	179	195	195	208
Belgium	82	98	86	109	102	104	146	140				
Denmark	277	236	210	242	220	236	241	245	292	347	301	
Finland	91	137	159	175	225	228	254	221	235	239	257	
France												
Germany*	421	384	476	683	853	1376	2008	2038	1725	1677	1594	1788
Greece	23	21	22	29	60	49	73	102	65	156	214	
Italy	444	405	498	712	913	1425	2081	2140				
Ireland	30	16	9	25	25	17	22	25	42	44	80	
Luxembourg												
Netherlands	84	83	55	54	57	69	63	64	69	74	53	
Portugal												
Spain												
Sweden	98	101	150	158	142	154	166	165	182	179	209	
UK												

* Note that the coverage has changed as of 1990 because of the unification of West- and East-Germany.

The distribution of causes of death shows an interesting pattern: code 304 (drug dependence) as (underlying) cause of death is never observed in Greece, very little

in Denmark, Finland, Belgium and - to a lesser extent - in the Netherlands. In contrast, drug dependence makes up the largest proportion of the drug-related deaths in Italy and Germany. Because of a stochastic dependence the reverse is also true, i.e. poisoning is the least frequently coded cause of death in Italy, and to a lesser extent, Germany. These findings seem to confirm findings of the previous working group.

Table 6b. Number of drug-related deaths according to ICD-9 codes 304, E850- E858, E980.0-E980.5 : rates per million inhabitants.

Note 1: the data have not yet been extracted in the same way in each country. **Note 2**: the selection of ICD codes is still under discussion. Unusual high rates, such as in Finland, may be explained by the inclusion of drugs that are not commonly known as drugs of abuse, or by abuse of prescription drugs, such as benzodiazepines, in a typical elderly (female) population.

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	pop*
Austria	8	5	8	10	8	8	11	18	23	25	25	26	7.9
Belgium	8	10	9	11	10	10	14	14					10.1
Denmark	53	45	40	47	42	45	46	47	56	67	58		5.2
Finland	18	27	31	34	44	45	50	43	46	47	50		5.1
France													
Germany						17	25	25	21	21	20	22	81.1
Greece	2	2	2	3	6	5	7	10	6	15	21		10.4
Italy	8	7	9	12	16	25	36	37					57.1
Ireland	8	4	3	7	7	5	6	7	12	12	22		3.6
Luxembourg													0.4
Netherlands	5	5	4	4	4	4	4	4	4	5	3		15.4
Portugal													9.8
Spain													39.0
Sweden	11	11	17	18	16	18	19	19	21	20	24		8.8
UK													58.0

* Population (x million). Data from Annual Report, 1997. Not controlled for annual changes in population size.

Differences in the way ICD-code 304 is applied in the different countries has been noted too by Teige (1998) in a recent report of the Cost A6 project. In some countries, such as Norway, typical overdose-deaths in known drug addicts are classified as 'narcomania' under code 304 as underlying cause of death, whereas in other countries such overdose deaths may be classified as accidental or unintentional drugs poisoning (E850-E859). In these cases code 304 may or may not be added to indicate that the drug dependence was a contributory cause of death. In fact, general coding rules imply that all deaths connected to a person's drug dependence (immediate, underlying or contributing cause of death) should be given this code. However, information regarding the deceased person's drug dependence is often lacking and the classification depends largely on what the individual doctors or medical examiners write on the death certificate.

The suggestion that different code distributions might reflect differences in coding procedures rather than actual variations in causes of death has been noticed in general in several international investigations (Jansson et al. 1997). A condition that is selected as the underlying cause of death in one country might be regarded instead as a contributory cause in another. In a Swedish study, multiple cause data have been used to detect artificial trends in underlying cause statistics, i.e. trends due to coder's selection and coding of causes (Lindahl et al., 1994).

5   DRUG-RELATED DEATHS IN SWEDEN AND THE NETHERLANDS: A CASE STUDY

To illustrate difficulties in comparing drug-related death data, statistics from Sweden and the Netherlands have been contrasted. Both countries use the national ICD-based mortality register as their main source of information on drug-related deaths. When comparing data based on the 'own' selection of ICD-codes used in each country , it is clear that the number of drug-related deaths is appreciably higher in Sweden compared to the Netherlands, both in absolute terms and rates per million (mind the y-axis scaling) [1]. There is also evidence for an increasing trend in Sweden whereas the pattern observed in the Netherlands is quite stable over time.

Definition according to Statistics Netherlands (ICD-9)	Definition according to Statistics Sweden (ICD-9)
• **292** drugs psychosis • **304** drug dependence • **305.2-9** nondependent drug abuse • **E850.0** accidental poisoning by opiates and related narcotics • **E854.1-E854.2** accidental poisoning by hallucinogens and psychostimulants	• **304** drug dependence • **965.0** opiate poisoning • **968.5** poisoning by cocaine and related sub-stances • **969.6** poisoning by hallucinogenic drugs • **969.7** poisoning by psychostimulants
Underlying causes only. Poisoning includes accidental cause; homicide and suicide are excluded.	Underlying and contributory causes. Poisoning includes both accidents, suicides and homicides.

However, case definitions are quite different in both countries. For example, poisoning in Sweden involves both accidental, suicidal and homicidal cases whereas in the Netherlands the definition is restricted to accidental cases. Further, the Dutch definition includes only underlying causes of death, while the Swedish definition also includes contributory causes. In the Netherlands this difference is probably only meaningful for codes 304 and 305.2-9 as these codes are rarely used as underlying cause of death, but more frequent as contributing cause (at least 304). E-codes are used largely as underlying cause of death, so this may limit bias due to excluding E-codes as contributing cause. Further, hardly any cases are counted for code 292 in the Netherlands, so the addition of this code in the Dutch definition is not likely to explain differences between countries. Still, no valid conclusions can be drawn using these case definitions.

Next, we have compared data when applying codes recommended by task 3.3. This selection involves underlying causes of death, codes 304, E850-E858 and E980.0-E980.5. Note that procedures to extract the data did not match exactly (see also comments in Appendix 4). Disregarding the possible impact of this procedural bias, it is clear that the difference in number and rate of drug-related deaths is largely maintained between countries. However, the magnitude decreased slightly which can be attributed to the higher numbers of deaths in the Netherlands under the task 3.3

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[1] All annual rates have been based upon one figure of the population size; Annual Report 1997). ICD-9 has been introduced in 1987 in Sweden, so data before this year are not comparable.

definition. Still, trends in the Netherlands show a reasonable match between the two data sets.

For Sweden quite good agreement exists between aggregated data provided under the 'own' and task 3.3 definitions, both as regards absolute numbers of drug-related deaths and their development over time, despite differences in applicated codes. However, the agreement may be merely accidental, or be attributed to overlap between cases counted both under an E-code and under poisoning (960-979). It is also possible that the data load high on one or more codes, common to both definitions, thus explaining most of the variation.

Another option for a comparative analysis is to extract cases from the Swedish register according to the Dutch ICD-9 selection and vice versa. However, this is only legitimate when coding procedures are comparable, and distributions of causes of death are not too different. It might also be considered to extract cases on a broader definition - based on a combination of 'own' codes selected in each of the countries - while controlling for double-counting.

Table 7   Data according to 'own' selection of ICD-9 codes in the Netherlands and Sweden, and according to the subtask 3.3 selection of ICD-9 codes

NL	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Definition NL	40	42	23	33	30	43	49	43	38	50	33	
Task 3.3	84	83	55	54	57	69	63	64	69	74	53	
Sweden	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Definition SW			141	125	113	143	147	176	181	205	194	
Task 3.3	98	101	150	158	142	154	166	165	182	179	209	

Data according to Dutch and Swedish definition : rate per million

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Definition NL	2,60	2,73	1,49	2,14	1,95	2,79	3,18	2,79	2,47	3,25	2,14	
Definition SW	0,00	0,00	16,02	14,20	12,84	16,25	16,70	20,00	20,57	23,30	22,05	

Data according to task 3.3 definition: rate per million

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Netherlands	5,45	5,39	3,57	3,51	3,70	4,48	4,09	4,16	4,48	4,81	3,44	
Sweden		11,14	11,48	17,05	17,95	16,14	17,50	18,86	18,75	20,68	20,34	23,75

In explaining differences in mortality rates between Sweden and the Netherlands the following factors should be considered:

- In Sweden, 30% of the drug-related deaths are based on the contributing cause of death, whereas such cases are not included in the Dutch statistics.

- According to Swedish law, all cases where the influence of drugs is suspected or needs to be excluded have to undergo a forensic examination. Local follow-up studies of known drug addicts showed that up to 90% of those who died were examined forensically, also including a toxicological analysis. For the Netherlands, forensic examinations are carried out in case of (assumed) unnatural death, but only when legal authorities consider it to be necessary. The precise percentage is not known, but local studies indicate a percentage in the range of 30-40. Although these figures can not extrapolated directly to the national level, this difference may contribute to the higher proportion of drug-related deaths detected in Sweden.

Comparison between Sweden and the Netherlands
using different case definitions
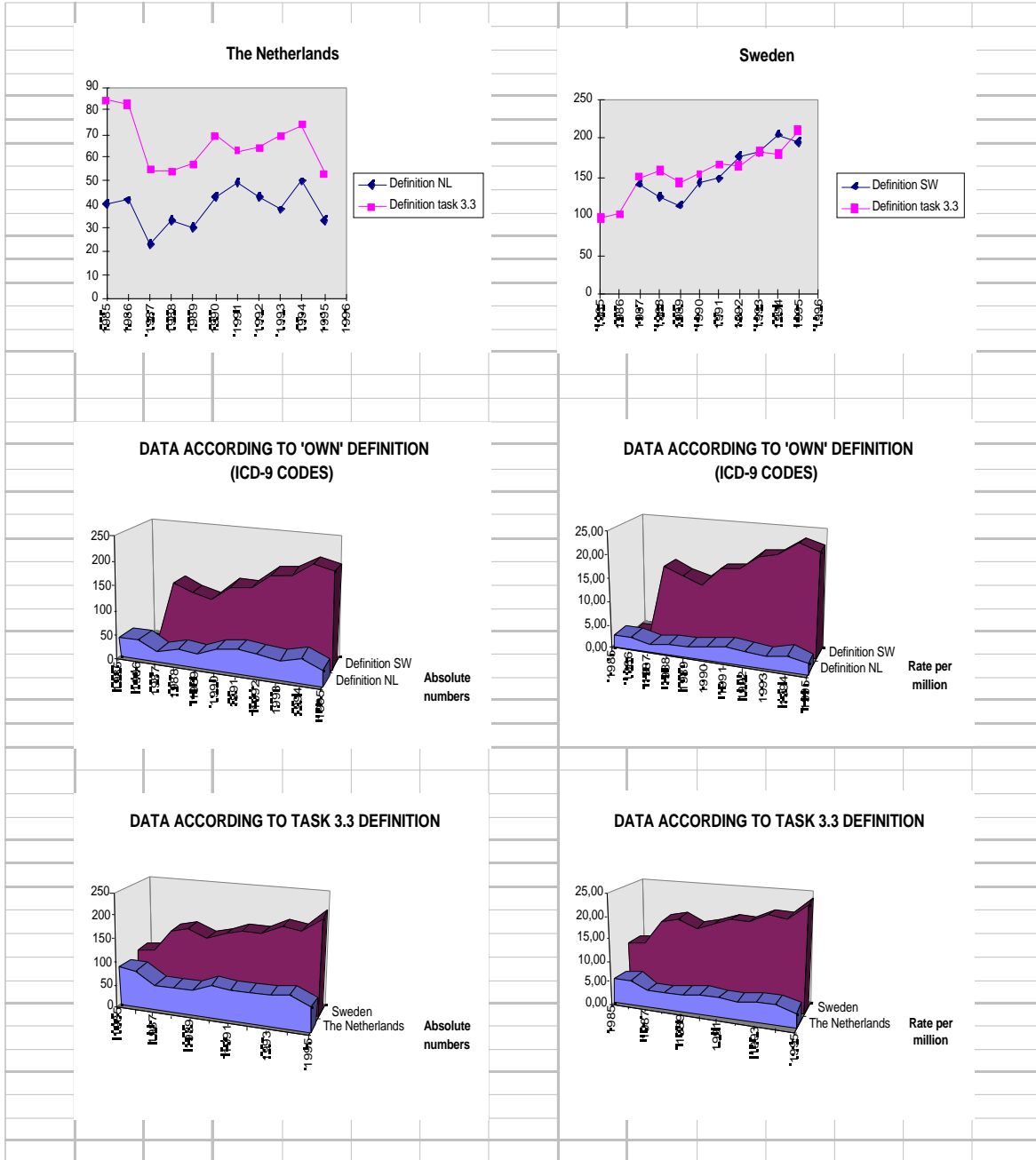
6   ICD-10

According to information of the task 3.3 working group, the General Mortality register in most countries is based on the ninth version of the ICD classification system. More precisely, eight countries presently use ICD-9 (Austria, Germany, Greece, Ireland, Italy, Portugal, Spain and the United Kingdom) and three countries have recently changed to the 10th edition of the ICD : Denmark (as of 1994, from ICD-8 to ICD-10), Finland (as of 1996) and the Netherlands (as of 1996). There is no information on Belgium and France, and conflicting information has been obtained as regards Luxembourg. In the near future most countries will implement ICD-10.

Changes brought about in the tenth edition are suggested to enable a more adequate classification and coding of drug-related deaths. However, there is presently neither agreement on which codes precisely should be used to cover 'drug-related deaths' nor how relevant ICD-9 codes, such as put forward by the task 3.3 working group, should be converted to ICD-10 codes as to maintain trends with ICD-9 coded data. Some difficulties have been discussed by Room (1997) of the Addiction Research Foundation in Canada. For example, the newly in ICD-9 introduced concept "pathological intoxication" -referring to idiosyncratic reactions to relatively small quantities of a drug - disappears as a four character category in ICD-10. Pathological intoxication continues as a five-character code for alcohol but not for drugs. On the other hand, some concepts are newly introduced, such as "harmful use". Relevant literature on this topic is limited. The utility of a specific conversion programme issued by the WHO has not yet been explored by the present working group. A list of ICD-10 codes referring to drug-related causes of death is given in Appendix 4. Lines printed bold are suggested to be relevant within the present framework (open for discussion).

A main amendment in ICD-10 as regards drugs is the insertion of a specific subsection 'drug-related disorders' under the chapter "Mental and behavioural disorders". Relevant codes are F11- F16 and F18-F19. The third character refers to the *substance* involved: F11 opioids; F12 cannabinoids; F13 sedatives/hypnotics; F14 cocaine; F15 other stimulants, including also caffeine and ecstasy; F16 hallucinogens; F18 volatile substances and F19 use of multiple psychoactive substances. The fourth character specifies the *clinical state:* .0 acute intoxication; .1 harmful use; .2 dependence syndrome; .and other disorders (.3 -.7).

The decision to put the type of drug in the third character of the ICD-10 is a change from past practice. According to Room (1997), this hold implications for data reporting. Traditionally most statistical reporting and research is based on three character ICD codes (e.g. based on Basic Tabulation Lists) and subsequently information is lost on the class of psychoactive drug involved. A preliminary proposal of the WHO (WHO/PSA/93.14) regarding the use of ICD-10 codes in direct drug-related deaths is as follows:

- **F10.0-F19.0** ("acute intoxication") should be used whenever *drug dependence or drug abuse* is mentioned. When there is no evidence of dependence or abuse, "overdose" cases (or preferably 'intoxication') should be classified as "poisoning".

- **X40-X49** codes should be used when not specified whether "overdose" was accidental or with intent to harm, in case it is assumed to be accidental.

- **Y10-Y19** (event of undetermined event) should only be used when available information is insufficient to enable a medical or legal authority to make distinction between accident and self-harm.

- **T36-T50** may be used in addition to all cases to provide greater specificity regarding the substance involved.

The mentioned X and Y categories encompass a broad range of drugs, only a few of them being relevant in the present context. For example, all drugs mentioned under X42 are relevant (cannabis, cocaine, codeine etc.), X 41 includes barbiturates (relevant) as well as neuroleptics and antidepressants (questionable) and X48, including various types of pesticides, is questionable as a whole. When no T code is added it seems necessary to further specify the broad X and Y categories and to use fourth-character subdivisions.

Whether ICD-10 is an improvement to ICD-9 remains to be seen. The harmonising of coding rules offers the opportunity to increase comparability of data. This does, however, not remedy basic problems regarding the diagnosis and detecting of drug-related deaths.

7　INTERNATIONAL CO-OPERATION AND INFORMATION EXCHANGE

Interest in improving the data on drug-related deaths is shared by several international organisations, such as the WHO, Eurostat and UNDCP. Although useful information on drug-related deaths has been collected in the different countries and suggestions have been made to improve data quality, progress in this area is clearly wanted.

In the past years the *WHO* has prepared two reports on drug-related deaths (one in 1993 and another in 1998), reflecting the need for international definitions and classifications. Their basic interest is not just aimed at (epidemiological) monitoring of the problem but also to increase knowledge from a public health point of view as to prevent early death associated with drug use. In a working paper entitled "Opioid overdose; trends, risk factors, interventions and priorities for action" (1998) reference has been made to the findings of the Reitox subtask 3.3 working group. One of the priorities set by the WHO's Programme on Substance Abuse is to improve surveillance systems on drug-related deaths. This requires ''*standardised definitions* of causes of drug-related deaths that distinguish between direct and indirect causes, *standardised reporting systems*, and accurate and uniform coding, certifying and registration practices". The WHO suggests to play a role in the training of the correct application of ICD-10 codes and toxicological analysis and forensic examination. Collaboration in this area is useful.

Eurostat (Luxembourg) has close working relationships with all national statistical centres in Europe and is also involved in the collection of data on drug-related deaths. Recently, Eurostat has set up a Task Force on the Causes of Death Statistics. It might be considered to develop guidelines to harmonise ICD coding practices on drug-related causes of death in the different Member States. Eurostat is an appropriate candidate for implementing such guidelines.

During the preparatory expert meeting with representatives from the EMCDDA, WHO and Eurostat, the possibilities of joint actions have been discussed. Even among coding experts from the WHO and national statistical centres there is some confusion on how to use the recently introduced 10th edition of the ICD as regards drug-related diagnoses. In a recent informal study, experts from WHO collaborating centres in five countries (Sweden, New South Wales/Queensland (Australia), Brazil, Germany) were asked to code several examples of cases along ICD-10. Cases included 1) acute opioid overdose, 2) acute overdose by known drug abuser, 3) acute opioid intoxication and 4) acute opioid intoxication by known drug abusers. The results pointed at a broad range of codes to each of these cases. There is apparently a lack of standardisation and no 'textbook' is as yet recognised as authoritative on this issue. This is not specific to the ICD-10. Looking for example at the "Instructions for physicians on use of international form of medical certificate of cause of death' (of which the latest version has been issued in 1979), there is just one line incorporated related to 'poisoning'. WHO will be issuing a revised edition of this publication and welcomes advice and guidance in the elaboration.

As most countries will introduce ICD-10 in the near future, it is essential to work on guidelines or protocols and on the implementation of such guidelines in the different Member States. This is best achieved through concerted actions that form a major challenge for the future. There is as yet an (informal) agreement between Eurostat and the EMCDDA to exchange information. The progress and results of the present project have been communicated with participants of the Eurostat Task Force on Statistics of Death Causes at a meeting in Paris on June 8, 1998. Further, informal initiatives have been undertaken to develop a proposal for a joint project with the WHO, in order to examine and analyse differences in coding procedures between and within countries and to prepare guidelines for the application of ICD-10 codes in a standardised way.

8 DISCUSSION AND RECOMMENDATIONS

The quality and comparability of statistics on drug-related deaths can be influenced at many successive levels during the data generation process, to be broadly divided into the following three stages:
1)   identification or detection of cases
2)   data processing, classification and coding
3)   data collection and reporting

Future activities within the framework of the EMCDDA will focus in particular on the second and third stage and recommendations will be formulated mainly along these lines. The feasibility of some proposals has been addressed in a questionnaire developed after the first preparatory expert meeting. The results are not yet available. Before further discussing recommendations for improvement, it must be mentioned that the feasibility of such approaches in terms of availability of human and financial resources, or commitment and broad-based support of (inter)national and local authorities, has not been taken into account. These general requirements are nevertheless deemed of great importance, requiring full attention whenever it has been decided to initiate concrete actions.

8.1   Definitions and Terminology

The lack of a unique definition of the term drug-related death and lack of consensus regarding which types of death should be included have for long hampered assessments of drug-related deaths and comparisons across and within countries. These issues have been discussed at length during the preparatory expert meeting. Main point was whether the present project should focus on 'drug-related deaths' in a strict sense - that means, deaths assumed to be caused directly by drug use, such as poisoning -, or whether the definition should be exhaustive, including also diseases indirectly related to drug use, such as AIDS, hepatitis, or fatal traffic accidents in which drugs have been detected in bodily fluids of victims. The discussion centred in particular on HIV and AIDS because of the great impact these diseases have on mortality among drug users. For each decision regarding the scope of the term drug-related deaths, there should be a proper operationalisation and this may give rise to technical and methodological difficulties. For example, it is as yet not possible to extract data on HIV and AIDS associated with (injecting) drug use in a reliable way from General Mortality Registers. In this regard, information on HIV, AIDS or other natural causes of death is more reliably obtained from cohort studies among drug users. Another approach to be considered is linkage of databases, such as the national AIDS statistics and statistics of causes of death. However, the discussion on the which types of deaths should be included has not been conclusive as yet.

In delineating the boundaries of the present study, it may be important to consider the following dimensions:

	drug-related causes of death	all causes of deaths
drug users/addicts	A	C
general population	B	D

Data along dimension A and C is typically obtained within the context of cohort studies among drug users. Data along dimension D refers to the general mortality in the general population. Data obtained along dimension B is usually obtained from General Mortality Registers. These data refer to drug-related mortality among the general population and may as such relate to both drug addicts and non (regular) drug users. This last dimension is what we focus on in the present project.

8.2   General Mortality Registers & Special Registers

There are two main sources of information on drug-related deaths - General Mortality Registers and Special Registers - that may be co-exist in a country. Both sources have their limitations and advantages and each of them may serve special purposes. ICD based General Mortality Registers allow for a high level of standardisation and facilitate the comparison of data between Member States. These are reasons for promoting their use as a 'standard' for extracting drug-related death data at long term.

Table 8 Characteristics of General Mortality Registers and Special Registers

Characteristics	GMRs	SRs
Responsible instit.	National statistics office	Police or forensic institutions
Use of forensic data	Not common - hence less sensitive and reliable	Cases commonly confirmed by toxicological data
Information included	No information on circumstances of death	More comprehensive information, f.e. circumstances of death, poly-use
Speed of data input	Relatively slow	Relatively fast
Comparability	Relatively high because of ICD coding	Lack of international comparable coding system or case definitions
Standardisation	Relatively good, although coding procedures may differ between countries	Procedures vary within and between countries

However, the risk of underreporting, and differences in coding procedures warrant as yet some caution in using data derived from these registers. For illustration, Frischer (1997) reported that a death 'caused' by drug overdose could be coded as such, or alternatively, as due to respiratory failure. Special Registers are generally seen as providing the most reliable information, contain more comprehensive information on drug-related deaths and data input is relatively fast which makes them more suitable for preventive purposes. In particular, Special Registers are better adapted to rapidly detect mortality associated with the use of new drugs and multiple substances.

Despite the aforementioned shortcomings, ICD-based General Mortality Registers may in the long run turn out to be the most convenient type of system for monitoring long-term trends in drug-related deaths. However, the completeness and reliability of statistics on drug-related deaths derived from GMRs should be improved.

8.3　Standards for data collection

a. Core set of ICD-9 codes

During the preparatory expert meeting the core set of ICD-9 codes proposed by the task 3.3 working group has been discussed, as well as the types and levels of breaking down the data. It has been suggested to broaden the range of ICD-9 codes as to encompass the most common causes of death usually reported in the EU countries. In addition, the broad categories grouping different E-codes together have been suggested to be broken down at least at three- or four-digit level as to be more specific with regard to the drugs involved. On the one hand, this allows to trace trends in mortality due to different types of drugs, which may be relevant with regard to preventive activities and policy making. On the other hand, this differentiation allows the exclusion of drugs that are not likely drugs of abuse, such as E856 (antibiotics) or E857 (other anti-infective drugs). Moreover, collecting data at a three and four-digit level enables a post-hoc exclusion of such 'ambiguous' codes. This may be done, for example, when an analysis reveals that there is evidence for a high rate of deaths attributed to prescription drugs, among a subpopulation of elderly (female) users. As described in §3.6, studies in Sweden and Denmark have pointed at the relatively heterogeneous populations included in General Mortality Registers - whereas Special Registers may include a more restricted population of regular illicit drug users. This emphasises the importance of breaking down the data by age and gender.

There is no gold standard as regards the selection of ICD-9 codes on drug-related deaths. A literature search has revealed an example of a more differentiated system of relevant ICD-9 codes (see Appendix 5). This system has been used in several epidemiological studies in the USA. The definition of drug-related deaths applied by Kallan et al., 1998 includes

"Deaths for which at least one of the causes of death on the death certificate, either underlying or contributing, indicates abuse of psychoactive drugs. Particular ICD-9 codes are selected within the categories:
- *drug psychoses*
- *drug dependence*
- *nondependent abuse*
- *accidental poisoning*
- *suicide or self-inflicted poisoning by a substance*
- *poisoning with undetermined intent*

The definition excludes homicide, adverse effects in correct therapeutic use, and alcohol abuse…"

The feasibility of implementing this differentiated system of ICD-9 codes has been investigated. The results will be published in a separate report.

b. Underlying and contributory causes of death

There has been long discussion about the question whether underlying causes of death should be extracted exclusively or whether the data should include both underlying and contributory causes. The last option may give a more comprehensive picture of drug-related mortality. This question touches upon the previous topic concerning the types of death that should be included in the definition of drug-related deaths. When drug abuse is taken as contributing cause of death, the underlying causes may constitute a whole range of 'natural' causes of death. For example, in some studies in the USA and Spain it has been noted that in cases where drug abuse was recorded as a contributing cause only, the recorded underlying cause was almost always some from of heart disease. However, there are some drawbacks when including contributory causes of death. One of these is the risk of double-counting, as one case may be assigned both a 'drug-related' underlying and contributing cause of death. One case may also have been assigned two (or more) drug-related contributory causes of death, hence appearing twice or more in the statistics. It has also been noted that there are no specific guidelines as to the recording of contributory causes of death, and there may be wide variations in the number of contributory causes recorded by physicians (ranging from zero to six in the Netherlands). Another problem is that only few countries may be able to provide data, because contributory causes are often not included in national statistics of death causes. We can see this for example in Austria, where economic reasons play a role, or in Germany where a more fundamental issue - the monocausal interpretation of the ICD - implies that only the underlying cause of death is recorded.

c. Age and gender breakdown

Each three or four-digit code should be differentiated by gender and certain age groups. A high degree of detail is opted for as it allows not only to use a descriptive approach of presenting data, but also to apply statistical models to determine differences in trends (time series analyses) and to analyse breaks in trends, for example, following the introduction of a new edition of the ICD. However, the proposal made by the preparatory working group to break down each of the 59 three- or four- digit codes by gender and five-years age groups has been rejected during the second expert meeting because of problems related to privacy regulations. With such a fine-grained breakdown of data the incidence of empty cells or cells with just one case may be very high, which happened to be the case in Ireland during a try-out of the proposed standard. Also in other countries with a higher absolute number of deaths a breakdown by five-years age groups will be problematic. The feasibility of a less detailed breakdown, consistent with other EMCDDA epidemiological key indicators, is now being tested. Theoretically speaking, the final choice of the age groups should be based on the greatest common denominator of all age subdivisions for which data can be provided in most EU Member States.

d. Special Registers: breakdown by causes of death

Concerning special registers, it has been suggested to differentiate the data by two broad categories, i.e. 'overdose or intoxications' and 'other causes of death'. If possible data within the first category should be further specified according to the (classes of) substances involved, as to enhance the comparability of trends and allow to trace changes in relative contribution of specific causes of death, just as for the different ICD-categories. Also, the more specific the data, the more relevant for policy making and preventive activities. Based on the outcome of the final expert meeting it has been decided to test the feasibility of breaking down the data on overdose into the following major categories: 1) opiates only, 2) opiates and other substance(s), 3) other illicit drugs without opiates and 4) psychoactive medicines.

8.4   Comparative Coding Study

Results of a pilot study carried out by the working group on task 3.3 among eight participating countries revealed considerable differences in distributions of causes of death. This has also been confirmed in the present project. These findings were suggestive of variations in coding procedures, rather than reflecting actual differences in causes of death. Hence it has been proposed to carry out a study comparing coding procedures in the EU Member States. Elaborating on the three stages described in the introduction of this chapter, Bonte et al., (1985) distinguish seven stages in the process of generating data to the final practical application of statistical information. These are:

1. the diagnostic stage, i.e. when the available clinical data is used to generate a diagnosis
2. the transformation from the diagnosed disease in a series of discrete events resulting in death, and the completion of a death certificate
3. transfer of B-letter (death certificate) by physician to the municipality
4. selection and coding of the (underlying) cause of death
5. classification and coding of demographic and data, other than cause of death
6. production and publication of statistics
7. use of statistics and interpretation.

Each level forms a potential source of error. In order to improve the reliability and validity of the statistics of death causes, all levels should ideally be subjected to a careful scrutiny. As this may be a quite difficult undertaking even *within* one country, the feasibility of carrying out a cross-national comparison including all listed issues is not seen as very realistic. In setting priorities, one could start with analysing level 3 and 4. Such comparative coding studies in the different EU Member states have been for conducted for several causes of death but, according to our knowledge, not for drug-related causes of death. The methods applied in these studies could function as a blue-print for the comparative study in question. For example, Mackenbach et al. (1984) participated in a multi-country study on the comparability of death statistics on respiratory diseases, presenting a random selection of physicians in each country with ten hypothetical case histories on the basis of which they had to complete death certificates. These were subsequently coded by national coding centres and (after

translation) by a WHO reference centre. Codes of the last centre were used as a gold standard. Instead of using 'synthetic patients' one could also think about using real death certificates collected in all participating countries. It could also be considered to employ a vignette method, allowing a more sophisticated statistical analysis of those factors contributing to differences in coding. This method is highly protocolised and has not yet been applied before to address this type of research questions so its feasibility remains to be determined.

Informal initiatives have been taken by the EMCDDA and the WHO as to develop a proposal for a comparative coding study.

8.5   ICD-10: Developing and Implementing Guidelines

The precise recoding rules for the transition from ICD-9 to ICD-10 have as yet to be determined. As most countries running ICD-9 based systems have indicated to implement ICD-10 within the near future, this would create a great opportunity to develop and introduce a set of *guidelines* aiming to attune the coding of drug-related causes of deaths across the EU countries. Of course, this would address only part of the problem (coding experts are to a large extent dependent on the quality of the information recorded on the death certificates) but reducing differences in coding practice would at least reduce one source of variation in data between countries.

It is expected that the co-operation of EMCCDA, WHO and Eurostat will increase the chance that individual countries will follow common guidelines in registration and coding in the future, as a way to enhance the comparability of data. Joint actions should preferably include the development of both guidelines for registration and coding as for training programs, development of research projects, exchange of information between organisations and countries. Each organisation has its own fields of interest and possibilities. The WHO is involved in the functioning of the ICD in general, and develops activities within the framework of their special programme on substances abuse (including the issue of drug-related death). Eurostat has a broader involvement in the collecting of statistical data on a national level, both with regard to vital statistics and police registrations. One of the main objectives of the EMCCDA is to collect and disseminate comparable and reliable data on drug-related deaths, whether obtained from ICD- and/or special (police) registers. The centre promotes the creation of technical and human networks in all EU Member States, and has access to data collected directly from experts and through the focal points in general.

8.6   Validation Studies

In several countries having both a General Mortality Register and a Special Register to record drug-related death, studies have been carried out to compare and validate the data. Several examples are summarised in Appendix 6. Usually such national validation studies show substantial differences in the coverage rates of drug-related

death. The results may reveal the weaknesses and bottlenecks in the registers and function as point of departure for improvement of the recording systems under study. Therefore, it may be advised to stimulate research in this area. In the Netherlands a validation study is being prepared in which local registers of the cities of Rotterdam and (possibly Amsterdam) will be compared with records of the National Vital Statistics. In Germany a pilot study has been proposed in which a regional model for co-operation and information exchange between the police and forensic experts will be evaluated (Buhringer, 1997).

8.7   Forensic Data

The frequency and quality of post-mortem are of paramount importance for correctly detecting and classifying drug-related deaths. Such examinations may include autopsy, histological, serological, and particularly toxicological analyses. However, in this context wide variations can be noted both between and also within countries. It would be useful to examine the feasibility of concerted actions for improvement, both at international and national level. A first step would be to make an inventory of existing mechanisms and structures in each countries. Items to be discussed are resources and funding, level or organisation, involvement of national and local authorities, training and education, and academic qualifications. Further, Special Registers usually rely heavily on data from forensic examinations whereas use of such data for coding cases in General Mortality Registers is quite rare or occurs unsystematically. Hence it has been suggested to systematically forward information from Special Registers as a way to improve the reliability and quality of GMR data. The feasibility of such an approach should be examined.

8.8   National Working Groups

Given the complexities in detecting and recording drug-related deaths, it may be considered to form multidisciplinary working groups in all Member States, consisting of medical examiners, forensic experts, coroners, epidemiologists, police, representatives of health services and governmental bodies. These groups may aim to create resources and broad-based support to improve the quality of (forensic) investigations, to disseminate and implement standard guidelines and protocols for recording and coding, to facilitate the data collection and dissemination (electronically) in an organised manner and to promote educational activities. Preferably such working groups should be internationally organised as to support information exchange and maintain international standards. To increase the chance of success and to enhance efficiency, concrete tasks should be formulated. One of these tasks could be the preparation of the introduction of the ICD-10.

It has been suggested to compose such working groups through the national focal points. For the Dutch situation some preliminary initiatives have been taken with the

establishment of a working group to improve the quality of data on drug-related deaths, including officials of the Ministry of Health, national organisation of municipal health services, Statistics Netherlands and forensic medicine.

8.9 Other Recommendations

Initiatives employed in several countries to improve the quality of data on drug-related deaths should be seriously evaluated for implementation at a broader scale. For example, a Scottish study has learned that asking forensic pathologists to pay particular attention to deaths which might be drug-related during post-mortem exams, resulted in a sharp increase in the number of deaths classified as drug-related (Arrundale, 1995). A pilot study might examine whether an additional attachment to the death certificate is helpful in detecting drug-related deaths. As errors in the completion of death certificates may be common, the accuracy of death certification might be improved by means of simple educational interventions (Myers et al., 1998).

Further, the ICD classification allows for the most standardised way of data collection but a certain degree of underreporting in these General Mortality Registers may persist despite efforts to improve ICD-(10) coding practices. Hence, it could be considered if those countries that do not have a special register should be advised to develop one. Another possibility involves the promotion of co-operation and information exchange between both types of registers. The feasibility of such an approach should be examined.

Finally, cases included in Special Registers will somehow also appear in the General Mortality Register, although they may not be recognised as 'drug-related'. It might be considered to conduct a pilot study in several countries, in which cases from special registers are also classified under ICD coding rules, as to get insight into the range of ICD codes these cases may spread over. Such a study is now ongoing in Denmark.

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Appendices

Appendix 1   Tables

Appendix 2   Drug-related death data from Special Registers

Appendix 3   Data collected from National registers on Causes of Death

Appendix 4   List of drug-related causes of death according to ICD-10

Appendix 5   ICD-9 codes to define psychoactive drug-related mortality (Kallan et al., 1998)

Appendix 6   Examples of validation studies

Appendix 7   Information on Special Registers

Appendix 1   Tables

ACUTE/DIRECT Drug-Related Deaths figures

* Use the more relevant source of information (as included in the 1995 and 1996 Annual report)
or
* If the population death registryis the more relevant source, ICD codes as proposed by REITOX 3.3 task should be used (304/E850-E858/E980.0-E980.5/965) unless the focal point consider other ICD codes as more appropriate .

COUNTRY			
Year:			
	Male	Female	Total
Number of cases			
Mean age			
Age distribution Numbers			
<15			
15-19			
20-24			
25-29			
30-34			
35-39			
40-44			
45-49			
50-54			
>=55			
Not known			
Geographical distribution Numbers			
Capital city + Metrop. Area			
Rest of the country			
Not known			
Toxicology			
% of cases with known toxicology			
of which			
a) total % with opiate (+any drug)			
% including cocaine			
% including amphetamines			
% including ecstasy/analogues			
% including benzodiacepines			
% including alcohol			
b) total % any drug without opiates			
% including cocaine			
% including amphetamines			
% including ecstasy/analogues			
% including any drug but without cocaine, amphetamines or ecstasy/analogs			
If Population Death Registry is used, break down by the ICD codes used			
1			
2			
3			
4			
5			

(1) The groups (a) and (b) are mutually exclusive, but within such groups a case may be in different sub-groups at the same time (e.g. a case
with opiates and cocaine, amphetamines and alcohol should bee counted in each sub-group)

METHODOLOGY	
Reference	
Case definition	
If ICD underlying and contributory causes are used, is double counting avoided?	
Method of data collection	
Geographical coverage	
Estimated level of underreporting	
Are there other RSDRD (1) in the country? Y/N	
REMARKS	

(1) RSDRD: Reporting System on Drug-Related Deaths

Population	
Total population of the country	
Total population of area covered	
Population of Capt. + Metropolitan area	
Population outside Capt.+ Metro. area	
Population (covered area) 5-54 years	
Population (covered area) >= 55 years	

TABLE MORT-B-EVO: ACUTE / DIRECT Drug-Related Deaths figures, using alternative available source of information

COUNTRY		1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
TOTAL	N°												
Gender	N°												
Male													
Female													
Not known													
Age distribution	N°												
<15													
15-19													
20-24													
25-29													
30-34													
35-39													
40-44													
45-49													
50-54													
>=55													
Not known													
Geographical distribution N°													
Capital city + Metropolitan area													
Rest of the country													
Not known													
Toxicology													
% of cases with known toxicology													
of which													
(a) % with opiate (+any drug)													
(b) % any drug without opiates													

METHODOLOGY	
Reference	
Case definition	
(eventual changes over time)	
Method of data collection	
(eventual changes over time)	
Geographical coverage	
(eventual changes over time)	
Estimated level of underreporting	
(eventual changes over time)	
REMARKS	

TABLE : MORT-A-2   NON-ACUTE / INDIRECT Drug-Related Deaths figures.

COUNTRY					
AIDS related to drug injection					
Year				Definition of case	
	Male	Female	Total		
Number of cases				Source of information	
Mean age					
Other infectious disseases related to drug injection					
Year				Definition of case	
	Male	Female	Total		
Number of cases				Source of information	
Mean age					
Accidents influeced by drug use (e.g. car accidents)					
Year				Definition of case	
	Male	Female	Total		
Number of cases				Source of information	
Mean age					
Drug use related violence (e.g. homicides)					
Year				Definition of case	
	Male	Female	Total		
Number of cases				Source of information	
Mean age					
Other causes (especify)					
Year				Definition of case	
	Male	Female	Total		
Number of cases				Source of information	
Mean age					

OVERALL NUMBER OF DRUG_RELATED DEATHS			
Year			
	Male	Female	Total
Acute/direct			
Non-acute/indirect (Total)			
AIDS			
Other infectious diseases			
Accidents			
Violence			
Other causes			
TOTAL			

REMARK	
Is there overlaping of case between these figures?	
If YES, explain the reasons and estimate the degree of overlaping	

Appendix 2   Drug-related death data from Special Registers

AUSTRIA

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Overdose morphine					20	36	70	121	130	140	160	179
Overdose pharmaceut.					27	14	7	7	24	34	12	12
Total overdose					*47*	*50*	*77*	*128*	*154*	*174*	*172*	*191*
Suicide					13	7	5	10	7	16	15	11
AIDS					17	22	26	39	47	41	28	23
Other					5	4	8	10	18	19	26	5
Total					**82**	**83**	**116**	**187**	**226**	**250**	**241**	**230**
n male						69	92	154	187	210	196	194
n female						14	24	33	39	40	45	36

Definition
- Direct deaths (overdose) and indirect deaths caused by drug use (AIDS, suicide, accidents, trauma)

Available data
- Breakdown total number by cause of death, by age groups (EMCDDA standard), by gender and by age x gender.

DENMARK

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
- Indirect and direct causes (see notes)												
Total	**150**	**109**	**140**	**135**	**123**	**115**	**188**	**208**	**210**	**271**	**274**	**266**
n male	116	88	116	107	99	91	153	162	166	227	226	220
n female	34	21	24	28	24	24	35	46	44	44	48	46

Definition
- Accidents or suicide directly or indirectly related to illegal drug abuse or other intoxicating agents; or other substances by known drug abuser

Available data
- No breakdown by cause of death or age group. Data broken down by gender and region: Copenhagen, Jutland, Denmark-rest.

FRANCE

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Overdose heroin					275	302	386	460	408	505	388	336
medicines					22	27	31	31	44	50	68	49
solvents					11	12	6	6	1	6	4	1
cocaine					7	5	5	0	1	2	4	6
unknown					3	4	1	1	0	1	1	1
Total	**172**	**185**	**228**	**236**	**318**	**350**	**411**	**499**	**454**	**564**	**465**	**393**
n male					274	288	339	413	363	473	395	336
n female					54	62	72	86	91	91	70	57

Available data
- Total number broken down by age (no EMCDDA standard), by gender, by nationality, by region, by place of death

GERMANY

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
• **overdose**												1458
• **suicide**												143
• **chronic harm**												94
• **accident /other**.												27
Total	**324**	**348**	**442**	**670**	**991**	**1491**	**2125**	**2099**	**1738**	**1624**	**1565**	**1712**
n male	235	275	356	548	815	1227	1770	1750	1419	1346	1293	1447
n female	89	73	86	122	176	264	329	332	298	264	254	238
?							26	17	21	14	18	27

Definition
- Intentional or accidental overdose; diseases after chronic use, incl. HIV, hepatitis; suicide (f.e. hanging) from despair about life situation or during withdrawal; fatal accidents UID

Available data
- Total number broken down by gender, by age group (no EMCDDA standard). Cause-specific data available only for 1996. Differentiation overdose by drug in 1996: heroin, cocaine, amphetamines, ecstasy - all alone and in combination with other drugs; medicines/substitutes; narcotics + alcohol/substitutes. 11 cases are double-counted as overdose and suicide in 1996.

GREECE

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Overdose-intoxication													
% heroin				82,3	88,9	90,9	93,7	92,4	98,7	91,8	89,2	95,9	95,9
% morphine				8,1	8,3	9,1	3,8	3,8	0	5,4	1,7	0,5	0
% psychotropic drugs				8,1	2,8	0	2,5	2,5	1,3	5,1	7,4	3,2	2,7
% cocaine				1,6	0	0	0	1,3	0	0	0,6	0	0,9
% cannabis-alcohol				0	0	0	0	0	0	0	1,1	0,5	0,5
Total (n)				**62**	**72**	**66**	**79**	**79**	**78**	**146**	**176**	**222**	**222**
% male				87,1	86,1	89,4	93,7	88,6	89,7	92,5	92	91	91
% female				12,9	13,9	10,6	6,3	11,4	10,3	7,5	8	9	9

Definition
- Overdose by single drug or synergic effects of multiple drugs, such as medicines and alcohol

Available data
- Total number broken down by age group (no EMCDDA standard), by gender, by nationality, by marital status, by educational level, by occupation

ITALY

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Overdose												
Total (n)		292	543	809	974	1.161	1.383	1.217	888	867	1.193	1.293
n male		249	486	710	882	1.041	1.247	1.117	781	806	1080	1.194
n female		43	57	99	92	120	136	100	107	61	113	99

Definition
- Overdose (single or poly drug) and accidental consumption. Excluded are suicide, homicide, accidents or natural deaths without evidence for excessive amounts of drugs in body fluids

Available data
- Total number broken down by gender, by age '%> 30 years' (no EMCDDA standard). Toxicological data in 1995:heroin (665), cocaine (6), methadon (3), morphine (26), minias (?), not specified (492). Data from 1996 are provisional.

PORTUGAL

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Overdose												
Total				33	52	82	143	155	100	142	196	232
n male				29	45	73	108	134	89	124	177	214
n female				4	7	9	16	21	11	18	18	18

Definition
- Overdose (deaths related to drug consumption)

Available data
- Total number broken down by gender, age (partly according to EMCDDA standard). Toxicological data: 100% in 1996 (91% contained opiates, alone or with other drug).

Limitations
- No national coverage. Cases are only included when analyses have been requested for legal/justice reasons etc.

SPAIN

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Direct & indir. deaths												
	143	163	234	337	455	455	579	557	442	338	392	

Definition
- Acute reactions following nonmedical and intentional consumption of (any) psychoactive substances in persons 15-49 years of age. Up to 1996, only opiates and cocaine were included.

Available data
- No age or gender breakdown.

Limitations
- No national coverage (6 major cities .14 million persons in 48 judicial districts). Age restrictions.

SWEDEN (STOCKHOLM)

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996

Overdose	29	21	41	32	43	47	43	45	53	48		
Suicide	9	13	12	10	13	17	16	14	8	8		
Homicide	1	6	2	4	9	3	6	3	3	4		
Accident/other	5	16	11	11	7	23	14	20	22	34		
Natural causes	4	2	3	2	5	5	9	12	15	9		
Unknown	0	1	3	7	2	6	6	2	6	5		
Total	**48**	**59**	**72**	**66**	**79**	**101**	**94**	**96**	**107**	**108**		
n male	40	39	61	50	69	89	86	85	88	87		
n female	8	20	11	16	10	12	8	11	19	21		

Definition
- Death directly and indirectly related to illicit drug use; includes overdose, premature death by organic damage and disease by long-standing drug abuse or habit of injecting drugs; violent deaths, accidents, suicide and homicide, and deaths associated with mental and behavioral changes induced by illicit drug use.

Available data
- Breakdown by gender. Age data are potentially available.

Limitations
- Register covers only the Stockholm area.

Appendix 3   Data collected from National Registers on Causes of Death - 9th edition

Drug-related deaths according to the task 3.3 definition
(note the differences in Y-axis scaling)

Austria
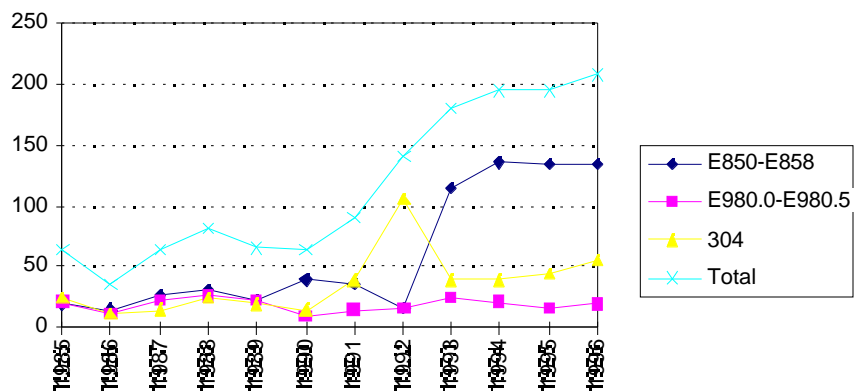
Belgium
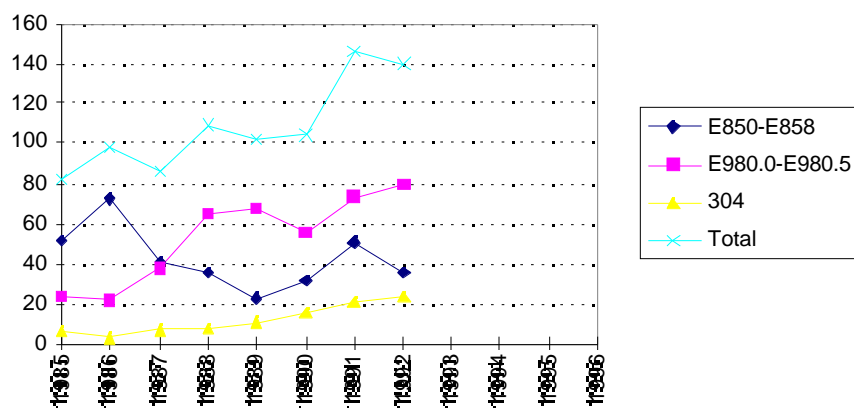
Denmark
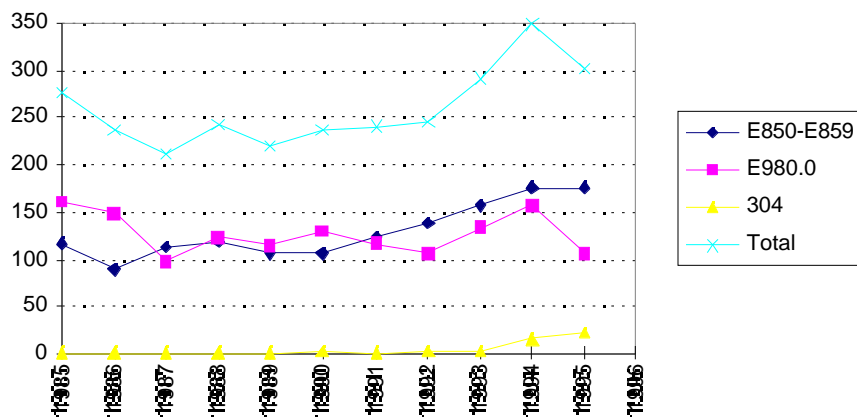
Drug-related deaths according to the task 3.3 definition

(note the differences in Y-axis scaling)

Finland
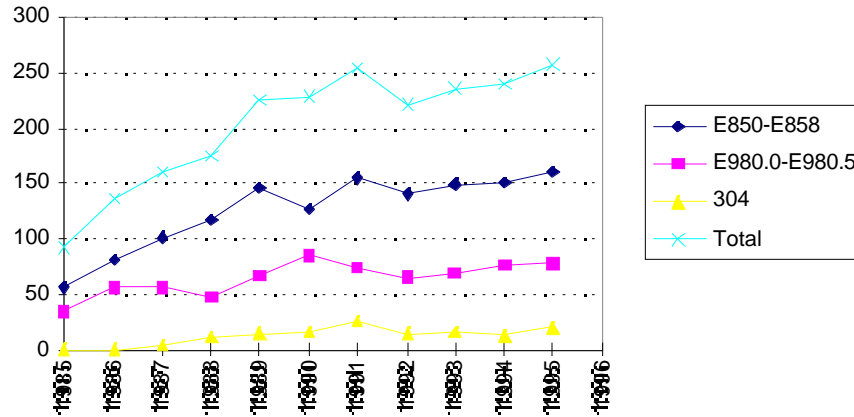
West-Germany Germany
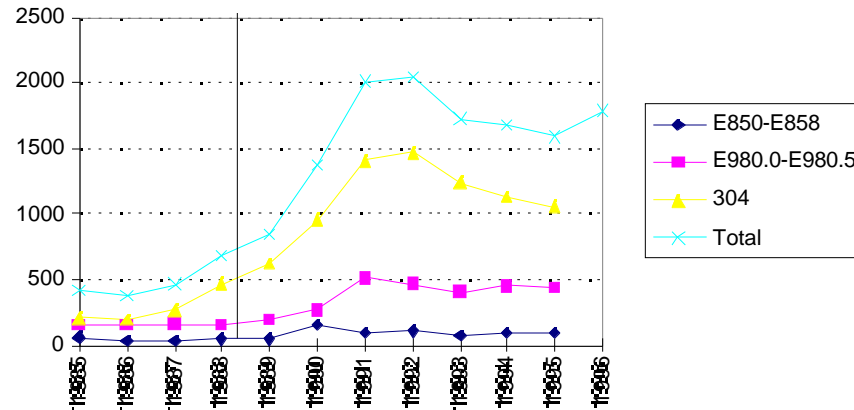
Greece
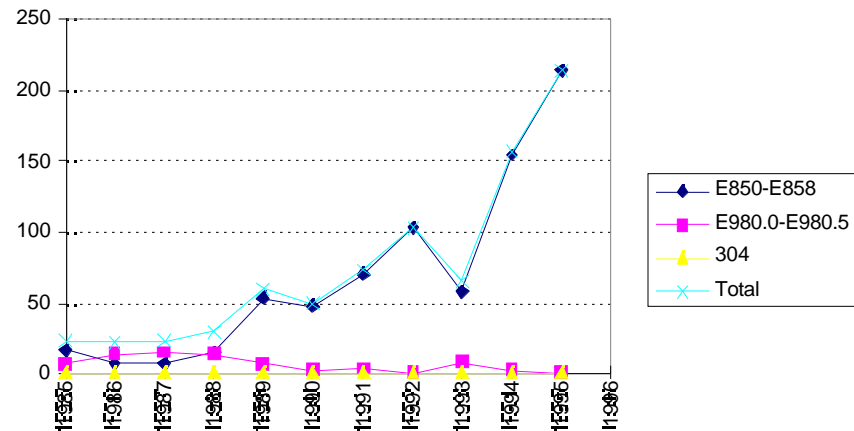
Drug-related deaths according to the task 3.3 definition
(note the differences in Y-axis scaling)

Ireland
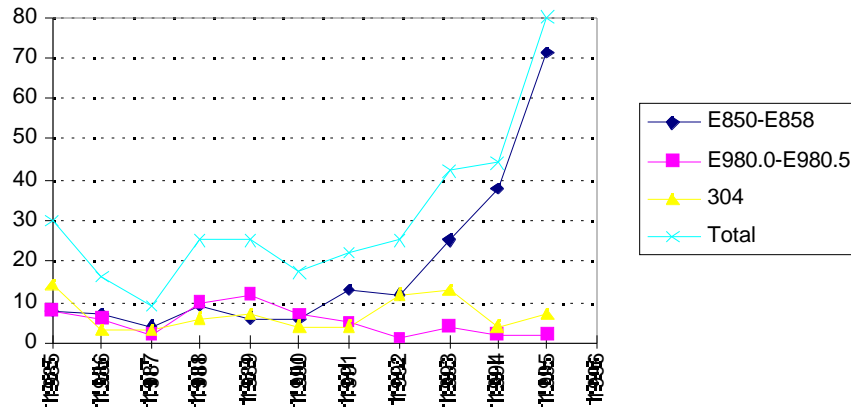
Italy
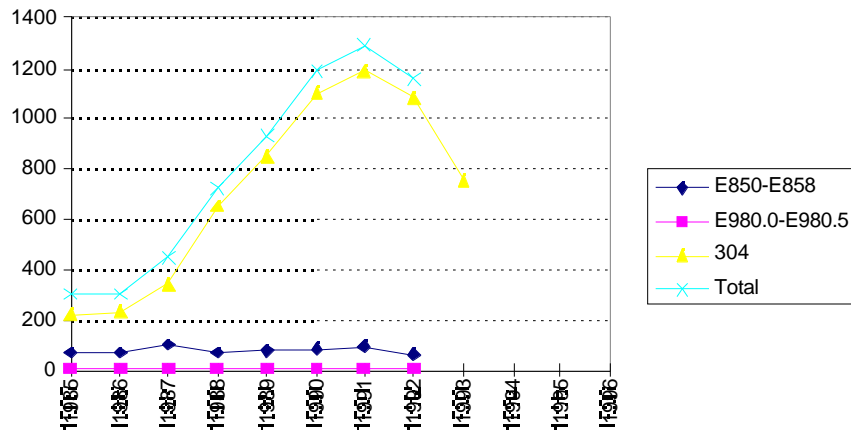
The Netherlands
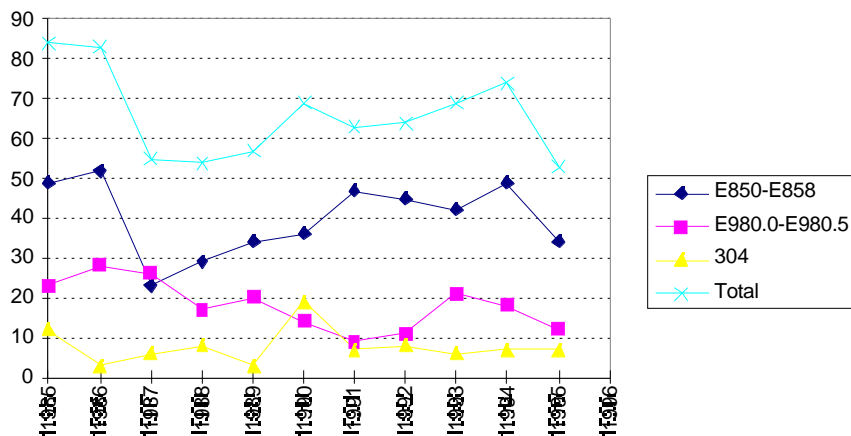
Drug-related deaths according to the task 3.3 definition

(note the differences in Y-axis scaling)

Sweden
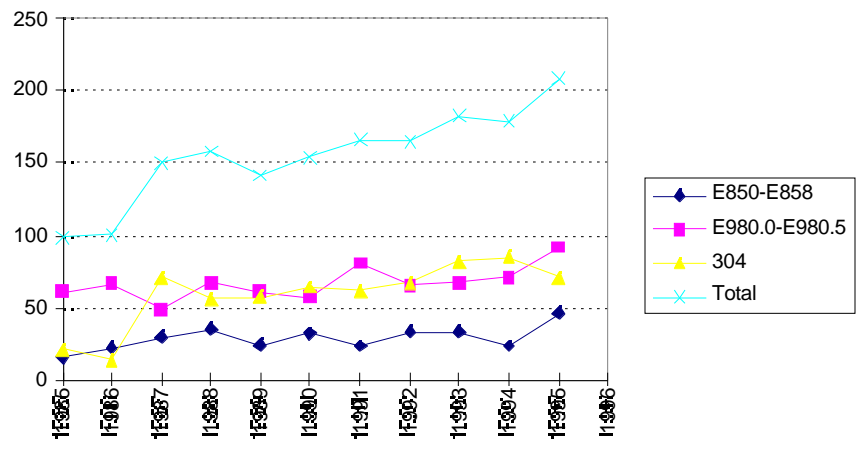
Note: caution is warranted when comparing data between countries because there are differences in the way data have been extracted from the national registers.

Austria

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
E850-E858	19	14	26	31	23	39	36	17	115	135	134	134
E980.0-E980.5	21	11	23	26	23	10	14	16	25	21	17	19
304	24	11	14	25	19	15	40	107	39	39	44	55
Total	64	36	63	82	65	64	90	140	179	195	195	208

- Code E850.0 makes up the large majority of category E850-E858
- Data on code 965 has also been provided, both separately and in combination with E codes. One case may have both an E-code and code 965, giving rise to double-counting, in particular between E850-E858 and 965. For example, of all 134 cases coded E850-E858, 126 had also been coded with 965.

Belgium

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
E850-E858	52	73	41	36	23	32	51	36				
E980.0-E980.5	24	22	38	65	68	56	74	80				
304	6	3	7	8	11	16	21	24				
Total	82	98	86	109	102	104	146	140				

- Data have also been provided for code 965 (or in fact E965), but there is no information on double-counting.

Denmark

| ICD-8	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
E850-E859	115	88	112	119	106	105	123	137	157	176	175	
E980	161	148	97	122	113	128	117	105	133	157	105	
304	1	0	1	1	1	3	1	3	2	14	21	
Total	277	236	210	242	220	236	241	245	292	347	301	

- Note that ICD-8 codes have been used from 1985-1993 and ICD-10 codes as of 1994. The data may not be fully compatible with the standard ICD-9 codes
- Codes selected to be compatible with Accidental poisoning are **X40-X44 and Y40-Y57.** Poisoning (cause undetermined) is equated with **Y10-Y14.** Drug addiction (ICD-8 304) is coded as **F11-F16; F18-F19.** The third digit was not specified but is assumedly ".0".

Finland

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
E850-E858	56	81	101	117	145	126	155	141	149	151	160	
E980.0-E980.5*	35	56	55	47	66	85	73	65	69	75	78	
304	0	0	3	11	14	17	26	15	17	13	19	
Total	91	137	159	175	225	228	254	221	235	239	257	

- Code E980.0-E980.5* has been combined with code 965, either used as conditional (avoiding double-counting) or data for both codes have been added (with a risk of double-counting).

Germany

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
E850-E858	59	25	30	52	40	144	91	99	73	84	88	
E980.0-E980.5*	155	156	170	157	192	275	510	474	407	450	439	
304	207	203	276	474	621	957	1407	1465	1245	1143	1067	
Total	421	384	476	683	853	1376	2008	2038	1725	1677	1594	1788

- Data refer to underlying causes of death. Register does not include secondary causes. Some cases of drug dependence (304) may have lost when coded from certifcates.
- Code E980.0-E980.5* has been combined with code 965, either used as conditional (avoiding double-counting) or data for both codes have been added (with a risk of double-counting).
- Coverage has changed: data from 1985-1989 involves only West-Germany (old Länder) and as of 1990 (former) West-and East-Germany (old and new Länder).

Greece

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
E850-E858	16	7	7	15	53	47	70	102	57	154	214	
E980.0-E980.5	7	14	15	14	7	2	3	0	8	2	0	
304	0	0	0	0	0	0	0	0	0	0	0	
Total	23	21	22	29	60	49	73	102	65	156	214	

- An additional separate entry with data on code 965 has been reported. One other column gave the "total number of drug-related deaths". Absolute numbers and trend seem to correlate quite well between 965 and this total number.

Ireland

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
E850-E858	8	7	4	9	6	6	13	12	25	38	71	
E980.0-E980.5	8	6	2	10	12	7	5	1	4	2	2	
304	14	3	3	6	7	4	4	12	13	4	7	
Total	30	16	9	25	25	17	22	25	42	44	80	

- Only underlying causes of deaths are registered.
- Because of the low numbers of cases, privacy regulations complicate a further breakdown according to age and gender

Italy

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
E850-E858	72	67	103	68	78	84	96	66				
E980.0-E980.5	5	4	4	5	5	8	7	8				
304	224	236	343	650	850	1101	1189	1086	756			
Total	301	307	450	723	933	1193	1292	1160				

- Data on 965 has also been reported (separately)

The Netherlands

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
E850-E858	49	52	23	29	34	36	47	45	42	49	34	
E980.0-E980.5	23	28	26	17	20	14	9	11	21	18	12	
304	12	3	6	8	3	19	7	8	6	7	7	
Total	84	83	55	54	57	69	63	64	69	74	53	

- Data refer to underlying causes.
- Code 965 has not been combined with E-codes to avoid double-counting; 965 is coded primarily as secondary cause to specify the substances.

Sweden

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
E850-E858	16	22	30	35	24	32	23	33	33	23	46	
E980.0-E980.5*	61	66	49	67	61	58	81	65	67	71	92	
304	21	13	71	56	57	64	62	67	82	85	71	
Total	98	101	150	158	142	154	166	165	182	179	209	

- Data refer to underlying causes of death.
- E-codes are restricted to cases have NO code 304 as contributing cause
- * Cases are included that are a combination of both E980.0-E980.5 and 965.

United Kingdom

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
E850-E858				191	202	233	255	327	358	442	465	
E980.0-E980.5*				302	279	262	295	274	252	243	257	
304												
Total				493	481	495	550	601	610	685	722	

- Code 304 has been given only in combination with 305 (probably also involving abuse of alcohol and tobacco, 305.1-.2).
- Code 965* has been used (conditional or added to E980.0-E980.5)

No data were available from France, Luxembourg, Portugal and Spain.

**Drug-related deaths according to task 3.3 definition
distribution of causes of death (%)**

Note: caution is warranted when comparing data between countries because there are differences in the way data have been extracted from the national registers.

Austria

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
E850-E858	29,7	38,9	41,3	37,8	35,4	60,9	40	12,1	64,2	69,2	68,7	64,4
E980.0-E980.5	32,8	30,6	36,5	31,7	35,4	15,6	15,6	11,4	14	10,8	8,72	9,13
304	37,5	30,6	22,2	30,5	29,2	23,4	44,4	76,4	21,8	20	22,6	26,4
Total	100	100	100	100	100	100	100	100	100	100	100	100

Belgium

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
E850-E858	63,4	74,5	47,7	33	22,5	30,8	34,9	25,7				
E980.0-E980.5	29,3	22,4	44,2	59,6	66,7	53,8	50,7	57,1				
304	7,32	3,06	8,14	7,34	10,8	15,4	14,4	17,1				
Total	100	100	100	100	100	100	100	100				

Denmark

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
E850-E859	41,5	37,3	53,3	49,2	48,2	44,5	51	55,9	53,8	50,7	58,1	
E980.0	58,1	62,7	46,2	50,4	51,4	54,2	48,5	42,9	45,5	45,2	34,9	
304	0,36	0	0,48	0,41	0,45	1,27	0,41	1,22	0,68	4,03	6,98	
Total	100	100	100	100	100	100	100	100	100	100	100	

Finland

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
E850-E858	61,5	59,1	63,5	66,9	64,4	55,3	61	63,8	63,4	63,2	62,3	
E980.0-E980.5	38,5	40,9	34,6	26,9	29,3	37,3	28,7	29,4	29,4	31,4	30,4	
304	0	0	1,89	6,29	6,22	7,46	10,2	6,79	7,23	5,44	7,39	
Total	100	100	100	100	100	100	100	100	100	100	100	

Germany

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
E850-E858	14	6,51	6,3	7,61	4,69	10,5	4,53	4,86	4,23	5,01	5,52	
E980.0-E980.5	36,8	40,6	35,7	23	22,5	20	25,4	23,3	23,6	26,8	27,5	
304	49,2	52,9	58	69,4	72,8	69,5	70,1	71,9	72,2	68,2	66,9	
Total	100	100	100	100	100	100	100	100	100	100	100	

**Drug-related deaths according to task 3.3 definition
distribution of causes of death (%)**

Greece

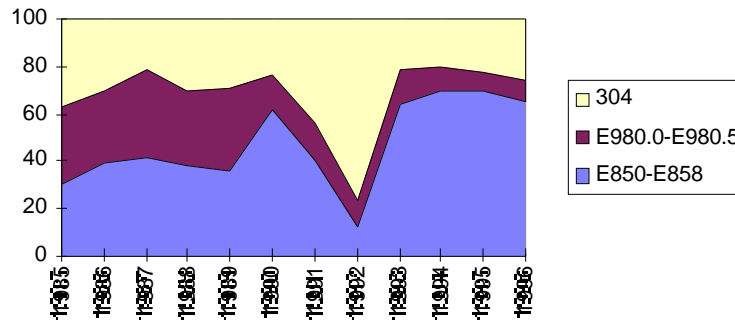|	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
E850-E858	69,6	33,3	31,8	51,7	88,3	95,9	95,9	100	87,7	98,7	100	####
E980.0-E980.5	30,4	66,7	68,2	48,3	11,7	4,08	4,11	0	12,3	1,28	0	####
304	0	0	0	0	0	0	0	0	0	0	0	####
Total	100	100	100	100	100	100	100	100	100	100	100	####

Italy

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
E850-E858	23,9	21,8	22,9	9,41	8,36	7,04	7,43	5,69	####	####	####	####
E980.0-E980.5	1,66	1,3	0,89	0,69	0,54	0,67	0,54	0,69	####	####	####	####
304	74,4	76,9	76,2	89,9	91,1	92,3	92	93,6	####	####	####	####
Total	100	100	100	100	100	100	100	100	####	####	####	####

The Netherlands

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
E850-E858	58,3	62,7	41,8	53,7	59,6	52,2	74,6	70,3	60,9	66,2	64,2	####
E980.0-E980.5	27,4	33,7	47,3	31,5	35,1	20,3	14,3	17,2	30,4	24,3	22,6	####
304	14,3	3,61	10,9	14,8	5,26	27,5	11,1	12,5	8,7	9,46	13,2	####
Total	100	100	100	100	100	100	100	100	100	100	100	####

Sweden

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
E850-E858	16,3	21,8	20	22,2	16,9	20,8	13,9	20	18,1	12,8	22	####
E980.0-E980.5	62,2	65,3	32,7	42,4	43	37,7	48,8	39,4	36,8	39,7	44	####
304	21,4	12,9	47,3	35,4	40,1	41,6	37,3	40,6	45,1	47,5	34	####
Total	100	100	100	100	100	100	100	100	100	100	100	####

Drug-related deaths according to task 3.3 definition
distribution of causes of death (%)

Austria

Legend:
- 304
- E980.0-E980.5
- E850-E858

Belgium

Legend:
- 304
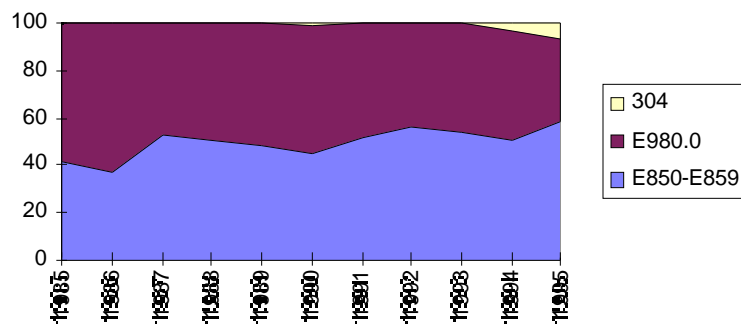- E980.0-E980.5
- E850-E858
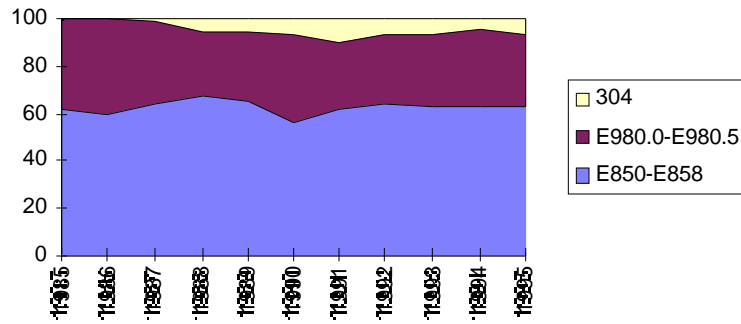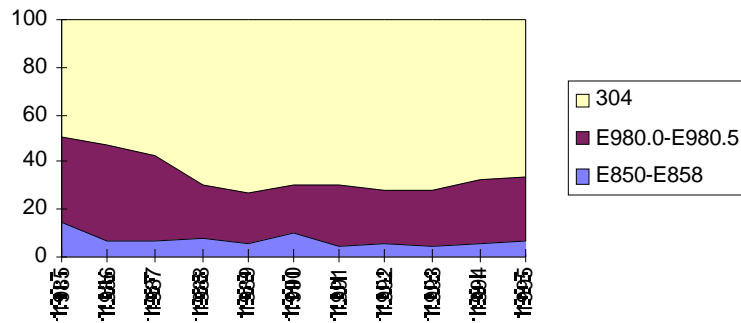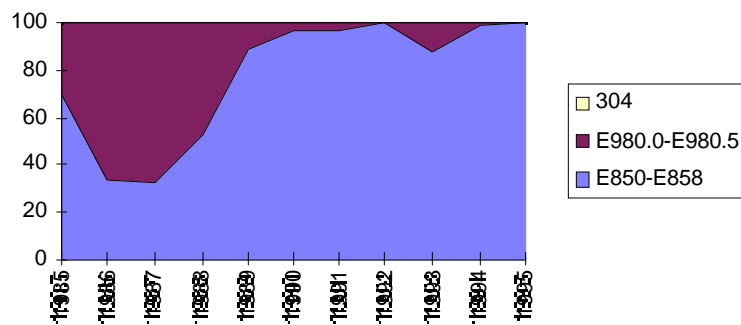
Denmark

Legend:
- 304
- E980.0
- E850-E859

**Drug-related deaths according to task 3.3 definition
distribution of causes of death (%)**
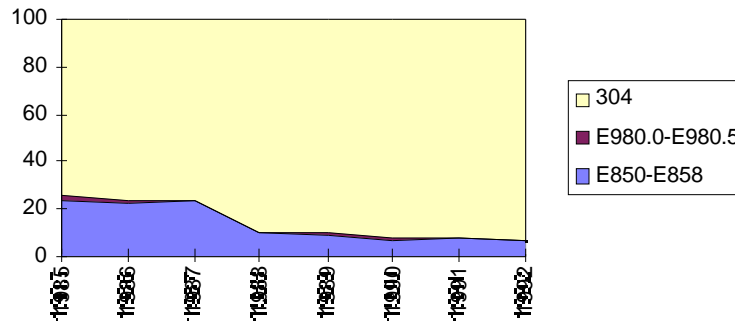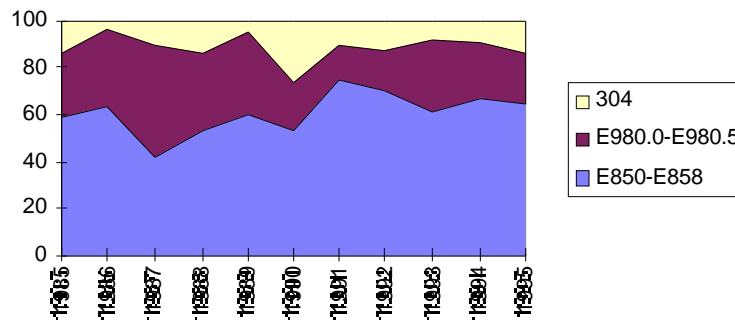
Finland

Germany

Greece

**Drug-related deaths according to task 3.3 definition
distribution of causes of death (%)**
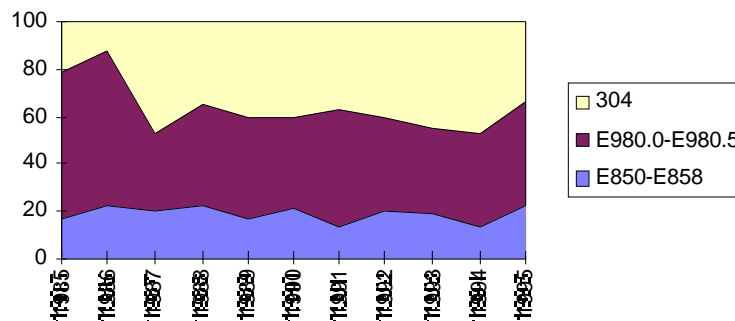
Italy

The Netherlands

Sweden

Appendix 4 List of drug-related causes of death according to the ICD-10

Codes printed bold are suggested to be relevant within the present framework of drug related deaths.

F 11	Mental and behavioural disorders due to the use of opioids
F 12	Idem due to the use of cannabis
F 13	Idem due to the use of sedatives or hypnotics
F 14	Idem due to the use of cocaine
F 15	Idem due to the use of other stimulants, including, incl. caffeine
F 16	Idem due to the use of hallucinogens
F 18	Idem due to the use of volatile solvents
F 19	Idem due to multiple drug use and use of other psychoactive substances (all specifications)

O 35	Maternal care for known or suspected fetal abnormality and damage
O 35.5	Maternal care for (suspected) damage to fetus from drug addiction

P 04.4	Fetus and new-born affected by maternal use of drugs of addiction
P 96.1	Neonatal withdrawal symptoms from maternal use of drugs of addiction

R 78.1	Findings of opiate drug in blood
R 78.2	Findings of cocaine in blood
R 78.3	Findings of hallucinogen in blood
R 78.4	Findings of other drugs of addictive potential in blood

T 36 - T 50	Poisoning by drugs, medicaments and biological substances (Includes overdose of these substances, wrong substance given or taken in error; excludes abuse of non-dependence producing substances, etc.). Select from this category only T40 and T42.3!
T 40	Poisoning by narcotics and psychodysleptics (hallucinogens) (all subcodes)
T 42.3	Poisoning by barbiturates

X 40 - X 49	Accidental poisoning by and exposure to noxious substances
X 41	Accidental poisoning by barbiturates (X 41.?)
X 42	Accidental poisoning by and exposure to narcotics and psychodysleptics (hallucinogens), not elsewhere classified (all subcodes)
X 60 - X 84	Intentional self-poisoning by and exposure to nonopioid analgesics, antipyretics antirheumatics.
X 61	Intentional self-poisoning // by barbiturates (X61.?)
X 62	Intentional self-poisoning // by cannabis, cocaine etc.(all subcodes)

Y 10 - Y 34	Event of undetermined intent
Y 11	Poisoning by and exposure to barbiturates, undetermined intent (Y11.?)
Y 12	Poisoning by and exposure to cannabis, cocaine// undetermined intent (all subcodes)

Y 40 - Y 59	Drugs, medicaments and biological substances causing adverse effects in therapeutic use
Y 45.0	Adverse effects // of opioids and related analgesics
Y 47.0	Adverse effects //.of barbiturates, not elsewhere classified
Y 50.1	Adverse effects //.of opioid receptor antagonists

Appendix 5

ICD-9 Codes Used to Define Psychoactive Drug-Related Mortality (underlying or contributing cause). From: Kallan (1998). Am J Drug Alcohol Abuse, 24(10):103-17.

292   **Drug psychoses**:
.0 drug withdrawal syndrome
.1 paranoid or hallucinatory states or both
.2 pathological drug intoxication
.8 other
.9 unspecified

304   **Drug dependence:**
.0 morphine type
.1 barbiturate type
.2 cocaine
.3 cannabis
.4 amphetamine type and other psychostimulants
.5 hallucinogens
.6 other
.7 combination of morphine-type drug with any other
.8 combination excluding morphine-type drug
.9 unspecified

305   **Nondependent abuse of drugs**:
.2 cannabis
.3 hallucinogens
.4 barbiturates and tranquillisers
.5 morphine type
.6 cocaine type
.7 amphetamine type
.8 antidepressants
.9 other, mixed, or unspecified

E850   **Accidental poisoning by analgesics, antipyretics, antirheumatics**:
.0 opiates and related narcotics
.8 other (e.g., pentazocine)
.9 unspecified

E851   **Accidental poisoning by barbiturates**:

E852   **Accidental poisoning by other sedatives and hypnotics**:
.0 chloral hydrate group
.1 paraldehyde
.2 bromine compounds
.3 methaqualone compounds
.4 glutethimide group
.5 mixed sedatives not elsewhere classified
.8 other
.9 unspecified

E853   **Accidental poisoning by tranquillisers**:

.0 phenothiazine based
.1 butyrophenone based
.2 benzodiazepine based
.8 other
.9 unspecified

E854 Accidental poisoning by other psychotropic agents:
.0 antidepressants
.1 psychodysleptics
.2 psychostimulants

E855 Accidental poisoning by other drugs acting on central and autonomic nervous systems:
.2 local anaesthetics (includes cocaine)
.9 unspecified

E858 Accidental poisoning by other drugs:
.8 other (includes drug combinations)
.9 unspecified

E950 Suicide and self-inflicted poisoning by solid or liquid substances:
.0 analgesics, antipyretics, and antirheumatics
.1 barbiturates
.2 other sedatives and hypnotics
.3 tranquillisers and other psychotropic agents (includes the antidepressants)
.4 other specified drugs or medicaments
.5 unspecified drug or medicament

E980 Poisoning by solid and liquid substances, undetermined intent:
.0 analgesics, antipyretics, and antirheumatics
.1 barbiturates
.2 other sedatives and hypnotics
.3 tranquillisers and other psychotropic agents (includes antidepressants)
.4 other specified drugs or medicaments
.5 unspecified drug or medicament

Appendix 6   Examples of validation studies

Spain
Spain has a National Death Register (NDR) and a special register (SEIT) in six cities (Reitox 3.3, 1997). The study covered the period 1984-1993. Included were all deaths from the NDR coded according to ICD 9 as poisoning (E850-858). From SEIT all deaths reported by the coroners were selected. The agreement between the cause of death in the NDR and in SEIT were poor. The differences varied from year to year and from city to city, and ranged between 3 and 79% during the years 1983-90. From 1990 on, the NDR improved in several cities, resulting in an overall under reporting in the NDR of about 50% in 1993. The mortality trends in both registers were more or less the same.

France
In France a validation study of drug-related death was made in 1990 (Lecomte, D. et al, 1995). The authors found that during this period in the Paris region, the National death Statistics only collected 36% of all drug-related deaths reported by the Forensic Medicine Institute. This difference was larger in Paris, where the National Register only collected 24% of cases.

Italy
In Italy information on overdose deaths derives from the General Mortality Register (ICD 9, code 304) and from the Ministry of Interior Affairs (death attributed to overdose found by the police) (Davoli, 1997). These two sources of data not only generate different figures but, more importantly, they often do not refer to the same persons. The agreement between these data sets was examined for the Lazio-region between 1987-1992. Linkage was possible for between 60-80% of cases. Agreement of diagnosis of death ranged from just over 40-90%.

Denmark
In Denmark two validation studies were carried out (Saelan, 1997). In the first one Death Register data for 1992 were compared with police statistics for the same year. There were 393 deaths in both of them. Of these 169 (43%) were common to the two registers whereas 185 (47%) appeared only in the Death Register. After examination of the original death certificates only 34 of these 185 (18.4 %) deaths were found to be drug-related, in the sense that these persons belonged to an addicted population using illicit drugs. The remaining 151 deaths (185-34) consisted of older persons, with a majority of females, suffering from chronic conditions and having addictive use of legally prescribed addictive painkillers. These deaths were almost all excluded when only deaths of people up to 39 years of age were considered.

In the second comparison a cohort of 300 addicts were searched for in the Death Register by their personal identification number. Of the 199 deaths known to have occurred among this cohort 102 (85%) appeared in the register under a drug related code (including contributory causes of death).On the basis of these studies Saelan concluded that the National Death Register in Denmark appears to have an

acceptable coverage of drug-related death (when contributory causes of death are also included).

Sweden

In Sweden a special register based on forensic examinations (N=830) in the Stockholm areas was compared with the official cause-of-death register (N=718) in the same area in the period 1985 to 1994. The special register (the Forensic Register) is based on revaluation of the causes of death in relation to drug use among all persons who had undergone forensic examination (1500-2000 causes per year). Death certificates, autopsy records, forensic chemical analyses and police records were used in this revaluation. The official Swedish cause-of-death register is based on death certificates. The criteria for defining drug-related deaths are similar in both registers. The most important difference between the two concerns the drug content; the forensic register includes only illicit drugs such as opiates, amphetamine, cocaine and cannabis, the special register includes also other chemicals.

70% of the 718 cases in the cause-of-death register were also found in the forensic register. The main reason for not including cases in the forensic register was when the death was attributed to prescribed (legal) drugs or alcohol, or when the persons had died in hospital or outside Stockholm and consequently were not examined at the Forensic Department in Stockholm. 70% of the cases in the forensic register were also included in the cause-of-death register. The main reason for not including cases in the cause-of-death register was the omission of mentioning a drug relation in the death certificate however, the diagnosis was known from the other sources. A more complete reporting evidently indicates a way to further improve the Swedish cause-of-death register. 89% of the 718 cases in the Swedish cause-of-death register were examined forensically. In 2% of the cases there was an autopsy in hospital and in 9% of the cases the diagnosis was based on other sources. In almost all cases subjected to a forensic examination, there were also toxicological analyses done, including tests for most of the usual illicit drugs.

Appendix 7 Information on Special Registers

Country	Source of information - responsible authorities
Austria	Federal Ministry of Health and Consumer Protection (FMHCP), to which drug-related deaths have to be reported immediately by the police and by the hospitals.
Belgium	Justice Department. Cases are reported by the police and transmitted for recording to the Police Central Office. System is not considered reliable.
Denmark	The National Commission of the Danish Police. Cases are reported by the police districts to this Commission.
Finland	Cases are reported by hospitals and police to medical examiners at the Department of Forensic Medicine, University of Helsinki, which analyses and records the data.
France	Ministere de l'Interieur. Cases are reported by police and gendarmerie departments to a special police department (OCTRIS, National File of Perpetrators of Narcotic-related Legislative Infractions) for recording.
Germany	Federal Criminal Office Police (BKA, Bundeskriminalamt). Cases are reported by local police units, working jointly with forensic physicians, to the Federal Criminal Office which records information. To some extent different assessment and recording methods are used in the individual Lander, so it is not always possible to determine the cause of death.
Greece	Ministry of Public Order, Directory of Public Security. In case of sudden death the procedure followed is that the police assign the necropsy, autopsy and toxicological analysis of the case to the appropriate forensic service or laboratory. They, in turn, notify the police station responsible for the investigation of the results. Results from all over the country are gathered in the Police Headquarters in the Ministry of Public Order and undergo statistical analysis.
Italy	Ministry of Internal Affairs/police registration. Cases are reported by local and special police units to the Central Office of Anti-drug Services (DCA) for recording. An improved police data collection (inclusion of data from hospitals, emergency rooms, jails etc.) is applied since 1996. The final objective is to have a combined registry for direct and indirect drug-related deaths.
Luxembourg	The Criminal Investigation Department. Cases are reported by the police.
The Netherlands	The cities of Amsterdam and Rotterdam have local registers. The Municipal health Service of Amsterdam traces deaths and causes of death by combining data from the Central methadone Register, the municipal registrar's office, the municipal coroners, the central register of the methadone programmes, hospital records and the police. In Rotterdam data from drug overdose are collected from the police and the municipal health service.
Portugal	Ministry of Justice. The information is recorded and reported by the institutes of legal medicine/forensic institutes in Lisbon, Porto and Coimbria.

Spain	Government Delegation for the national Plan on Drugs. All deaths in which there is a judicial intervention are included in the register (Mortality Indicator of State Information System on Drug Abuse/SEIT). All cases of unnatural death involve a judicial action to establish the existence of possible legal responsibilities. The pathologist is always included in this process, and the information produced provides the basis for the case report. There are two sources of information for this indicator: the medical pathologists (usually grouped in the larger cities in the Institute of Pathology or IAF) and the national Institute of Toxicology (INT). Coverage: six cities.
Sweden	The Institute of Forensic Medicine in Sweden records the findings of all autopsies in a separate register, covering all Sweden. There is no special report. Forensic data are used by the National Register on Causes of Death.
United Kingdom	Home Office (until 1994). In 1997 the National Programme on Substance Abuse Deaths managed by St George's Hospital medical School (London) continued the register. Inquest data are collected from coroners and procurator fiscal in 35 jurisdictions in England and Wales.