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DEVELOPMENT OF A PROTO-TYOLOGY OF OPIATE OVERDOSE ONSET

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DEVELOPMENT OF A PROTO-TYOLOGY OF OPIATE OVERDOSE ONSET

ABSTRACT

Background and aims: The time available to act is a crucial factor affecting the likely success of interventions to manage opiate overdose. We analyse opiate users' accounts of non-fatal overdose incidents to i. construct a proto-typology of non-fatal opiate overdose onset and ii. assess the implications for overdose management and prevention of fatalities.

Methods: Re-analysis of a subset of data from a large qualitative study of non-fatal opiate overdose conducted 1997-1999. Data were generated from semi-structured interviews undertaken with opiate users who had experienced a non-fatal overdose in the previous 24 hours. Forty-four participants (30 men; 14 women; 16-47 years) provided sufficient information for in-depth analysis. Data relating to 'memory of the moment of overdose', 'time to loss of consciousness', and 'subjective description of the overdose experience' were scrutinised using Iterative Categorisation.

Findings: Four types of overdose onset were identified. *Type A "Amnesic"* (n=8): characterised by no memory, rapid loss of consciousness, and no description of the overdose experience. *Type B "Conscious"* (n=17): characterised by some memory, sustained consciousness, and a description of the overdose in terms of feeling unwell and symptomatic. *Type C "Instant"* (n=14): characterised by some memory, immediate loss of consciousness, and no description of the overdose experience. *Type D "Enjoyable"* (n=5): characterised by some memory, rapid loss of consciousness, and a description of the overdose experience as pleasant or positive.

Conclusions: The identification of different types of overdose onset highlights the complexity of overdose events, the need for a range of interventions, and the challenges faced in managing incidents and preventing fatalities. Opiate overdose victims who retain consciousness for a sustained period and recognize the negative signs and symptoms of overdosing could summon help or self-administer naloxone, thus indicating that opiate overdose training should incorporate self-management strategies.

KEY WORDS: overdose, opiates, naloxone, overdose management, qualitative study

DEVELOPMENT OF A PROTO-TYPE OF OPIATE OVERDOSE ONSET

INTRODUCTION

The World Health Organisation estimates that 69,000 people die from opiate overdose annually [1]. Further, in some countries, there are overlapping epidemics of opioid overdose deaths. In the US, for example, there has been a greater than fourfold increase in prescription opioid deaths since 1999, including more than sixteen thousand in 2010 alone [2]. This coincides with a more recent but sharper epidemic of heroin overdose deaths from 2007 onwards, to levels now comparable to prescription opioid deaths [3]. In the UK, heroin overdose deaths also remain persistently high and have recently risen again (by 64% between 2012 and 2014) [4].

Analyses of drug-related deaths consistently find that the illicit drug most usually involved is heroin [4-6]. Heroin overdoses and their circumstances have now been widely studied and a recent review has identified a number of recurrent themes: namely, most overdoses are unintentional (rather than suicides or parasuicides), overdoses occur primarily amongst tolerant older users (rather than younger users), most overdoses occur in the presence of others, most overdoses involve polypharmacy, drug purity has only a moderate influence on overdose rates, and most deaths appear to involve relatively low morphine concentrations [7, 8].

In recent years, responses to heroin overdoses have included training both drug users and their family members in resuscitation techniques [9-11]. Authors have also recommended that overdose prevention strategies should promote behavioural changes by heroin users (such as not mixing opiates and other depressant drugs) [12] and encourage a ‘mutual duty of care’ amongst drug users so that they appropriately identify and respond to problems [6]. Paramedics and hospital staff have, meanwhile, successfully used the opioid antagonist, naloxone, to reverse the effects of heroin overdose [13-15], and, latterly, naloxone access has been extended to drug users, their family members and others who might be present at an overdose incident [10, 16-21].

The likely success of any intervention at the point of overdose depends crucially on the time available to act [22]. There is a clinical view that there are two types of overdose: ‘catastrophic sudden loss of consciousness’ and ‘insidious slow-onset’ [23]. However, research evidence suggests that instant deaths are rare and protracted deaths are more common [8, 22, 24-27]. According to one review, most individuals die between one and three hours after injection [14], whereas scrutiny of witness and police statements, alongside police photographs of corpses in situ, has indicated that deaths mostly occur one to two hours after the last heroin use [28]. This time lapse creates opportunity for drug-using peers, bystanders or first responders to intervene. Nonetheless, witness responses to overdose tend to be poor since those present often fear police involvement, may be intoxicated, or can fail to recognise the signs of acute respiratory distress [8, 19, 29-31].

Despite this important body of literature, subjective experiences of overdosing remain difficult to interpret, particularly given the lack of qualitative research. Specifically how do individuals feel between the point of drug consumption and loss of consciousness, are they aware that they are overdosing, and could – indeed would - they act to save themselves? We draw upon opiate users’ self-reported accounts of the period immediately preceding a non-fatal overdose incident in order to i. construct a proto-typology of non-fatal opiate overdose onset and ii. assess the implications for overdose management and the prevention of fatalities.

METHODS

We have re-analysed data from a qualitative study of non-fatal illicit drug overdose that took place over a 13-month period (1997-1998). In the original study, JN conducted in-depth interviews with 200 opiate users recruited from five hospitals, eleven drug services and ten pharmacies in Glasgow and Dundee, Scotland. The interviews were all 20-90 minutes long, audio recorded and transcribed verbatim at the time of the study. Information on ethical approval, recruitment procedures, and participant characteristics have been reported previously [32-35].

For this report, all interview transcriptions and study fieldnotes were reviewed to identify those interviews that had taken place within 24 hours of an overdose event occurring. In total, 51 interviews fitted the criteria and were isolated for further in-depth analyses. The 24-hour

time frame was chosen to maximize participant recall of events and to minimize the likelihood of other factors influencing recall accuracy.

The 51 interviews were conducted with 35 men and 16 women; age 16-47 years (mean = 28 years). Although 35 of the 51 participants had experienced more than one overdose over their lifetimes, details of only the most recent (last 24 hours) overdose experienced are analysed here. The 51 overdoses had involved a range of prescribed and illicit substances (injected and not injected); however, all had involved at least one opioid substance. Forty-eight interviews had been conducted in an emergency department, hospital ward or waiting room, and 3 had been conducted in the community shortly after hospital discharge. Most participants had been treated with naloxone, although the exact number could not be confirmed as the researcher did not have access to patient medical records and participants often did not know what treatment they had received.

JB read all 51 interview transcriptions and made detailed notes of what had happened in the hours and minutes preceding the most recent overdose. These notes were collectively reviewed by the team who identified six 'features of overdose' for further in-depth scrutiny: i. substances used; ii. mode of substance use; iii. where the overdose had occurred; iv. who else, if anyone, had been present; v. events leading up to the overdose; and vi. description of the overdose event. The six features were entered as column headings into an Excel spreadsheet, where each row of the spreadsheet represented one of the 51 overdoses. Columns for basic demographic characteristics were also added.

JB next re-read all of the interview transcriptions line-by-line, summarizing the content of each interview under the appropriate heading, so that all cells in the spreadsheet were populated with text. Once the matrix was complete, similarities and differences between the overdose events were explored by reading the spreadsheet both vertically and horizontally. This process indicated that column 'vi. description of the overdose event' was most central to the analysis, but it needed further refinement. Accordingly, three new sub-columns were added: 'vi-a. memory of the moment of overdose'; 'vi-b. time to loss of consciousness; and 'vi-c. subjective description of the overdose experience'.

JB populated the new cells (n=153 [51 x 3]) with text from the parent cell 'vi. description of the overdose event'. At this point, seven overdose events were deleted due to incomplete

data. This left 44 overdoses for the analyses. The content of the remaining cells (n=132 [44 x 3]) was next compared, contrasted and grouped using a systematic and iterative process, Iterative Categorisation [36]. This generated four basic types of overdose onset. Findings were then supplemented by data from the other matrix cells.

FINDINGS

Proto-typology overview

The four types of overdose onset – with descriptive labels – are presented in Table 1 and described in more detail below. No clear differences between the onset of overdoses experienced by men (n=30) and women (n=14) or participants of different ages were identified.

INSERT TABLE 1

Type A onset: “Amnesic” (8 overdoses)

The eight participants describing Type A overdose onset were aged 23-29 years, and just over half (n=5) had used heroin intravenously. Participants all reported rapid, but not immediate, loss of consciousness. They had good recall of events leading up to their last drug consumption, and remembered some situational information about the overdose. For example, six reported that they had been using drugs alone (although one had had her eight-year-old daughter with her) and two reported using with friends. Three had overdosed outside, one in a public toilet, one in a hostel, one in a psychiatric hospital, one in a café, and one in a taxi. Despite this, none of the eight participants had any memory of the actual moment of overdose and none could describe how they had felt as they lost consciousness (see Table 2 for illustrative examples).

INSERT TABLE 2

Type B onset: “Conscious” (17 overdoses)

Seventeen participants described Type B overdose onset. They were aged 16-33 years, and over half (n=11) had used heroin intravenously. All participants described being conscious as the overdose occurred and remaining conscious for some time afterwards (one even drove himself to the hospital and another called a taxi). Participants remembered events leading up to the overdose. Some reported that they had been using drugs alone (although sometimes non-using friends or relatives had been nearby), some said that they had been using with friends, and some described using with friends but then overdosing alone later. Four said that they had overdosed at home or in ‘a house’, whilst others described a range of overdose locations including on the street, in a shopping centre, in a park, at a train station, and in a public toilet.

All participants were able to describe the experience of overdosing, explaining that they had felt unwell and had known that something was ‘wrong’. Reported symptoms included: staggering, drowsiness, sickness, dizziness, numbness, pins and needles, breathlessness, hallucinations, palpitations, headache, feeling faint, shaking, headache and fitting (see Table 3).

INSERT TABLE 3

Type C onset: “Instant” (14 overdoses)

This type of overdose onset was described by 14 participants, aged 22-47 years; all had injected heroin. Most remembered where they had been and who had been with them prior to injecting. Some reported that they had been using drugs alone, some said that they had been using drugs with friends, some explained that they had used some of their drugs alone *and* some with friends, and some described how they had been using drugs alone but other people (non-drug-using partners, friends, relatives) had been nearby (for example, in another room in the same house). Nine said they had overdosed in a house (their own home, a partner’s home or a relative’s home) and two said they had overdosed outside; others had no memory of the overdose location. Although all participants were able to recall events up to the moment of

overdose, they all then described a sudden and abrupt loss of consciousness with no recollection of how they had felt or what had happened next (see Table 4).

INSERT TABLE 4

Type D onset: “Enjoyable” (5 overdoses)

The 5 participants describing a Type D overdose onset were aged 22-33 years, and nearly all (n=4) had used heroin intravenously. All 5 participants were able to provide information about where they had been and who had been with them when the overdose had occurred. One had used drugs with a friend but overdosed at home alone later. The others had been using drugs with friends or partners when they had overdosed. Four had been at home or in a house and one in public toilets.

All participants reported losing consciousness rapidly, yet all explained that they had realized that they were overdosing. Moreover, unlike participants who described other types of overdose onset, these individuals did not refer to the incident in negative terms. Thus, they did not report feeling unwell or worried. Instead, they described overdosing as a ‘pleasant’, ‘great’ or even ‘beautiful’ experience (see Table 5).

INSERT TABLE 5

DISCUSSION

Our analyses have generated a four-fold proto-typology of opiate overdose onset. This provides a more nuanced understanding of the time available to act compared with the existing clinical and research literature, where overdoses have tended to be polarized into either ‘instantaneous’ and ‘catastrophic’ or ‘insidious’ and ‘protracted’ [22, 23]. Significantly, our typology also broadens current conceptualizations of opiate overdose onset beyond a simple focus on ‘speed of onset’, to include both ‘memory of the moment of overdose’ and ‘subjective experience’.

A slow onset overdose (Type B) offers more time for others to intervene than does an immediate onset overdose (Type C). On the other hand, where an individual suddenly and unexpectedly loses consciousness (Type C), ‘shocked’ onlookers may react more proactively (so saving life) than in less dramatic (Type B) situations where a victim slowly and perhaps imperceptibly stops breathing. Other drug users, as well as non-drug-using others (family, friends and professionals) may well be present in the vicinity (even if not at the actual overdose scene) and overdoses occur in a wide range of public and private settings (including locations visited some time after drugs were consumed). This confirms the importance of involving a wide range of individuals in overdose prevention and response training and reinforces the need for a ‘mutual duty of care’ amongst drug users themselves [12].

The identification of different ‘types’ of opiate overdose onset has real practical implications for the feasibility and worth of some of the peer-implemented overdose reversal strategies recently developed and being applied, such as training in emergency overdose management and lay administration of emergency naloxone. Firstly, because time is short, the actions of peers and family members may be most critical to saving life in cases of overdoses of sudden or rapid onset, especially as the overdose victims are themselves unlikely to be able to initiate any emergency call or self-resuscitative action. This applies particularly to overdoses which are ‘Instant’ (Type C) and to those where the effects are perceived as ‘Enjoyable’ (Type D).

Secondly, time may be less critical in responding to overdoses which are ‘Conscious’ (Type B), where the opiate user may be aware that something is wrong and that some remedial action is necessary. However, the challenge here, and also to some extent with ‘Amnesic’ (Type A) overdoses, is one of recognition that an emergency situation is developing. The less dramatic onset of the overdose may more easily be overlooked and peers may leave such an individual to ‘sleep it off’ without realizing the life-threatening and potentially fatal nature of the events that are unfolding.

Thirdly, our analyses have implications for an aspect of overdose management that has not been well-considered to-date – the ability of the victim to help and treat themselves. Where victims retain consciousness for a sustained period and are able to recognize the signs and symptoms of an overdose (Type B), they have greatest potential to summon help or even self-administer naloxone. The near-ubiquity of mobile phones and the advent of both pre-filled, ready-to-inject naloxone syringes and nasal spray preparations of naloxone make this

increasingly feasible. Training in recognition of the subjective experiences and symptoms of overdose onset, as reported by our participants, could potentially increase life-saving reactions. Where victims lose consciousness immediately (Type C) or rapidly (Type A), calling others for help or the self-administration of an antagonist drug is not likely to occur. Where victims recognise that the overdose is occurring but experience it as enjoyable before they lose consciousness (Type D), they are again less likely to self-manage the incident unless we can develop interventions that help them to recognize (via cognition or autonomic reaction) that those pleasurable experiences are dangerous.

Some limitations should be noted. Our findings are based on a small number of overdose events occurring nearly twenty years ago in two Scottish cities. We did not employ any objective definition of ‘overdose’, seven overdoses could not be analysed because of missing data, and we recognise that fatal and non-fatal overdoses are not one and the same phenomenon. However, particular strengths of our data and analyses include the successful conduct of interviews so proximal to the time of overdose events, no other study has to our knowledge reported on this topic, and the fact that participants’ gender and age profile was broadly similar to that reported in other national and international studies of drug overdose at the time [29, 37, 38].

Caution should, of course, be taken in generalizing from our data to other locations and time periods. Although we have reported the number of each overdose type within our sample to increase clarity and transparency, no inferences about prevalence can be drawn from these data [39]. Indeed, we have deliberately called our findings a ‘proto-typology’ to indicate that further research is now needed to test, refine and develop our categorisations. For example, it is possible that Type A onset is in practice either Type B or C onset; it is simply that intensive drug use has resulted in poor recall (via retrograde or anterograde amnesia). Despite these shortcomings, our early framework for identifying different types of overdose onset highlights the complexity of overdose events, the need for a range of interventions, and the challenges faced in managing incidents and preventing fatalities. Additionally, the identification of Type B onset indicates that some opiate overdose victims can potentially summon help or self-administer naloxone; consequently, self-management strategies should be incorporated into opiate overdose training.

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TABLES

Table 1: Overdose onset proto-typology

Overdose Type	Overdose Features	Substances Taken (Number of Participants)	Number of Participants		
			Males	Females	Total
A. 'Amnesic'	- No memory of the moment of overdose - Rapid loss of consciousness - No description of the overdose experience	- IV heroin only (n=1) - IV heroin plus other substances (n=4) - Oral opiates plus other substances (n=3)	5	3	8
B. 'Conscious'	- Some memory of the moment of overdose - A period of consciousness maintained - Good description of the overdose experience (feeling unwell and symptomatic)	- IV heroin only (n=3) - IV heroin plus other substances (n=8) - Oral opiates plus other substances (n=6)	10	7	17
C. 'Instant'	- Some memory of the moment of overdose - Immediate loss of consciousness - No description of the overdose experience	- IV heroin only (n=5) - IV heroin plus other substances (n=9) - Oral opiates plus other substances (n=0)	11	3	14
D. 'Enjoyable'	- Some memory of the moment of overdose - Rapid loss of consciousness - Limited description of the overdose experience (not unpleasant/ positive)	- IV heroin only (n=1) - IV heroin plus other substances (n=3) - Oral opiates plus other substances (n=1)	4	1	5
Total			30	14	44

Table 2: “Amnesic” - Examples

Details from the interview data and fieldnotes	Quotation
Alan (23 years) reported that he had recently reduced his heroin consumption. On the day of the overdose he had been told to leave the hostel where he had been staying because he had taken drugs and was intoxicated. He said that he had felt ‘low’ and did not care whether he lived or died. He had then taken more heroin and was wandering around outside, but could not remember overdosing. He was found unconscious in the street by two non-drug-using friends who had taken him to the hospital in their car.	<i>“I went and got more heroin. Took more heroin... Then I was walking about the street... That’s all I can remember.”</i>
Claire (28 years) was an inpatient in a psychiatric hospital. On the day of the overdose, she had taken her prescribed medication (benzodiazepines and haloperidol). Her partner had then visited and brought her a syringe containing heroin. She remembered injecting the heroin in the toilets after he left, but nothing after that. Staff from the psychiatric ward had found her later in the patients’ day room (not the toilets), called an ambulance and took her to the hospital.	<i>“I don’t remember. I remember going in the toilet... I took it [heroin] in the toilets.”</i>

Table 3: “Conscious” - Examples

Details from the interview data and fieldnotes	Quotation
Louise (26 years) reported that she had not taken her prescribed methadone for the last two days, but had used heroin and temazepam with her boyfriend the day prior to the overdose and amitriptyline alone on the morning of the overdose. She had ‘blacked out’ later at midday on her way to visit her mother. She described feeling ‘as if in a dream’ and remembered repeatedly falling over and banging her head, although she could not remember anything after that. Two policemen had taken her to the emergency department, but Louise had no recollection of that. She remarked that this overdose had been different from her previous two drug overdoses which had felt ‘nice’.	<i>“Jellies [benzodiazepines] first, kit [heroin] next, the amitriptyline’s next... I kept falling down [on] the floor and banging my head.”</i>
Nigel (29 years) reported that he usually injected heroin intramuscularly because of vein damage. On the day of the overdose, he had drunk alcohol and taken temazepam. Then someone had injected him intravenously. He remembered feeling as though he was about to ‘keel over’ and said he knew that the overdose was about to happen as he had felt tingling (‘pins and needles’) in his head. He explained that he had overdosed many times previously and had always felt it ‘coming on’, but the feeling was not something that could be controlled.	<i>“I felt I’m going to keel over. I could feel it... pins and needles in my head.”</i>

Table 4: “Instant” - Examples

Details from the interview data and fieldnotes	Quotation
Howard (29 years) had been released from prison the day before his overdose. He reported that he had been suffering from insomnia for a while. On the day of the overdose, he had been drinking alcohol. That evening one of his friends had injected him with heroin and temazepam. He remembered the injection being administered but then nothing until he had woken up in the ambulance.	<i>“I had some heroin and an egg [benzodiazepine]... All I remember is something going in my arm.....and that was it.”</i>
James (38 years) reported that he had been drinking alcohol prior to injecting heroin. He said that this was only the second time he had used heroin and his friend had injected him. He stated that he could not remember anything about the effects of the heroin as he had instantly ‘blacked out’ as the needle ‘went in’.	<i>“It [needle] went in and the lights went out.”</i>

Table 5: “Enjoyable” - Examples

Details from the interview data and fieldnotes	Quotation
Hugh (29 years) had recently been released from prison. He was at home with his wife and a friend when he had injected heroin and overdosed. He had overdosed previously and reported that it had always felt similar – like ‘going into a lovely sleep’ or ‘being in love’. There was no pain, but he had felt ‘groggy’, ‘headachy’ and ‘stiff’ when he had regained consciousness. He stated that he had known he was overdosing but could not stop it from happening. He remembered waking up whilst the paramedics were taking him from the house into the ambulance but then could not remember the rest of the journey to the hospital.	<i>“You know you’re going over [overdosing] ... just like a beautiful feeling taking over you.”</i>
Robert (31 years) had been drinking alcohol the evening prior to, and on the morning of, the overdose. He had stayed up all night drinking with his friend. He said he was a heavy drinker and used cannabis regularly but did not generally take other drugs. This was only the second time he had used heroin, which he had snorted. He remembered feeling ‘great’ and then nothing else until he woke up in hospital.	<i>“I felt great, you know. And the next thing, I’ve woke up here [in hospital].”</i>