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Heroin and addict 'careers'

1.1 Introduction

The opiates, the class of drugs of which heroin is a member, carry by far the highest burden of disease of any drug of dependence and are, worldwide, one of the leading public health problems. They have an extremely long history in human civilisation across the globe, extending back at least 6000 years. While opiate dependence has long been recognised, in the last century this problem dramatically transformed and expanded following the twin developments of heroin and the intravenous syringe. We were no longer talking of the more genteel days of sipping laudanum (tincture of opium, suspended in alcohol). Injecting opiate use has gone on to consume massive amounts of resources in health and legal resources across the world. The opioids (a term which includes both natural opiates and synthetic analogues) are, of course, a core component of the medical armoury, and have relieved enormous suffering throughout the course of human civilisation. In the early twenty-first century, however, heroin and other opiates are also responsible for large-scale mortality and untold misery.

One of the major characteristics of heroin dependence is its remarkably persistent nature. Terms such as '*chronically relapsing disorder*', '*lifelong condition*', '*chronic illness*' and '*disease*' have been employed in attempts to capture this perseverance. Of course, this is not to say once a user always a user. Rather, it is to characterise heroin dependence as a long, difficult battle for many affected by it. Despite the fact that clinicians and researchers have long been aware of the extended nature of the problem, it is surprising how little has been written on the lifecycle, or natural history, of the heroin user. Of course, there are notable exceptions, such as the pioneering work of David Nurco and colleagues (Nurco *et al*., 1981), the oral history of David Courtwright and colleagues (Courtwright *et al*., 1989) and the more recent work on

trajectories of Yih Ing Hser (Hser *et al.*, 2007a,b). There are a number of possible reasons for this. Firstly, the explosion of heroin use as a major public health concern in western industrialised societies is a phenomenon that arose in the second half of the twentieth century. Those users from the first large-scale heroin epidemics of the 1960s and 1970s are now in their sixth decade and beyond. It is only now that we are seeing the totality of the picture across decades of the lives of individuals and cohorts. Secondly, despite all we know about the intractability of the problem, the public image of the heroin user is of a young person. The idea of people who continue use into their 50s and 60s does not accord well with this image. As we shall see, this image could not be further from the truth. Finally, there is the 'who cares' factor. The concept of young lives at risk carries some cachet. After all, who would not want to save young lives from death and ruin? Old users at risk does not carry quite the same urgency. The irony here is that, clinically, they are at far *greater* risk than their younger counterparts. They are sicker, die at disproportionately higher rates and have generally lived long lives burdened by psychopathology, incarceration and self-harm.

An understanding of the origins and trajectories of heroin use clearly would be valuable in informing interventions. In this book I will attempt to provide a cradle to grave examination of the lives of heroin, and other opioid, users. Where do heroin users come from? How do they get into heroin? Why do they get into heroin? What happens to them? Can their trajectories be changed? In attempting to characterise the life of a dependent opiate user, I will, by necessity, be wielding a rather broad brush. Needless to say, people differ from each other and from society to society, and heroin users are no different in this respect. There are, however, remarkable similarities across cultures in the clinical picture presented by heroin users. It is to these differences and commonalties across the life course that we will address our attention.

In this chapter we will examine the class of opioids themselves, the prevalence of their use, their dependence liability, the harms and costs of opioid use and introduce the concept of an addict 'career'.

1.2 What are the opioids?

Before we begin to examine the lifecycle of the heroin user, we need to first describe what the opioids are, and what their primary positive and negative effects are upon users. The opioids are a class of drugs that include the natural products of the opium poppy *(Papaver somniferum)*, and synthetic

compounds derived from it. The term describes any of the narcotic opioid alkaloids found as natural products in the opium poppy plant, as well as many semi-synthetic chemical derivatives (European Monitoring Centre on Drugs and Drug Addiction (EMCDDA), 2010). In addition to heroin, the class includes drugs such as morphine, codeine, methadone, oxycodone and fentynyl. They may also be classified as 'narcotics' or 'narcotic analgesics' (a type of analgesic acting on the central nervous system) due to their soporific and pain relief properties. Although the term 'opiate' is often used as a synonym for opioid, the term is properly limited to only the natural alkaloids found in the resin of the opium poppy. The two major production areas for both opium and heroin are south-west Asia (the 'Golden Crescent', centred on Afghanistan and Pakistan) and south-east Asia (the 'Golden Triangle, centred on Myanmar and Laos) (United Nations Office of Drug Control (UNOCD), 2009). Heroin from south-west Asia is typically brown in colour, and is in the form of a free base. In contrast, south-east Asian heroin is typically a white powder in the form of a hydrochloride salt. Smaller cultivation of opium poppies also occurs in South America, most notably Columbia and Mexico.

Opiates have a long history of both medicinal and recreational use, dating back to at least the Sumerian civilisation of 4000BC (Friedman *et al*., 1996). The nineteenth century saw a large increase in the use of these drugs due to three key events that were to have lasting and pervasive effects: the isolation of morphine, the invention of the hypodermic syringe and, of particular import, the synthesis of heroin (diacetylmorphine) in 1874. Indeed, heroin was sold as an over-the-counter cough suppressant between 1898 and 1910. The name derives from the German word '*heroisch*' (heroic), which has proved to be sadly ironic as heroin epidemics swept the world over the subsequent century, with attendant pain and misery. There is little that could be counted as heroic about this drug.

What do these drugs do? One of the primary clinical characteristics of opioids is that they produce analgesia, thus the term 'narcotic analgesics'. As noted above, opioids also suppress the cough reflex, and are used in a variety of over-the-counter cough medicines. Opioids act as agonists for a complex group of neuroreceptors (the μ, κ and δ subtypes) that are normally acted upon by endorphins, the body's endogenous opioids. Apart from analgesia, opioids induce drowsiness and sleep. Indeed, the intoxicated heroin user is often referred to as being 'on the nod'. More importantly, from our perspective, opioids produce a sense of euphoria and detachment. These effects are rapid. After ingestion, heroin (diacetylmorphine) is rapidly hydrolysed to 6-monoacetylmorphine, which in turn is hydrolysed to morphine (the main

active metabolite) (Goodman & Gilman, 1996). Following heroin injection, diacetylmorphine crosses the blood–brain barrier within 20 seconds. This rapid effect is referred to by users as the 'rush', and is one of the major features of injection as a route of administration. The 'rush' consists of feelings of warmth and pleasure, followed by a long period of sedation. While injection is associated with the most rapid onset of effects, smoking heroin produces an effect that is almost as rapid. Heroin is mainly excreted in the urine as free and conjugated morphine. The plasma half-life of morphine is about 120 minutes. Longer acting opioids such as methadone (12–18 hours) and buprenorphine (24–60 hours) have substantially longer half-lives which is why, as we will see in later chapters, they are used as substitute maintenance drugs for the treatment of heroin dependence. The longer half-life also means that their effects, positive and negative, are more prolonged than that of heroin.

Whilst opioids are associated with considerable pleasure in their subjective effects, they have a number of serious negative sequelae. Use of the drugs, at least prior to the development of tolerance, produces nausea and vomiting. The novice user has to work through these effects to become the long-term user we discuss in this book. There is also decreased motility in the gastro-intestinal tract, resulting in chronic constipation. Indeed, the great poet Coleridge, dependent upon laudanum, was facetiously described as a stranger to the toilet. The major clinically significant negative effect of the opioids is that they are central nervous system (CNS) respiratory depressants (Karch, 2009). Respiration rates are suppressed, even amongst the tolerant and, in overdose may decline to just four breaths per minute, if the person still lives. The cardinal signs of opioid toxicity are the so-called 'diagnostic triad': reduced level of consciousness (from drowsiness to coma), pinpoint pupils and a depressed rate of respiration. Cyanosis, hypotension, bradycardia, hypothermia may also be present. Death is usually due to respiratory failure, although cardiac arrest may occur due to myocardial oxygen deprivation (Goodman & Gilman, 1996).

One of the major sequelae of opioid use of any kind is the development of a dependence syndrome, including physical and psychological aspects (American Psychiatric Association (APA), 2000; White & Irvine, 1999). Signs and symptoms include: increased tolerance, continued use despite physical and/or psychological problems engendered by use and a persistent desire to cut down or control opioid use. The abrupt cessation of use in tolerant subjects leads to characteristic withdrawal symptoms that include rhinorhoea ('runny nose'), diarrhoea, nausea, muscle spasm and anxiety.

To some extent the route of heroin administration is determined by the geographical source of the drug. The brown powder from south-west Asia may readily be 'smoked' by heating the powder on a metal foil above a flame and inhaling the vapour (Strang *et al*., 1997). This is known as 'chasing the dragon', a reference to 'chasing' the trail of vapour fumes that emanate from the heated heroin. Brown heroin may be injected, but as it is insoluble in water it first must be dissolved in citric or ascorbic acid, such as lemon juice. The white powder from south-east Asia is soluble in water, and may be dissolved directly in water for injection. It may be smoked, but is not as amenable for this purpose as the brown heroin from the Golden Crescent.

Methadone is dispensed in oral syrup and tablet forms. For maintenance treatment, the syrup preparation is predominant. While usually taken orally, the injection of the syrup by illicit drug users has been documented (Darke *et al*., 1996a; Humeniuk *et al*., 2003). Buprenorphine is dispensed as a sub-lingual tablet for oral ingestion. As with methadone, however, the injection of these tablets has been noted (Mattick *et al*., 2009). Finally, the other opioid of particular note for this book, oxycodone, is also a tablet-form preparation and, again injection has been noted (Darke *et al*., 2011).

1.3 How common is heroin use?

Compared with other illicit drugs, such as cannabis, the prevalence of opioid use is relatively low. It is currently estimated that, globally, between 15 and 21 million people aged between 15 and 64 years used opioids in the preceding year (UNOCD, 2009). This translates to between 0.3% and 0.5% of the global population. Rates appear to be highest per capita in Europe (0.6%–0.7%), followed by the Americas and Oceania (0.4%), Africa (0.2%–0.5%) and Asia (0.3%–0.5%). As the proportions of users indicate, opioid use is a truly international phenomenon. Around half (approximately 12 million) of the world's opioid users live in Asian countries (UNOCD, 2009). The next largest population is found in Europe (approximately 4 million), followed by Africa (3 million), the Americas (2.3 million) and Oceania (90 000). It should be noted that there is a consistent gender bias in the prevalence of opioid use, with males approximately twice as likely to be using these drugs (UNOCD, 2009).

Heroin constitutes a large proportion of global opioid use, with approximately 9 million estimated users, or approximately 0.2% of the global population aged 15 to 64 years (UNOCD, 2009). Recent use estimates in some major heroin markets include the United Kingdom (0.1%), the United States (0.2%) and Australia (0.2%). As with the other opioids, the use of heroin is

male dominated, as seen in national surveys, street users and treatment samples. Indeed, it is one of the most robust findings of the literature that males constitute approximately two-thirds of lifetime, and current, heroin users.

It should be borne in mind that the illicit opioid market is dynamic, and that use patterns may vary significantly across time. In recent years there has been considerable concern, particularly in the United States, about the abuse of oxycodone, with substantial increases in sales, and deaths attributed to the drug (Carise *et al*., 2007; Cicero *et al*., 2005; Forrester, 2007). Indeed, oxycodone deaths in the USA have grown to exceed those due to heroin or cocaine. The dramatic increase in oxycodone use appears to have been driven by a mixture of older, chronic pain patients and younger, illicit opioid users (Carise *et al*., 2007; Darke *et al*., 2011).

1.4 The dependence liability of heroin

Heroin and other opioids may result in a dependence syndrome, characterised by a cluster of cognitive, behavioural and physiological symptoms that include tolerance, withdrawal and a persistent desire to cut down (APA, 2000). The most important clinical point to note is that the person continues to use, despite significant drug-related problems (APA, 2000). How likely is it, that once having used opioids, the individual will become dependent upon them? This probability is known as the dependence (or abuse) liability of a substance. Furthermore, how does this liability compare to those of other substances? Despite the salience of heroin and the other opioids as a major clinical and public health issue, surprisingly little work has been conducted on the transition between use and dependence (Anthony *et al*., 1994; Gable, 1993; Gossop *et al*., 1992; Robins, 1993; Van Etten & Anthony, 1999). We must commence with opportunities for drug use and the uptake of the drug on offer. Van Etten & Anthony (1999) reported that 20% of those who had an opportunity to use heroin did so, and 17% did so within 12 months of the initial offer. Males were twice as likely as females to have had an opportunity to use heroin. Interestingly, there were no sex differences in the likelihood of use once an opportunity arose, with 18% of males and 26% of females using after being given an opportunity. The authors argued that gender differences in the epidemiology of heroin use are due to opportunity, and *not* due to any differences in susceptibility in the transition to use.

Use is one thing, but the transition to regular use and dependence is quite another. The most influential paper on this issue is that of Anthony *et al*.

(1994), based upon retrospective data collected from the US National Comorbidity Survey. The authors estimated that approximately one in four who used heroin would develop dependence upon the drug. Again, as was seen for opportunity and use, it was notable that there were no differences between males and females in the proportions who developed dependence. Again, once use occurs, females are as likely as males to become heroin dependent. Differences in the gender proportions of users simply reflect opportunity and uptake *per se*, not any differential dependence liability. Of all the drug classes analysed by the authors, heroin was second in dependence liability, with only tobacco having a higher liability of approximately one in three. In contrast, cocaine (17%), alcohol (15%), methamphetamine (11%) and cannabis (9%) were all substantially *lower* in their abuse liability than heroin. Not only is use associated with a substantial risk of future dependence, the risk is higher than for almost all other substances. It should be noted that the incredibly high mortality rates associated with opioids, which we discuss throughout this book, means that the estimates of dependence liability are probably conservative. A great many users who have tried heroin, become dependent and died will not by definition be interviewed in studies of this type. The more marginalised the user population, the more conservative these estimates are likely to be, as dependent heroin users are difficult to contact and interview for large-scale household surveys.

The Vietnam war of the 1960s and 1970s provided an unusual opportunity to examine heroin dependence liability, as cheap heroin was widely available to troops stationed in Vietnam (Robins, 1993). Robins (1993) reported that 40% of US veterans had used opiates whilst in Vietnam, with 20% reporting having become 'addicted' to the drug. The rate here is thus one in two. Clearly, however, this is not a population of street users. These veterans were exposed to high levels of trauma and sheer boredom. Higher rates of use, and the transition to dependence, would both be expected in a combat setting.

An alternative way of examining dependence liability is by measuring the dependence potential and harms associated with a drug (Gable, 1993; Morgan *et al*., 2010; Nutt *et al*., 2007, 2010; van Amsterdam *et al*., 2010). Gable (1993) reported that injected heroin had the greatest risk of dependence and lethality. Opium and morphine were rated next highest in terms of lethality and dependence risk. The lowest risks were associated with cannabis and psilocybin (an hallucinogenic). Similar work conducted by Nutt *et al*. (2007), Morgan *et al*. (2010) and van Amsterdam *et al*. (2010) produced results consistent with these data. The authors examined the physical harms, dependence potential and social harms associated with a number of drug classes.

In terms of all three dimensions of harm, heroin was rated the highest risk. Its dependence risk was rated significantly higher than other widely used illicit drugs such as cocaine and methamphetamine. Similarly, Gossop *et al*. (1994) compared the dependence levels of polydrug users, using an identical dependence scale for each drug class. Heroin dependence varied by route of administration, with injecting associated with the highest levels of dependence. Importantly, and consistent with both Gable (1983) and Nutt *et al*. (2007), heroin dependence levels were significantly higher than those of cocaine and methamphetamine.

Overall, heroin and the other opioids appear to have extremely high dependence liabilities. A likely conservative estimate that one in four who use heroin will develop dependence is certainly pause for thought. Moreover, the dependence liability of the opioids appear higher than those seen for the other major illicit drugs. *Any* use of heroin presents a high risk for dependence. It is this dependence liability that makes the drug such an intractable clinical problem, as we will see in subsequent chapters.

1.5 The major harms of heroin use

The use of heroin and the other opioids is not common, certainly when compared to the use of other illicit drugs such as the psychostimulants and cannabis. Why then, if the number of users is relatively low, are they of such clinical and public health importance? We will discuss the harms of heroin use in detail in subsequent chapters, so at this stage we will only briefly outline them to illustrate the potential for harm to the individual, and how this costs the societies in which they live.

Of illicit drugs, the opioids carry the highest degree of harm and, proportionally, the highest demand for treatment (Darke *et al*., 2007a; UNOCD, 2009). These harms are expressed in the extremely high rates of premature death seen amongst heroin and other opioid users. Indeed, mortality rates typical of the elderly are one of the defining characteristics of dependent users (Darke *et al*., 2007a). The major harms associated with regular use include the direct effects of the drugs themselves, serious and often life-threatening psychopathology, and the indirect effects such as criminality and social marginalisation that arise from use. Many of these effects are due to the high dependence liability of heroin discussed above, and the consequent longevity of dependence in individuals. Indeed, dependence can be viewed as one of the most serious harms of opioid use, and of heroin use in particular. It is from this characteristic that all else typically flows.

The other major direct harm of opioid use is the risk of overdose. Overdose is a major contributor to premature death, and non-fatal overdose is associated with a range of serious health sequelae, including brain damage and cognitive impairment (Darke *et al*., 2007a). As we will see, heroin users also have very poor general health. Much of this relates to injection as a route of administration, and to viral transmission through the sharing of injecting equipment. There are also direct negative health effects from injecting or smoking these drugs, including vascular collapse and pulmonary disease.

The mental health of heroin users is also extremely poor. Indeed, it appears to be even poorer than their generally poor physical health. At least half of any group of heroin users will qualify for a psychiatric diagnosis other than drug dependence, with the most commonly diagnosed disorders being mood, anxiety and personality disorders (Brienza *et al*., 2000; Kidorf *et al*., 2004; Teesson *et al*., 2005). As with their physical health, the burden of psychological disease amongst heroin users is many times that of the general population. Indeed, the treatment of comorbid psychopathology is one of the major challenges that faces drug treatment agencies.

The use of illicit opioids, such as heroin, is an expensive business. The regular heroin user is highly likely to be involved in frequent criminal activity. As we shall see in Chapter 5, approximately half to three-quarters of regular heroin users have a current involvement in crime, apart from the use of illegal drugs (Darke *et al*., 2010e; Haasen *et al*., 2007; Van der Zanden, 2007). Not surprisingly, almost all users who have been using for any length of time will have a conviction record, and at least half have been incarcerated (Bargagli *et al*., 2006; Darke & Ross, 2001; Lofwall *et al*., 2005). Apart from crime, a great many female users perform high levels of sex work, as do some male users, exposing them to high risks of violence and blood-borne viral infection (Maher *et al*., 2002; Spital *et al*., 2003). Involvement in illicit drug use, crime and sex work exposes heroin users to high levels of traumatic injury and, indeed, trauma is a major cause of death amongst users (Darke *et al*., 2007a).

Finally, the social profile of users is extremely poor. Educational attainment is low, unemployment close to universal and financial problems are the norm (Azim *et al*., 2008; Galea *et al*., 2003; Neale & Robertson, 2005; Ross *et al*., 2005). This is a highly disadvantaged, and socially marginalised, group with a large burden of disease.

The general picture seen here, and elaborated upon in ensuing chapters, is of a highly dysfunctional and ill group of people. The picture is a long way from the so-called '*heroin chic*' image beloved by advertisers worldwide in

the mid-1990s. This was a false image built upon a heady mixture of ignorance and stupidity. There is nothing chic about a life of dependence, illness, incarceration and premature death. The life comes with serious cost to individuals and their families. It also comes at great cost to society, as we shall now see.

1.6 Costs to society

As we have seen, the harms associated with heroin dependence are substantial, and completely out of proportion to the prevalence of their use. It should thus not surprise that these harms come with enormous costs to society, as well as to the individual user. Attempting to define the costs of drug dependence, or of opioid dependence in particular, is fraught with difficulty. There are direct and indirect costs to be considered. The most common framework to evaluate the burden of disease associated with substance use is a 'cost of illness' analysis (Collins *et al*., 2007; Harwood *et al*., 1998; Mark *et al*., 2001; Rehm *et al*., 2006; Strassels, 2009). Analyses cover three types of costs: (i) direct costs, (ii) indirect costs from loss of output and (iii) psychosocial costs. Factors to be considered include medical care, crime, lost productivity and social welfare (Mark *et al*., 2001).

The most obvious direct costs of opioid dependence are the costs of treatment and medical care. As noted above, opioids have, proportionally, the highest demand for treatment (UNOCD, 2009). As we will see in subsequent chapters, treatment tends to be protracted and repeated across many enrolments. For outpatient pharmacological interventions, such as methadone, there are the costs of the drugs themselves, as well as the costs of medical practitioners and nursing staff to administer these drugs. Inpatient drug-free residential rehabilitation does not entail medication costs, but does entail the costs of providing beds, food and staff. There are also the medical sequelae of heroin addiction to consider in direct costings. As we have noted, the dependent heroin user is generally in poor health, ambulance callouts for overdoses are common, and rates of blood-borne viral infections requiring hospitalisation and expensive medications are high. Similarly, levels of psychopathology are extraordinarily high, and concomitant treatment of these problems consumes medical resources.

The direct costs of heroin addiction are not restricted to health costs. We must also take into account the direct costs of the criminal behaviours that are commonly conducted to support drug use. As noted above, acquisitive criminal behaviours are common, as are arrests and incarceration. Involved