

Does the combined use of heroin or methadone and other substances increase the risk of overdose?



Drug-related death publications

This series of publications emanates from the Government Action Plan to Prevent Drug-Related Deaths, a response to the Advisory Council on the Misuse of Drugs' report on drug-related deaths

The research was funded by the Department of Health and the NTA, which administered grants to increase the knowledge base around drug-related deaths.

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The National Treatment Agency for Substance Misuse

The National Treatment Agency for Substance Misuse (NTA) is a special health authority within the NHS, established by Government in 2001, to improve the availability, capacity and effectiveness of treatment for drug misuse in England.

Treatment can reduce the harm caused by drug misuse to individuals' well-being, to public health and to community safety. The Home Office estimates that there are approximately 250,000–300,000 problematic drug misusers in England who require treatment.

The overall purpose of the NTA is to:

- Double the number of people in effective, well-managed treatment between 1998 and 2008
- Increase the percentage of those successfully completing or appropriately continuing treatment year-on-year.

Reader information

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| Document purpose | To identify risks of overdose among drug users taking heroin or methadone in combination with other substances, to inform treatment service planning and delivery |
| Title | Does the Combined Use of Heroin or Methadone and Other Substances Increase the Risk of Overdose? |
| Lead author | Phillip Oliver, University of Sheffield |
| Publication date | April 2007 |
| Target audience | Primarily providers and commissioners of drug treatment services in England. |
| Circulation list | Managers and commissioners of treatment services Co-ordinators and chairs of local partnerships (e.g. drug action teams and crime and disorder reduction partnerships) Service user and carer groups Commissioners of pharmaceutical enhanced services local pharmaceutical committees Regional government department leads on drugs Central government department leads on drugs. |
| Description | This document summarises the full report of a research project investigating whether taking other substances in combination with heroin or methadone increases the vulnerability to fatal overdose |
| Contact details | Phillip Oliver, Addiction Research Unit, Institute of General Practice and Primary Care, University of Sheffield, UK |
| Gateway/ROCR approval | The NTA is a self-regulating agency in relation to the Department of Health Gateway |

Disclaimer

This publication is not a journal publication and does not constitute National Treatment Agency or Department of Health guidance or recommendations. The views expressed by this study are not necessarily those of the Department of Health or the NTA, but are based on externally refereed research.

This document is a summary of the publication, Study to Determine the Relationship Between Blood-Heroin/Methadone and Concomitant Drug Levels in Fatal Opioid Poisonings (NTA, 2007).

Introduction

Drug misuse is one of the leading causes of death in young people in the UK. Users of heroin are at considerable risk of early death and are estimated to be around 20 times more likely to die than their peers. Up to half of these deaths believed to result from fatal opioid overdose (predominantly heroin and methadone).

Understanding the factors that influence the risk of opioid overdose offers the potential to better inform health promotion strategies aimed at reducing death and harms associated with overdose.

Heroin and other opioid drugs such as methadone are potent central nervous system depressants and typically cause death by depressing the breathing centres of the brain. One of the most common findings in such deaths is that other, albeit less potent, respiratory depressants are present in the blood of overdose victims. Up to 75 per cent of heroin overdose fatalities test positive for alcohol, while benzodiazepines are present in around 40 per cent of heroin deaths.

These estimates vary greatly between studies and little is known about trends in England and Wales over the past decade, or the involvement of other drugs typically used alongside heroin.

Existing research suggests that the presence of alcohol in opioid-related deaths may have a significant effect on the outcome of the poisoning, to the extent that less heroin may be required to fatally overdose when both are used simultaneously. Although benzodiazepines are frequent features of opioid deaths, this relationship has not yet been demonstrated for these or other drugs.

Research aims

The main purpose of this study was to test the hypothesis that the presence of substances such as alcohol and benzodiazepines reduces the amount of heroin or methadone required to fatally overdose.

A second aim was to identify which other drugs were detected in cases of heroin and methadone overdoses and to explore how this has changed over the past decade in England and Wales.

We looked at a large collection of heroin and methadone toxicology reports and produced two statistical models.

Methods

In accordance with the Coroners Act 1988 and the Coroners Rules 1984, all sudden, unexpected, or suspicious deaths in England and Wales are investigated by the local coroner's office. If a death is suspected to be from a drug overdose, a full toxicological investigation is carried out by an accredited laboratory.

The data used in this study comes from 15,000 toxicology reports produced by the Department of Clinical Chemistry at the Royal Hallamshire Hospital Sheffield for various coroners throughout England and Wales, covering the period between 1991 and 2004. In order to identify deaths caused primarily by heroin or methadone overdose, we developed a database and transferred all 15,000 toxicology reports. A database search resulted in 1,586 potential heroin cases and 553 potential methadone cases.

Since it was possible that some of these deaths were due to causes other than opioid overdoses (such as road traffic accidents), a senior researcher rated each case to assess the likelihood that death was caused by heroin or methadone. Each of these cases was then examined for the presence of over 100 other substances relevant to opioid overdose.

Levels of methadone and heroin in the blood, along with levels of associated drugs, were transferred onto a statistical database. In order to assess whether blood levels of heroin or methadone were influenced by the presence of other drugs, we adjusted the results for other relevant variables such as age and gender. The overall aim of these statistical analyses was to select which drugs best predicted the fatal heroin or methadone level.

Results

Heroin

For heroin fatalities, alcohol was the most commonly detected substance, found in around 50 per cent of cases, followed by diazepam (34 per cent) and Temazepam® (13 per cent).

Over 75 per cent of heroin fatalities involved one or more of these substances, with 37 per cent per cent of cases involving at least one benzodiazepine. During the last ten years this pattern has remained fairly stable with the exception of Temazepam®, which after peaking in 1995 has reduced in recent years.

Methadone

In cases of methadone overdose, diazepam was the most commonly detected drug (44 per cent of cases), followed by alcohol (33 per cent), morphine (28 per cent) and Temazepam® (21 per cent). Fifty-four per cent of all index cases involved at

least one benzodiazepine and overall, more than 80 per cent of methadone-related deaths involved one or more other drugs. The general trend however appears to be towards a decrease in people testing positive for benzodiazepines.

The role of alcohol and benzodiazepines

Alcohol was the only accompanying substance associated with lower heroin blood levels. Where alcohol was detected, levels were between 20 per cent and 50 per cent lower, suggesting that concurrent alcohol use reduces the lethal heroin overdose threshold by as much as half. This effect appears to be limited to blood alcohol concentrations greater than the current UK legal driving limit (80mg/100ml).

No such effect was found for the benzodiazepine drugs in heroin and methadone overdose fatalities.

Alcohol was also associated with lower methadone blood levels, especially in females who were estimated to have methadone concentrations around 60 per cent lower where ethanol concentrations were greater than 80mg/100ml.

Conclusions

- Alcohol concentrations, even those associated with mild intoxication, appear to lower the amount of heroin required to fatally overdose. Other substances frequently detected in

cases of heroin overdose do not appear to show this effect. If benzodiazepines have a causative role in fatal heroin overdoses, it is not through this mechanism

- Other mechanisms may be important and future research could explore the association between benzodiazepine use and behaviours or characteristics that increase the risk of opioid overdose
- As in heroin cases, the threshold for fatal methadone overdose would also appear to be lowered by alcohol, especially in females. Female methadone maintenance clients who use alcohol may therefore be at elevated risk of fatal overdose.
- Treatment agencies and policymakers should consider alcohol use to be a principal risk factor – alongside reductions in tolerance and quantities of opioids consumed – in developing their opioid overdose prevention strategies.

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