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# Psychiatric disorders are overlooked in patients with drug abuse

Line Kruckow, Kristian Linnet & Jytte Banner

## ABSTRACT

**INTRODUCTION:** Psychiatric disease is overlooked in drug users. Patients with both drug abuse and a psychiatric disease – dual diagnosis – suffer decreased compliance to treatment and decreased life expectancy compared with single-diagnosis patients. Identifying the patients among either drug addicts or mentally ill patients is difficult.

**METHODS:** All drug addicts autopsied at the Department of Forensic Medicine, University of Copenhagen, Denmark, in the years 1992, 2002 and 2012 were included. The group was divided into two subpopulations of possible dual diagnosis patients either according to police reports stating mental illness or to psychotropics found in the toxicology screening after autopsy.

**RESULTS:** We found a rise in possible mental illness in both subpopulations in the study period. Drug addicts with psychotropics in the blood at the time of death increased from 3.1% in 1992 to 48.1% in 2012, and this group was significantly younger at the time of death than those without psychotropics in the blood.

**CONCLUSIONS:** Suspected dual diagnosis patients have increased in number. They die earlier than their drug addict counterparts. Methadone remains the leading cause of death in all subpopulations. Possible causes are misuse of treatment and/or illegally bought methadone, wrongly assigned cause of death due to unknown tolerance and/or polydrug toxicity in combination with psychotropic medicine.

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Drug addicts and mentally ill patients have a markedly lower life expectancy than the general population [1, 2].

Dual diagnosis – the simultaneous occurrence of drug and/or alcohol use and a mental illness in a patient – is a different kind of challenge than suffering from either one or the other for both the patient and for health personnel, social workers, families and friends. Suffering from a dual diagnosis leads to a further decreased treatment compliance and an even more reduced life expectancy compared with suffering from one diagnosis alone [2-4]. Unfortunately, this also seems to be true for dual diagnosis patients receiving substitution treatment for their drug use [5] and could be due to polydrug toxicity [6].

The number of patients with dual diagnosis has increased in the past decades [7]. Numerous initiatives have been launched to improve treatment and quality of life and to decrease the mortality rate for these patients; however, a major challenge is to identify the group which could benefit from these initiatives. Identification has been attempted during the past 20 years with different measures and different outcomes [3, 7, 8], either by describing drug abuse among admitted individuals or by describing psychiatric disorders within a population of drug addicts in out-patient treatment centres.

The dual diagnosis population increased from 8,000 in 2000 to 11,000 in 2008, encompassing 10% of the entire psychiatric population in Denmark [7]. Approx. 1,800 dual diagnosis patients with severe psychiatric disorders and a minimum of 1,600 patients with lighter psychiatric disorders were admitted for psychiatric treatment during the course of one year, either for out-patient or in-hospital treatment [3].

In comparison, the most recent estimate of the number of drug users in Denmark is 33,000 out of 5.6 million inhabitants (0.6%) [1]. It is estimated that – at any given time – the number of people who suffer from a mental illness of varying degrees comprises 10-20% of the population, whereas 2% of the population suffer from a long-lasting mental illness at any time [2].

Many of the estimates, including two of the most recent Danish studies [3, 7], focus on identifying dual diagnosis among living, mentally ill patients by use of registry-based analysis. This method is based on studying psychiatric patients admitted or treated in open psychiatric facilities or hospitals and it focuses solely on the assessment of the population size and the challenges for the healthcare system. Only one study focuses on identifying dual diagnosis patients among living drug addicts [9]. In Denmark, all deaths that are considered to be connected to drug abuse have been autopsied since 1970 due to a decree from the Ministry of Justice [10]. This creates a unique collection of data on drug addicts in Denmark.

The three Danish departments of forensic medicine do not have access to patient files, but receive background information concerning deceased persons through police reports. This means that the doctor performing the autopsy will have no information of any

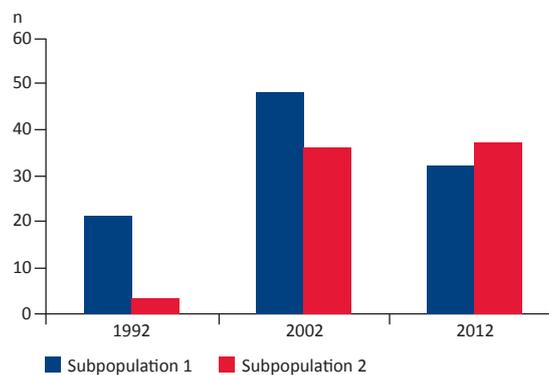
## ORIGINAL ARTICLE

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FIGURE 1

Proposed dual diagnosis population.



mental illness unless this information has been given to the police prior to the autopsy.

Police reports rely on information from general practitioners whenever available, and on information from family members, friends or other people such as neighbours. Furthermore, police reports include a description of medicine found among the possessions of the deceased.

Another possible predictor of mental illness may be the identification of psychotropic medication in the blood at the time of death, which may either be due to abuse or treatment; the latter indicating mental illness.

Through many years of research on drug addicts in Denmark, the most current being from 2014 [1], it is known that benzodiazepines are popular among drug addicts without mental illness and these are prescribed as part of their substitution treatment. Unfortunately, this makes it an unreliable marker for mental illness unless the diagnosis can be cross-referenced.

To our knowledge, no Danish or international studies analyse the prevalence of dual diagnosis cases in a deceased population with access to unique autopsy analyses.

**Aims:** The purpose of this study was to explore to which degree dual diagnosis can be identified in a population consisting solely of identified, deceased and autopsied drug addicts. By uncovering the number of deceased drug addicts with a dual diagnosis – either through a reported psychiatric diagnosis in the police report or the occurrence of psychotropic medication in the blood at the time of death – we may be able to further characterise this population. We therefore studied the cause of death in relation to single or dual diagnosis and explored trends during the past 20 years.

## METHODS

The material includes all drug addicts who were autopsied at the Department of Forensic Medicine, Univer-

sity of Copenhagen, Denmark, in the years 1992, 2002 and 2012. The cases were chosen from the department's internal diagnosis system using the diagnosis of euphoria and including all cases from the three years mentioned. The department of Copenhagen covers the eastern part of Denmark, which counts approx. 2.5 million inhabitants.

Death from poisoning involving more than one drug are listed after the drug considered the main contributor in the cause of death. All drugs found in the toxicology analysis are included and grouped into their respective major type of drug, including: antipsychotics, antidepressants, antiepileptics, benzodiazepines, methylphenidate and mood stabilisers. Heroin is listed as heroin/morphine as heroin is degraded through several steps into morphine and cannot usually be isolated.

To identify any dual diagnosis patients, two subpopulations were established based on police reports (subpopulation 1) and based on the presence of psychotropics in the blood at the time of death, excluding benzodiazepines (subpopulation 2).

*Trial registration:* not relevant.

## RESULTS

In total, 290 deceased and autopsied drug addicts were included: 97 were autopsied in 1992, 116 in 2002 and 77 in 2012.

### Identifying the subpopulations

#### Subpopulation 1

Data from police reports suggested that in 1992, 21.6% (21/97) possibly had a psychiatric disorder or mental illness, while the percentage rose to 41.4% (48/116) in 2002 and to 41.6% (32/77) in 2012.

#### Subpopulation 2

From toxicology reports, we found that a total of three cases had psychotropic medication (excluding benzodiazepines) in the blood at the time of death, accounting for 3.1% (3/97) in 1992. In 2002, the share had increased to 31.0% (36/116) and in 2012 to 48.1% (37/77). More detailed information about the subpopulations is presented in **Figure 1**.

There is a significant association between subpopulation 1 and subpopulation 2 (chi-squared = 51.206,  $p < 0.005$ ), meaning that there is an association between a police report stating a mental illness and the presence of psychotropic medicine in the toxicology screening.

Some characteristics of the entire group and the subpopulations are detailed in **Table 1**. The mean age at the time of death of all deceased drug addicts has increased; yet, subpopulation 2 died earlier than the non-dual diagnosis group.

In the three years covered in this study, a total of 218 died from poisoning with no apparent rise in the number throughout the period. Of these, 11 were registered with suicide as the manner of death and the remaining 207 were recorded as accidental poisoning/overdose.

In subpopulation 1 (three years combined), 28.7% died from other causes than poisoning in comparison to the non dual diagnosis drug addicts opposing subpopulation 1, where 22.8% died from other causes. There is no significant difference between the two groups (chi-squared = 1.253,  $p > 0.05$ ).

In subpopulation 2, 21.1% died from other causes; within the remaining group, the percentage was 26.2%; no significant difference was found here either (chi-squared = 0.786,  $p > 0.05$ ).

The other causes cover cardiovascular (4.5%), neurological (3.4%), pulmonary (2.4%), and gastrointestinal (1%) causes. The remaining deaths were due to traumas and specific disorders. A total of 4.1% died from unknown causes.

In general, the amount of psychotropic drugs and medications in the blood at the time of death increased in the 20-year study period. This increase could not be related to the number of established, fatal cases of poisoning as presented in **Table 2**.

In total, 42.9% of all drug addicts in 2012 had psychotropics in their blood, excluding benzodiazepines and antiepileptics. Looking at the 24 cases with antiepileptic medicine in their blood in 2012, there is an overlap; viz. 11/24 (45.8%) had either antidepressants, antipsychotics or methylphenidate in the blood as well. This means that up to 54.2% of the drug addicts in 2012 that only had antiepileptics in their blood could wrongly be assigned a dual diagnosis if they were undergoing epilepsy treatment.

**Table 3** presents the frequency of the two most common drugs causing fatal poisonings. The table demonstrates that there is no significant difference between the subpopulations and that all groups share similar patterns irrespectively of a positive police report or the presence of psychotropics in the blood.

Fatal methadone poisonings were more common in the group of drug users who received methadone as substitution treatment for their addiction: in this group the percentage rose to 77.8% in 2012 compared with 61.3% in 2002 and 52.1% in 1992. However, the trend was not statistically significant (Mantel-Haenszel chi-squared for linear trend = 0.6,  $p = 0.4$ ).

## DISCUSSION

From 1992 to 2012, the number of possible mentally ill drug addicts increased in both subpopulations. Fatal poisonings remain the leading cause of death in both

groups, with methadone being the major contributor, and no difference was found between the populations. Death from other causes than poisoning was equally distributed across the subpopulations.

The aim of this study was not to distinguish accidental overdoses from suicides. Therefore, it is possible that part of the 200 deceased drug addicts dying from accidental causes may, in fact, be due to intended overdosing. Judging whether a case of overdose was accidental or intended is difficult and often relies on the presence of vital information of intent (prior history of suicidal behaviour and witness accounts), as well as on circumstantial evidence such as suicide notes. If these are not present, even suspected suicides will typically be declared accidental overdoses.

Fatal methadone poisonings in drug addicts being treated with methadone have increased with more than 75% of drug addicts dying from methadone poisoning in 2012. This makes it important to include drug addicts receiving substitution treatment when researching drug addicts with a dual diagnosis as they too die from fatal poisonings.

It must be underlined that the dose of methadone leading to death in patients who are being treated with the drug varies from case to case because of varying degrees of tolerance. Thus, deaths may occur even though the dose is within the treatment range, especially for drug-naïve subjects or after drug pauses. Furthermore, in most cases, several drugs are present, which stresses the importance of polydrug toxicity.

The mean age of drug addicts at the time of death has increased over time. Subpopulation 2 shows a significant difference in age at the time of death. This is as-



Many deceased drug addicts may have been mentally ill.

TABLE 1

General characteristics.

	1992				
	male	female	non-dual	dual	total
n (%)	76 (78.4)	21 (21.6)	–	–	97 (100)
Age, yrs, mean (range)	33 (20-48)	32 (20-48)	–	–	32.71 (20-48)
Poisoning as cause of death, n (%)	56 (73.7)	17 (81.0)	–	–	73 (72.5)
<i>Age, yrs, mean ± SD (n)</i>					
Subpopulation 1	–	–	32.04 ± 6.7 (76)	35.14 ± 7.3 (21)	–
p-value <sup>a</sup>				0.069	
Subpopulation 2	–	–	32.45 (94)	41.00 (3)	–
p-value <sup>a</sup>				– <sup>b</sup>	

SD = standard deviation.

a) The independent samples t-test.

b) Sample size too small for accurate testing.

CONTINUES »

TABLE 2

Psychotropics found in all deceased drug addicts, grouped by categories. The values are % (n).

	1992	2002	2012
Antidepressants	1.0 (1)	13.8 (16)	20.8 (16)
Antipsychotics	2.1 (2)	18.1 (21)	32.5 (25)
Antiepileptics <sup>a</sup>	0.0 (0)	8.6 (10)	31.2 (24)
Mood stabilisers	0.0 (0)	0.9 (1)	0.0 (0)
Methylphenidate	0.0 (0)	0.0 (0)	2.6 (2)
Benzodiazepines	47.4 (46)	38.8 (45)	62.3 (48)

a) Includes a variety of drugs that can be used as stabilisers in psychotic patients; however, here we chose to group them according to their main purpose.

sociated with the presence of psychotropics, which reduces their lifespan. This demonstrates that even if we cannot be certain of the accuracy of the dual diagnosis, psychotropic medication is a risk and increases mortality in drug addicts.

There was a significant association between police reports stating mental illness in the deceased drug addicts and psychotropic medication found in the toxicology screening. However, this was not a 100% match. The group of drug addicts not included in the subpopulations may still have been mentally ill; the diagnosis could have been omitted from witness accounts during the primary

TABLE 3

Major deadly poisonings sorted by the drug thought to be the major contributor (exact number of entries).

	1992			2002			2012		
	non-dual	dual	total	non-dual	dual	total	non-dual	dual	total
<i>Subpopulation 1</i>									
Patients, % (n/N)	76.3 (58/76)	71.4 (15/21)	(73/97)	76.5 (52/68)	66.7 (32/48)	(84/116)	80.0 (36/45)	78.1 (25/32)	(61/77)
p-value <sup>a</sup>		0.646			0.245			0.842	
Drugs, % (n):									
Methadone	32.8 (19)	40.0 (6)	–	51.9 (27)	46.9 (15)	–	88.9 (32)	76.0 (19)	–
Heroin/morphine	62.1 (36)	53.3 (8)	–	44.2 (23)	43.8 (14)	–	8.3 (3)	16.0 (4)	–
Other	5.2 (3)	6.7 (1)	–	3.8 (2)	9.4 (3)	–	2.8 (1)	8.0 (2)	–
p-value <sup>a</sup>		0.826			0.571			0.393	
<i>Subpopulation 2</i>									
Patients, % (n/N)	75.5 (71/94)	66.7 (2/3)	–	70.0 (56/80)	77.8 (28/36)	–	77.5 (31/40)	81.0 (30/37)	–
p-value <sup>a</sup>		0.726			0.386			0.699	
Drugs, % (n):									
Methadone	35.2 (25)	0.0 (0)	–	48.2 (27)	53.6 (15)	–	83.9 (26)	83.3 (25)	–
Heroin/morphine	60.6 (43)	50.0 (1)	–	46.4 (26)	39.3 (11)	–	9.7 (3)	13.3 (4)	–
Other	4.2 (3)	50.0 (1)	–	5.4 (3)	7.1 (2)	–	6.5 (2)	3.3 (1)	–
p-value <sup>a</sup>		0.017			0.809			0.787	
<i>Total</i>									
Drugs, % (n/N):									
Methadone	–	–	34.2 (25/73)	–	–	50.0 (42/84)	–	–	83.6 (51/61)
Heroin/morphine	–	–	60.3 (44/73)	–	–	44.0 (37/84)	–	–	11.5 (7/61)
Other	–	–	5.5 (4/73)	–	–	6.0 (42/84)	–	–	4.9 (3/61)

a) Pearson's chi-squared test.



TABLE 1, CONTINUED

2002					2012				
male	female	non-dual	dual	total	male	female	non-dual	dual	total
99 (85.3)	17 (14.7)	–	–	116 (100)	61 (79.2)	16 (20.8)	–	–	77 (100)
39 (19-66)	43 (24-54)	–	–	39.45 (19-66)	45 (22-62)	44 (26-60)	–	–	44.3 (22-62)
72 (72.7)	12 (70.6)	–	–	84 (72.4)	46 (75.4)	15 (93.8)	–	–	61 (79.2)
–	–	40.16 ± 8.1 (68)	38.44 ± 9.6 (48)	–	–	–	44.89 ± 10.9 (45)	43.47 ± 10.4 (32)	–
			0.3					0.569	
–	–	39.96 ± 8.7 (80)	38.31 ± 8.9 (36)	–	–	–	46.93 ± 10.55 (40)	41.46 ± 10.2 (37)	–
			0.349					0.024	

police investigation. It is also possible that some drug addicts had not been diagnosed or were diagnosed as mentally ill, but remained non-compliant to treatment. Likewise, non-diagnosed cases and cases that were not mentally ill may appear in the population due to self-medication with prescription drugs bought illegally.

Finally, the toxicology screening shows only the final picture and not the history leading to it.

In 1992, psychotropics were usually not present in the toxicology screening, but in 2012 psychotropics were found in one third of the population. The specific drugs in question are primarily the major groups of antidepressants, antipsychotics and antiepileptics; and they appear in all cases irrespective of the cause of death. Further studies are needed to determine why these drugs have such a prominent presence in the post mortem toxicology screenings, and our findings raise the question if these drugs are prescribed more loosely or if they have entered the illegal drug market.

The use of psychotropic medication presents a vital risk factor as it increases the mortality among drug addicts even if we cannot be certain whether this is due to a dual diagnosis or to illegal use. The group with psychotropic medicine in the blood has a significantly lower life expectancy than those in whom these medicines were absent. This creates an unfortunate dilemma where clinicians should be aware of possible underlying psychiatric disorders in drug addicts and provide the correct treatment. Meanwhile, the use of psychotropic medication in the treatment of a dual diagnosis lowers the lifespan of drug addicts and provides them with substances that may be abused.

#### Limitations of the study

The populations considered in this study are relatively small. The results presented here may therefore change in more extensive studies.

Some prescription drugs are used both in the treatment of psychiatric disorders and for somatic diseases,

e.g. antiepileptic medicine. Caution is warranted because of the uncertainty of data concerning the diagnosis of epilepsy and the prescription of antiepileptics. The subpopulations are defined by surrogate markers for mental illness.

Further studies are needed to identify the dual diagnosis population among drug addicts in Denmark, including registry data to secure the diagnoses and facilitate the identification of morbidity and mortality risk factors within the group, and to establish the source of any prescription medication found in the blood of deceased drug addicts

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