

Mortality among problem drug users in Europe: A project of the European Monitoring Centre for Drugs and Drug Addiction (EMCDD)

**Anna Maria Bargagli¹, Alessandra Sperati¹, Marina Davoli¹, Carlo Perucci¹,
Julian Vicente², Richard Hartnoll², Joseph Barry³, Teresa Brugal⁴,
Marcel Buster⁵, Filipa Ferraz de Oliveira⁶, Lene Haastrup⁷, Axel Heinemann⁸,
Angelos Kouklinos⁹, Daniele Risser¹⁰, Daniel Svensson¹¹, Erkki Vuori¹²**

Summary

The European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) is currently co-ordinating a project which aims to enrol and follow up prospective cohorts of problem drug users (PDUs) in several countries, so as to compare overall and cause-specific mortality. Within the project a literature overview of drug user mortality and a comparative analysis of data from already followed-up cohorts were performed. Although the joint analysis provided new knowledge on mortality trends among PDUs in several European countries, care should be taken in comparing data from retrospective cohorts due to the heterogeneity of study populations and their settings and follow-up procedures. The formation of prospective cohorts, in line with a standard methodology, should improve the comparability of results both for overall and cause-specific mortality.

Key words: Drug users - Mortality - EMCDDA - European project

Introduction

Drug abuse is known to have serious health consequences [1, 3, 13-14]. Overall and cause-specific mortality can be considered a valid indicator of the health effects of drug abuse. In most European countries data on drug-related deaths are commonly used in estimating mortality related to substance abuse among the general population and as an indicator to assess the health impact of drug addiction. Many sources of information on drug-related deaths using different criteria for data collection are now available in the

EU countries. Although most European countries have national and/or regional mortality registers, where deaths are coded on the basis of the International Classification of Diseases (ICD), there is a broad heterogeneity of the ICD codes applied to classify “drug-related death”. A specific EMCDDA project has been developed to implement a standard definition and classification of “drug-related deaths” directly linked with the use of drugs (“overdoses” or “poisonings”) in order to improve comparability between countries [4]. However, problem drug users die from a wide spectrum of causes other than overdoses (e.g. AIDS and accidents). Moreover, data on drug-related deaths cannot be referred to a common denominator; they depend on factors such as the prevalence of drug users, and overdose incidence and fatality.

The strength of longitudinal studies lies in their capacity to estimate the current mortality rate among drug users, even if it should be borne in mind that longitudinal studies are carried out on selected groups that may be unrepresentative of the overall drug addict population.

The Agency for Public Health in the Region of Latium (Lazio), Italy, is currently co-ordinating a project promoted by the EMCDDA which aims to calculate and compare mortality rate estimates across a spectrum of European countries through the formation of cohorts of problem drug users participating in enrolment and follow up, in conformity with a common methodology. This paper aims to describe the development of the project and the results already obtained.

Objectives of the project

The broad objective of the EMCDDA project is to promote and co-ordinate the setting up of cohorts of problem drug users recruited through treatment centres in EU Member States, in order to estimate overall and cause-specific mortality rates, while analyzing and comparing longitudinal trends in mortality across countries for monitoring purposes. The project has been developed in the following phases:

- overview of published studies on the mortality of problem drug users that have been undertaken in Europe, and the development of a standardized protocol to assess overall and cause-specific mortality rates among PDUs;
- evaluation of the feasibility of implementing the standardized methodology in various European countries;
- promoting and co-ordinating the formation of cohorts of problem drug users recruited in treatment centres;
- joint analysis of available cohorts.

Results

Review of the literature

A review of the literature, comprising studies and reports/editorials on mortality among drug users in Europe, published between 1980 and 1996, was carried out within the project. The objectives of this overview were to outline the knowledge available on PDU mortality in Europe and assess the comparability of data from different countries.

Of the 33 papers on cohort studies reviewed, 20 were published between 1987 and

1996. Twenty-four longitudinal studies were carried out in European countries. Drug users who had been enrolled at treatment centres in several countries over different time periods showed very high overall and cause-specific mortality rates, ranging from 9.6/1000 in Glasgow in 1985 [7] to 63.8/1000 in Milan in 1991 and 1992 [9]. The main causes of deaths were AIDS and other infectious diseases, overdose, injuries and poisoning, cirrhosis and cardiovascular diseases [2, 5, 7, 10, 16].

All cohort studies showed higher than expected death rates among PDU's compared with a matched general population, although there was variability across study periods, study population and location. The estimated risk of death ranged from 10 to 30 times that of non-drug users of the same sex and age [7, 11, 16]. The excess mortality was estimated almost exclusively among drug users receiving treatment as outpatients. Some studies showed that females have a higher excess mortality than males [2, 11]. Among intravenous drug users, HIV-positive subjects had a higher overall risk of dying than that of HIV-negative ones [6, 8, 15, 17].

The overview of the literature demonstrated that results based on the published data are hard to compare, because of the heterogeneity of the enrolment criteria for drug users, follow-up procedures and methods of data analysis. Most studies have been conducted in eight European countries only, whereas no data were available for the other countries.

Standard protocol to carry out longitudinal studies of mortality among problem drug users

A standard protocol, for carrying out cohort mortality studies among problem drug users, was prepared by defining criteria for the inclusion of subjects in the cohort, follow-up procedures, data collection and methods of analysis. During its development the standard protocol took into account the results of the feasibility study, which was carried out in the early phases of the project. The study aimed to identify subjects to be included in the cohort and to investigate the availability and accessibility of population and mortality registers or similar sources available for determining vital status. The results of the feasibility study showed that the available study population in most countries consisted mainly of addicts entering treatment centres, with some differences both in treatment and in type of substance abused. Using treatment centres as sources of information on study populations seemed the most feasible and reliable option, since identifiers of people enrolled are necessary to assess vital status and cause of death. Moreover, drug addicts who seek treatment are the part of the drug abuse population that has the most urgent problems, and they are not representative of the whole drug user population. In addition, it was considered that at present most PDU's entering treatment in European countries are opiate users. Users of non-opiates (such as cocaine, amphetamines and cannabis) who are admitted to treatment constitute a very special group, and mortality figures derived from this sub-population may be highly biased and unrepresentative of the source population. Opiate users are more likely to enter treatment than other drug addicts, as their health problems are known to be more serious. One outcome is that, in some countries opiate users are the majority of drug addicts in

Table 1. Characteristics of the cohorts					
Study site	Period of enrolment	Study population (N) and setting	Fw-up period	Mean age at enrolment	N of deaths
Sweden	1987-1997	Opiate addicts entering in-patients TCs. Recruitment through the National Hospital Discharge Registry (4023)	1987-1997	30.1	592
Denmark	1996-1999	Opiate addicts entering any kind of treatment. Recruitment through from the National Treatment Database (10355)	1996-1999	31.1	449
Amsterdam	1985-1996	Opiate addicts entering Methadone programs at specialised out-patient TCs and General Practitioners (GPs). Data from Central Methadone Register (CMR) (4853)	1985-1996	29.0	446
Vienna	1987-1998	Opiate addicts in MMTPs at GPs, specialised residential, specialised out-patient, specialised in prison (4683)	1987-1998	27.5	282
Barcelona	1992-1996	Opiate addicts entering out-patient specialised out-patient TCs (4501)	1992-1998	28.6	918
Lisbon	1992-1998	Heroin addicts entering one specialised residential TC and 9 specialised out-patient TCs (2525)	1992-1999	25.3	306
Rome	1980-1995	Opiate addicts entering Public TCs (PTCs) and Non Governmental Organisation (NGOs) (10332). Recruitment through the Local Surveillance System	1980-1996	26.6	1444

treatment. Local and comparative analysis for both opiate and non-opiate users should be carried out where they do not represent a special group.

In the standard protocol included a definition of the study population and the enrolment criteria. All addicts entering treatment at least once during the study period were considered eligible for inclusion in the cohort. As stated in the protocol, the information needed to ascertain vital status must be available and the date of entry at the treatment centre (marking the beginning of the observation period) must be specified, too.

Some essential information was required to provide a description of the people enrolled. This was done to orient the analysis towards enhancing comparability between study sites. Follow-up procedures and their reliability were specified and various analytical strategies were suggested.

Comparative analysis

Although the goal of the EMCDDA mortality project is to describe mortality using a standard methodology, an attempt to analyse and compare data from cohorts that had already been followed up in some study sites was performed. The available study populations appeared to be relatively heterogeneous; they mainly included opiate users, but also comprises variable proportions of users of other drugs (e. g. 24% of amphetamine users in Sweden). To improve the comparability of results, opiate addicts only were included in the analysis.

As shown in table 1, all the analysed cohorts consisted of opiate addicts who had entered treatment, and some differences in period of enrolment, setting and follow up were observed.

The availability of information on individuals enrolled varied across study sites. Gender, age at enrolment and age at death were available at all sites, as well as the variables needed to calculate person-years at risk. The average age at enrolment ranged from 25.7 to 31.1; these were the figures for the cohorts enrolled in Lisbon and in Denmark, respectively.

Figure 1 shows the overall mortality trend in each cohort. The highest mortality rate

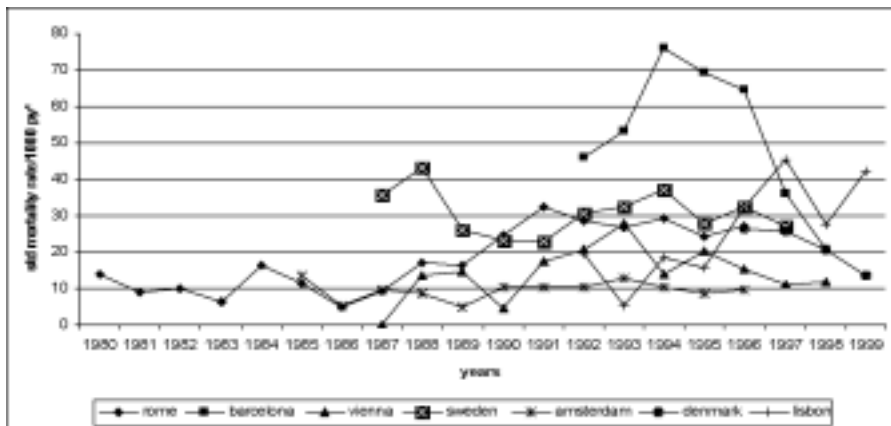


Figure 1. Mortality from all causes: standardized mortality rates (males and females). Directly standardized mortality rates calculated using the European Union population aged between 15-49 as standard. This range was chosen to avoid unstable rates deriving from small numbers of cases per person-years of observation in older age strata.

was observed in Barcelona (75.9/1000 person-years) in 1994 and the lowest in Amsterdam, where mortality rates were consistently below 13.0/1000 person-years over time. In Barcelona a marked decrease in mortality rates in more recent years was reported (20.6/1000 person-years in 1998) – a trend that calls for further analysis. The joint analysis revealed strong differences in overall mortality and trends between study sites, but caution is appropriate when comparing the cohorts retrospectively, due to differences in enrolment criteria, follow up and other variables. In any case, it should be stressed that overall mortality rates have been estimated from cohorts enrolled in various study sites, comprising those countries where longitudinal studies on drug addict mortality had never been carried out before.

Conclusion

There is strong evidence that problem drug users have a higher risk of death than the general population of the same gender and age. The increased risk is only partly due to acute intoxication (overdoses); other causes of death have a strong impact on mortality among drug users. As a result, data on drug-related death and mortality figures estimated through longitudinal studies are useful complementary indicators of the health effects of drug abuse.

The EMCDDA has been working for several years to issue standard guidelines, with the aim of improving the quality and comparability of data on drug-related deaths and of results from mortality cohort studies among PDUs. Eleven European countries (Austria, Denmark, Finland, Germany, Greece, Ireland, Italy, Portugal, Spain, Sweden and the Netherlands) are currently collaborating with the EMCDDA cohort mortality project that has been developed, with contributions coming from a group of experts comprising members working in all the participating sites.

The feasibility study and the results of the joint analysis have shown that analysing data from retrospective cohorts is worthwhile in countries where mortality rates have never been estimated, but only as long as access to the required information is easily available. Further analysis is being performed on cause-specific mortality for the cohorts already followed up, and on the possible determinants of mortality.

Most study sites are currently dealing with the enrolment and follow-up of cohorts in line with the standard protocol. The implementation and follow-up of cohorts in conformity with a standard methodology should improve the comparability of results both for overall and for cause-specific mortality. It is, however, necessary to enhance the availability of information on the study population characteristics as required by the protocol.

References

1. Cherubin C.E., Sapira J.D. (1993): The medical complication of drug addiction and the medical assessment of intravenous drug users: twenty-five years later. *Ann Intern Med* 119: 1017-1028.
2. Davoli M., Perucci C.A., Rapiti E., Bargagli A.M., D'Ippoliti D., Forastiere F.,

- Abeni D.D. (1997): A persistent rise in mortality among injection drug users in Rome, 1980 through 1992. *American Journal of Public Health* 87: 851-853.
3. de la Fuente L., Barrio G., Vicente J., et al (1995): The impact of drug-related deaths on mortality among young adults in Madrid. *American Journal of Public Health* 85: 102-105.
 4. European Monitoring Centre for Drug and Drug Addiction (EMCDDA). Co-ordination of implementation of the EMCDDA standard guidelines on the Drug-Related Deaths Indicator in the EU Member States, and collection and analysis of information on drug-related deaths (EMCDDA project CT.99.RTX.04). Lisbon, 2000
 5. Engström A., Adamsson C., Allebeck P., Rydberg U. (1991): Mortality in patients with substance abuse: a follow-up in Stockholm County, 1973-1984. *The International Journal of Addiction* 26: 91-106.
 6. Eskild A., Magnus P., Samuelsen S.O., Sohlberg C., Kittelsen P. (1993): Differences in mortality rates in causes of death between HIV positive and HIV negative intravenous drug users. *International Journal of Epidemiology* 22: 315-320.
 7. Frischer M., Goldberg D., Rahman M., Berney E.L. (1997): Mortality and survival among a cohort of drug injectors in Glasgow, 1982-1994. *Addiction* 92: 419-427.
 8. Fulgestad A., Annell A., Rajs J., Agren G. (1997): Mortality and causes and manner of death among drug addicts in Stockholm during the period 1981-1992. *Acta Psychiatr Scand* 96:169-175.
 9. Galli M., Musicco M., for the COMCAT study group (1994). Mortality of intravenous drug users living in Milan, Italy: role of HIV-1 infection. *AIDS* 8:1457-1463.
 10. Joe G.W., Simpson D.D. (1987): Mortality rates among opioid addicts in a longitudinal study. *American Journal of Public Health* 77: 347-348.
 11. Oppenheimer E., Tobutt C., Taylor C., Andrew T. (1994): Death and survival in a cohort of heroin addicts from London clinics: a 22-year follow-up study. *Addiction* 89: 1299-1308.
 12. Perucci C.A., Davoli M., Rapiti E., Abeni D.D., Forastiere F. (1991): Mortality of intravenous drug users in Rome: a cohort study. *American Journal of Public Health* 81: 1307-1310.
 13. Perucci C.A., Forastiere F., Rapiti E., Davoli M., Abeni D.D. (1992): The impact of intravenous drug users on mortality of young adults in Rome, Italy. *British Journal of Addiction* 87: 1637-1641.
 14. Selwyn P.A. (1991): Injection drug use, mortality, and the AIDS epidemic. *American Journal of Public Health* 81: 1247-1249.
 15. van Haastrecht H.J.A., van Ameijden E.J.C., van den Hoek J.A.R., Mientjes G.H.C., Bax J.S., Coutinho R.A. (1996): Predictors of mortality in the Amsterdam cohort of human immunodeficiency virus (HIV)-positive and HIV-negative drug users. *Am J Epidemiol* 143: 380-391.

16. Wahren A.C., Brandt L., Allebeck P. (1997): Has mortality in drug addicts increased? A comparison between two hospitalised cohorts in Stockholm. *International Journal of Epidemiology* 26: 1219-1226.
17. Zaccarelli M., Gattari P., Rezza G., Conti S., Spizzichino L., Vlahov D., Ippolito G., Lelli V., Valenzi C. (1994): Impact of HIV infection on non-AIDS mortality among Italian injecting drug users. *AIDS* 8:345-350.

Received March, 21, 2001 - Accepted June, 28, 2001