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Heroin-related overdose: The unexplored influences of markets, marketing and source-types in the United States

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ABSTRACT

Heroin overdose, more accurately termed 'heroin-related overdose' due to the frequent involvement of other drugs, is the leading cause of mortality among regular heroin users. (Degenhardt et al., 2010) Heroin injectors are at greater risk of hospital admission for heroin-related overdose (HOD) in the eastern United States where Colombian-sourced powder heroin is sold than in the western US where black 'tar' heroin predominates. (Unick et al., 2014) This paper examines under-researched influences on HOD, both fatal and non-fatal, using data from a qualitative study of injecting drug users of black tar heroin in San Francisco and powder heroin in Philadelphia Data were collected through in-depth, semi-structured interviews carried out in 2012 that were conducted against a background of longer-term participant-observation, ethnographic studies of drug users and dealers in Philadelphia (2007–12) and of users in San Francisco (1994–2007, 2012). Our findings suggest three types of previously unconsidered influences on overdose risk that arise both from structural socio-economic factors and from the physical properties of the heroin source-types: 1) retail market structure including information flow between users; 2) marketing techniques such as branding, free samples and pricing and 3) differences in the physical characteristics of the two major heroin source forms and how they affect injecting techniques and vascular health. Although chosen for their contrasting source-forms, we found that the two cities have contrasting dominant models of drug retailing: San Francisco respondents tended to buy through private dealers and Philadelphia respondents frequented an open-air street market where heroin is branded and free samples are distributed, although each city included both types of drug sales. These market structures and marketing techniques shape the availability of information regarding heroin potency and its dissemination among users who tend to seek out the strongest heroin available on a given day. The physical characteristics of these two source-types, the way they are prepared for injecting and their effects on vein health also differ markedly. The purpose of this paper is to examine some of the unexplored factors that may lead to heroin-related overdose in the United States and to generate hypotheses for further study.

1. Introduction

Overdose is the leading cause of mortality among regular and dependent heroin users (Degenhardt et al., 2010). The vast majority of overdoses, whether fatal or non-fatal, occur after intravenous injection, which in pharmacodynamic terms delivers a drug all at once as a 'bolus' and is the most concentrated and efficient way to

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introduce opiates into the bloodstream (Shafer and V, 1991). Recent national rises in heroin-related overdose, linked to an explosion in prescription opioid use, (Unick et al., 2013; Mars et al., 2014) have made it an urgent public health issue. The purpose of this paper is to examine, using qualitative methods, some of the unexplored factors that may lead to heroin-related overdose, both fatal and non-fatal, in the United States and to generate hypotheses for further study. To this end, we contrast risk environments of heroin consumption and distribution in San Francisco with those of Philadelphia, each city exemplifying one of the two predominant rival source forms of street heroin in the USA. Though this ethnographic tale of two cities is not intended to yield statistical generalizations applicable to all US metropoles, we hope to draw attention to previously overlooked risks for overdose.

Overdose is an idea with a long history (as early as 1690 Locke talks of honey 'over dose' (Oxford English Dictionary, 1971)) and one that remains current in the language of both drug users and professionals in the drugs field. While the most clear-cut cases of heroin overdose might be described uncontroversially as heroin-induced respiratory depression with hypoxia (White and Irvine, 1999; Darke and Zador, 1996), more often than not they are significantly more complicated, leading many in the field to point out that 'heroin overdose' as a generic description is an inaccurate simplification (Darke and Zador, 1996; Mirakbari, 2004; Zador, 1999). Taken literally to mean a dose in qualitative or quantitative excess of tolerance, the overdose model could be said to posit retrospectively an unverifiable *safe dose threshold* beneath which the adverse event would not have occurred. Thus while telling us little more than that an event is heroin-related, the heroin overdose designation elides the complexities of heroin tolerance, especially as it relates to polydrug use and the context of use. For this reason, we prefer the term 'heroin-related overdose' (HOD).

Users who return to heroin after a period of abstinence are at a high risk of overdosing, eg after a period of incarceration or treatment (Darke and Hall, 2003; Binswanger et al., 2007). This makes sense in terms of the tolerance-overdose model since we know that tolerance rapidly decreases with abstinence (White et al., 1999 a). However in many study samples, the majority of HODs occur in older (male) long-term addicts who otherwise might be expected to have a high tolerance, with fatal cases often revealing relatively low blood morphine concentrations (Darke et al., 2002; Warner-Smith et al., 2002). Medical examinations of addict HOD deaths often reveal blood morphine levels similar to those of addicts who died from other causes such as homicide (Warner-Smith et al., 2002).

Such results hint at the complexity of heroin tolerance. For example, tolerance to the dangerous respiratory effects of heroin does not develop at the same rate as tolerance to its euphoric effects and these different shades of tolerance also decrease at different rates (White and Irvine, 1999). Also, there is a direction of study suggesting a Pavlovian conditioning relationship between context of use and tolerance (Adams et al., 1969; Siegel, 1976; Siegel and MacRae, 1984). In this tradition, Gutierrez-Cebollada et al. combine pharmacological and contextual factors in their study of familiar and unfamiliar settings for heroin injecting, finding that unfamiliar settings are an independent risk factor for overdose (Gutierrez-Cebollada et al., 1994). An explanation for this is that associated environmental cues at the time of opiate administration affect tolerance by prompting opposite attenuating physiological responses in the body (Siegel, 1976). Changing the environment could therefore leave the body less prepared for the dose, ie, less tolerant (Ehrman et al., 1992).

Regarding social contexts more broadly, a growing literature looks at drug-related harm in terms of the 'structural risk environment', a phrase coined by Rhodes to locate health risks beyond individual behavior, ranging in scope from the immediate local environment to the larger political economy underlying the structure of social relations (Rhodes, 2009). This useful approach brings back into the discussion risk determinants frequently obscured by an ideology of individual responsibility. For example, high levels of drug law enforcement are linked to increased risk of overdose deaths; under such conditions users witnessing HOD are often disinclined to seek professional assistance, fearing a police encounter (Mirakbari, 2004; Davidson et al., 2002; Bourgois and Schonberg, 2009; Bohnert et al., 2011). It has also been observed that under conditions of especially aggressive policing, addicts are even further marginalized and may 'pursue drugs with a self-destructive intensity akin to devotion, as if they had nothing left to lose' (Bourgois and Schonberg, 2009; Bourgois et al., 1997; Koester, 1994). Self-destructive behavior is not necessarily intentionally suicidal but may be favoring short-term benefits despite long-term costs (Baumeister and Scher, 1988).

Another significant variable is that HOD usually involves more than one drug (McGregor et al., 1998). Interactions with sedatives, especially benzodiazepines and alcohol, are well-established and very frequently implicated in HOD deaths since they exacerbate the respiratory depression caused by heroin (White and Irvine, 1999; Darke and Zador, 1996; Gutierrez-Cebollada et al., 1994). Although sedatives are respiratory depressants in their own right, it remains unclear whether their interaction with heroin is additive or synergistic (COMMENTARIES – Comments on White and Irvine's, 1999). It is clear, however, that combining CNS depressants with heroin significantly increases risk for HOD. As well as sedatives, heroin is often mixed with cocaine and injected as a 'speedball' (Morrison et al., 2000). Much less is understood about the pharmacodynamics of this mixture than about that of either drug on its own. Animal studies suggest that the effect of heroin and cocaine in combination is unique and different from either drug alone, (Garrido et al., 2007) with increased neurotoxicity compared with heroin and cocaine used sequentially (Cunha-Oliveira et al., 2010). Epidemiological findings suggest that speedballs may play a role in heroin overdose risk but this is less well established than that of sedatives (O'Driscoll et al., 2001).

Unintentional polypharmacy can occur when street heroin is adulterated with other drugs, sometimes to increase recovery of the drug or to intensify its effects (Strang et al., 1997). Fentanyl, a synthetic and much more powerful opiate has long been implicated in overdose outbreaks (Wong et al., 2008). A number of drug overdose deaths were attributed to fentanyl from 1979 onwards, usually in combination with at least one other drug (Hibbs et al., 1991). It is difficult to determine from post-mortem data whether fentanyl or its chemical homologs were sold as heroin or as fentanyl although ethnographic data suggests the former (Fernando, 1991). Singer gives account of users intentionally seeking out fentanyl sold as heroin when warned by the police that it had caused overdoses, on the assumption that they could experience a powerful effect but would not overdose themselves (Singer, 2006). Even before fentanyl, Preble and Casey, in their classic 1969 ethnography of hustling for heroin in New York City, mention that 'A report on the street that a heroin user died of an overdose of heroin results in a customer rush on his dealer for the same bag' (Preble and C, 1969). However the intentional seeking of overdose-implicated heroin and its health implications have received little attention elsewhere in the literature.

Characteristics of the US heroin market and differences in the products sold have also been considered in relation to health risks. For a summary, see Ciccarone (2009) (Ciccarone, 2009). The US heroin market is currently divided between Mexican-sourced heroin in the West (predominantly 'black tar' or BTH) and