



Heroin and other opioids

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Introduction

The opioids comprise a group of drugs widely used for their analgesic and euphoric properties.¹ Opioids vary widely in terms of their strength, onset and duration of action. The opioid class of drugs includes naturally occurring opiates—such as morphine—and semi-synthetic drugs—such as heroin—derived from the opium poppy, *papaver somniferum*. Opioids exert their key actions through specific opioid receptors in the brain, known as the *mu*, *sigma* and *kappa* opioid receptors. Variations in actions on these receptors cause the differential effects of the different opioid drugs. Evidence shows that opium has been used since the Neolithic Age² and opium preparations

have underpinned pain relief throughout ancient and much modern history.³ Opioids have also been used recreationally in various forms, including oral preparations such as laudanum and the smokeable opium made famous in Chinese culture in the late 19th century.⁴ Other opioids include synthesised drugs such as methadone, fentanyl and pethidine that have effects analogous to those of the naturally occurring and semi-synthetic opioids.¹

Today, opioids are widely used for pain relief in medical and clinical practice but they are also used recreationally for their euphoric properties. Heroin in particular is favoured by many people who inject drugs (PWID) as a primary drug of choice, but oxycodone, morphine and other opioids are also used in recreational settings. In this paper we briefly describe some of the patterns of opioid use along with the key harms experienced by people who use them. We then consider

some of the prevention and treatment responses designed to reduce the harms associated with the use of heroin and other opioids.

Trends in the use of heroin and other opioids

There is evidence that opioids are used for non-therapeutic purposes in most countries, but quantitative estimates of such use are rarely made, and are of debatable accuracy; this is especially true for estimates of drug dependence.^{5–10} The United Nations Office on Drugs and Crime (UNODC) estimated that 13–22 million people used opiates in 2008,¹¹ or 0.3–0.5 per cent of those aged 15–64 years. More than half of all people who use opiates live in Asia, and the highest levels of use are typically found along main drug trafficking routes (e.g. out of Afghanistan). The highest opiate usage rates are thought to be in eastern Mediterranean countries (notably Iran),

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where opium itself is smoked (2.8 per cent). The highest rates of heroin use are in Eastern Europe (notably Russia, 1.6 per cent).

In Australia, heroin was prohibited in the mid-1950s. Its use was rare until the period after the Vietnam War which saw the first of several epidemic cycles in the use of the drug.¹² The most recent Australian epidemic began in the late 1990s, when high-purity heroin became easily obtainable in the major cities.^{13,14} This was accompanied by significant harms to many people who used the drug, through heroin overdose and dependence, as well as harms associated with injecting the drug such as blood-borne viruses and injecting-related injuries.^{14,15} The broader community was also affected by heroin use; rates of fatal overdose and demand for heroin treatment increased markedly, and the rise of street-based drug markets and associated public injecting made heroin use newly visible and confronting.¹⁴ The epidemic ended with a dramatic reduction in supply in late 2000/early 2001, commonly termed the Australian heroin “drought”.^{13,14} Since that time the Australian heroin market has fluctuated markedly, with street drug market activity much reduced.¹⁶ Nevertheless, needle and syringe distribution figures in some jurisdictions, notably Victoria,¹⁷ suggest that injecting continues with the same or higher frequency as in the late 1990s and evidence suggests that heroin remains the preferred drug of Australian PWID.¹⁶

The emergence of pharmaceutical opioid misuse

Pharmaceutical opioid use has increased recently in some countries, with the United States (US) recording more deaths associated with this category of drug than any other.^{18,19} Markets for diverted opioids in Australia have been described as “small scale” and “disorganised”, operating through people engaged in small-scale “doctor shopping” (visiting multiple doctors

to obtain multiple prescriptions) and diversion of prescribed medicines.^{20–22} In 2004, 3 per cent of the general population reported having “misused” a pharmaceutical opioid (i.e. using pharmaceuticals without a doctor’s prescription or in ways other than the doctor recommended).²³

Most pharmaceutical opioid misuse and injection appears to occur among established heroin injectors and is probably related to the availability of their preferred opioid (heroin). Important jurisdictional differences have been documented in the prevalence, frequency and types of pharmaceutical opioids misused and injected. In states and territories where heroin has traditionally been less available, the injection of morphine and methadone tablets (prescribed for relief of severe pain) is more common among PWID.^{20,24,25} Morphine injection is also more common among PWID in rural areas where heroin availability is poorer than in larger cities,²⁶ although morphine injection has increased among PWID across Australia against a backdrop of sustained low heroin availability.^{24,27}

In 2006, 35 per cent of a sample of Australian PWID reported that pharmaceutical opioids were the last drug they had injected²⁴; most identified their drugs as non-opioid substitution therapy (OST) opioids (18 per cent morphine) rather than OST opioids (8 per cent methadone, 6 per cent buprenorphine). Although 32 per cent reported that these drugs were the drugs they had injected most frequently in the past month, few (5 per cent) reported that they were their preferred drug; heroin remained the most favoured opioid and the most commonly nominated favourite drug among this group (48 per cent).²⁴ In 2005–2006, 4 per cent of all non-OST drug treatment episodes in Australia were for the treatment of a primary problem with pharmaceutical opioids.²⁸ In the 2006 annual needle and syringe program (NSP) survey, 25 per cent of

PWID reported that the last substance they had injected was a pharmaceutical opioid, 11 per cent morphine, 8 per cent methadone and 5 per cent buprenorphine.²⁹

Pharmaceutical opioids present significant challenges for law enforcement and regulation. The absence of real-time monitoring of prescription and dispensing of these drugs in Australia means that practices such as “doctor-shopping” remain an issue.³⁰

The consequences of, and responses to, heroin and other opioid use

Heroin and other opioids are associated with a wide range of social and health problems related to both drug use and dependence. They include significantly increased morbidity and mortality compared to the general population, due to overdose and other directly or indirectly associated harms, such as blood-borne viruses (e.g. hepatitis B, hepatitis C and HIV).^{31,32} Other associated problems include high psychiatric comorbidity, particularly affective and anxiety disorders,³³ and social problems such as disrupted parenting, difficulties with accommodation and employment, and the consequences of participation in income generating crime.^{30,32,34}

A key harm associated with heroin or other opioid use is dependence. Here, dependence is characterised by a strong desire to take the drug, impaired control over its use, continued use despite harmful consequences, a higher priority given to drug use than to other activities and obligations, increased tolerance, and a physical withdrawal reaction when drug use is discontinued.³⁵ Dependence is a relapsing and remitting condition that can extend over decades.³⁶

Policy responses

Australia’s response to these problems has been undertaken within a harm minimisation approach, i.e. the overarching framework of all National



Drug Strategies developed since 1985.³⁷ The harm minimisation framework described in these strategies rests on the three pillars of demand, supply and harm reduction. In this context, prevention is a key demand and harm reduction strategy, which may refer to measures that prevent or delay the onset of drug use (e.g. media campaigns and school-based education programs), as well as measures that protect against risk and reduce harm associated with drug supply and use.³⁸ The latter measures are also referred to as secondary prevention (treating problems in the early stages of development) and tertiary prevention (arresting or retarding existing disease).³⁹ This paper is primarily concerned with the latter two categories, and in the next sections we focus specifically on the harms associated with dependence and the prevention of overdose.

Treatment

The quality of life of PWID is demonstrably lower than that of the broader community,⁴⁰ presumably a result, for many, of their illicit opioid use or dependence. Therefore, the broad aim of any form of opioid dependence treatment is to improve quality of life. Achieving increased quality of life often requires substantial lifestyle changes, including a reduction or cessation of illicit drug use.⁴¹ As the pathway into and out of dependence is highly individualised, the treatment and support services required to treat this chronic and relapsing condition need to be sufficiently flexible to cater for a wide variety of treatment needs and goals.³⁷ A robust service system will cater for client movement in and out of treatment and between treatment types; support continuity of treatment between community and prison; accommodate different treatment goals (abstinence, reduced use, controlled use); acknowledge different needs and desires to access psychosocial and other support

services; and respect different treatment setting preferences (to name a few). This service system description is client-centred, meaning client engagement in treatment decision-making is paramount.⁴² As with treatment for any condition, good evidence underpins Australian drug treatment decision making.³⁷ Finally, treatment options need to be accessible and affordable.⁴³

Australia has a range of effective treatments for heroin and other opioid dependence that can be provided in a wide variety of residential and non-residential settings.⁴⁴ The treatment service system varies between jurisdictions, particularly in relation to the delivery mix between public clinics, private clinics, not-for-profit providers and primary care/general practitioner services. The provision of OST demonstrates this point well. In Victoria, there is no direct government service provision and GPs and community-based pharmacists are the key service providers. In NSW, public clinics play a central role, supported by community providers. Despite the diversity across Australia, there are no systematic outcome differences between the models of care.⁴⁵ With a variety of treatments available, one challenge is to ensure that these treatment interventions are accessible, affordable and tailored to meet diverse client groups and treatment goals.^{43,46} This includes ensuring that they are available as long-term options for clients, as evidence suggests that long-term treatments are most effective.⁴⁶

Empathy, and the establishment of effective working alliances between treating staff and clients, may be as important in terms of engagement, retention and treatment outcome as different treatment modalities used.^{47,48} Features of a positive working alliance include flexibility, supportiveness, interest, warmth and optimism regarding treatment approaches and outcomes.^{17,49}

Incorporating client preferences into treatment decision-making also results in less treatment drop-out and better treatment outcomes.⁵⁰

There are two broad pathways for treating opioid dependence and most opioid-dependent people will engage with both at various times in their drug-using “careers”. Choosing between them will depend on many factors, including client treatment goals and preferences, availability and affordability. One pathway is OST, which is also referred to as opioid replacement or maintenance (a broader term that applies when heroin is the prescribed treatment—discussed below). Opioid substitution therapy is the mainstay of the Australian response to heroin dependence, typically implemented as a long-term treatment option which reflects the evidence of improved outcomes with longer treatment duration (>19 months).⁴⁶ The second pathway can be broadly referred to as abstinence-oriented treatment. Detoxification is the first step in an abstinence-oriented treatment process, but is not considered to be a treatment in its own right. It is usually followed by a course of psycho-social rehabilitation and/or self-help. Detoxification services can also be used to induct people into OST. For example, a client who commences withdrawal using buprenorphine may choose to remain on a buprenorphine maintenance dose.

Opioid Substitution Therapy

Methadone

Methadone is a synthetic opioid agonist which, in adequate doses (60–150 mg per day), can suppress withdrawal symptoms and opioid craving for at least 24 hours.^{51,52} There is a large body of evidence demonstrating that methadone maintenance treatment for opioid users is associated with retention in treatment, reduction in heroin use and improved health and social functioning.⁵² Methadone’s retention and heroin use outcomes are



The Australian opioid substitution therapy system: Issues and challenges

The OST system in Australia functions very well compared to systems in many other countries, but long-standing issues need to be addressed to take it to the next level. While it is important that we continue to develop new evidence-based treatments, it is equally important to translate what we know about effective treatment into better clinical practice and improved service delivery systems. Some of the key issues for the OST service system are outlined below.

Treatment access

Although more than 40 000 clients are receiving OST in Australia,⁵⁶ it has been estimated that between 10 000–30 000 people are unable to access treatment.⁴⁵ Attempts to make treatment more accessible through provision from general medical practice and community pharmacies have struggled due to low uptake: it has been estimated that fewer than 5 per cent of GPs¹¹³ and 36 per cent of pharmacies⁵⁶ are engaged in the OST system across Australia. Access is also restricted by treatment place caps imposed on prescribers and dispensers in various jurisdictions.⁴⁵ Prescribing by other health professionals (nurses and pharmacists) to address access issues has received some attention, but still seems a long way off. In the future, pressure on the full range of pharmacotherapy services and potentially greater access issues may arise with the growing issue of pharmaceutical misuse.³⁹

Some clients may occasionally need access to the more comprehensive services offered by specialist providers. Access to these services is often restricted by the limited number of treatment places, low client turnover and geographical isolation.⁴⁵

Treatment affordability

The dispensing fees and medication distribution system for OST are unique in the Australian context, given that it is a widely-used and cost-effective treatment for a recognised medical condition. More than 70 per cent

of clients are supported by either welfare payments or low incomes.^{114,115} A consistent finding of service system reviews is that the costs associated with participation in treatment (fees and travel costs) place an unreasonable burden on most clients, serving to reduce treatment access and retention.¹¹⁵ Failure to make payments leads to bad debts, conflict with community pharmacists and treatment drop-out. Although different jurisdictions do have arrangements for fee relief for some groups (e.g. young people and ex-prisoners in Victoria), one way to address this issue, recommended by pharmacists, user-group advocates and prescribers, would be to include OST medications on the Pharmaceutical Benefits Scheme (PBS). Despite much discussion, there has been little action on this front.

Treatment stigma

Some of the aims of GP and pharmacy engagement in the Australian OST system include convenient service access (close to home or work) to normal and non-stigmatised services. While there is evidence that clients are generally happy with community-based services, some problems remain. Clients have reported concerns about services provided in some community pharmacies, including the lack of privacy, restricted access and longer wait times compared to other customers, and a general perception of being “treated differently”.^{115,116}

Treatment quality

It is difficult to make judgements about overall OST treatment quality, but there are some pointers to areas where improvement is necessary. Stigmatised treatment is an obvious example. Another is widespread sub-optimal methadone and buprenorphine dosing (whether this is a result of client wishes or professional practice).¹¹⁷ Other issues that have been raised include limited client involvement in care planning¹¹⁸; inadequate service-provider training and overcrowded or run-down treatment facilities¹¹⁹; and insufficient emphasis on counselling and ancillary services.⁵⁴

superior to those of non-maintenance treatments (detoxification, drug-free rehabilitation, placebo and wait-list controls).⁵³ Nevertheless, relapse to heroin use is common for those who leave treatment.^{54,55} Until the year 2000, methadone was the only available OST option in Australia and it currently makes up 70 per cent of all Australian OST prescriptions.⁵⁶

Buprenorphine

Buprenorphine (Subutex®) is a partial opioid agonist that was registered as a treatment for opioid dependence in Australia in 2000. It has been found to be an effective maintenance treatment but generally not superior to methadone.⁵⁷ Buprenorphine may be advantageous in terms of safety (e.g. reduced risk of respiratory

depression at high doses), the need for less frequent administration, and ease of transition between detoxification and maintenance treatments. The evidence overall does not provide guidance on who is better suited to buprenorphine or methadone OST.⁵⁸ However, buprenorphine is clearly effective and offers clients another treatment choice.

Misuse of opioid substitution therapy in Australia

Patterns of misuse and injection of OST differ across the country and have been associated with different treatment policies. In New South Wales (NSW), methadone syrup injection has at times been prevalent (but infrequent) among PWID, including some who are in treatment¹²⁰; buprenorphine injection is less common.¹²¹ In contrast, methadone injection is considerably less common in Victoria¹²² where doses are rarely available as “takeaways” and the syrup is highly

diluted; buprenorphine injection is, however, much more common and frequent, and accompanies a much less supervised method of dosing through pharmacies.¹²³ Pharmacists suspect that 33 instances of non-adherence or diversion may occur per 100 patients per month.¹²⁴ One NSW study of methadone injectors found that some began injecting methadone because they felt they were on inadequate doses;¹²⁵ other factors included the “rush” and quicker onset of effects.¹²⁵

A second partial agonist–antagonist formulation containing buprenorphine and naloxone (Suboxone®) was approved in Australia in 2005. Negligible absorption of naloxone occurs when the combined product is taken sublingually (under the tongue), but opioid receptor antagonism occurs when injected. This preparation was introduced to reduce the likelihood of diversion and therefore may be a better option for unsupervised use.⁵⁹

Heroin prescription

The prescription of supervised, injectable heroin (diamorphine or diacetylmorphine) is a treatment approach that has been used in Switzerland, Britain and other (largely European) countries for many years.⁶⁰ Although controversial, this treatment is an effective way to attract and retain a small group of clients who have not responded to other treatments.^{60,61} This treatment is not currently available in Australia. A trial proposed for the Australian Capital Territory (ACT) in the mid-1990s was unable to secure the necessary political support to proceed.⁶²

Adjunctive psychosocial support services

Many people presenting for heroin dependence treatment are poly-drug users with multiple physical and mental health problems.⁶³ While there is little evidence to support psychosocial treatments alone as an effective way to treat opioid dependence,⁶⁴ adding psychosocial support to OST may be associated with less post-treatment

drug use.^{65,66} This highlights the need to ensure that psychosocial support is accessible for those who need and choose to avail themselves of it.⁶⁷

Abstinence-oriented treatment

Detoxification/withdrawal

A robust treatment service must provide opportunities to withdraw from prescribed or non-prescribed opioids. We know that a high proportion of clients on OST express interest in coming off treatment but are concerned about relapse.⁶⁸ That concern is well-founded given the low rates of detoxification success and the increased overdose vulnerability associated with loss of tolerance.^{69,70,80} Therefore, treatment decisions should be carefully considered and include discussion about the evidentiary basis for different options. Detoxification should not be considered a stand-alone treatment but rather a necessary first step for those seeking abstinence from heroin or other opioid drugs.⁵⁸ Outcomes for withdrawal treatment in residential and non-residential settings are comparable,⁷¹ but residential settings, although more expensive, may be more appropriate for marginalised and seriously dependent clients.⁷²

Methadone and buprenorphine are used as withdrawal treatment medications, with little to differentiate them in terms of treatment completion; some evidence suggests that withdrawal symptoms may resolve more quickly with buprenorphine.⁷³ Adrenergic agonists (clonidine

and lofexidine) can also be used to manage withdrawal. Lofexidine may be more effective and safer than clonidine but is not currently registered for use in Australia. Neither lofexidine nor clonidine is superior to buprenorphine in reducing withdrawal symptoms and retaining clients in treatment.^{73,74} Antagonist-induced withdrawal (e.g. using naltrexone) under anaesthesia is not recommended due to the risk of life-threatening adverse events and lack of benefit over antagonist-induced withdrawal under minimal sedation.⁷⁵

Rehabilitation

Rehabilitation programs are offered on either an outpatient or a residential basis (such as therapeutic communities) and typically consist of psychosocial interventions and peer group support. Residential rehabilitation has been shown to improve outcomes in terms of heroin use, criminality and general physical and mental health up to three years post-treatment.⁷⁶ The evidence suggests that therapeutic communities do not offer significant benefits over other residential treatment,⁷⁷ or over non-residential treatment options.^{78,79} There is evidence that engagement with peer-based aftercare such as Narcotics Anonymous can improve treatment outcome.⁸⁰

Naltrexone

The goal of maintaining abstinence post-withdrawal can be assisted with prescription of naltrexone. Naltrexone is a long-acting opioid antagonist

which acts to block the pharmacologic effects of opioids. A problem with this medication is that compliance and retention are low.⁸¹ A recent study using once-monthly injectable naltrexone demonstrated the capacity of this formulation to retain patients in treatment compared to a placebo group.⁸² Overdose risk on treatment cessation is a serious concern; it has been shown to be much higher at the end of antagonist treatment when compared to agonist medications.⁸³ Similar concerns have been expressed regarding overdose during naltrexone implant treatment.⁸⁴ It should be noted that overdose risk is a concern for all abstinence-based treatments.⁸³ While these formulations are promising, they require further research to establish safety and efficacy.⁸⁵ They are not currently approved for routine opioid dependence treatment in Australia.

Overdose

Overdose on opioid drugs is characterised by changes in breathing and consciousness and can result in significant morbidity⁸⁶ and in some cases, death. Clinical signs include shallow or raspy breathing, cyanosis (turning blue), pinpoint pupils and altered consciousness.¹

It should be noted that most opioid overdoses occur in the context of personal, behavioural, contextual and pharmacological factors that contribute significantly to risk (see *Risk factors for opioid overdose* below). Heroin overdose is one of the major harms associated with the use of the drug and the leading cause of illicit drug-related death in Australia.⁸⁷ Importantly, while heroin overdose rates have stabilised in recent years, harms related to opioid analgesics, such as fatal and non-fatal overdose, appear to have increased.^{88–90}

Overdose reversal and naloxone

In most instances opioid overdose need not be fatal. A combination of supported breathing and administration of an opioid antagonist drug, such as naloxone, usually results in successful resuscitation.⁹¹ Further, most overdose deaths occur a considerable time after the use of the opioid, often in the presence of witnesses who are in a position to initiate a response.⁹²

Naloxone is an opioid antagonist with no analgesic properties, but a very strong affinity to the *sigma*, *kappa* and particularly the *mu* receptor.¹ Naloxone effectively reverses the effects of opioids as the strong affinity of the

drug for the opioid receptors rapidly displaces heroin and other opioid agonists. Indeed, the reversal effects of naloxone can be extremely rapid, depending on the route by which the drug is administered. The preferred route of administration in the case of heroin overdose is intramuscular, as the onset of action is slower than with intravenous administration. There is also evidence that naloxone can be effectively administered intra-nasally, with the drug absorbed through mucous membranes in the nasal passages.^{93–95} Irrespective of how the drug is administered, naloxone is an effective way to reverse overdoses involving opioid drugs.

Enhancing overdose responses

Overdose response in Australia typically involves acute health services such as ambulances and emergency departments; settings where the antagonist drug naloxone is readily available, at least in major cities.⁹⁶ In these settings, overdose victims are generally assisted to breathe (i.e. given positive pressure ventilation using a bag valve mask or equivalent) to ensure oxygenation as soon as possible. Following further observation, naloxone is given when the clinical signs indicate

Risk factors for opioid overdose

Research has shown that the combined purity and amount of heroin consumed is not the sole determinant of overdose.⁹² Studies of coronial files (for fatal overdose), and surveys of living PWID (for non-fatal overdose), show that overdoses are more likely when people using heroin:

- combine it with other central nervous system depressants such as alcohol and benzodiazepines^{98,109,110}
- inject the drug rather than inhale it¹¹¹ (although people can still die after inhalation¹¹²)
- take the drug after a period of abstinence or reduced use (i.e. have experienced a change in tolerance).

Heroin overdose deaths tend to occur more often in private spaces among male PWID who have been using heroin for several years or longer. While non-fatal overdose victims tend to be similarly-aged men, these

overdoses tend to occur more frequently in public spaces,⁹⁶ with this public use a clear risk for overdose.¹⁰⁹

Since the onset of the heroin “drought” in late 2000/early 2001, the number of fatal and non-fatal heroin overdoses in Australia has declined dramatically. Meanwhile, the prescription and use of pharmaceutical opioids such as oxycodone has increased substantially, with correspondingly dramatic increases in the detection of oxycodone in drug-related deaths.⁹⁰ In response to the increasing numbers of opioids available on the market, there has been an increase in the number of drugs tested at the Victorian Institute of Forensic Medicine. Nevertheless, heroin (and its metabolites) remains the drug most frequently found in opioid overdose victims. Methadone is also occasionally found in overdose victims, often in people who are not registered for methadone treatment.

a likely overdose on opioids. Ideally, ventilation is maintained throughout this process. Findings from the Sydney-based MSIC suggest that assisted ventilation is often all that may be required.⁹⁷

Many fatal and non-fatal overdoses occur in situations where other people are present or may discover the victim in an overdose state,^{92,98} meaning there are often opportunities for bystander responses, whether the bystanders are peers, professionals or strangers. Recommendations for bystander response include basic first-aid responses (e.g. placing the victim in the recovery position) through to cardio-pulmonary resuscitation (CPR) and calling emergency services. These responses can help improve outcomes for overdose victims. Bystander CPR, for example, has been shown to reduce the need for ambulances to transport victims to hospital in Melbourne, reducing the demand on these stretched public services.⁹⁹

Unfortunately, bystander responses are not always ideal. Evidence around peer responses from the late 1990s suggested

that a variety of ineffective techniques were used in response to overdose, including saline injection, hitting the victim, putting the victim in a shower or just walking the victim around.¹⁰⁰ These ineffective responses, consistent with myths around overdose response portrayed in popular culture, are the target of various overdose education and prevention campaigns that have been implemented across the country from the mid-1990s onwards.¹⁰¹ While the situation appears to have improved in the past decade, there is still room for improvement.¹⁰² The key response to heroin and other opioid overdose should be to call for emergency service involvement.¹⁰²

Inappropriate or delayed responses to overdose are driven, in part, by a fear among people who use drugs of police involvement, and the implied possibility of arrest, following any call to emergency services. This highlights the importance of dispelling myths around police involvement in overdose response, which occurs only infrequently in Australia.^{103,104}

One way to improve bystander responses to overdose is to train people who are likely to come into contact with people in overdose states, such as peers and family of people who inject heroin. Education programs targeting peers have been running since the 1990s, implemented by drug user organisations (e.g. Harm Reduction Victoria) and other services. These education programs focus on providing messages that improve the actual actions undertaken in overdose situations (e.g. calling an ambulance), and are an important part of an effective overdose response.¹⁰⁵ However, peers of people who use heroin can be further empowered to respond to overdose using naloxone.¹⁰⁶ Overseas studies have shown that peers can be trained in recognising and responding to overdose and use naloxone appropriately in the resuscitation process.^{107,108} There is some observational evidence to suggest that expanding access to naloxone may have resulted in a decrease in heroin overdose mortality. While there have been calls to make naloxone available to peers in this country for overdose response, the drug is not yet available in this manner in any Australian jurisdiction.

The special needs of prisoners

Many prisoners in Australia have a history of opioid use and dependence, but the treatment options for this group are limited. Results of a recent national prisoner census suggest that around one in five of Australia's prisoners (19 per cent) used heroin in the year before imprisonment, 18 per cent used other analgesics and 12 per cent were receiving OST.¹²⁶ However, despite a commitment to provide health services for prisoners commensurate with those available in the community,^{127,128} OST is not yet available to all prisoners in Australia and not all jurisdictions permit initiation of OST for opioid-dependent prison entrants. Although all jurisdictions offer methadone to at least a subset of prisoners, buprenorphine is currently available only in NSW, Victoria and South Australia.⁸¹

Release from prison is a time of great risk for people with a history of injecting drug use, with the incidence of fatal drug overdose between three and eight times higher in the first two weeks post-release than in the subsequent 10 weeks.¹²⁹ In Australia the majority of these overdoses are heroin related,^{130,131} although—as in the wider

community—many also involve other central nervous system (CNS) depressants, particularly benzodiazepines and/or alcohol.^{132,133} Although the evidence remains weak,¹³⁴ a key reason for this elevation in risk of fatal overdose is thought to be reduced drug tolerance due to a period of relative abstinence in prison.^{129,135} Consistent with this finding, there is evidence that OST in prison is associated with reduced drug-related mortality post-release.^{136,137} This reduction may be a direct benefit of prison OST (which increases tolerance at the point of release) and/or an indirect benefit of increasing the likelihood that the individual will remain on OST in the community after release. It is probable that the combination of OST in prison and after release is effective in reducing mortality, and therefore that facilitating transition to OST post-release will reduce the incidence of both fatal and nonfatal overdose among recently released prisoners. In recognition of this, in addition to providing OST for prisoners, Corrections Victoria subsidises OST during the first 30 days post-release. Although this initiative may reduce the risk of overdose post-release, it has not yet been evaluated.

Harm reduction and injecting drug use

In Australia, heroin is typically injected so it is not possible to consider responses to heroin use in isolation from issues related to this route of drug administration. Injecting is linked to the transmission of blood-borne viruses such as hepatitis B (HBV), hepatitis C (HCV) and HIV, injecting related injuries and other injecting related infections, as well as overdose. The implementation of an extensive needle and syringe program from the mid-1980s onwards prevented an HIV epidemic among Australian PWID.^{138,139} Nevertheless, rates of HCV remain stubbornly high among PWID in Australia,¹⁴⁰ with 86 per cent of the estimated 9700 new hepatitis C infections per year due to injecting drug use.³¹

High rates of HCV infection and other harms that arise from injecting highlight the need to implement effective strategies to reduce the incidence and prevalence of these consequences. To this end, Australia:

- maintains an extensive needle and syringe program
- encourages testing for blood-borne viruses such as HBV, HCV and HIV
- provides a framework for HBV vaccination and HCV and HIV treatment.^{141,142}

Some jurisdictions have explored and implemented innovative programs, such as the Sydney-based Medically Supervised Injecting Centre (MSIC), that reduce injecting-related injury and disease as well as improve community amenity.¹⁴³

Despite a sound underlying harm reduction strategy, and high quality and coverage of services compared with most countries, much work is required to significantly reduce drug-related harms in Australian PWID. Knowledge of HCV testing and treatment protocols among health practitioners is variable.¹⁴¹ The uptake of HBV vaccination among PWID is low.¹⁴⁴ The uptake of HCV treatment is similarly low among PWID (in part driven by a lack of knowledge among service providers and clients as well as the side effects of treatment).¹⁴¹ Needle and syringe program coverage and policies on the use of needle and syringe vending machines vary across the country.^{145,146} Australia has only one supervised injecting facility, Sydney's MSIC, in spite of the demonstrated effectiveness of this and similar facilities in reducing harms associated with injecting drug use.^{143,147}

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