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NATIONAL DRUG AND  
ALCOHOL RESEARCH CENTRE

## **CROSS-NATIONAL COMPARISONS OF DRUG-INDUCED DEATHS**

International comparisons of drug-induced mortality are only possible if the terms of reference are similar. The World Health Organisation (WHO) is responsible for producing the classification system that is used to categorise mortality – the International Statistical Classification of Diseases and Related Problems – 10<sup>th</sup> revision (ICD-10). The purpose of ICD is to promote international comparability in the collection, classification, processing and presentation of mortality statistics (Centers for Disease Control and Prevention - USA Department of Health and Human Services, 2001). However, there is no WHO definition for drug-induced deaths. The Commission on Narcotic Drugs (CND), which is part of the United Nations Office of Drugs and Crime, states that drug-related mortality should reflect deaths directly (such as overdose) or proportionally (such as AIDS) attributable to drug consumption. The CND acknowledges that there are considerable methodological problems in compiling and comparing information on drug-related mortality (Commission on Narcotic Drugs - United Nations Office on Drugs and Crime, 2000).

The USA National Centre for Health Statistics (NCHS - a component of the Centers for Disease Control and Prevention - CDC), the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) and the United Kingdom each use different definitions for drug-induced deaths and different parameters for population rates to Australia.

Outlined below are descriptions of the definitions used by these different countries to define drug-induced deaths. Future work by the National Drug and Alcohol Research Centre (NDARC) will be aimed at examining the extent to which these definitions affect the numbers of deaths recorded.

## 1.1. AUSTRALIA

The Australian Bureau of Statistics (ABS) generates cause of death (COD) information for all deaths in Australia. Data are collected from each of the eight state and territories Registrars of Births, Deaths and Marriages as well as the National Coroners Information System (NCIS).

The ABS definition of drug-induced death was based on extensive consultation between the ABS and key stakeholders (e.g. researchers, coroners, and health departments) within Australia and from a review of international definitions (Wellington, 2003). The ABS uses the term “drug” to refer to substances classified as drugs, medicaments or biological substances (under ICD-10 guidelines) that are used for medicinal, therapeutic or psychoactive purposes.

The ABS definition of drug-induced death includes any death where the underlying<sup>1</sup> cause of death was due to:

- a) an acute condition caused by drug use where the deceased person was identified as having **misused drugs** (F11-F16, F19, F55); which is usually coded as a **history of drug dependence** (F11.2-F16.2, F19.2) – see Appendix A; and
- b) an **acute poisoning or toxicity caused by drugs**. Included are deaths from accidental overdoses (X40-X44), intentional self-harm (X60-X64), assault (X85) and deaths of undetermined intent (Y10-Y14) – see Appendix B.

**Table 1: ICD-10 codes for ABS definition of drug-induced death.**

ICD-10 Codes	Descriptors
F11-F16, F19	Mental and behavioural disorders due to psychoactive substance use (excluding alcohol, tobacco and volatile substances)
F55	Abuse of non-dependence producing substances
X40-X44	Accidental poisoning by drugs, medicaments and biological substances
X60-X64	Intentional self-harm by drugs, medicaments and biological substances
X85	Assault by drugs, medicaments and biological substances
Y10-Y14	Deaths of undetermined intent by drugs, medicaments and biological substances

<sup>1</sup> The underlying cause of death is defined as the “disease or injury that initiated the train of morbid events leading directly to death, or the circumstances of the accident or violence which produced the fatal injury”.

Although ICD-10 does not have a unique poison code for all drugs, many drugs of interest can be identified by cross-tabulating the appropriate external (X or Y) cause code by the one of the available poison codes for drugs, medicaments and biological substances (T36-T50) – see Appendix C.

Where evidence of the misuse or toxicity of more than one drug is found, a code indicating multiple drug use (F19, X44, X64, Y14) would ideally be used for the underlying cause. However, with the exception of a statement of ‘multiple drug accidental poisoning’, the recording of accidental poisoning due to multiple drug use (X44) only occurs if the drugs noted are from different categories within ICD-10 external cause chapter (e.g. benzodiazepines – X41 and heroin – X42), and not if they occur within the same grouping (e.g. cocaine and heroin – X42). Therefore the presence of X44 may not be indicative of all cases where multiple drugs were recorded. Similarly, with the exception of a statement of ‘multiple drug dependence’, the recording of multiple drug dependence (F19.2) only occurs if there is more than one drug dependency noted (e.g. cocaine and heroin dependence). Thus, for Mental and Behavioural disorders due to psychoactive substance use the 4<sup>th</sup> character has to be the same for more than one drug before F19 can be utilised.

Since the definition of drug-induced death refers to those cases where the underlying cause of death is directly attributable to drug use, the following categories of death are excluded:

- any death considered to be indirectly related to drug use (such as motor vehicle accidents or drownings where drugs were reported as having a contributing role);
- any death where the underlying COD is a medical condition caused by long-term therapeutic drug use (cardiomyopathy due to therapeutic drugs);
- deaths of newborn babies associated with the mother’s drug use;
- any death where the underlying COD is related to the use of alcohol, tobacco or volatile solvents (Australian Bureau of Statistics, 2002b).

## **1.2. UNITED STATES**

Data on drug-induced deaths in the USA are based on information from all death certificates filed in the 50 states and the District of Columbia. Information from the states is provided to the NCHS.

The USA definition of drug-induced mortality includes selected codes from ICD-10 mental and behavioural disorders due to psychoactive substance use (F11-F19) with the exclusion of the 4<sup>th</sup>

character of 6 which reflects ‘amnesic syndrome’ (e.g. for F11 only include F11.0-F11.5; F11.7-F11.9); accidental poisoning (X40-X44); intentional self-poisoning (X60-X64); assault by poisoning (X85); and poisoning by undetermined intent (Y10-Y14).

**Table 2: ICD-10 codes for NCHS definition of drug-induced death.**

ICD-10 Codes	Descriptors
F11-F19	Mental and behavioural disorders due to psychoactive substance use (excludes amnesic syndrome - 4 <sup>th</sup> character of 6)
X40-X44	Accidental poisoning by drugs, medicaments and biological substances
X60-X64	Intentional self-harm by drugs, medicaments and biological substances
X85	Assault by drugs, medicaments and biological substances
Y10-Y14	Deaths of undetermined intent by drugs, medicaments and biological substances

Drug-induced mortality excludes the following deaths: accidents, homicides and other causes indirectly related to drug use; and newborn deaths associated with mother’s drug use.

Currently the only breakdowns reported in the National Vital Statistics Report is the number of deaths, death rates and age-adjusted death rates for drug-induced causes by race and sex (Miniño et al., 2002).

### 1.2.2 DAWN

DAWN is a national surveillance system that monitors trends in drug-related deaths in the US. It is operated by the Office of Applied Studies (OAS) - Substance Abuse and Mental Health Services Administration (SAMHSA), of the U.S. Department of Health and Human Services. Two types of drug abuse deaths are reportable to DAWN: those that were drug-induced (i.e., the drug caused the death) and those that were drug-related (i.e., the drug played a contributory role in the death).

Drug abuse deaths reported by DAWN do not represent the nation as a whole, nor do they necessarily represent the total number of deaths in which drug abuse was a causal or contributing factor in any given metropolitan statistical area (MSA). Of the 362 MSAs in the US, in 2001 only 42 submitted data to DAWN, and only some areas within these MSAs contributed. Thus, DAWN data reflects the number of drug abuse deaths reviewed, identified, and reported by participating medical examiners and coroners in selected metropolitan areas.

The advantage of DAWN is that it is monitor patterns and trends in new drugs of abuse and new drug combinations. DAWN has breakdowns for the following: demographic characteristics; cause of death (i.e., whether the death was drug-induced or drug-related); the manner of death (accidental, suicide, undetermined, natural); whether alcohol was involved; and the specific drug(s) involved. DAWN does not report deaths using ICD codes (Office of Applied Studies - Substance Abuse and Mental Health Services Administration, 2002).

### **1.3. THE EUROPEAN UNION**

The EMCDDA collects information from the 15 member states of the European Union<sup>2</sup>. Each year selected COD data from the member states are extracted from General Mortality Registers<sup>3</sup> and reported to the EMCDDA.

The EMCDDA definition of drug-related death is the key indicator “drug-related deaths and mortality among drug users” and refers to “those deaths that are caused directly by the consumption of drugs of abuse”. These deaths occur generally shortly after the consumption of the substance(s).

The ICD-10 codes (as underlying cause of death) utilised to estimate the number of drug-related deaths are: mental and behavioural disorders due to psychoactive substance abuse (F11, F12, F14-F16, F19); accidental poisoning (X41, X42); intentional poisoning (X61, X62); and poisoning by undetermined intent (Y11, Y12). The external cause codes (i.e. X, Y) are only reported when one of the following poison codes is present: T40.0-9 and T43.6 (see Appendix C). Apart from the selected poison (i.e. T) codes the EMCDDA do not examine contributing causes of death since a significant number of countries are not able to provide the corresponding data (European Monitoring Centre for Drugs and Drug Addiction, 2002).

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<sup>2</sup> Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden and the United Kingdom.

<sup>3</sup> General mortality registers are present in all member states and are the preferred method for extracting data. However a subset of countries also report information based on special registries, which are held by police and forensic institutions.

**Table 3: ICD-10 codes for EMCDDA definition of drug-induced death.**

<b>ICD Codes</b>	<b>Descriptors</b>
F11, F12, F14-F16, F19	Mental and behavioural disorders due to psychoactive substance use
X41-X42	Accidental poisoning by drugs, medicaments and biological substances
X61, X62	Intentional self-harm by drugs, medicaments and biological substances
Y11, Y12	Deaths of undetermined intent by drugs, medicaments and biological substances

### **1.3.2 United Kingdom**

Although the United Kingdom contributes drug-related mortality data to the EMCDDA; England, Wales and Scotland also report their own drug-induced death statistics based on a different definition. Data on drug-related deaths in the United Kingdom are available for England and Wales from the Office for National Statistics (ONS) and for Scotland from the General Register Office for Scotland (GROS).

The definition of drug misuse deaths in the United Kingdom<sup>4</sup> is any “death where the underlying cause is poisoning, drug abuse or drug dependence and where any of the substances controlled under the Misuse of Drugs Act (1971)<sup>5</sup> are involved”.

The ICD-10 codes utilised to estimate the number of drug misuse deaths in England and Wales are: deaths where the underlying cause of death has been coded to the following sub-categories of mental and behavioural disorders due to drug use (F11-F16, F19); and deaths coded to the following categories and where a drug controlled under the Misuse of Drugs Act (1971) was mentioned on the death record: accidental poisoning (X40-X44), intentional self-poisoning (X60-X64), assault by drugs (X85), poisoning of undetermined intent (Y10-Y14), and mental and behavioural disorders due to volatile substances (F18).

<sup>4</sup> The UK comprises England, Scotland, Wales, and Northern Ireland.

<sup>5</sup> Drugs controlled under the Misuse of Drugs Act 1971 include class A, B and C drugs.

**Table 4: ICD-10 codes for ONS definition of drug-induced death.**

ICD Codes	Descriptors
F11-F16, F18-F19	Mental and behavioural disorders due to psychoactive substance use (excluding alcohol and tobacco)
X40-X44	Accidental poisoning by drugs, medicaments and biological substances
X60-X64	Intentional self-harm by drugs, medicaments and biological substances
X85	Assault by drugs, medicaments and biological substances
Y10-Y14	Deaths of undetermined intent by drugs, medicaments and biological substances

When specific compound analgesics, which contain relatively small quantities of drugs listed under the Misuse of Drugs Act, are recorded on the death record they are ignored. For England and Wales deaths coded to opiate abuse which have resulted from the injection of contaminated heroin have been included in the ‘drug misuse related deaths’ indicator, which is the opposite to Scotland where these deaths have been excluded. This is because they can be identified in Scotland (Office for National Statistics, 2003).

The ICD-10 codes utilised to estimate the number of drug misuse deaths in Scotland are deaths where the underlying cause of death has been coded to the following sub-categories of mental and behavioural disorders due to psychoactive substance use (F11-F16, F19); and deaths coded to the following categories and where a drug listed under the Misuse of Drugs Act (1971) was known to be present in the body at the time of death: accidental poisoning (X40-X44), intentional self-poisoning (X60-X64), assault by drugs (X85) and poisoning of undetermined intent (Y10-Y14).

**Table 5: ICD-10 codes for GROS definition of drug-induced death.**

ICD Codes	Descriptors
F11-F16, F19	Mental and behavioural disorders due to psychoactive substance use (excluding alcohol, tobacco and volatile substances)
X40-X44	Accidental poisoning by drugs, medicaments and biological substances
X60-X64	Intentional self-harm by drugs, medicaments and biological substances
X85	Assault by drugs, medicaments and biological substances
Y10-Y14	Deaths of undetermined intent by drugs, medicaments and biological substances

Categories of death excluded for Scotland are those deaths: due to alcohol, tobacco and volatile substances; coded to drug abuse that were caused by secondary infections and related complications<sup>6</sup> (e.g. 20 deaths caused by clostridium novyi infection in 2000); from AIDS where the risk factor was believed to be the sharing of needles; from road traffic accidents which occurred under the influence of drugs; and where a drug listed under the Misuse of Drugs Act was present because it was part of a compound analgesic or cold remedy (Jackson, 2002).

## 1.4. CONCLUSION

The Australian definition of drug-induced death differs from other definitions used internationally in the following ways:

- The United States:
  - The US includes deaths due to mental and behavioural disorders due to tobacco and volatile substance;
  - The US excludes deaths due to non-dependence producing substances, and deaths due to mental and behavioural due to psychoactive substance use, amnesic type.
- The EMCDDA
  - The EMCDDA definition only includes deaths for accidental poisoning, intentional poisoning and poisoning by undetermined intent when the following poison codes are mentioned: opium, heroin, other opioids, methadone, other synthetic narcotics, cocaine, lysergide, other and unspecified hallucinogens and psychostimulants with potential for use disorder.
  - The EMCDDA excludes deaths by accidental poisoning, intentional self-harm, and undetermined intent for the following categories: non-opioid analgesics, antipyretics and antirheumatics; other drugs acting on the autonomic nervous system; and other and unspecified drugs, medicaments and biological substances (i.e. multiple drugs).
  - The EMCDDA also excludes the following deaths: mental and behavioural disorders due to sedatives and hypnotics; non-dependence producing substances; and assault by poisoning.
- The United Kingdom
  - England and Wales include deaths due to mental and behavioural disorders due to volatile substances.

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<sup>6</sup> There have been reports in Australia of deaths due to infection as a result of contaminated heroin.

- England, Wales and Scotland exclude deaths due to non-dependence producing substances.

**Table 6: Differences in ICD-10 codes for Australian and other countries definitions of drug-induced death.**

Country	ICD-10
USA	Includes F17 and F18 Excludes F55 and the 4 <sup>th</sup> character of 6 for the F codes of interest.
EMCDDA	Includes only specific T codes Excludes F13; F55, X40, X43, X44; X60, X63, X64; Y10, Y13, Y14 and X85
England and Wales	Includes F18 Excludes F55
Scotland	Excludes F55

This review has attempted to set the scene for international comparisons using drug-related mortality data. We will be conducting further work to assess whether it is feasible to compare rates of drug-induced deaths based on the drug-induced death definitions and available data.

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## 1.5. REFERENCES

Australian Bureau of Statistics (2002b) ABS, Canberra, pp. Available online at:

<http://www.abs.gov.au/>.

Centers for Disease Control and Prevention - USA Department of Health and Human Services (2001) USA DHHS, Hyattsville, MD, pp. Available online at:

<http://www.cdc.gov/nchs/data/dvs/icd10fct.pdf>.

Commission on Narcotic Drugs - United Nations Office on Drugs and Crime (2000) UNODC, Lisbon, Vienna, pp. Available online at:

[http://www.unodc.org/pdf/drug\\_demand\\_gap\\_lisbon\\_consensus.pdf](http://www.unodc.org/pdf/drug_demand_gap_lisbon_consensus.pdf).

European Monitoring Centre for Drugs and Drug Addiction (2002) European Monitoring Centre for Drugs and Drug Addiction, Lisbon, pp. Available online at:

[http://www.emcdda.eu.int/multimedia/project\\_reports/situation/drd\\_standard\\_3.pdf](http://www.emcdda.eu.int/multimedia/project_reports/situation/drd_standard_3.pdf).

Jackson, G. (2002) General Register Office for Scotland., Edinburgh, pp. Available online at:

<http://www.gro-scotland.gov.uk/grosweb/grosweb.nsf/pages/01ddeaths>.

Miniño, A., Arias, E., Kochanek, K., Murphy, S. and Smith, B. (2002) *National Vital Statistics Reports*, **50**, Available online at: <http://www.cdc.gov/nchs/about/major/dvs/mortdata.htm>.

Office for National Statistics (2003) *Health Statistics Quarterly*, **17**, 65-71. Available online at:

[http://www.statistics.gov.uk/downloads/theme\\_health/HSQ17.pdf](http://www.statistics.gov.uk/downloads/theme_health/HSQ17.pdf).

Office of Applied Studies - Substance Abuse and Mental Health Services Administration (2002) USA Department of Health and Human Services, Rockville, MD, pp. Available online at:

[http://dawninfo.samhsa.gov/pubs\\_94\\_02/mepubs/files/DAWN2001.pdf](http://dawninfo.samhsa.gov/pubs_94_02/mepubs/files/DAWN2001.pdf).

Wellington, A. (2003) ABS Health and Vitals National Project Centre, Brisbane.

## 1.6. APPENDIX A

**Table 7: Drug-related codes from ICD-10 Chapter V – Mental and Behavioural Disorders**

ICD	Descriptors
<b>Codes</b>	
F10	Mental and behavioural disorders due to psychoactive substance use - alcohol
F11	Mental and behavioural disorders due to psychoactive substance use - opioids
F12	Mental and behavioural disorders due to psychoactive substance use - cannabinoids
F13	Mental and behavioural disorders due to psychoactive substance use - sedatives or hypnotics
F14	Mental and behavioural disorders due to psychoactive substance use - cocaine
F15	Mental and behavioural disorders due to psychoactive substance use - other stimulants
F16	Mental and behavioural disorders due to psychoactive substance use - hallucinogens
F17	Mental and behavioural disorders due to psychoactive substance use - tobacco
F18	Mental and behavioural disorders due to psychoactive substance use - volatile substances
F19	Mental and behavioural disorders due to psychoactive substance use - multiple and other psychoactive substances
F55	Harmful use of non-dependence producing substances <sup>7</sup>

**Table 8: Fourth character descriptor for Mental and Behavioural Disorders (F10-F19) due to psychoactive substance use.**

4 <sup>th</sup> character	Descriptors
0	Acute intoxication
1	Harmful use
2	Dependence syndrome
3	Withdrawal use
4	Withdrawal state with delirium
5	Psychotic disorder
6	Amnesic syndrome
7	Residual and late onset psychotic disorder
8	Other mental and behavioural disorders
9	Unspecified mental and behavioural disorder

<sup>7</sup> 4<sup>th</sup> character denotes type of substance i.e. anti-depressants, laxatives, analgesics, antacids, vitamin, steroids or hormones, folk/herbal remedies, other and unspecified substances

## 1.7. APPENDIX B

**Table 9: Drug-related codes from ICD-10 Chapter XX – External Causes of Morbidity and Mortality.**

<b>ICD</b>	<b>Descriptors</b>
<b>Codes</b>	
X40	Accidental poisoning by and exposure to nonopioid analgesics, antipyretics and antirheumatics
X41	Accidental poisoning by and exposure to antiepileptic, sedative-hypnotic, anti-parkinsonism and psychotropic drugs, NEC
X42	Accidental poisoning by and exposure to narcotics and psychodysleptics (hallucinogens), NEC
X43	Accidental poisoning by and exposure to other drugs acting on the automatic nervous system
X44	Accidental poisoning by and exposure to other and unspecified drugs, medicaments and biological substances
X60	Intentional self-poisoning by and exposure to nonopioid analgesics, antipyretics and antirheumatics
X61	Intentional self-poisoning by and exposure to antiepileptic, sedative-hypnotic, anti-parkinsonism and psychotropic drugs, NEC
X62	Intentional self-poisoning by and exposure to narcotics and psychodysleptics (hallucinogens), NEC
X63	Intentional self-poisoning by and exposure to other drugs acting on the automatic nervous system
X64	Intentional self-poisoning by and exposure to other and unspecified drugs, medicaments and biological substances
X85	Assault by drugs, medicaments and biological substances
Y10	Poisoning by and exposure to nonopioid analgesics, antipyretics and antirheumatics, undetermined intent
Y11	Poisoning by and exposure to antiepileptic, sedative-hypnotic, anti-parkinsonism and psychotropic drugs, NEC, undetermined intent
Y12	Poisoning by and exposure to narcotics and psychodysleptics (hallucinogens), NEC, undetermined intent
Y13	Poisoning by and exposure to other drugs acting on the automatic nervous system, undetermined intent

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Y14	Poisoning by and exposure to other and unspecified drugs, medicaments and biological substances, undetermined intent
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## 1.8. APPENDIX C

**Table 10: Drug-related codes from ICD-10 Chapter XIX – Injury, poisoning and other certain consequences of external causes<sup>8</sup>.**

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ICD Codes	Descriptors
T40.0	Opium
T40.1	Heroin
T40.2	Other opioids
T40.3	Methadone
T40.4	Other synthetic narcotics
T40.5	Cocaine
T40.6	Other and unspecified narcotics
T40.7	Cannabis
T40.8	Lysergide
T40.9	Other and unspecified hallucinogens (mescaline, psilocin, psilocybin)
T42.3	Barbiturates
T42.4	Benzodiazepines
T43.0	Tricyclic and tetracyclic antidepressants
T43.1	Monoamine oxidase inhibitor antidepressants
T43.2	Other and unspecified anti-depressants
T43.6	Psychostimulants with potential for use disorder

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<sup>8</sup> Poisoning by drugs, medicaments and biological substances includes codes from T36-T50, thus this list is not an exhaustive list of all possible codes. Refer to ICD-10 or the ABS Information paper on drug-induced deaths for further information on poison codes.