

Benefits and risks of pharmaceutical opioids: Essential treatment and diverted medication

**A global review of availability, extra-medical use,
injection and the association with HIV**

Louisa Degenhardt, Briony Larance, Bradley Mathers, Tasnim Azim,
Adeeba Kamarulzaman, Richard Mattick, Samiran Panda, Abdalla Toufik,
Mark Tyndall, Lucas Wiessing and Alex Wodak on behalf of the Reference
Group to the United Nations on HIV and injecting drug use

National Drug and Alcohol Research Centre
UNIVERSITY OF NEW SOUTH WALES
Sydney, Australia



ISBN: 978-0-7334-2707-7

This work is copyright. You may download, display, print and reproduce this material in unaltered form only (retaining this notice) for your personal, non-commercial use or use within your organisation. All other rights are reserved. Requests and enquiries concerning reproduction and rights should be addressed to the information manager, National Drug and Alcohol Research Centre, University of New South Wales, Sydney, NSW 2052, Australia.

Acknowledgements

This report is a product of the Reference Group to the United Nations on HIV and injecting drug use and was reviewed by the 2007 members of the Reference Group and also the Secretariat of the Reference Group.

In 2007 the Reference Group members were Tasnim Azim, Mauro Guarinieri, Matthew Hickman, Adeeba Kamarulzaman, Kasia Malinowska-Sempruch, Fabio Mesquita, Azarakhsh Mokri, Olanrewaju Olusola Onigbogi, Fred Owiti, Samiran Panda, Steffanie A. Strathdee, Fayzal Sulliman, Abdalla Toufik, Jallal Toufiq, Mark Tyndall and Lucas Wiessing.

In 2007 the Secretariat consisted of Richard Mattick, Louisa Degenhardt, Bradley Mathers, Benjamin Phillips, Kate Dolan and Alex Wodak.

The following individuals assisted with the compilation of the literature:

- Laura Kemmis, United Kingdom
- Gabrielle Campbell, NDARC, University of NSW
- Eva Congreve, NDARC, University of NSW
- Benjamin Phillips, NDARC, University of NSW
- Jessica Singleton, NDARC, University of NSW

The following individuals assisted with the compilation of data, or provided comment on the report:

- Rey Chad Abdool, UNODC, Regional Office for Eastern Africa, Nairobi, Kenya
- Pavel Aksenov, UNODC, Regional Office for Russia and Belarus, Moscow, Russian Federation
- Hement Bajaj, UNAIDS, New Delhi, India
- Raimondo Bruno, University of Tasmania, Hobart, Australia
- Jimmy Dorabjee, Centre for Harm Reduction, Melbourne, Australia
- Jeremy Douglas, UNODC Regional Centre for East Asia and the Pacific, Bangkok, Thailand
- Ranjan Dwivedi, UNAIDS, New Delhi, India
- Wayne Hall, University of Queensland, Brisbane, Australia
- John Howard, Ted Noffs Foundation, Sydney, Australia
- David Jacka, WHO, Hanoi, Viet Nam
- Danica Klempova, European Monitoring Centre for Drugs and Drug Addiction, Lisbon, Portugal
- Joao Matias, European Monitoring Centre for Drugs and Drug Addiction, Lisbon, Portugal
- Linda Montanari, European Monitoring Centre for Drugs and Drug Addiction, Lisbon, Portugal
- Jane Maxwell, Addiction Research Institute, The University of Texas at Austin, United States
- Susannah O'Brien, NDARC, University of NSW, Sydney, Australia
- Amanda Roxburgh, NDARC, University of NSW, Sydney, Australia
- Graham Shaw, WHO, Phnom Penh, Cambodia
- Mahshid Taj, UNODC, Tehran, Iran
- Mutabara Vohidova, UNODC, Dushanbe, Tajikistan
- Paul Williams, UNODC, Vienna, Austria

Table of contents

Acknowledgements.....	iii
Foreword.....	vi
Abbreviations.....	vii
Executive Summary.....	viii
1.1. Introduction.....	viii
1.2. Terminology.....	viii
1.3. Scope of this report.....	viii
1.4. Findings.....	ix
1.5. The use of pharmaceutical opioids outside of prescribed bounds.....	ix
1.6. Mechanisms of diversion.....	x
1.7. Clinical use of pharmaceutical opioids.....	x
1.8. Harms associated with pharmaceutical opioid injecting.....	xi
1.9. Pharmaceutical opioid availability, extra-medical use, injection, and HIV.....	xi
• Eastern Europe and Central Asia.....	xi
• South Asia.....	xii
• East and South East Asia.....	xii
• Caribbean.....	xiii
• Latin America.....	xiii
• Oceania and the Pacific.....	xiii
• Canada, United States and Western Europe.....	xiv
• Middle East and Northern Africa.....	xv
• Sub-Saharan Africa.....	xv
1.10. Discussion.....	xvi
1.11. Regulatory responses.....	xvii
1.12. Drug preparations and formulations.....	xviii
1.13. Harm reduction.....	xviii
1.14. HIV treatment.....	xviii
1.15. Future research.....	xix
1.16. Conclusions.....	xix
2. Introduction.....	2
2.1. Scope of this report.....	2
2.2. Terminology.....	3
2.3. Pharmaceutical opioids.....	4
2.4. Dependence.....	5
2.4.1. The concept of “dependence liability”.....	6
3. The use of pharmaceuticals outside of prescribed bounds – “extra-medical” use.....	8
3.1. Why does extra-medical use occur?.....	8
3.2. Do all opioids carry the same risk of extra-medical use and diversion?.....	8
3.3. How does “diversion” occur?.....	10
4. Clinical use of pharmaceutical opioids.....	13
4.1. Treatment of acute pain.....	13
4.1.1. Risks for misuse and diversion.....	13
4.2. Treatment of cancer pain.....	13
4.2.1. Risks for misuse and diversion.....	14
4.3. Palliative care for HIV/AIDS.....	15
4.3.1. Risks for misuse and diversion.....	15
4.4. Treatment of chronic non-cancer pain.....	15
4.4.1. Risks for misuse and diversion.....	16
4.5. Treatment of illicit opioid dependence.....	17
3.5.1 Risks for misuse and diversion.....	18
4.6. Summary of medical and extra-medical pharmaceutical opioid use.....	19
5. Harms associated with pharmaceutical opioid injecting.....	20
5.1. Association with HIV.....	20
5.2. Injecting risk behaviours.....	20
5.3. Injection among those living with HIV.....	21

5.3.1.	Effects of opioids and impact of injecting drug use	21
5.3.2.	Non-adherence to HIV treatment	21
5.3.3.	Interactions between opioids and HIV medication	21
5.4.	Viral hepatitis	22
5.5.	Other injection-related problems	22
5.5.1.	Consequences of injecting drugs formulated for oral use.....	22
5.5.2.	Consequences of injecting transdermal patches	23
5.5.3.	Infective complications	23
5.6.	Polydrug use and interactions	24
5.7.	Non-fatal overdose	24
5.8.	Mortality	24
6.	Pharmaceutical opioid availability, use, injection and HIV	26
6.1.	Eastern Europe and Central Asia	26
6.2.	South Asia.....	32
6.3.	East and South East Asia.....	36
6.4.	Caribbean	40
6.5.	Latin America	42
6.6.	Oceania and the Pacific.....	44
6.7.	Canada, United States and Western Europe	47
6.8.	Middle East and Northern Africa.....	56
6.9.	Sub-Saharan Africa	58
7.	Discussion.....	62
7.1.	Epidemiology.....	62
7.1.1.	Evidence on extra-medical use and injection	62
7.1.2.	Evidence on diversion	63
7.2.	Clinical uses of pharmaceutical opioids.....	63
7.2.1.	Treatment of cancer and AIDS-related pain	64
7.2.2.	Treatment of chronic non-malignant pain	64
7.2.3.	Opioid substitution treatment for dependent opioid users	64
7.3.	Regulatory responses to ensure medical availability and minimise diversion.....	65
7.3.1.	International regulations	66
7.3.2.	National policies on palliative care and pain management	66
7.3.3.	Opioid availability and regulation	67
7.3.4.	Monitoring of drug marketing.....	67
7.3.5.	Prescription monitoring and professional standards for prescribers.....	67
7.4.	Drug preparations and formulations	68
7.4.1.	Less injectable formulations and preparations	68
7.4.2.	Injectable formulations for opioid substitution treatment.....	69
7.5.	Harm reduction	69
7.5.1.	Opioid substitution treatment.....	69
7.5.2.	Needle and syringe programmes	69
7.5.3.	Education for injecting drug users.....	70
7.6.	HIV treatment	70
7.7.	Future research	71
8.	Conclusions	72
9.	References.....	73
Appendix A:	Method.....	89
Medline Search Strategy	90	
PubMed Search Strategy.....	91	
EMBASE Search Strategy	92	

Foreword

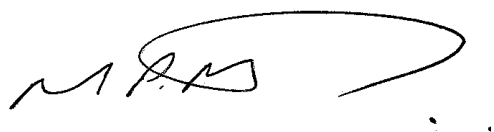
Opioids are the *drug of choice* for many people who inject drugs. Frequently, this opioid is heroin, which is produced, distributed, purchased and consumed illegally. However, a significant number of people inject opioids manufactured by pharmaceutical companies. These are intended for medical use, but at some point in the chain between production and prescribed consumption, they are diverted for what is termed *extra-medical use*.

Important efforts to reduce drug use and its consequent burden can too easily ignore the greater context in which drug use occurs. This paper describes the factors that make addressing extra-medical use and injection of pharmaceutical opioids a complex problem.

On the one hand, there is the need to regulate opioid availability to prevent extra-medical use and injection, and on the other, to ensure that opioids are available for appropriate medical use. This balance is critical, yet, as detailed in this paper, difficult to achieve.

Regulation, availability and consumption differ geographically. Opioids have an essential role in medical practice yet, alarmingly, many people who need them, especially those in low and middle income countries, do not have access. The harm caused by **not** providing them must be considered when restricting access to reduce the harm of extra-medical use.

As Director of the Secretariat of the Reference Group to the United Nations on HIV and injecting drug use, it is my pleasure to present this report, which is the second in a series of thematic papers produced on behalf of the Reference Group in 2007. The thematic papers address issues of current concern relating to injecting drug use and HIV, and supplement the two annual reports of Reference Group that examine the global epidemiology of injecting drug use and HIV prevention and care services.



Professor Richard P. Mattick
Director
Secretariat of the Reference Group to the United Nations on HIV and injecting drug use
National Drug and Alcohol Research Centre
University of New South Wales
Australia

Abbreviations

ART	antiretroviral treatment
ARVs	antiretrovirals
BBVI	blood borne viral infection
CNS	central nervous system
HAART	highly active antiretroviral therapy
HBV	Hepatitis B Virus
HCV	Hepatitis C Virus
HIV	Human Immunodeficiency Virus
ICD-10	International Classification of Diseases, 10th revision
IDU	injecting drug use
IDUs	injecting drug users
INCB	International Narcotics Control Board
MMT	methadone maintenance treatment
NDARC	National Drug and Alcohol Research Centre
NGO	non-government organisation
NSP	needle and syringe programme
OST	opioid substitution treatment
PIEDs	performance and image enhancing drugs
SSRIs	Selective Serotonin Reuptake Inhibitors
STI	sexually transmitted infection
UN	United Nations
UNAIDS	Joint United Nations Programme on HIV/AIDS
UNDP	United Nations Development Programme
UNODC	United Nations Office on Drugs and Crime
UNSW	University of New South Wales
WHO	World Health Organization

Executive Summary

1.1. Introduction

Psychoactive pharmaceuticals have an important, legitimate role in medical practice, and can make an enormously positive contribution to the health and wellbeing of many patients. Not all pharmaceuticals are used in accordance with doctors' prescriptions. In some countries the extra-medical injection of some of these drugs is being noted and is the focus of increasing attention worldwide. Here, we review the literature on the extra-medical use and injection of opioid pharmaceuticals and associated harms across the globe. We finish with a brief review of interventions to address misuse and harm.

'Opioid' is a general term which includes drugs containing natural opiates derived from the opium poppy and a range of synthetic and semi-synthetic substances, which have effects upon the opioid receptors in the brain. The immediate effects of all opioids include analgesia (relief from pain) and euphoria (feeling of wellbeing). A large number of pharmaceutical opioids have been developed for medical use; those used most commonly in the management of acute and chronic pain include morphine, oxycodone, hydromorphone, dextropropoxyphene, fentanyl, pethidine and codeine. Methadone and buprenorphine are the most commonly used opioids for the management of opioid dependence.

Adverse consequences are associated with opioid use, even when used in accordance with medical directions. Some side effects from normal doses may include nausea, vomiting, respiratory depression, constipation, drowsiness and confusion. Inappropriately high doses can produce respiratory depression and circulatory failure.

When medications are used outside the guidelines for safe and effective use, adverse effects are more likely, particularly those due to

overdosing. Additional risks of injection include risks of blood borne viral infections (BBVIs) if injection equipment is shared; harms related to injection of non-sterile preparations not intended for injection; risks of polydrug use; and harm related to pre-existing conditions for which opioids may be contra-indicated. Because of the dependence liability of opioids, the risk of developing dependent use may also be particularly great if used outside, or without, medical supervision.

1.2. Terminology

This report uses a number of different terms to describe the problems associated with pharmaceutical use outside the bounds of a medical professional's prescriptions. '**Diversion**' describes the unsanctioned supply of regulated pharmaceuticals from legal sources to the illicit drug market, or to a user for whom the drugs were not intended. It does **not** refer to use of medications by a patient outside the doctor's recommended treatment regime.

'**Misuse**' refers to the use of pharmaceuticals for purposes not in line with either medical or legal guidelines. Misuse, '**non-medical use**' and '**extra-medical use**' are often used interchangeably in practice. The term 'extra-medical use' makes clear that use is without a prescription, but does not exclude the possibility that the user may have medically driven reasons for using the drug.

'**Harmful use**' refers to a pattern of drug use that is causing negative impacts upon health and may have negative social consequences. The term '**abuse**' is **not** used in this report because of its ambiguity and negative connotations.

1.3. Scope of this report

The focus in this report is on pharmaceutical opioids. Opioid dependence is a problem of

considerable concern, and dependence through use of prescription opioids has increased in low and middle income countries as well as high income countries.

Injection of other pharmaceutical drugs is also worthy of investigation and future work might examine in detail the epidemiology of injection and harm related to these drugs. Injection of pharmaceutical drugs such as performance and image enhancing drugs (PIEDs) is likely to be concentrated among specific subpopulations in high income countries and, to our knowledge, has not been noted as an issue in low and middle income countries. Although injection of benzodiazepines is associated with significant harm, it is thought to be typically concentrated among persons who are primarily opioid dependent.

The risks of *extra-medical* opioid use and diversion are acknowledged by multiple international organisations, including those which monitor pharmaceutical opioid availability, and those which address injecting drug use (IDU), Human immunodeficiency Virus (HIV) and the treatment of pain. All of these agencies also emphasise the importance of providing medical treatment for those who need it and are unanimous in assertions that pharmaceutical opioids must be made available for this purpose.

The 1961 Single Convention stipulates that although the provision of designated drugs (including morphine-like opioids) is restricted to prevent recreational use, their availability and supply should meet medical and scientific need. The International Narcotics Control Board (INCB) is required to report on the adequacy of availability of drugs covered under the 1961 Convention. This report summarises published data from the INCB Annual reports on the kinds of opioids available, and the *extent* of their availability adjusted for population size. There are massive inequities in the availability of pharmaceutical opioids for medical and scientific purposes across countries and regions, inequities that do not preclude misuse and

injection occurring in many regions of the world.

There is a complex interplay of factors that appear to be linked to the extent of pharmaceutical opioid misuse and injection, and associations with HIV. This report attempts to highlight several that seem core: the extent of opioid availability – heroin and opium as well as pharmaceutical opioids; regulation of pharmaceutical opioids and their availability; the existence of established populations of injecting drug users (IDUs), and of dependent opioid users; and the prevalence of HIV in different locations and within certain populations. Once illicit opioid use of any sort is established, and injecting occurs among some users, the extent to which HIV harm reduction interventions are in place – particularly needle and syringe programmes (NSPs) and opioid substitution treatment (OST) – may modify both the extent of injection of pharmaceutical opioids and of incident HIV cases.

This report provides an overview of the availability of pharmaceutical opioids and the evidence on the extent of misuse, diversion, injection and associated HIV. It is intended to stimulate further research into the many complexities surrounding this issue. There are huge gaps in our understanding of the extent of misuse, injection and attributable HIV transmission. Literature on the mechanisms and comparative risks of diversion, misuse and injection is also very limited.

1.4. Findings

1.5. The use of pharmaceutical opioids outside of prescribed bounds

There are numerous motivations for the extra-medical use, diversion and/or injection of pharmaceuticals. Not all extra-medical use is via injection. Some people use pharmaceuticals for extra-medical purposes and take them orally and irregularly; these groups do not attract the

attention of authorities and little is known about this use. Few population studies have been conducted looking at motivations for the extra-medical use of pharmaceuticals; most have examined motivations among IDUs. Different responses will be required depending upon the reason for initiation and maintenance of use; not all misuse is occurring for the same reasons.

Various types of opioids differ in the extent to which they are likely to be misused. In large part this is because of their varying potency which is a key determinant of **dependence potential**. In the case of misuse or diversion for *injection*, different opioids will also vary in the likelihood of misuse depending upon how easily they can be injected (e.g. whether in injectable, tablet or patch form), and degree to which adverse effects occur following injection.

Availability plays an obvious role. It is affected by the extent to which clinicians can and do prescribe different opioids, and how easy they are to obtain from a health professional. Misuse and diversion will also depend upon the availability of illicit drugs, particularly heroin and opium.

Regular use of opioids (even in therapeutic applications) can lead to dependence, and this is one of the reasons that clinicians are hesitant to prescribe opioids for pain over extended periods of time. Dependence is more likely with higher doses consumed for longer durations. There is considerable debate about the frequency of dependence developing under usual clinical conditions.

1.6. Mechanisms of diversion

As with all psychoactive medications, opioid substitution and pain medications carry a risk of diversion. Diversion can occur anywhere along the wholesale to consumer chain. Few studies have attempted to estimate the relative contributions of different diversion sources to the pool of diverted medication; many discussions refer to long lists of potential mechanisms without attempting to prioritise

their importance; others make strong claims about which are the most important sources of diversion without providing the data upon which such claims are made.

Although limits to the supply of opioids may include the costs of these drugs and other structural factors, it is clear that fears of diversion drive many countries' policies on pharmaceutical opioids: a default position of limiting or precluding supply of prescription opioids for medical conditions appears to be the norm. This can have the serious consequence of depriving patients in need of access to essential medications that would be highly effective in treating them.

Such an approach also appears unsuccessful in avoiding diversion and injection. Even in countries where legitimate access is currently limited, epidemics of pharmaceutical opioid injecting and HIV transmission have been documented; this has occurred in a number of South Asian countries. When opioid injection of any kind is established, and HIV is prevalent, there is an additional public health imperative to introduce OST which has been demonstrated as an effective strategy in the prevention of HIV transmission.

More sophisticated and coordinated policy approaches can and have been developed. Key organisations affiliated with the World Health Organization (WHO) have been working successfully with several countries to ensure a more balanced approach towards supply and control of these medications.

1.7. Clinical use of pharmaceutical opioids

There are two broad clinical indications for the use of pharmaceutical opioids: 1) management of pain that is often dichotomised as either acute or chronic, and as cancer or non-cancer related; and 2) OST in the management of opioid dependence.

As outlined above, it is likely that some diversion of pharmaceuticals occurs at the level of importation or production, particularly in countries where there is only limited capacity to monitor this. In many countries, however, it seems reasonable to assume that the bulk of opioids that are diverted, or used extra-medically, are acquired from health professionals and patients. There are good reasons to assume, however, that the risk of diversion and misuse is not the same for all patient groups.

1.8. Harms associated with pharmaceutical opioid injecting

When medications are used outside the guidelines for safe and effective use, adverse effects are more likely, particularly those due to overdosing. Additional risks are associated with the concomitant use of other substances, particularly sedative drugs, and in the presence of pre-existing conditions for which opioid use may be contra-indicated. The injection of pharmaceutical opioids also carries risks such as the potential transmission of BBVIs if injecting equipment is shared as well as harms related to injection of a non-sterile medication that is intended for consumption by other routes. The risk of developing opioid dependence (see below) may also be greater if used outside of or without medical supervision.

The literature on the magnitude of risk for HIV transmission among IDUs injecting pharmaceutical opioids is limited but there is reason for concern. We were unable to locate specific studies examining the relative risk of HIV *transmission* among IDUs injecting pharmaceutical opioids, but it seems reasonable to assume that in countries where most IDU is occurring with pharmaceutical opioids, and where HIV transmission also occurs, that unsafe injection of these drugs is driving the epidemic.

Globally, between 5-10% of HIV infections result from IDU, but in some countries in Asia and Europe, over 70% of HIV infections are

attributed to IDU; in many countries in these regions, pharmaceutical opioids are commonly injected drugs. Of particular concern here is South Asia. Unsafe injecting drug use – including dextropropoxyphene and buprenorphine injection – is a significant issue in some countries in this region, and is also a significant cause of the spread of HIV. From such high-risk groups the virus is now reportedly spreading to non-injecting populations through sexual transmission.

1.9. Pharmaceutical opioid availability, extra-medical use, injection, and HIV

This report summarises pharmaceutical opioids available for the treatment of pain and for OST, from peer reviewed and grey literature, and using the INCB's consumption estimates. INCB data are the only data collected internationally on pharmaceutical opioid availability. There is a range of issues that make it difficult to comprehensively evaluate adequate coverage of required medical needs or estimate the scale of misuse/diversion across different countries.

Data from extensive searches are presented on misuse, injection, and HIV among injectors of these drugs. In many countries there seems to be a reluctance to provide opioids for the treatment of pain and to a greater extent for OST. To provide insufficient pharmaceutical opioid coverage (for pain *and* illicit opioid dependence) is against the recommendations of international health and regulatory bodies. Such an approach also clearly fails to preclude misuse, diversion and injection.

• Eastern Europe and Central Asia

In almost every country in the region, large populations of injecting heroin users have become firmly established, and HIV has become prevalent among these IDUs. Opioid substitution treatment is available in some but not all countries; in many places OST programmes that are available are limited in size and therefore entry to these programs is

difficult. Access to opioids for the management of pain appears to be limited in a number of countries in the region which would limit the availability of these drugs for extra-medical use. In some countries, there is evidence of injection of pharmaceutical opioids among already established populations of heroin dependent IDUs; in some cases this extra-medical use is occurring despite less than adequate provision of opioids for medical purposes.

In **Belarus**, the injection of methadone is becoming increasingly common; however, OST is not available in this country. Methadone is rarely diverted in the **Czech Republic**, but buprenorphine is frequently diverted, and in some locations is more commonly injected than heroin. Both drugs are available for OST, but buprenorphine can be prescribed by any general practitioner (GP) regardless of training, whereas methadone is only available in specialist settings. In **Georgia**, methadone is available as OST but buprenorphine is not; the injection of buprenorphine, believed to be diverted from nearby countries where it is legally available, has recently been reported as increasingly common among IDUs who perceive it to be a preferable alternative to heroin.

• **South Asia**

In some South Asian countries there have been marked problems related to pharmaceutical opioid misuse and increasingly, injection, particularly in **India, Nepal** and **Bangladesh**. Some have suggested that a shift from heroin smoking to pharmaceutical opioid injection may have been related to reduced availability or increased costs of heroin at certain times, the low cost and easy availability of pharmaceuticals, and legal controls introduced in India to address heroin supply. The pharmaceutical opioids being misused in this region are typically lower potency opioids such as codeine, nalbuphine and dextropropoxyphene, in contrast to the pharmaceutical opioids being used by IDUs in other regions around the globe which include oxycodone and morphine, and high dose buprenorphine.

These problems have occurred despite very low levels of licit opioid medication consumption for medical purposes in this region suggesting that misuse has not been avoided simply through having limited supplies of the drug for medical purposes. Consistent reports indicate that prescribing for all types of pain is inadequate in this region; OST is available in some countries but *much* better coverage is needed, particularly since unsafe injecting is driving the HIV epidemic in some countries. HIV and HCV co-infection are common among IDUs in the region.

A recent United Nations Office on Drugs and Crime (UNODC) report concluded that the diversion of pharmaceutical opioids for misuse and trafficking is occurring on a large scale both within and outside the region, primarily because of the limited enforcement of pharmaceutical regulations. It is thought that **India** accounts for significant large-scale diversion both within the country and to other countries in the region, and to countries further afield through illegal online pharmacies based in India.

• **East and South East Asia**

In East and South East Asia, pain relief has been noted as “poor” with low availability of opioid medications, but some efforts are being made to increase coverage. Few reports of pharmaceutical opioid diversion or injection were noted, with the exception of **Singapore**. This was in contrast to the prominence of heroin as a drug of dependence in this region: all countries are close to the heroin producing region, the “Golden Triangle”. OST availability has traditionally been extremely limited, but concerted efforts have been made to establish and roll out OST in several countries, particularly **China, Malaysia, Thailand** and **Indonesia**.

Singapore previously had widespread and relatively poorly regulated availability of buprenorphine as an OST for heroin dependence, leading to a significant problem with injection of the drug, sometimes by persons who had been initiated to injecting with

this drug. Rather severe restrictions were introduced in 2005 to address this problem, with removal of patients from this form of OST through detoxification. The impact of this has not yet been reported in the literature.

- **Caribbean**

Coverage of opioids for medical purposes is clearly inadequate in many countries in this region. Governments are preparing legislation to improve the nature of controls over pharmaceutical substances: this includes **the Bahamas** and **Dominica**. Few data could be located on the extent of pharmaceutical opioid misuse, injection or diversion. Given the low levels of consumption, it seems likely that the extent of pharmaceutical opioid misuse and diversion is not great, but there is a need for much better coverage of opioid medications for the treatment of pain and for OST.

This is particularly the case in **Puerto Rico**, where injecting drug use is a major cause of HIV transmission and heroin injection is the most commonly injected drug. The general population prevalence of HCV in San Juan is 6.3%, with estimates of 39% for heroin injectors. HIV incidence rates are much higher among IDUs in Puerto Rico than in New York, whereas methadone and HIV treatment coverage is much worse, although methadone has been piloted in prison settings.

- **Latin America**

The availability of pharmaceutical drugs in general is poor in many countries of Latin America. In response to the high cost of drugs, some countries in the region have developed methods for encouraging generic brands of these medications and ensure swift registration.

Access to opioids for pain and drug dependence is inadequate; few mentions of pharmaceutical drug misuse in this region could be found, with most of the focus upon cocaine production, trafficking and use. Access to opioid medication is very low. A meeting of cancer pain physicians, researchers and government representatives over a decade ago considered

the use of opioid medication in Latin America and concluded that opioids were severely under-utilised for the treatment of cancer pain in all countries in the region because of cost, bureaucratic requirements that dissuaded physicians from prescribing stronger opioids, a clinical orientation to short-term mild opioids for acute pain only, and limited training leading to fear of prescribing by doctors and failure to stock medications by pharmacists. Efforts have been made in some countries to improve inadequate standards of care for dependent drug users.

Use and injection of opioids in general (including heroin) is thought to be low in this region. The exception is **Mexico**, which has an established population of heroin users (and injectors), and is one of the heroin producing countries of the world. Heroin is the most common drug used by Mexican IDUs and increased poppy cultivation, greater security at the United States border, and reduced prices may be related to the establishment of significant heroin use in the country. Risky practices among IDUs are reportedly high and risk perception is low; there are some indications that HIV prevalence may be increasing among this group, with estimates of 4% prevalence in 2003. OST treatment has been available in **Mexico** since 2001. No reports of pharmaceutical opioid diversion were located from studies of treatment or out-of-treatment drug users.

- **Oceania and the Pacific**

Pharmaceutical opioid misuse was not noted as an issue in most countries in this region. This is almost certainly because of very minimal availability of these drugs for medical use. Most countries in this region have minimal levels of opioid consumption reported to the INCB. Two exceptions are **Australia** and **New Zealand**. These countries have comparatively high opioid consumption, including comparatively good levels of coverage for pain treatment.

In **Australia**, OST for the treatment of illicit opioid dependence is long established and there is a high level of coverage of the opioid

dependent population. OST is highly regulated and there is highly regulated availability of other opioid medications. OST is considered a “low threshold” treatment, in accordance with a policy designed to minimise harms associated with illicit opioid use. Markets for diverted opioids in Australia have been described as “small scale” and “disorganised” and diversion seems typically to occur sporadically among established heroin injectors, and is probably related to the availability of their preferred opioid (heroin).

In **New Zealand**, misuse and injection of prescription opioids has been a more long-standing issue among established IDUs, related in part to the poor availability of heroin for many years as a result of the disruption of a major heroin trafficking ring in the 1970s. In 1990, 81% of opioid users presenting to a drug treatment clinic for treatment of their opioid dependence reported the injection of buprenorphine within the past month, and 68% had injected morphine. Following the introduction of buprenorphine-naloxone in 1991, among clients presenting for treatment, 57% were injecting buprenorphine-naloxone, with patients reportedly having learnt to inject buprenorphine-naloxone at doses and frequencies that would allow them to avoid withdrawal.

- **Canada, United States and Western Europe**

In terms of extra-medical use, injection and diversion, the **United States** appears to have the largest per capita problem in the world. Even the INCB voiced significant concern about the extent of problems in the country. It accounted for half (49%) of the world’s estimated morphine consumption in 2005, despite only comprising 4.7% of the world’s population. Controlled-release oxycodone is widely misused, and the country accounts for 99% of the world’s consumption of this opioid. It was estimated that prescription opioid misuse cost US\$8.5 billion in 2009; given that problems seem to be increasing, the figure is likely to be much larger today. Dependence, and the number of both non-fatal and fatal overdoses

related to pharmaceutical opioid misuse continue to increase across the country, particularly oxycodone misuse. Methadone is increasingly being used for pain management, and the number of dosage units of the tablets used for pain increased by 277% between 2000 and 2005, as compared to a 163% increase in diskettes used both for pain and opioid treatment, and a 99% increase in liquid used in opioid treatment. Between 1999 and 2004, the number of poisoning deaths mentioning methadone increased 390%, while the number of deaths mentioning other opiates such as oxycodone and hydrocodone increased 90%.

Multiple formulations of varied opioids are available, and many appear easily obtained from GPs for diffuse, non-specified pain conditions. It seems to be this feature of the US policy context that is in part related to the extent of the problem with oxycodone, but other important aspects have played a part. The pharmaceutical company that manufactures the most popular of these products, OxyContin® (Purdue Pharma), aggressively marketed the drug as a treatment for both cancer and chronic non-cancer pain to oncologists, palliative care physicians and pain specialists, claiming it had a low dependence liability. In May 2007, the company agreed to pay \$600 million in fines and other payments to resolve the criminal charge of "misbranding" its product; further lawsuits are currently underway.

In **Canada**, there has been sustained research and community attention upon the misuse and injection of pharmaceutical opioids among regular illicit opioid users, with evidence of increasing use and injection of pharmaceutical opioids, probably related to inconsistent heroin supply in most areas of the country. Despite this, population level data on illicit opioid use (including heroin) are limited. Data suggest that OST coverage in the country is around 23%, representing a very substantial increase relative to the poor availability of OST until a decade ago. There is no national monitoring system in place to track the diversion and extra-medical use of prescription drugs, although district-level systems are in place.

In Western Europe, there is certainly less population-level consumption of these drugs compared to Canada and the United States, and it is not related to OST coverage; in many countries (e.g. France) OST coverage is decidedly superior. Some countries had notably low levels of pharmaceutical opioid consumption, such as **Albania, Andorra, Serbia,** and **Montenegro**, and no data could be located on the existence or extent of misuse or diversion in these countries. However, there is a need for better coverage of OST in some of these areas, given evidence of heroin dependence and HIV prevalence among these populations.

Misuse and diversion is occurring in Western Europe. Although very good monitoring occurs through the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA), routine reporting does not appear to stress differentiation between heroin and pharmaceutical opioids. As a result, it is not clear in some countries to what extent problems related to these pharmaceuticals are a concern. Future monitoring might separate heroin from other opioids.

In **Finland**, there have been high levels of diversion of buprenorphine from OST for some years. In 2005, buprenorphine was the most frequently injected drug among IDUs attending an NSP (73%) and was reportedly commonly used to avoid withdrawal. Some evidence has suggested that it might be a more common problem among younger drug users. Since the introduction of buprenorphine-naloxone, many IDUs said that they had injected the drug (68%) but 80% of these users reported a negative experience; the street price of this formulation was also reportedly half that of buprenorphine. Overdose deaths are likely to involve buprenorphine but overdose rates are low.

In **France**, a similar problem has been reported in relation to buprenorphine, but much of the misuse appears to be among users enrolled in OST, which is widely available and dispensed through pharmacies. A 1997 study found some evidence of a younger cohort of IDUs who *only* injected buprenorphine (not heroin or cocaine);

compared to an older group who also injected these other drugs, they injected drugs more frequently and were more likely to be enrolled in buprenorphine treatment. There is evidence of doctor shopping and prescription fraud among OST clients – one study found two profiles for forged prescriptions: males under 45 years, presenting with stolen prescription forms and requesting opioids; and women aged over 45 years presenting with altered prescriptions for benzodiazepines or opioids.

• **Middle East and Northern Africa**

Medication for severe pain is inadequate in supply in many countries in the region. According to the INCB, pharmaceutical preparations containing controlled substances are easily obtained on unregulated markets in this region, with considerable unregulated sale of pharmaceuticals over the counter without prescriptions occurring. Misuse of these preparations is reported to be taking place but no data were available to quantify this. Drug control legislation prohibiting such practices is in place in most countries, but it is often not adequately implemented and enforced. Due to insufficient funds, there is apparently a shortage of trained pharmacists and pharmacy inspectors in many African countries, which is often exacerbated by a lack of funds to fill vacancies. The INCB recently voiced concern about controlled drugs being sold via illegally operating internet pharmacies in larger cities. Data on the extent of this possible problem are seriously lacking.

• **Sub-Saharan Africa**

Provision of pharmaceutical opioids for the management of severe pain is severely limited in this region and repeated calls are being made for dramatic changes to availability and use. There are significant structural barriers to the provision of medication in some countries, and doubtless fear of limited capacity to control diversion adds to difficulties in achieving change.

An added issue is the fact that many African countries now serve as routes for the trafficking

of illegal drugs, including heroin, through to the richer markets of Europe. It is likely that countries such as **India** may account for significant and/or increasing supply of diverted pharmaceutical opioids to this region; this needs to be addressed. The development of noticeable drug problems has been noted in multiple transit countries in Sub-Saharan Africa, with many countries lacking national policy frameworks to address these issues. Policies are being introduced across the continent to address illegal drug use and related harm. The development of populations of dependent heroin users is an issue of significant concern, given the very high population prevalence of HIV existing in the country. OST should be introduced as a matter of priority in countries where heroin injection has become an issue.

1.10. Discussion

Pharmaceutical opioids have an important role in the treatment of a range of medical and psychological conditions, but globally, they are inadequately prescribed for the conditions for which it is known they are highly effective. Patients (particularly those who are terminally ill) should be given relief from severe pain; and OST should be introduced to help dependent users and avoid the significant risks of HIV transmission and other harm.

Diversion and injection of pharmaceutical opioids is occurring in many countries, but it is important to consider this within the context and the manner of licit availability. Considering the level of concern about its occurrence, there is comparatively little data with which to understand the extent and nature of extra-medical use in each country, but it seems reasonable to expect some level of diversion will occur. Monitoring of trends in South Asia and South East Asia is important – these countries are likely to account for the majority of users injecting pharmaceutical opioids. The evidence on associated harms of pharmaceutical injection is dominated by research in high income countries where use and diversion of pharmaceutical opioids

probably differs from low and middle income countries.

On the basis of the current evidence, extra-medical use, diversion and injection of pharmaceutical opioids appears to be a significant problem for the United States, South Asia, South East Asia, and some Eastern European countries. The nature of the populations injecting these pharmaceuticals seems very different across countries. For example, in India, populations of IDUs appear to be developing dependent, injecting use of these drugs; in Australia, injection may be more common among IDUs whose preference is heroin and for whom injection is less frequent; in the United States, a generalised epidemic of pharmaceutical opioid use appears to have been driven by overly liberal prescription for non-specific pain states, leading to a new cohort of dependent opioid users who may switch to injecting.

Different opioids have different dependence potential, and the types available may also affect the likelihood of misuse and diversion for injection. There needs to be much more routine monitoring work conducted to provide data on the extent of the problem (or otherwise). There appears to be a general tendency for those opioids that are more available to be those which are more likely to be misused. If a range of pharmaceuticals is available, those which are more potent appear to be more sought after and misused. In countries where strong opioids are not available (e.g. India), other less potent opioids are still used and injected. Where pharmaceutical opioids (even less potent ones) are introduced without sufficient regulation, it seems that there is a risk of misuse and diversion (e.g. the United States and Singapore). The challenge is ensuring that such problems are addressed without implementing policy that is overly restrictive and ensuring that patients are not deprived of appropriate treatment.

In terms of injecting risk, the evidence on this topic is limited. Some studies have suggested increased injecting risk among pharmaceutical opioid injectors compared to other IDUs, others

have not. The context of opioid use – whether it is among IDUs in contexts where OST is currently available, or whether pharmaceuticals are largely used by otherwise naïve IDUs – may be related to this. The prevalence of HIV and HCV among this group of IDUs is poorly documented in almost every country, except where these drugs are the major drugs of injection. The evidence on the magnitude of HIV risk associated with pharmaceutical opioid injecting – relative to other opioids such as heroin – is limited, although it may be lower if injection occurs less frequently.

Responses to misuse, diversion and injection should *not* further discourage what we know are inadequate levels of medical use of opioids for the treatment of pain. Unfortunately, there has been little research examining the relative benefits of different policy interventions, a gap that would benefit from systematic research examining different contexts and policy responses across countries. There seem to be few cases where national policies spanning palliative care, HIV and AIDS, OST and other pain management have been produced. There is much that is not known about how, why, where and how much diversion is occurring.

For users who have developed dependence on opioids, treatment should be provided: it has positive impacts upon illicit drug use, physical and mental health, and public amenity. OST is an effective HIV prevention strategy that should be considered for implementation as a treatment for IDUs with opioid dependence in communities at risk of HIV epidemics.

1.11. Regulatory responses

“Optimally-designed” drug diversion control programmes have three goals: a) limit access to only those with a legitimate need for the drug; b) track and identify cases where control over this access is compromised; and c) minimise the effect of these controls upon legitimate medical practice. These general principles must be used to produce a mix of strategies to apply to the

context of a given country. The question is: how does a country balance the needs and risks?

International bodies can and do play an important role in determining pharmaceutical opioid availability. The INCB in particular can place pressure upon countries to increase or further regulate pharmaceutical opioid availability. It has urged many countries to make opioids more available for the effective management of pain – an important change that must be made.

The INCB can also play an important part in ensuring the availability of opioids for OST where illicit opioid dependence has developed as an issue. Given the documented benefits of widespread OST implementation – reduced HIV transmission, reduced opioid overdose, improved wellbeing for patients and improved public amenity – there is a clear public health imperative for international agencies to assist countries to make OST available where it is required.

In many countries, it may be appropriate to register a greater number of opioid medications for use. As the tables in this report show, many countries not only have highly inadequate opioid supply, but also do not stock the medicines listed by WHO as essential in the treatment of acute and chronic pain. Fewer still stock the model medicines for treatment of illicit opioid dependence.

Pharmaceutical companies can play an important role in opioid pharmaceutical use and misuse. The US example of oxycodone highlights the very significant risk that unbalanced depictions of dependence risk, and overly generalised marketing to health professionals may pose for populations that are predisposed to taking up medications for a variety of health conditions. One way in which availability needs to be regulated therefore includes monitoring of drug company promotion of pharmaceutical opioids to the medical profession and the broader community to ensure that appropriate use occurs.

1.12. Drug preparations and formulations

The pharmacological formulation of different pharmaceuticals may impact on their potential for misuse and/or injection. Approaches can include the addition of naloxone to deter injection, less injectable formulations, or formulations which prevent drug tampering. This avenue of research should be continued as a matter of priority for obvious public health reasons.

Not all people who inject drugs will cease injecting, even if pharmaceutical opioids are less amenable to injection. Some IDUs will inject formulations or preparations that are designed not to be injected. For IDUs who have not responded to standard oral OST and repeatedly struggle to remain in treatment, provision of injectable formulations such as morphine or heroin may represent an alternative treatment option and warrants further research.

1.13. Harm reduction

As described earlier in this report, OST reduces the level of HIV risks and HIV transmission and allows for stabilisation of persons who have already contracted HIV. OST can therefore be seen as an HIV harm-reduction measure in addition to an intervention to reduce demand for diverted pharmaceutical opioids.

NSPs have been shown to reduce HIV transmission and injecting risk behaviour. Injecting equipment must be made available as a matter of priority in regions where access is currently limited, yet pharmaceutical opioid injection is still occurring and HIV risk behaviours are common, such as South Asia.

Another issue is whether equipment that facilitates the injection of pharmaceutical preparations (e.g. pill filters, large barrels/needles and vein infusion kits) should be made available. Some have recommended *reducing* the availability of equipment for

injection of formulations not designed for injection, such as methadone syrup. However, not all IDUs will cease injecting. In one study in Australia, among those IDUs who continued to inject methadone syrup after large-barrelled syringes and winged infusion sets (or 'butterflies') stopped being distributed by NSPs, there was greater re-use of injecting equipment; it was recommended that additional policy initiatives were required to further address this issue.

There is a tension between providing equipment that facilitates injection of these non-injectable drugs, and reducing overall injection at the expense of those who choose to continue doing so. It has been suggested that more comprehensive responses (e.g. including dilution of methadone syrup) were required, since removing access to equipment for injecting methadone syrup clearly has not led to a complete cessation of injecting for some IDUs.

Particularly in countries where pharmaceutical opioid injection is occurring, attempts should be made to provide factual information to IDUs about the risks of injecting these medications, and ways in which harm can be reduced.

1.14. HIV treatment

Interventions to address HIV among those who inject pharmaceutical opioids should be consistent with the UNAIDS essential package for HIV prevention and care for IDUs. This package includes:

- NSPs;
- OST;
- HIV counselling and testing; and
- Antiretroviral therapy.

Those actively using drugs should be offered treatment for HIV, but clinicians should provide good support to assist clients with adhering to medication. Part of good clinical practice involves assessment for potential non-adherence and this should be conducted

carefully. Adherence counselling should be a component of treatment.

1.15. Future research

There is an imperative for good research on this topic. Concerns about inappropriate responses to evidence of diversion and injection should not preclude research into this issue. Lack of data on the topic will only serve to maintain the status quo, which appears to be a tendency to limit availability of pharmaceutical opioids for medical and scientific purposes. Some areas of research include, but are not limited to:

- systematic collection of detailed data on pharmaceutical opioid availability for medical purposes;
- regular collection of data on the extent and nature of extra-medical use of pharmaceutical opioids, including injection;
- studies examining the relationship between pharmaceutical opioid injection among IDUs and the availability of other illicit drugs;
- studies examining the reasons for pharmaceutical opioid extra-medical use and injection among users from different country contexts and different subpopulations of users within countries;
- studies examining the factors that maximise attractiveness of OST while minimising diversion risk;
- research documenting the prevalence of HIV and HCV among those who inject pharmaceutical opioids;
- research into formulations of pharmaceutical opioids that reduce the risk of injection;
- research into formulations of pharmaceutical opioids that pose less risk of harmful use;
- evaluation of national policies for regulation of pharmaceutical opioids in low and middle income countries;
- research to examine the feasibility and cost effectiveness of injectable forms of OST for those clients who have not succeeded in standard forms of OST;

- further research into the ways in which opioids can be used for chronic pain: which patients benefit from this form of therapy, and in what circumstances;
- research examining the influence of policy in both facilitating and restricting health promotion and harm reduction among those who inject pharmaceutical opioids; and
- review of current national and international legislation through which pharmaceutical companies can be held accountable for policies and procedures that facilitate large-scale diversion of their products.

1.16. Conclusions

There are understandable reasons why clinicians and policymakers are concerned about overly liberal access to opioid medications that might place users at risk of developing dependence upon these drugs. It is abundantly clear, however, that the number of people who are not receiving effective medication for their pain (e.g. perhaps 10 million out of 20 million new cases of cancer each year) is far larger than the population of persons with illicit opioid dependence. This means that a huge number of people are being denied effective treatment that has been described as “absolutely essential” by the WHO.

Some diversion should be expected to occur when opioids are made available for medical purposes. That is not sufficient grounds for a *priori* refusal of treatment to all patients who would receive relief from pain. It is imperative for many countries to design effective systems for access to opioids for those who need them, ensuring that prescriptions are provided by those providing good clinical care, and without placing patients at undue risk of developing dependent use of these drugs. Further research must be conducted into the many complexities surrounding this issue. There are huge gaps in our understanding of the extent of misuse, injection, and attributable HIV. We need to know more about why misuse occurs,

particularly in countries where it has begun among previously opioid naïve users. The literature on the mechanisms of diversion and comparative risks of diversion, misuse and injection is also very limited. Until further data are produced, fear of diversion will probably continue to dominate policy decisions, efforts to control diversion will be misdirected and lead to overly restrictive control of supply, and prescriptions for legitimate medical conditions will continue to be inadequate. Yet diversion will continue.

2. Introduction

Psychoactive pharmaceuticals have a vital role in medical practice, and make an enormously positive contribution to the health and wellbeing of many patients. However, not all pharmaceuticals are used in accordance with the directions of health professionals. In a number of countries, the injection of some of these drugs outside therapeutic instruction is being reported and is the focus of increasing attention.

Worldwide, 10% of Human Immunodeficiency Virus (HIV) incident cases are attributed to injecting drug use (IDU)¹. In Eastern Europe and Central Asia, two-thirds (67%) of prevalent HIV infections in 2005 were due to IDU²⁻³. Possible associations between unsafe pharmaceutical injecting and HIV therefore warrant careful consideration, particularly since they have concerned clinicians and health authorities in multiple countries where HIV infections are also of concern⁴⁻⁵.

2.1. Scope of this report

This paper reviews the existing peer reviewed and “grey” literatureⁱ on the injection of opioid pharmaceuticals and associated harm, including associations with HIV, and considers the context of the availability of pharmaceutical opioid medications for the medical indications for which they are recommended. The paper finishes with a brief review of interventions to address misuse, injection and harm.

Numerous pharmaceutical drugs have the potential for misuse. These include benzodiazepines (e.g. diazepam, temazepam); performance and image enhancing drugs (PIEDs, e.g. anabolic-androgenic steroids); antidepressants (e.g. tricyclics and selective serotonin reuptake inhibitors); and prescription stimulants (e.g. dexamphetamine).

The focus of this report is on pharmaceutical opioids for several reasons: 1) opioid dependence is a problem of considerable concern, and opioid dependence through use of prescription opioids has increased in low and middle income countries⁵⁻⁷ as well as high income countries⁸; 2) injection of pharmaceutical drugs such as PIEDs is likely to be concentrated among specific subpopulations in high income countries⁹ and to our knowledge, has not been noted as an issue in low and middle income countries; and 3) although injection of benzodiazepines is associated with significant harm¹⁰⁻¹¹, it is thought to be typically concentrated among persons who are primarily opioid dependent¹². Injection of other pharmaceutical drugs is also worthy of investigation, however, and future work might examine in detail the epidemiology of injection and harm related to these drugs.

The risks of *extra-medical* opioid use and diversion are acknowledged by multiple international agencies, including those which monitor pharmaceutical opioid availability, and those which address injecting drug use, HIV and pain conditions. All of these agencies also emphasise the importance of providing medical treatment for those who need it, and are unanimous in assertions that pharmaceutical opioids must be made available.

The 1961 Single Convention stipulates that although the provision of designated drugs (including morphine-like opioids) is restricted for recreational purposes, their availability and supply should meet medical and scientific needs. The International Narcotics Control Board (INCB) is required to report on the adequacy of availability of drugs covered under the 1961 Convention. This report summarises – as

ⁱ The methods with which we searched the literature and data are summarised in Appendix A.

part of the review of the “availability” of pharmaceutical opioids – the published data from the INCB Annual reports on the kinds of opioids available, and the *extent* of their availability adjusted for population size (Section 5). As will become clear, there are massive inequities in the availability of pharmaceutical opioids for medical and scientific purposes across countries and regions, inequities that nonetheless do not preclude misuse and injection occurring in many regions of the world.

There is a complex interplay of factors that appears to be linked to the extent of pharmaceutical opioid misuse and injection, and associations with HIV. This report attempts to highlight several factors that seem core: the extent of opioid availability – heroin and opium as well as pharmaceutical opioids; regulation of pharmaceutical opioids and the manner in which they are made available; the existence of established populations of injecting drug users (IDUs), and of dependent opioid users; the background prevalence of HIV, and the extent to which HIV harm-reduction interventions are in place – particularly needle syringe programmes (NSPs) and opioid substitution treatment (OST).

As might be imagined, this report provides an overview of these issues as covered in the literature. It is intended to act as a paper that might be used to stimulate further research into the many complexities surrounding this issue. As will become clear, not only are there huge gaps in our understanding of the extent of misuse, injection, and attributable HIV, but the literature on the mechanisms of diversion and comparative risks of diversion, misuse and injection is also very limited.

2.2. Terminology

This report uses a number of different terms to describe the problems associated with pharmaceutical use outside the bounds of a medical professional’s prescription. Our use of these terms is in line with both the World Health Organization’s (WHO) *Lexicon of Alcohol and Drug Terms* (2007)¹³ and the international literature. Some terms used in this report (and those we avoid) are presented below for clarity.

Misuse, non-medical use and **extra-medical use** are often used interchangeably. The term ‘extra-medical use’ makes clear that use is without a doctor’s prescription but does not exclude the possibility that the user may have medically driven reasons for using the drug (see Table 4 below). ‘Misuse’ refers to the use of pharmaceuticals for purposes not in line with either medical or legal guidelines¹³. We prefer this term to “abuse”, in agreement with others, because it is less judgmental¹³.

Harmful use refers to a pattern of drug use that is causing negative impacts upon health and which may have social consequences accompanying them¹³.

Abuse is not used in this report because of the ambiguity and negative connotations of this term. “Abuse” is variously used to refer to a drug use disorder¹³, and as a term denoting use that is disapproved of (e.g. in the *World Drug Report*¹⁴). The WHO does not use the term abuse. In accordance with WHO, this report refers to “harmful patterns of use” or “harmful use” to refer to use that may cause harm.

Diversion is used in this report to describe the unsanctioned supply of regulated pharmaceuticals from legal sources to the illicit drug market, or to a user for whom the drugs were not intended¹⁵⁻¹⁶. It does **not** refer to use of medications by a patient outside the doctor’s recommended treatment regime.

2.3. Pharmaceutical opioids

'Opioid' is a general term which includes drugs containing natural opiates derived from the opium poppy, and a range of synthetic and semi-synthetic substances which have morphine-like effects¹⁷.

Opioids act primarily on the opioid receptors of the brain. The immediate effects of all opioids relate to analgesia (relief from pain) and euphoria (feeling of wellbeing)¹⁷. A large number of pharmaceutical opioids have been developed for medical use. We list some of the more common types in Table 1; a full list of pharmaceutical drugs and their availability on a country-by-country basis can be found in the annual reports of the INCB¹⁸⁻¹⁹.

Table 1: Common pharmaceutical opioids

• Buprenorphine	• Methadone
• Codeine	• Morphine
• Dextropropoxyhene	• Oxycodone
• Fentanyl	• Pethidine
• Hydrocodone	• Propoxyphene
• Hydromorphone	

Opioids used most commonly in the management of pain (both acute and chronic) include **morphine**, **oxycodone**, **hydromorphone**, **propoxyphene**, **fentanyl**, **pethidine**, **codeine** and less commonly, **methadone** and low dose **buprenorphine**. Methadone and buprenorphine are the most commonly used opioids for the management of opioid dependence.

Methadone is a synthetic opioid with full agonist actions at the opioid μ -receptor²⁰. It is typically administered orally as a liquid, although it does come in tablet form, and tablets may be more commonly prescribed in the treatment of pain. Methadone is the most common substitution therapy for opioid dependence and was included in 2005 on the WHO's *Model List of Medicines*²¹ as an OST for illicit opioid dependence.

Buprenorphine is a partial opioid μ -receptor agonist and k -receptor antagonist²², with weaker opioid activity than methadone²². It is not well-absorbed when taken orally, so the usual route of administration is sublingual. Because the effects plateau at increasing doses, buprenorphine carries a lower overdose risk than methadone, even if taken with other opioids²³, although it may cause respiratory depression²⁴. Buprenorphine dissociates from opioid receptor binding sites very slowly, possibly explaining the limited withdrawal syndrome²⁵⁻²⁶. Like methadone, buprenorphine has applications in both the management of pain and the treatment of opioid dependence. It is increasingly used as an OST, and was also included in 2005 on the WHO's *Model List of Medicines*²¹ for this indication.

Morphine and **codeine** are both derived from opium. Both are listed as essential medicines on the WHO's *Model List of Medicines*²¹ for the treatment of analgesia, and chronic, severe cancer pain. Codeine has about one-sixth of the potency of morphine; it is often combined with other drugs such as paracetamol in low doses for mild to moderate pain. Morphine is also listed as a model analgesic medicine for preoperative pain treatment²¹.

Pethidine is a synthetic opioid with similar actions to morphine. It is typically used for pre- and post-operative pain; it is neurotoxic, and use is not recommended for more than 36 hours¹⁷. **Fentanyl** is a potent synthetic opioid with similar properties to morphine, but has a much faster onset and shorter duration of action compared to morphine¹⁷. It is typically used as a short acting analgesic for acute pain management.

Dextropropoxyphene is a synthetic opioid, structurally similar to methadone, with a potency around two-thirds that of codeine¹⁷. It is used for mild to moderate pain.

Oxycodone is a semi-synthetic opioid used for moderate to severe pain. It is superior to morphine in oral absorption and bioavailability, and similar in terms of protein-binding and lipid-solubility²⁷. The controlled-release formulation (as opposed to the immediate-release formulation) is considered to be similar to morphine in dependence potential²⁷. The pharmacokinetics of oxycodone are altered by age and reduced by renal and hepatic function²⁷.

Side effects associated with opioid use, even under medical supervision, include nausea, vomiting, respiratory depression, constipation, drowsiness and confusion. Higher doses can produce severe respiratory depression, circulatory failure, coma and death²⁸.

When medications are used outside the guidelines for safe and effective use, adverse effects are more likely, particularly those due to overdosing. Additional risks are associated with the concomitant use of other substances, particularly sedative drugs, and in the presence of pre-existing conditions for which opioid use may be contra-indicated¹⁷. The injection of pharmaceutical opioids also carries risks such as the potential transmission of blood borne viral infection (BBVI) if injecting equipment is shared as well as harms related to injection of a non-sterile medication that is intended for consumption by other routes (see Section 4). The risk of developing opioid dependence (see below) may also be greater if used outside of or without medical supervision. In short, extra-medical opioid use matters.

2.4. Dependence

Regular use of opioids (even in therapeutic applications) can lead to dependence²⁹⁻³², and this is one of the reasons that clinicians are hesitant to prescribe opioids for pain over extended periods of time. Dependence is more likely with higher doses consumed for longer durations. There is considerable debate about the frequency of dependence developing under usual clinical conditions. Organisations such as the United States Academy of Pain Medicine are working to establish guidelines to establish ways to appropriately prescribe and manage iatrogenic dependence. It is important to note that for some cases such as very severe or palliative pain management, dependence is expected to occur and is not considered a concern if the guidelines are followed. The features of opioid dependence are presented in Table 2.

Tolerance can develop following a period of therapeutic opioid use, as well as among those who are using opioids for non-medical purposes³⁰. Opioid tolerance is a predictable pharmacological adaptation and patients may require increasing amounts of the drug to maintain the same pharmacological effects³⁰⁻³¹. Tolerance develops to the analgesic, euphoric, sedative, respiratory depressant and nauseating effects of opioids, but not to their effects on miosis (constriction of the pupils) and constipation³⁰.

If use ceases after tolerance has developed, withdrawal can and does occur. Common withdrawal symptoms include body aches, diarrhoea, gooseflesh, loss of appetite, nervousness, restlessness, runny nose, sneezing, tremors or shivering, stomach cramps, nausea, insomnia, increased sweating, lethargy, tachycardia and fever^{28, 30}. With appropriate medical supervision and gradual withdrawal, these symptoms are usually mild. When opioid use is stopped abruptly, however, these symptoms are more severe.

Opioid dependence develops after a sustained period of regular use, and depends upon the amount, frequency, and route of administration. It is likely that individual factors predispose some users to greater

risk of developing dependence than others. Dependence is a complex health condition, with multiple risk factors across individual, social and biological domains²⁹.

Illicit opioid dependence causes a significant burden to the user, his/her family, and the broader community. It can be a chronic disorder, with users struggling to control their use over years or even decades. Opioid dependence can result in significant costs to society through unemployment, homelessness, family disruption, loss of economic productivity, social instability, criminal activity, or ill health^{29, 34-35}. Major health consequences of illicit opioid dependence include increased risk of BBVI such as HIV, hepatitis C virus (HCV) and hepatitis B virus (HBV) through injection²⁹, and highly elevated risks of premature mortality³⁶⁻³⁷.

Where opioid dependence develops in the context of treating chronic non-malignant pain, most of the time its management is not difficult. A proportion of these patients can be very difficult to manage, however, demanding increasing doses, usually of their own preferred opioid, often attending multiple doctors, sometimes fraudulently. Problems are more common and more severe with certain preparations (especially pethidine) and certain routes of administration (especially intra-muscular injections). This first situation is not relevant to HIV except where such patients might begin injecting their own medication. The second situation is where prescription opioids are diverted to street drug users who often inject the prescription opioids; this is of greater concern in terms of the spread of HIV.

2.4.1. The concept of “dependence liability”

Drugs differ in their liability to problematic use^{8, 38-39}. The WHO defines dependence liability as “the extent to which a substance, as a consequence of its pharmacological effects on physiological or psychological functions, gives rise to dependence on that substance. It is determined by the intrinsic pharmacological properties that can be measured in animal and human drug testing procedures”¹⁷.

There are various factors that have been identified in the literature that influence the degree to which a drug may be associated with harmful patterns of use^{8, 12, 17, 26-27, 39-47}. This includes the rate at which the drug enters the brain and exerts an effect (the “rate of onset”) and the duration of the drug effect (the “half-life”)¹⁷.

In general, drugs that are most highly reinforcing are associated with more harmful patterns of use. These drugs have characteristics that enable rapid entry of a substance into the brain, including rapid absorption, rapid onset of action, rapid entry into the central nervous system (CNS), a high potency, a brief duration of action (short half-life), high purity, water solubility (for injectable use) and/or high volatility (ability to vaporise if smoked)^{12, 17, 26, 48-49}.

The half-life and speed of onset of a drug are determined by its pharmacokinetic properties (absorption, metabolism, distribution and elimination) and its lipid solubility (because drugs that are lipid-soluble cross the blood-brain barrier more rapidly)^{17, 48}. Table 3, developed by Quinn et al²⁶, summarises some of the specific pharmacokinetic factors associated with how frequently a drug is self-administered, the development of dependence, and the emergence of withdrawal symptoms.

Table 2: Criteria for past year ICD-10 drug dependence

Three or more of the following have been present together at some time during the previous year:

- a strong desire or sense of compulsion to take the substance;
- difficulties in controlling drug use in terms of its onset, termination, or levels of use;
- a physiological withdrawal state when substance use has ceased or has been reduced, as evidenced by the characteristic withdrawal syndrome for the substance; or use of the same (or closely related) substance with the intention of relieving or avoiding withdrawal symptoms;
- evidence of tolerance, such that increased doses of the psychoactive substance are required in order to achieve effects originally produced by lower doses;
- progressive neglect of alternative pleasures or interests because of psychoactive substance use, increased amount of time necessary to obtain or take the substance or to recover from its effects; and
- continued use despite clear evidence of overtly harmful consequences.

Source: World Health Organization³³

Table 3: Pharmacokinetic characteristics predictive of dependence potential

Persistent self-administration	Dependence
<ul style="list-style-type: none">• Rapid absorption/high bioavailability• Rapid delivery of drug to the CNS (specific areas of the brain such as the nucleus accumbens may be particularly important)• Low protein and peripheral tissue binding• Small volume of distribution• Short half-life• High drug-free clearance	<ul style="list-style-type: none">• Long half-life• Low drug-free clearance• Sufficient drug exposure to allow development of tolerance (high enough concentrations, long enough at site of action)
	Withdrawal
	<ul style="list-style-type: none">• Short half-life• High drug-free clearance• Rapid efflux from the CNS

Reproduced from Quinn, Wodak and Day²⁶ (p. 46)

3. The use of pharmaceuticals outside of prescribed bounds – “extra-medical” use

3.1. Why does extra-medical use occur?

There are numerous motivations for the extra-medical use, diversion and/or injection of pharmaceuticals. Not all extra-medical use is via injection. Some use pharmaceuticals for extra-medical purposes and take them orally and irregularly; these groups do not attract the attention of authorities and little is known about this use⁵⁰. Few population studies have been conducted looking at motivations for the extra-medical use of pharmaceuticals; most have examined motivations among IDUs. Table 4 lists some motivations behind this drug use. The multitude of possible motivations behind a user’s misuse of pharmaceuticals should be taken into account. Different responses will be required depending upon the reason for initiation and maintenance of use; not all misuse is occurring for the same reasons.

3.2. Do all opioids carry the same risk of extra-medical use and diversion?

The various opioids differ in the extent to which they are likely to be misused. In large part this is because of their varying potency as opioid drugs – their varying **dependence potential**. In the case of misuse or diversion for *injection*, different opioids will also vary in the likelihood of misuse depending upon how easily they can be injected (e.g. whether in injectable, tablet or patch form), and degree to which adverse effects occur following injection (e.g. precipitated withdrawal in a heavily dependent heroin user who injects a large dose of buprenorphine or buprenorphine-naloxone⁵¹).

Availability plays an obvious role. It is affected by the extent to which GPs can and do prescribe different opioids, and how easy they are to obtain from a doctor or purchase from the black market. Misuse and diversion will also depend upon the availability of illicit drugs, particularly heroin and opium and probably also on the availability and attractiveness of treatment for drug users.

Only a limited number of investigations into the importance of these varied factors have been conducted, and all in high income countries. A recent US study came to a rather common sense conclusion: the extent of extra-medical use and related problems for different pharmaceutical opioids in the United States was relatively simple to gauge, and was a function of their relative potency and their ease of availability⁶⁰.

In an examination of why some opioids are more attractive for misuse than others, Butler et al developed an “Opioid Attractiveness Scale”⁶¹. In ranking “attractiveness”, questions were asked about features reflecting dependence liability, characteristics of medication and preparation that were *unattractive* (e.g. combined with an antagonist or not meant for injection), and external factors such as costs and the drug’s availability and that of alternativesⁱⁱ. There were clear preferences for illicit drug users in the United States to rank different opioids as more or less attractive⁶¹, and it is likely that brand recognition also plays a part in determining their attractiveness. A Canadian study found that fentanyl was the most attractive pharmaceutical opioid for illicit opioid users⁶².

ii It should be noted that this study received unspecified support from Janssen Pharmaceutica Inc., the company involved in the production of Durogesic®.

The “street” value of diverted prescription medications is a relatively good indicator of their attractiveness to users. Compared with generic formulations, trade-name prescriptions may be worth as much as twice as much per tablet when they are sold on the street because they are recognisable^{12, 49}. Buprenorphine-naloxone, a mixed partial agonist-antagonist, has been found to have half the street value of buprenorphine⁶³. Long-acting opioids have a lower price than shorter-acting ones⁶⁴, and injectable preparations have a higher price than tablets⁶⁵.

In recognition that some pharmaceutical opioids are more likely to be misused than others, there are growing efforts by pharmaceutical companies to develop formulations that are less prone to being misused and, in particular, injected. Examples of these are slow-release formulations, mixed agonist-antagonist formulations⁶⁶, and tablet formulations that are more difficult to inject. This response to diversion and injection is considered in Section 6.

Table 4: Reasons for extra-medical use of prescription drugs

Experimental use	Among young people, non-medical use of pharmaceuticals may reflect wider patterns of experimental drug use ⁵²
Euphoria	Prescription opioids may be used to “get high”
Self-treatment of pain	Opioids may be used to self-medicate chronic pain ⁵³
Self-treatment of drug dependence	Pharmaceutical opioids may be used to self-treat withdrawal symptoms, particularly among opioid-dependent persons who perceive treatment services as being unavailable or undesirable ⁵⁴⁻⁵⁵
Iatrogenic dependence	Patients may have become dependent on a medication they were being prescribed through their treatment of a medical problem ¹⁷
Drug substitution	Substitute for other drugs when availability is irregular or low ^{54, 56-57}
Polydrug use	Individuals who are entrenched in the illicit drug market may also use diverted pharmaceuticals if they are available ⁵⁵
Drug culture	Influence of peers and exposure to particular patterns of drug use ⁵²
Preference for injecting over other routes	Injection may be preferred for its faster onset of action, avoidance of withdrawal, or enjoyment of the ritual of injecting. There is debate about the concept of needle fixation . The term has limited usefulness and describes multiple attitudes and practices ⁵⁸⁻⁵⁹
“Safer” alternative	A perception that these drugs are “safer” than illicit drugs ¹⁷
Fear of sanction	There may be a perception of reduced legal risk in supplying and possessing psychoactive pharmaceuticals compared to illicit drugs ⁵⁰
Suicidality	To facilitate an intentional overdose

Table 5: Ways in which pharmaceutical drugs may be diverted

- Cross-border smuggling by traffickers and tourists
- Wholesale and retail shipments via the internet⁷¹⁻⁷²
- Robberies or thefts from manufacturers, distributors, pharmacies⁷³
- Illegal sale of prescriptions by physicians, pharmacists, nurses or other health professionals¹⁶
- Residential burglaries⁷³
- Thefts of prescription pads and drug supplies
- Theft, forgery or alteration of prescriptions by patients^{57, 74-76}
- “Doctor shopping”, or multiple visits to numerous doctors by the same patient^{57, 74-75, 77}
- Acquisitions from family and friends^{52, 78} or other users^{57, 74-75}
- Medicine cabinet thefts by housekeepers⁷⁸

Note: List derived from Inciardi et al¹⁶

3.3. How does “diversion” occur?

As with all psychoactive medications, opioid substitution and pain medications carry a risk of diversion²⁹. Diversionⁱⁱⁱ can occur anywhere along the wholesale to consumer chain¹⁶ (see Table 5). Few studies have attempted to estimate the relative contributions of different diversion sources to the pool of diverted medication; many discussions refer to long lists without attempting to prioritise them; others make strong claims about which are the most important sources of diversion without providing the data upon which such claims are based.

Fears of diversion appear to drive many countries’ policies on pharmaceutical opioids: in many low and middle income countries, a default position of limiting or precluding supply of prescription opioids for medical conditions appears to be the norm (see Section 5). This overly restrictive attempt to avoid pharmaceutical opioid diversion deprives patients in real need of medications that would be highly effective in treating them and which have been described as essential elements of treatment⁶⁷⁻⁶⁹.

Such an approach is also unsuccessful in avoiding diversion and injection. Even in countries where legitimate access is currently limited, epidemics of pharmaceutical opioid injecting and HIV transmission have been documented, particularly in South Asia (Section 5). When opioid injection of any kind is established, and HIV is prevalent, there is an additional public health imperative to introduce OST. In Section 5 we review the population-adjusted supply of pharmaceutical opioids for all United Nation (UN) member states as reported by the INCB.

More sophisticated and coordinated policy approaches can be developed⁶⁷. This will be mentioned repeatedly through this report, because these are crucial to address both HIV and misuse of pharmaceutical opioids. Key organisations affiliated with the WHO have been working successfully with

ⁱⁱⁱ As noted above, we refer to “diversion” as the channelling of regulated pharmaceuticals from legal sources to the illicit (unintended) marketplace, either for personal use or for profit.

several countries to ensure a more balanced approach towards supply and control of these medications⁷⁰.

The numerous ways in which diversion might occur may seem overwhelming. It is highly likely, though, that the bulk of diverted opioids are sourced through several primary means, which probably vary across countries and regions.

Supply control factors such as the extent to which diversion is policed, and the ease with which large-scale importation or diversion of medications is possible, will have an impact. Difficulty in controlling supply may be more significant in countries with limited resources to police and regulate these markets, and has been noted as an issue in South Asia. Geography will also affect diversion risk to the extent that it is related to the availability of other preferred opioids (particularly heroin), drug-using cultures, and the availability of OST for those who are already opioid dependent^{65, 74, 79}. We are unaware of any studies that have mapped the relationship between all of these factors and the mechanisms of diversion.

There is disagreement, even within countries, about the extent to which different sources of diversion are important. The United States' Drug Enforcement Agency (DEA) announced that physicians' and pharmacists' "diversion" accounted for the majority of pharmaceutical opioids diverted to the black market in the United States⁷⁸. Authors of one US paper voiced concerns about diversion of pharmaceuticals over the internet⁸. Another documented diversion by healthcare providers in one US state with nurses and medical assistants most commonly involved and typically occurring from hospitals¹⁶. By contrast, US police and regulatory agents perceive that the major source of diversion in the United States is doctor shopping and pharmacy theft or forgery⁷³. Although theft and fraud of prescriptions from ill and deceased elderly persons has been suggested as a possible source of diversion, a careful analysis of Canadian records found that this was highly uncommon and when it did occur was unlikely to involve prescriptions for opioid medications⁷⁶.

Many extra-medical users in high income countries such as the United States typically obtain medications from family, friends, and peers who often "swap" drugs or sell them on a small scale to fund the use of other drugs^{50, 52, 57, 65, 74-75, 78, 80-81}.

Notably, in the United States, GPs have been encouraged in recent times to prescribe opioids (particularly oxycodone) for moderate to severe chronic pain conditions. There has been a repeated finding that in such a context, some IDUs who inject pharmaceutical opioids present to doctors for diffuse medical conditions consistent with those for which opioids might be appropriate treatment^{50, 52, 57, 65, 74-75, 78, 80-81}. In some cases, these conditions may be authentic, but some will present with feigned symptoms^{57, 65, 74-75, 77}.

Some sources may be unduly emphasised. The internet is mentioned frequently as a source of diversion⁸, but there are views that the contribution of the internet to diversion may be overstated^{57, 73-75}. Even in the United States, where internet access is extremely high, only 4% of the general population had ever used it to fill a prescription and most sites required a doctor's prescription⁷³. It is also unclear to what extent diversion by highly disadvantaged dependent users would occur through this means (given the need for a credit card, computer and internet access, and a fixed address for shipping). The problems related to pharmaceutical opioids in the United States appear to be much greater than those for other countries; it could well be the case that the new cohort of dependent opioid users in that country (see Section 6) is driving substantial demand for opioids, with users seeking new ways to source their medications, including illegal internet pharmacies¹⁹.

There is inadvertent collateral damage from supply control. For example, the system of “triple prescriptions” has been introduced in a number of countries to reduce diversion to the black market and this has been shown to reduce prescribing to patients with severe chronic pain (see Section 6).

Unfortunately, little is known about the mechanisms and extent of diversion of pharmaceutical opioids across countries. As long as fear of diversion exists, and no examination of the situation is made, it is likely that efforts to control diversion will be misdirected and lead to overly restrictive control of supply, and yet diversion will continue.

4. Clinical use of pharmaceutical opioids

There are two broad clinical indications for the use of pharmaceutical opioids: 1) management of pain that is either acute or chronic and either cancer or non-cancer related; 2) OST in the management of opioid dependence.

As outlined above, it is likely that some diversion of pharmaceuticals occurs at the level of importation or production, particularly in countries which have only a limited capacity to monitor this. In most countries, however, it seems reasonable to assume that the bulk of opioids that are diverted, or used extra-medically, are acquired from health professionals and patients. The fear of diversion from these sources seems to be an important factor in limiting the adequate provision of opioids for clinical use in many countries. There are good reasons to assume, however, that the risk of diversion and misuse is not the same for all patient groups.

4.1. Treatment of acute pain

Opioids are highly effective in the treatment of pain and have a long history of use for pain relief³¹. They are routinely used in hospital settings, particularly in surgery for pre- and post-operative pain management. This involves short-term use to treat acute pain as opposed to the more chronic use that may occur for severe cancer pain, or for chronic non-cancer pain.

4.1.1. Risks for misuse and diversion

Because of the short duration of treatment and the acute and normally quite severe nature of the pain to be treated, it is probably unlikely that patients account for much of the diversion of opioids intended for this clinical indication.

The greater risk in this instance is probably from those involved in administering these medications, namely doctors, nurses, and other medical professionals. There is some evidence that medical professionals are at risk of misusing such medications themselves⁸². There is also some evidence (e.g. from the United States) that nurses and doctors may be involved in diversion to the illicit market^{78, 82}. The highly regulated nature of opioid medications in hospital and other settings probably reduces the size of this source of diversion, and/or increases the likelihood of detection when it occurs¹⁶, but few studies have estimated the magnitude of this diversion source. Having said that, there are many sources other than health professionals: in the United States alone, there are as many as one million registered manufacturers, distributors, pharmacies, hospitals, nursing homes and physicians⁷⁸.

4.2. Treatment of cancer pain

It has been estimated that there are 10 million incident cases of cancer each year, and six million deaths. Twenty years from now, 70% of the 20 million incident cancer cases worldwide are likely to be in low and middle income countries⁸³.

Pain specialists recognise pharmaceutical opioids to be central in the management of severe cancer pain^{68, 84-86}. The WHO stated that morphine and codeine were “*absolutely necessary*” for the management of severe cancer pain (p.7)⁶⁷. The WHO recommended that health professionals and

governments use a three-step “Analgesic Ladder”^{iv} to treat cancer pain. This entirely depends on the availability of drugs which are effective in relieving severe pain, such as morphine or other strong opioids (including fentanyl, hydromorphone, methadone and oxycodone)⁶⁸⁻⁶⁹.

Global morphine consumption has increased since 1986 but has been concentrated in a small number of high income countries: Australia, Canada, Denmark, France, Germany, Japan, Spain, Sweden, the United Kingdom, and the United States⁶⁸. The remaining countries, representing approximately 85% of the world’s population, consumed only 13% of the morphine in 1999⁶⁸. A WHO survey of countries concluded that 60% were not following the Analgesic Ladder because of inadequate availability of opioid medication⁶⁸.

In some countries, the lack of palliative care and opioids for pain management is particularly serious because, by the time most patients are diagnosed, they have late-stage cancer that is often accompanied by pain⁶⁸. As many as 50% of cancer patients worldwide may suffer from pain that goes unrelieved^{69, 83}. In many instances this may be due to a lack of knowledge and experience in delivering this form of treatment in the countries concerned. Despite being urged by the UN’s INCB to provide adequate pharmaceutical opioid coverage for pain management⁸⁷, in many countries, the prescription of opioids for cancer pain management is considered highly inadequate^{5, 44, 85, 87-90}; in some cases, it is non-existent (see Section 5).

4.2.1. Risks for misuse and diversion

It seems plausible that patients with severe cancer pain are at comparatively low risk of diverting their own medication. Even in relatively resource-limited countries, outpatient, long-term opioid medication can be provided to those suffering from cancer pain, with a relatively low incidence of diversion or apparent misuse. This has been well illustrated in India, where an outpatient pain clinic was established to address very poor levels of opioid prescription particularly for cancer patients⁵. A two-year trial of oral morphine for severe cancer pain at a Pain and Palliative Care Clinic in Kerala, India⁹¹ involved the assessment of 1,723 patients, treatment plans, and careful monitoring by medical staff trained in pain medicine; no diversion occurred during the entire trial⁹¹. The authors recommended that palliative care programmes talk to concerned governmental authorities to make them aware of the medical need for opioids, and communicate with local news media to increase awareness of palliative care and the use of these analgesics⁹¹.

Doctors might be concerned about the possibility that relatives or others close to the patient might divert medication. However, the relatively high level of patient-doctor contact in the treatment of chronic cancer pain along with good clinical skills and training may ensure good monitoring and hence help reduce risk.

There is a need for better coverage of cancer pain with opioid medication⁷⁰ and better education needs to be provided both to doctors and patients about the benefits of medication and the relatively low risk of diversion or misuse for this group^{68, 70}. Countries need to implement policies that do not overly restrict access for this group because of concerns about diversion by others (those with chronic non-cancer pain, and those who are opioid dependent). The WHO has published guidelines for developing more balanced policies to ensure appropriate treatment of pain for this condition⁶⁷.

^{iv} The analgesic ladder involves three steps:

Step 1: Aspirin or paracetamol.

Step 2: Codeine or dihydrocodeine, with or without non-steroidal or anti-inflammatory drugs such as ibuprofen.

Step 3: Morphine, with or without co-analgesia, with or without steroid anti-inflammatory drugs. Other strong opioid analgesics include pethidine and fentanyl.

4.3. Palliative care for HIV/AIDS

For patients suffering from AIDS, uncontrolled pain and other symptoms can be severe. This is particularly true in the late stages of the illness⁹². The need for pain relief for AIDS has been recognised by the WHO as a crucial component of palliative care for this patient group⁹², yet in many countries where HIV is highly prevalent, opioid treatment will be limited or non-existent⁹². In many of these same countries, there is also inadequate access to HIV medications.

4.3.1. Risks for misuse and diversion

The nature and extent of risks for misuse and diversion are probably similar to those for cancer pain, but no research on this issue was found for this review.

4.4. Treatment of chronic non-cancer pain

Chronic pain is a common complaint. In one survey of 16 European countries, between 10% and 30% of participants in each country reported “chronic pain”, one-third (35%) of whom said that they experienced pain every day, and 16% that some days the pain made them “want to die”⁸⁵. One-quarter reported that it had impacted upon their careers⁸⁵. Between 30% and 50% of those with chronic pain in these general population samples felt that their pain was not “adequately controlled”⁸⁵.

Chronic pain is caused by many factors, including trauma; the varied aetiology probably impacts upon the effectiveness of treatment³¹. Physical and psychological factors such as depression and anxiety, a history of psychological trauma, and sleep problems moderate the pain experience³¹. Context is also important: relationships, occupational setting and culture all impact upon the experience and expression of pain³¹.

Effective behavioural treatments and non-opioid pharmacotherapy exist for chronic pain³¹, but even when a combination of interventions is used, some patients continue to suffer. Controlled trials have evaluated pharmaceutical opioids in the treatment of a range of chronic non-cancer pain conditions and have demonstrated modest attenuation of pain⁹³. An open label US study of long-term treatment (three years) with controlled released oxycodone^v among chronic non-cancer pain patients (n=219), found that treatment was well tolerated, most had stable or decreased doses over time, and pain ratings often remained unchanged or decreased⁹⁴. Investigators reported six cases (3%) of possible drug misuse, but no new cases of dependence were observed⁹⁴.

A recent cross-sectional study in Denmark examined chronic non-cancer pain among a representative population sample, and contrasted opioid users and non-users, adjusting for age, gender, concomitant use of anxiolytics and antidepressants, and pain intensity⁹⁵. Opioid usage was associated with more severe pain, poorer self-rated health, unemployment, higher health care service use, and poorer quality of life. Acknowledging that the cross-sectional nature of the study limited the capacity to consider the reasons for this association, the authors nonetheless commented that “it is remarkable that opioid treatment of long-term/chronic non-cancer pain does not seem to fulfil any of the key outcome opioid treatment goals: pain relief, improved quality of life and improved functional capacity” (p.172)⁹⁵.

Such a statement is of concern because it does imply causality. It ignores the possibility that persons with chronic pain who use opioids may have fared even worse before starting use, and that they may have

^v This study received funding from, and one of the authors was employed at, Purdue Pharma Inc., which markets Oxycontin[®]

failed to respond to other treatments for their pain; it further assumes that the treatment regimens of the treating physicians were in line with recommended best practice (prescription of opioids for chronic pain in Denmark is apparently “liberal”⁹⁶).

There are clear statements from peak pain organisations supporting some use of opioids in the treatment of chronic non-cancer pain^{85, 97}. Debate continues about how, when, and in what manner opioids should be prescribed for this diverse patient group^{31, 95-96, 98-101}. Consensus statements have recommended that prescription of opioids for chronic pain is only recommended after following these steps: a thorough assessment of the patient’s pain problem and history, development of a treatment plan, consultation with a pain specialist if necessary, and regular reviews of patient progress^{85, 97}. It is unclear how many physicians in routine clinical practice follow such guidelines. It is highly likely that in the United States, where rapid increases in prescribing of opioids for these conditions has occurred (with increases in dependence, injecting and overdoses across the country), that many GPs may not have conducted sufficient assessment of conditions, nor gone through the recommended steps to ensure that alternative treatments were considered and that progress was carefully monitored.

4.4.1. Risks for misuse and diversion

The situation for those suffering from chronic non-cancer pain is more complicated. The therapeutic role for long-term opioid medication in such cases is less than well established, the aetiology of these problems is varied, and its expression is highly moderated by the cultural context of the patient. This patient group is likely to have comorbid conditions that place the patients at risk of problematic drug use. Some physicians are also concerned about the risk of respiratory depression that may be seen early in treatment, as well as the need for escalating doses due to the development of tolerance.

Some patients will be at greater risk of misusing medication prescribed for chronic non-cancer pain. For example, in a US routine pain care setting, 9% of clients misused opioid medication (4% doctor shopping, and 5% diverting in “trafficable” quantities)¹⁰². Misuse or diversion was more likely among those who were younger, who had a pain condition as a result of a motor vehicle accident, had more extensive pain, and a history of illicit drug use¹⁰².

This highlights the comorbidity that tends to occur between chronic pain conditions and drug dependence^{53, 103-106}. US research suggests that chronic pain patients with comorbid mental health and drug use problems are much more likely to be those at risk of misusing their medication or developing a problem with use¹⁰⁶⁻¹⁰⁸.

Without careful assessment and monitoring, problematic use may develop. In countries such as the United States, where there has been extremely aggressive marketing of some pharmaceutical opioids to a wide range of specialist and non-specialist physicians, where medication is a prominent feature of treatment, and where GPs without training in pain management can prescribe opioids for such patients, there may be an over-reliance on medication. This has led to a significant problem in the United States with many patients developing iatrogenic dependence, and easier access for others who are actively seeking opioids.

The extent of the problem with oxycodone is instructive with respect to policy. The pharmaceutical company (Purdue Pharma) that manufactures the most popular of these medications, OxyContin®, a sustained release formulation of oxycodone, aggressively marketed the drug in the United States as a treatment for both cancer and chronic non-cancer pain to oncologists, palliative care physicians and pain specialists, claiming it had a low dependence liability¹⁰⁹. The drug was also heavily promoted to primary care and family practitioners, who were encouraged to prescribe it liberally¹¹⁰. There was a major campaign to market the drug to patients; in this campaign, the risks of dependence were

minimised¹¹⁰⁻¹¹². Those liable to misuse the drug were probably alerted to its misuse potential by the product information material which said patients should *not* crush or dissolve the tablets because this released a large dose of the drug¹¹⁰. In the United States, problems related to pharmaceutical opioid misuse have been increasing across the country, particularly for oxycodone^{44, 47, 60, 113-118}. We return to this example in the section on epidemiology (Section 6).

As will become clear, it seems most likely that it is among this relatively diverse population of patients, with diffuse symptoms and high comorbidity, in which misuse may occur. Fears of misuse or diversion among this group are warranted, but it should not mean that this patient group is not given the opportunity for pain relief through opioid medication^{85, 97}. A balanced approach that ensures appropriate access while minimising diversion and misuse is essential. Good clinical practice should involve careful assessment of need and risk, and careful monitoring of patient progress.

4.5. Treatment of illicit opioid dependence

Some people become dependent on opioids, whether upon illicit heroin or opium, or diverted pharmaceutical opioids. Some people become dependent upon prescribed opioids because of inadequate monitoring (by prescribers and/or the patient themselves) of doses and usage levels. It is estimated that less than 0.5% of the world's population is dependent on opioids, and it is likely that far fewer would be dependent upon prescription opioids¹¹⁹⁻¹²⁰.

Nonetheless, dependence is a disabling disorder which causes significant harm to the user, his/her family and the community at large. Research with prospective cohort studies of dependent opioid users spanning decades in the United Kingdom and the United States indicates that many dependent heroin users, who seek treatment or come to attention through the legal system, continue to use heroin for decades¹²¹⁻¹²². In this population, daily heroin use is punctuated by periods of abstinence, drug treatment and imprisonment. In the year after any episode of drug treatment, the majority of users relapse to heroin use¹²³. When periods of voluntary and involuntary abstinence during treatment or imprisonment are included, it has been estimated that dependent heroin users use heroin daily for 40-60% of their 20-year use careers¹²⁴⁻¹²⁵. In the most recent 2000 WHO Global Burden of Disease estimates, it was thought that illicit drug use caused around 200,000 deaths worldwide, of which opioid overdose was estimated to account for around 70,000 (around 35%), and AIDS around 105,000 (around 53%)³⁶.

Pharmaceutical opioids have important applications in the treatment of opioid dependence. OST involves the medically supervised administration of an opioid and can be used either to help manage withdrawal, or to maintain a patient on a safe dose as opposed to the more hazardous use of illicit drugs²⁹. There is strong evidence that OST is effective in reducing the spread of HIV, reducing drug use, improving physical and mental health and social functioning, and reducing criminality^{20, 22-23, 29, 126-132}. Methadone is also associated with a low level of side effects and positive health outcomes²⁰. Higher doses and longer durations of methadone are generally associated with greater reductions in heroin use^{20, 29} and HIV risk behaviours¹³³⁻¹³⁴. Demand for treatment, however, typically far exceeds the number of treatment places²².

Untreated illicit opioid dependence increases the risk of HIV transmission: some research has found that IDUs who do not enter OST are up to six times more likely to become infected with HIV than injectors who enter and remain in treatment^{29, 135}. OST is not only an HIV prevention measure, but will allow those who are already HIV positive to stabilise their underlying condition¹³⁶⁻¹⁴⁰. In multiple countries worldwide where IDU is an important vector for HIV transmission, the expansion of OST provision is believed to underlie the reductions in HIV incidence seen in these countries¹⁴⁰.

Longitudinal studies examining changes in HIV risk behaviour for patients currently in treatment have found that longer retention in drug treatment, as well as completion of treatment, are correlated with reduction in HIV risk behaviours related to drug taking or an increase in protective behaviours²⁹.

OST drugs typically have a longer duration of action than the drug they are replacing, to delay onset of withdrawal symptoms and reduce the frequency of administration²⁹, although there is continued debate about the role of shorter-acting opioids for patients who have not responded to first line OST such as methadone and buprenorphine¹⁴¹ (see Section 6). Whereas illicitly used opioids are usually injected or inhaled, prescribed opioids are typically meant for oral administration as tablets or in a solution to reduce the risk of infections associated with injections, and to encourage behavioural change (from injecting)²⁹. Some exceptions to this are injectable heroin and morphine for OST in the United Kingdom¹⁴²⁻¹⁴⁴, and injectable heroin in Switzerland¹⁴⁵ and the Netherlands.

3.5.1 Risks for misuse and diversion

Persons in OST for treatment of illicit opioid dependence may also misuse or divert these medications. Indeed, most research on misuse and diversion has been conducted with IDUs in treatment for drug use problems, probably reflecting the greater likelihood of misuse. The manner in which OST is provided probably has an impact upon the extent of misuse and diversion for injection. This may include instances where treatment is provided without good patient monitoring, where large amounts of OST are provided in takeaway doses, and where unstable or disadvantaged patients are also not provided with psychosocial support. Many other factors might also play a role in changing the likelihood of misuse, diversion and injection, including cost of the drugs, the availability of other illicit drugs (particularly heroin) and varied cultural factors (e.g. whether injecting is an established route of administration among the population). Economic factors are likely to be important. If demand for OST far outstrips supply, then the black market price of OST medications will be high. If OST patients are poor, as they usually are, then it is inevitable that income generation may take place on a considerable scale.

One prescription database study in France estimated that “doctor shopping” (patients approaching multiple doctors to obtain greater a quantity of drugs) accounted for 19% of the entire “delivered” quantity of buprenorphine for OST (“delivered” takes account of the fact that patients could see more than one physician)¹⁴⁶. This occurred among a minority of patients and was extremely concentrated: 87 out of the total 3,259 patients accounted for 45% of all doctor-shopped buprenorphine¹⁴⁶. In France, e.g. there has been a policy of “low threshold” entry into buprenorphine, which has led to large numbers in OST, reduced overdose rates related to opioids at a population level, and low HIV prevalence among IDUs. An even greater problem with buprenorphine diversion has been noted in Finland¹⁴⁷⁻¹⁴⁸.

Misuse or diversion of OST may occur for many reasons, including:

1. heroin availability may be low or fluctuating in price and/or purity;
2. treatment may not be sufficient to maintain the person in a stable maintenance pattern, through inadequate doses or dissatisfaction with the treatment medication’s effects;
3. users may wish to switch between different opioids (e.g. sometimes selling OST doses in order to buy heroin or another opioid);
4. users may have a strong preference for injection despite high doses of OST;
5. there may be insufficient treatment places available, so patients assist other users not able to enter treatment; and
6. theft or “standovers” may occur.

The policy implications for these various motivations differ. Evidence strongly suggests that higher OST doses are more effective in retaining patients in treatment, and reducing misuse, diversion and other opioid use. There is continued debate about the need for varied OST to assist different patients (e.g.

heroin, morphine) who may not be adequately held in standard OST such as methadone and buprenorphine. Debate continues about the need for injectable forms for some patients who have repeatedly found other OST difficult to continue. Finally, diversion to assist other users obviously indicates a need for more treatment places of sufficient attractiveness to retain more users in treatment.

4.6. Summary of medical and extra-medical pharmaceutical opioid use

There are understandable reasons why clinicians and policymakers are concerned about overly liberal access to opioid medications that might place users at risk of developing dependence upon these drugs. It is abundantly clear, however, that the number of people who are not receiving effective medication for their pain (e.g. perhaps 10 million out of 20 million new cases of cancer each year) is far larger than the population of persons with illicit opioid dependence. This means that a huge number of people are being denied effective treatment that has been described as “absolutely essential” by the WHO⁶⁹ and a “human right” by the International Society for the Study of Pain¹⁴⁹. There is a great imperative for many countries to design effective systems for access to opioids for those who need it, ensuring that prescriptions are provided by those providing good clinical care, and without placing patients at undue risk of developing dependent use of these drugs.

5. Harms associated with pharmaceutical opioid injecting

5.1. Association with HIV

The literature on the magnitude of risk for HIV transmission among IDUs injecting pharmaceutical opioids is limited but there is reason for concern. We were unable to locate specific studies examining the relative risk of HIV *transmission* among IDUs injecting pharmaceutical opioids, but it seems reasonable to assume that in countries where most IDU is occurring with pharmaceutical opioids, and where HIV transmission is occurring, that unsafe injection of these drugs is driving the epidemic.

Globally, between 5% and- 10% of HIV infections result from IDU, but in some countries in Asia and Europe, over 70% of HIV infections are attributed to IDU; in many countries in these regions, pharmaceutical opioids are commonly injected drugs²⁹. Of particular concern here is South Asia¹⁵⁰. Injecting drug use – including dextropropoxyphene and buprenorphine injection – is a significant issue in some countries in the region, and is also the primary cause of the spread of HIV among communities of IDUs (see Section 4)¹⁵¹⁻¹⁵³.

From such high-risk groups, the virus is now reportedly spreading to the non-injecting populations through sexual transmission¹⁵¹⁻¹⁵². The first convincing evidence of HIV transmission from HIV positive IDUs to their female regular sex partners (wives) who had never injected drug in South Asia came from Manipur, one of the north-eastern states of India bordering Myanmar¹⁵⁴. The explosive spread of HIV epidemic among IDUs of Manipur took place in 1990 and 45% of the wives of HIV positive IDUs were found to be HIV infected within seven years of this outbreak. The drugs injected in Manipur and other north-eastern states included heroin (white sugar) and dextropropoxyphene¹⁵⁴.

5.2. Injecting risk behaviours

Research on persons injecting pharmaceutical opioids is largely confined to a few high income countries. In these contexts, injection of pharmaceutical opioids has mainly been studied among groups of entrenched IDUs with extensive histories of heroin and other drug injecting. Conclusions drawn about associations of risks in these populations may not be directly comparable to low and middle income countries.

One exception is research on IDUs in South Asia, which indicates that the epidemic of injecting occurring in that region typically involves diverted pain medication, with infrequent injection of other drugs¹⁵¹⁻¹⁵³. Although behavioural surveillance data in some countries such as Bangladesh suggest that knowledge of injecting risk is quite good among persons who inject drugs, and that they are typically aged in their 20s and 30s, other populations of younger and less knowledgeable IDUs in South Asia exist and are likely to be taking risks without understanding the harms that may result.

In high income countries with established IDU and heroin injecting populations, and relatively good OST coverage, the context of pharmaceutical opioid injection differs. Injection of methadone syrup (prescribed as an OST) has been associated with higher levels of injection-risk behaviour¹⁵⁵⁻¹⁵⁶. Among an Australian sample of heroin users, methadone injectors reported poorer general health, more injection-related problems and were also more likely to report having passed on used injecting equipment¹⁵⁶⁻¹⁵⁷. Other studies have examined the injection-related HIV risk behaviours associated with injection of OST, such as methadone and buprenorphine¹⁵⁵⁻¹⁶⁰, with mixed findings.

In France, however, buprenorphine injectors have been found to display *fewer* injection-related HIV risk behaviours than other groups of illicit drug users¹⁶⁰⁻¹⁶¹. One study surveyed IDUs and found that 34% were polydrug users who occasionally injected buprenorphine in addition to heroin and/or cocaine,

while 24% had only injected buprenorphine in the previous six months. IDUs in this latter group were significantly younger, injected more frequently, and were more frequently on buprenorphine substitution therapy, but they were less likely to be HIV-infected and to report HIV-related risky injecting behaviours¹⁶⁰. Injection-risk behaviours appeared more likely among those who were primarily using *diverted* buprenorphine (as opposed to injection of one's own medication); these users were also more likely to be unemployed and to be polydrug users¹⁶²⁻¹⁶³.

In South Asia, attempts to compare IDUs who are “only buprenorphine or dextropropoxyphene” injectors and “only heroin” injectors, in cities where both licit and illicit opioids are available, has led to a situation fraught with difficulty¹⁵². The division has proved artificial because opioids injected by IDUs in these settings are mostly guided by the availability of the substances in the market and their cost rather than by individual choices. In fact, all of the 208 heroin injectors in a study from Chennai had also injected buprenorphine at some point in time of their injecting career¹⁵². Ninety percent of those who had reported ever using heroin had used it first through smoking and the rest had injected heroin when they were using it for the first time. Only 18 IDUs were exclusive buprenorphine injectors in this study.

5.3. Injection among those living with HIV

5.3.1. Effects of opioids and impact of injecting drug use

Some pharmaceutical opioids – e.g. oxycodone – are metabolised by the cytochrome isoenzyme CYP2D6²⁷, an enzyme that is severely impaired by liver dysfunction²⁷. Harmful patterns of opioid use may mask symptoms associated with HIV, and dependent users may delay seeking testing or treatment for HIV infection¹⁶⁴.

5.3.2. Non-adherence to HIV treatment

Harmful patterns of psychoactive pharmaceutical use may interfere with adherence to HIV treatment regimens and lead to the development of viral resistance¹⁶⁵⁻¹⁶⁶. In these cases, it is important that treatment for drug use is initiated to support adherence to antiretroviral treatment and medical follow-up²⁹. It has been shown that stopping drug injecting slows the progression of HIV disease in infected subjects²⁹. Interventions could be developed to improve treatment adherence among HIV positive patients in antiretroviral therapy¹⁶⁷.

5.3.3. Interactions between opioids and HIV medication

The occurrence of HIV and HCV co-infection is common among IDUs, many of whom are opioid dependent. It is important to understand the adverse drug to drug interactions that may occur between antiretroviral therapeutic agents, unsanctioned psychoactive pharmaceuticals and the medications used in OST. For a detailed review of the drug interactions between antiretroviral drugs and co-medicated agents, see previous reviews¹⁶⁸⁻¹⁶⁹. The following summary outlines some of the main drug-drug interactions that have been identified.

Methadone has been the most widely used treatment for OST. Methadone has significant, adverse drug-drug interactions with Efavirenz and Nevirapine, which can contribute to non-adherence and poor clinical outcomes in this high-risk population¹⁷⁰. For opioid-dependent IDUs who are HIV positive, methadone therapy may facilitate adherence to complex highly active antiretroviral therapy (HAART) regimens. Current HAART regimens include one or more nucleoside analogues. One study examined the effects of methadone on the pharmacokinetics of the tablet formulation of didanosine (ddI) and of stavudine (d4T). The results suggest that larger doses of the tablet formulation or an alternate formulation may be needed when didanosine is given to study subjects treated with methadone¹⁷¹. Pharmacokinetic studies have demonstrated that non-nucleoside reverse transcriptase inhibitors and some protease inhibitors may interfere with the metabolism of methadone, which in turn may lead to withdrawal symptoms^{165, 172-174}.

The extent to which these interactions may impact on adherence with HAART and illicit drug use has only received limited research attention. One US study found that diverted methadone was not

associated with HIV status or treatment, and was used among older heroin users to treat signs of withdrawal⁵⁵. The absence of a higher rate of diverted methadone use among HIV-positive IDUs does not suggest that antiretroviral/methadone interactions are a primary determinant of use outside of treatment settings⁵⁵.

Buprenorphine is a more recent OST and as the number of persons receiving buprenorphine treatment and antiretroviral therapy continues to grow, so too does the existence and clinical impact of drug interactions between buprenorphine and HIV medications. The evidence to date suggests that buprenorphine may have fewer adverse interactions with antiretroviral agents^{165, 170}. Buprenorphine has a significant kinetic interaction with Efavirenz but no dynamic interaction; therefore, simultaneous administration of these drugs is not associated with opioid withdrawal, as has been observed with methadone¹⁷⁰.

5.4. Viral hepatitis

Injecting drug use is now the dominant mode of transmission of HCV worldwide. Infection with HCV results in chronic infection in 50-85% of cases; approximately 7-15% of chronically infected persons progress to liver cirrhosis within 20 years, and of these, a proportion will subsequently develop liver cancer²⁹.

Compared to active heroin injectors, the risks of HCV transmission among prescription opioid injectors may be lower if the frequency of injection is less (as might reasonably be expected for those such as buprenorphine, which have a longer duration of action). Evidence on the extent of HCV infection risk is, however, limited. In countries where pharmaceutical opioids are the predominant drug injected (e.g. some countries in Asia) most of the incident HCV cases among this group will be related to pharmaceutical injection¹⁷⁵⁻¹⁷⁹.

5.5. Other injection-related problems

Injection-related problems can result from a number of different scenarios, such as non-sterile preparation of an injected substance, non-sterile injection sites, and repeated puncturing of major vessels. All of these situations can lead to a range of infective and non-infective complications¹⁸⁰, even where the pharmaceutical is a formulation specifically developed to be injected (e.g. some formulations of morphine). The injection of drug formulations that have been developed as oral, sublingual tablets or transdermal patches can lead to further complications. The availability of specific injecting equipment (e.g. availability of needles/syringes, winged vein infusion kits, pill filters, etc.) may also impact on the experience of harms.

As mentioned above, methadone injecting has been independently associated with higher levels of injection-related health problems^{158, 181}. The literature examining harms associated with pharmaceutical injecting focuses mainly on buprenorphine and methadone, and less is known about the injecting behaviour and harms associated with injection of other pharmaceutical opioids^{156-157, 159, 182}.

A case of paralysis of the long thoracic nerve of Bale resulting in winging of scapula has been recorded¹⁸³. This was observed in a buprenorphine injector on the streets of Kolkata from a larger sample of street-based injectors; his arm muscles were atrophied due to neuralgic amyotrophy following repeated injecting of buprenorphine in the deltoid. Most of the injectors reported injecting buprenorphine alone or in a cocktail with injectable chlorpheniramine or promethazine¹⁸³. One-third of the IDUs reported injecting drugs through intravenous route and an equal proportion took it intramuscularly, the rest switched intermittently between these two routes of injecting.

5.5.1. Consequences of injecting drugs formulated for oral use

Some opioid injectors produce solutions from formulations intended for oral or sublingual administration so they can inject these preparations (e.g. methadone, buprenorphine, morphine tablets)^{26, 184}. The

viscous consistency of oral liquids such as methadone make it unsuitable for injection and increase the likelihood of vein damage¹⁸². In one study of methadone clinic attendees who injected methadone, it was found that 58% had difficulty accessing veins and 30% had experienced vein problems as a result of injecting methadone¹⁸⁵.

Adding non-sterile water to methadone syrup or sublingual buprenorphine tablets carries the additional risk of infection/contamination. The crushing and dissolution of tablets (such as morphine, oxycodone, etc.) intended for oral administration also carries further risks. For example, the additives and particulate matter in tablets developed for oral ingestion can cause vein damage. Further, tablets are not produced in sterile environments and are bulked out with insoluble particulates¹⁸⁶⁻¹⁸⁷, which add to the risks of injection-related problems.

The most common injury associated with injection of oral or sublingual drug formulations is vascular and soft tissue damage, which can lead to a range of secondary complications^{180, 188-189}. The injection of oral and sublingual formulations of pharmaceutical opioids (such as methadone, buprenorphine and oxycodone) has been associated with thrombosis^{180, 190}; limb ischaemia (in some cases leading to amputation)^{180, 190-191}; nerve damage¹⁹¹; tissue necrosis^{188, 192}; rhabdomyolysis¹⁹⁰, pulmonary granuloma¹⁹², and ocular candidiasis¹⁹³.

When buprenorphine is injected by an opioid-dependent individual, it can precipitate an uncomfortable withdrawal syndrome. This may last several hours or, if used in large quantities, may last as long as three to four days^{51, 190}, and may be even more exacerbated if buprenorphine-naloxone is injected^{42, 63, 194}.

Examples of serious physical consequences of injecting drugs formulated for oral use in South Asia came from Mizoram, one of the north-eastern Indian States bordering Myanmar¹⁹⁵⁻¹⁹⁶. Stringent laws and enforcement activity against heroin trafficking and peddling in the early 1990s in Mizoram, and the early 2000s in Manipur, resulted in a shift among local youths towards injecting dextropropoxyphene. The synthetic powder emptied from the capsules (containing dextropropoxyphene, diazepam and paracetamol), obtained from peddlers or procured over the counter, is injected after dissolving it in water by heating up the solution in easily available containers such as a spoon or the metal caps of beverage bottles¹⁹⁶. A surgical ward dedicated to deal *only* with physical consequences of dextropropoxyphene injecting (non-healing ulcers, cases requiring skin grafting, osteomyelitis, amputation etc.) had to be established in one of the prime hospitals of Aizwal, the capital city of Mizoram. It is capable of catering for only 15 people at a time and is reportedly adequate for only one-third of demand at any given point in time¹⁹⁵.

5.5.2. Consequences of injecting transdermal patches

Transdermal patches were developed as a non-intrusive system for delivering a time-released dose of a medication through the skin. They are commonly used in nicotine replacement therapy (“nicotine patches”). Opioid transdermal patches (e.g. transdermal fentanyl patches) have been associated with harmful patterns of use and injection. When aspirated with a syringe, the content of fentanyl patches can be injected; this practice has been associated with fatalities¹⁹⁷⁻¹⁹⁹, probably related to the very high potency of the drug.

5.5.3. Infective complications

Injection of a non-sterile preparation of a pharmaceutical (that is itself not produced in a sterile environment) carries the risk of contamination with bacteria, fungi and other microbes that can cause infection and disease. Contamination may occur through contact with skin flora, re-use/sharing of injecting equipment, contact with non-sterile surfaces, removal of a supervised dose from the mouth (for injecting at a later time), and repeated puncturing of veins (leaving injecting sites vulnerable to infection).

The injection of methadone has been associated with abscesses and infections at injecting sites^{156, 200}. The injection of buprenorphine has been associated with abscesses, cellulitis, endocarditis, myositis/pyomyositis, and multiple reports of candida endophthalmitis^{180, 191, 193, 201-204}. Candida endophthalmitis has been reported from injecting buprenorphine prepared with lemon juice containing

fungus (*C albicans*) or contaminated with fungi from an oral infection (in the case of removal of a supervised dose)¹⁸⁰. In India, one-third of street-based IDUs in Kolkata had had an abscess within the last six months, with 12% having had maggots growing in them, reflecting neglect of health among street recruited IDUs in this region¹⁸³.

5.6. Polydrug use and interactions

Alcohol, opioids and benzodiazepines all have sedative effects, and the interactions between these drugs increase the risk of toxicity and adverse effects. The combination of opioids with other sedative drugs places users at increased risks of polydrug dependence, overdose and perhaps more severe withdrawal. There is good evidence of high rates of comorbid benzodiazepine and opioid use in particular^{57, 74-75, 158, 205-213}.

Opioid potentiation of the sedative response to benzodiazepines has been observed in the anaesthetic setting as well as among individuals who co-ingest these drugs^{12, 26, 214}. Among a cohort of methadone patients in Italy, those with comorbid benzodiazepine use problems were more likely to have experienced significant social and drug use problems during follow-up²¹⁴. A recent UK study also found that dependence upon benzodiazepines worsened the withdrawal syndrome for opioids²¹⁵.

The clinical picture for IDUs with comorbid opioid and other drug dependence also tends to be much more complex. There is evidence that those with comorbid benzodiazepine use problems are more disadvantaged, engage in higher levels of risk behaviours (both injecting and other), and that they are likely to have comorbid mental health problems^{158, 208, 214, 216-218}.

5.7. Non-fatal overdose

Non-fatal overdose causes considerable morbidity among IDUs²¹⁹. Among heroin users, non-fatal overdose is a significant risk, particularly for those injecting the drug²¹⁹. The magnitude of risks for pharmaceutical opioid users and injectors is less well studied, but there are good reasons to expect that the magnitude of risk might be less than for heroin because of the slower onset of effects, or the partial agonist effects²²⁰⁻²²¹.

There are risks nonetheless. The injection of methadone carries risks due to its unique pharmacological characteristics: it builds slowly to peak blood levels and has a long half-life, leading to an accumulation in the body that can result in toxicity and increased likelihood of mortality^{17, 26, 158, 222}. Buprenorphine carries virtually no risk of non-fatal opioid overdose (respiratory depression, and CNS depression)^{24, 223-224} if the drug is taken on its own without any other CNS depressants. Risks are greater when polydrug use occurs: a number of studies have found that the toxicity of methadone and buprenorphine are increased when used in conjunction with other opiates, benzodiazepines and/or alcohol^{206, 220-221}.

A recent study found that among persons who had used both buprenorphine and methadone, symptoms of opioid toxicity were more likely for methadone and non-fatal overdose on methadone was 10 times more likely²⁰⁶. Injection of the medication was more strongly related to buprenorphine toxicity, whereas methadone toxicity was likely to have accompanied co-administration of heroin; the consumption of benzodiazepines was common in both cases²⁰⁶.

5.8. Mortality

Compared to heroin, the risk of death – both for overdose and other causes – for many pharmaceutical opioid drugs is likely to be significantly lower, regardless of whether the user is in maintenance treatment or not. The reason for this lower risk is related to the slower onset of action, the impact of sustained release preparations²²⁵, and in the case of partial agonist drugs such as buprenorphine, the ceiling effect for the agonist component of the formulation.

One exception is fentanyl, a very potent and short-acting opioid¹⁹⁷. Harmful use of transdermal fentanyl patches have been associated with deaths in the United States²²⁶⁻²²⁷, Canada¹⁹⁹, Europe¹⁹⁸ and Australia²²⁸. Deaths have also been associated with clandestinely produced fentanyl²²⁹.

Buprenorphine has a smaller risk of fatal overdoses than heroin or other full-agonist opioids^{221, 230-231}. Factors associated with fatalities include intravenous administration, high-dose buprenorphine and especially concomitant use of benzodiazepines, neuroleptics and/or alcohol²³²⁻²³⁷. One study has noted that the introduction of high-dose buprenorphine in France coincided with a substantial *decrease* in opioid poisoning mortality²²¹. Similar reductions in overdose mortality have been noted in the United Kingdom following treatment expansion²³⁸.

A number of international studies have examined deaths associated with methadone^{221, 233, 239-243}. These studies have identified that a number of deaths have occurred in IDUs who had recently commenced methadone where high doses were involved^{239, 244}; one Australian study concluded that in the first two weeks after treatment induction, the mortality risk was six times that of heroin users *not* in treatment²⁴⁵; thereafter, mortality risk decreased markedly below that of non-treated heroin users²⁴⁵⁻²⁴⁶.

In most of these cases, individuals had obtained methadone from sources other than the substitution therapy programme²⁶. Of the methadone-related deaths identified in a study in New Mexico (1998-2002), 22% were due to methadone alone, 24% were due to a combination of methadone and other prescription drugs, 50% were due to the combination of methadone and other illicit drugs and 3% were due to the combination of methadone and alcohol²⁴³.

One factor that significantly increases mortality risk for all opioids (whether heroin or prescription) is the use of multiple depressant drugs. Concurrent use of pharmaceutical opioids and benzodiazepines, with and without alcohol²⁴⁷⁻²⁴⁸, are commonly associated with unintentional drug overdose deaths^{221, 243, 247}. Deaths attributed to oxycodone are also usually associated with polydrug use in which oxycodone was combined with psychostimulants, other opioids, antidepressants, benzodiazepines or alcohol^{27, 249-250}. The contribution of the CNS depressant drugs, benzodiazepines and alcohol, is particularly important.

6. Pharmaceutical opioid availability, use, injection and HIV

In this section, we summarise pharmaceutical opioids available for the treatment of pain and for OST, from peer reviewed and grey literature, in particular the INCB consumption estimates¹⁸⁻¹⁹. Data from extensive searches are presented on misuse, injection, and HIV among injectors of these drugs.

INCB data are the only data collected internationally on opioid pharmaceutical availability. The following issues make it difficult to comprehensively evaluate adequate coverage of required medical needs or estimate the scale of misuse/diversion across different countries:

- The INCB only collects data on total narcotic (opioid) “consumption”, as per the terms of the 1961 UN *Single Convention on Narcotic Drugs*^{vi} and psychotropic drugs (including buprenorphine) as per the 1972 UN *Convention on Psychotropic Substances*^{vii}.
- “Consumption” includes opioids that are used by the population, *as well as* those used in the manufacture of other opioid-containing preparations, which may include medications that combine morphine, codeine, dextropropoxyphene and opium with other drugs. Opioids contained in these other compound opioid preparations may be transported to other countries and/or consumed domestically; because governments have no obligation to report on the export and import of these Schedule III preparations, this export and consumption is not recorded in INCB reports¹⁸.
- The INCB presents information on the average consumption of narcotic drugs in each country calculated as *defined daily doses for statistical purposes* (S-DDD) per million inhabitants per day. These exclude Schedule III preparations¹⁸; we list these in the tables.

In many countries, the primary response to concerns about diversion and injection seems to be a reluctance to provide opioids for the treatment of pain and, to a greater extent, for OST. To provide insufficient pharmaceutical opioid coverage (for pain *and* illicit opioid dependence) is against the recommendations of international health and regulatory bodies. Such an approach also clearly fails to preclude misuse, diversion and injection.

6.1. Eastern Europe and Central Asia

In many countries in this region, large populations of injecting heroin users have become firmly established, and HIV has become prevalent among these IDUs. In general, availability of pharmaceutical opioids for OST is also limited and treatment entry difficult, or completely lacking in some countries (Table 6). Pain management seems limited in some countries in this region, which will limit the availability of drugs such as morphine for medical and extra-medical use (Table 6). In some countries, there is evidence of injection of pharmaceutical opioids among these established populations of heroin-dependent IDUs, but injection was not necessarily occurring in the context of good provision of opioids for medical purposes (Table 7). We briefly summarise trends below.

^{vi} See: http://www.incb.org/pdf/e/conv/convention_1961_en.pdf

^{vii} See: http://www.incb.org/pdf/e/conv/convention_1972_en.pdf

In **Armenia**, a significant problem has emerged with the injection of heroin, related to a favourable climate for cultivating opium poppies and well-developed access routes into Iran ensuring a relatively good supply of heroin from Pakistan and Afghanistan²⁵¹. No mentions of the extent of pharmaceutical opioid diversion or injection were located, but opioid pharmaceuticals appear to be available on the illicit market²⁵². The extent of use of opioid medication for medical purposes in the country is low (Table 6); in general, access to WHO essential medicines was judged to be very poor in this country due to “an extremely low level of both public pharmaceutical expenditures and population incomes” (p.10)²⁵³. It was estimated in 2000 that HIV prevalence among heroin IDUs in **Armenia** was 14%, and IDU is a major route of HIV transmission in the country, accounting for 54% of infections²⁵¹⁻²⁵². Although injecting harm reduction such as NSPs has been introduced, no OST is available²⁵¹.

Low levels of opioid consumption per capita are reported for **Azerbaijan**; no information on the injection or misuse of pharmaceutical opioids was found.

Belarus has traditionally received significant supplies of heroin from Afghanistan through the Russian Federation which ensured the development of a population of heroin IDUs²⁵⁴. In recent years, cases of methadone misuse and diversion have been recorded, including injection in combination with heroin and opium²⁵⁴. In 2005, 166 registered patients (1.7%) were in treatment for methadone use problems (up from one in 2003), concentrated in Minsk City and Mogilev Oblast. According to the Ministry of Interior, illicit methadone seizures grew by 14 times from 1997-2005. Methadone “has been gradually replacing heroin as the drug of choice”²⁵⁴, although homemade opium typically dominates. Few users request treatment because of fear of reprisals, so “treatment” is only provided if users are detected by police. No OST is available in the country and no treatment guidelines exist²⁵⁴⁻²⁵⁵. HIV is an issue among IDUs in the country. The first outbreak was in Svetlogorsk in the late 1990s²⁵⁶, with over 90% of HIV-positive persons having injected narcotics and transmission thought to be due to injection of “a ready-made HIV-infected drug which had been supplied for sale”²⁵⁶, presumably home-produced opium²⁵⁴. At the end of 2005, IDUs accounted for 62% of prevalent and 37% of incident HIV infections in **Belarus**²⁵⁴.

No reports of opioid pharmaceutical injection or diversion were found in **Bosnia and Herzegovina**, although heroin injection is an issue. Methadone has been established for both withdrawal and maintenance treatment^{255, 257}. No measures of prevalence among IDUs were identified but HCV among methadone clients was reported to be 68-81%²⁵⁷.

In **Bulgaria**, heroin appears to be the major opioid problem and is mentioned in over 95% of drug treatment episodes²⁵⁸⁻²⁶⁰; however, reports exist of methadone diversion²⁵⁹⁻²⁶¹ and 28% of IDUs not in treatment report extra-medical methadone use²⁵⁸. Between 1996 and 2000, “other opioids” were mentioned in 2% of acute drug poisonings²⁶². In the general population, 0.2% report using opioids other than heroin, 0.6% of males less than 30 years of age had used methadone at some point in their lifetime and 1.8% of men and 0.7% of women had used morphine, codeine or pethadine²⁶⁰. There were 670 methadone patients as of 2003²⁵⁸ but no other OST is available^{255, 259}. A trial of slow release oral morphine as substitution treatment for heroin dependence has been conducted, with promising results²⁶³.

In **Croatia**, heroin is a problem for many drug treatment entrants and methadone has been established as a widely used OST for some time^{255, 264-265}. Although there have been reports of methadone on the black market, it is reportedly very expensive and is detected in less than 10% of overdose deaths in the country²⁶⁵.

In the **Czech Republic**, an increase in the number of people using buprenorphine sourced from the black market was reported in 2004²⁶⁶. Buprenorphine is reported as the primary drug of choice for 1.8% of IDUs²⁶⁷ and was used by 41% of drug users at a low-threshold centres and outreach programmes²⁶⁷.

Among outpatients treated for opioid dependence, methadone and other opioids are the primary drugs of dependence for 3.5% and 13% respectively²⁵⁹. Approximately 2,000-3,000 persons were in OST in 2004. Methadone can only be prescribed in a specialist clinic²⁶⁸⁻²⁶⁹, but buprenorphine can be prescribed by any GP regardless of training^{259, 266}; a recent survey found that many current prescribers were willing to prescribe the drug²⁷⁰. It is estimated that approximately 7-9% of the 5,200 GPs in the Czech Republic prescribe buprenorphine²⁶⁶. Methadone is rarely a diverted drug in the Czech Republic, but buprenorphine has been identified as a diverted and injected drug^{266, 271-272}. Buprenorphine injection may be more common than heroin injection in some cities²⁶⁶. Some have called for greater training of physicians who prescribe this drug, and for the introduction of buprenorphine-naloxone²⁷². Rates of HCV and HBV among methadone clients are high, with 72% testing positively to one or both²⁷³, but HIV is almost zero among IDUs in the country and there are some indications that HCV prevalence may be decreasing²⁶⁶. No overdoses have been identified involving any OST drug²⁶⁶.

Estonia has an established population of heroin injectors. In a 2005 study, 59% of IDUs were reported to have injected fentanyl as their main drug in the past four weeks²⁷⁴. There is significant treatment demand for OST, with methadone treatment numbers rising consistently since its introduction in 2003^{259, 275-276}, buprenorphine has also been introduced²⁷⁶. There are reportedly insufficient services to meet growing demand, probably related to the high cost of providing methadone through specialised services (of which there are very few)²⁵⁹. HIV prevalence has been very high (54%) among IDUs²⁷⁷, as has HCV, but there are signs that incidence is decreasing²⁷⁵.

In a 2000 study of IDUs in **Georgia**, the primary drugs of injection were heroin, homemade opiates (from poppy straw) and opium, but no mention was made of pharmaceutical opioids²⁷⁸. This has changed dramatically in recent times, with recent reports of an “epidemic” of buprenorphine misuse and injection in the country, with users apparently seeing the drug as a “cleaner” alternative to heroin and 70% of “drug addicts” injecting it⁴. The drug is reportedly being smuggled over the border from countries providing buprenorphine as an OST, including France⁴. Calls to introduce the drug as an OST have so far gone unheeded⁴. Among IDUs, prevalence of HIV and HCV are 2% and 68%, respectively.

Heroin has been a common drug used among IDUs for many years in **Hungary**²⁷⁹⁻²⁸⁰ and the use of OST (methadone) has been in place for 20 years^{259, 281}, but not without disagreement between medical professionals and police, and unfavourable media depictions²⁸²; consensus clinical guidelines were not drafted for 10 years²⁸¹. No reports of diversion of OST or injection of pharmaceutical opioids were found; however, 2.3% of outpatients treated for opioid dependence reported methadone and 23% opioids other than heroin as their primary drugs of choice²⁵⁹. Opioids were reported as the second most commonly detected drug in army conscripts²⁸³ and 0.3% of the general population report having used opioids other than heroin¹⁴⁸.

No data could be located on misuse or diversion of pharmaceutical opioids in **Kyrgyzstan**. Outbreaks of HIV have been recorded among IDUs²⁸⁴, presumably among those injecting heroin. No OST is available for the treatment of heroin dependence.

In **Latvia**, 0.4% of the general population reported having used opioids other than heroin¹⁴⁸. The country had 54 methadone and 38 buprenorphine maintenance clients in 2004²⁸⁵; OST in the country has been described as “underdeveloped” with treatment provided through specialist hospitals^{255, 259}. In 2004, it was noted that fewer clients were presenting for outpatient non-OST or OST treatment for heroin use problems. Few reports of pharmaceutical opioid use among clients were noted by methadone clinics; however, around 10% of outpatient non-OST treatment episodes and 31% of new treatment entrants in 2004 were for problems with opioids other than heroin²⁸⁵. Reduction in HIV transmission due to IDU has occurred since 2001²⁸⁵.

Lithuania has had both methadone and buprenorphine available as OST for illicit opioid dependence for over a decade, through specialised and private treatment centres; methadone was provided to 332 patients²⁵⁹. Treatment clients' details are registered in a central registry and OST is typically administered in a supervised fashion, although takeaway doses are permitted for stable clients²⁸⁶. Use of pharmaceutical opioids was not reported among methadone maintenance treatment (MMT) entrants²⁸⁷. HIV prevalence is low among IDUs (but nonetheless comprises 75% of HIV infections in the country), but HCV is more prevalent²⁸⁸.

In the **Republic of Moldova**, no data could be located about pharmaceutical opioid misuse. Attention has been drawn to the very low coverage of pain management with pharmaceutical opioids for cancer and HIV/AIDS palliative care²⁸⁹ (Table 6). There is insufficient funding to support even a palliative care system in the country, although plans were drawn up for one in 1994²⁹⁰. Opioids are incredibly expensive to purchase in the country and only 770 patients received them in 2002 out of a total population of 4.4 million²⁹⁰.

Opioid use in **Poland** evolved with the expanding economy from the use of poppy straw or "kompot" during the late 1960s and 1970s to heroin or "brown sugar" in the late 1990s; smoking was initially the dominant route of administration, but injecting became entrenched among some users. The first case of HIV among IDUs was detected in 1988²⁹¹ and it has spread since then; a recent study estimated HIV prevalence at 12% and HCV at 60%²⁹². OST was introduced in 1992, largely methadone although buprenorphine is allowed^{259, 293}. Treatment is free, but some clients wait for over two years to enter treatment²⁵⁵. No reports of diversion of pharmaceutical opioids could be found.

In **Romania**, pharmaceutical opioid availability has been traditionally limited for all indications. Recently, a national policy for palliative care was developed to address this issue²⁹⁴⁻²⁹⁵. Heroin injection is commonly reported among drug treatment entrants in the country²⁹⁶, with 21% of such clients receiving methadone OST in 2004²⁵⁹; buprenorphine is available but reportedly too expensive for most clients, and is little used. No reports of diversion, misuse or injection of pharmaceutical opioids were located in this review.

In the **Russian Federation**, considerable harm related to injecting heroin use exists, with the country having the most explosive HIV epidemic in Eastern Europe among IDUs²⁹⁷. Methadone is prohibited and no OST or treatment guidelines are available^{255, 298}, despite the HIV epidemic and considerable lobbying on the part of clinicians and researchers²⁹⁹⁻³⁰¹. Pharmaceutical opioid availability for pain treatment is extremely limited. No reports of diversion, misuse or injection of pharmaceutical opioids were located in this review.

Slovakia has had an established heroin use problem for some time³⁰²⁻³⁰³. In recognition of this, OST has been introduced for treatment of opioid dependence^{259, 303}. Opioid pharmaceutical prescribing for pain, particularly morphine, is very low, although some increases have occurred in recent years³⁰⁴. Among clients of a low-threshold agency, pentazocine and buprenorphine were used by 7% and 1% respectively³⁰⁵. In Košice, 53% of low-threshold agency clients cited pentazocine as their primary drug³⁰⁵. Opioids other than heroin were the primary problem among 3% of all users in one treatment sample³⁰⁵ and among 10% of outpatient clients being treated for opioid dependence²⁵⁹. Among opioid users in treatment, 29% were reported to be inject opioids other than heroin³⁰⁵.

In **Tajikistan** and **Turkmenistan**, no reports were obtained of pharmaceutical opioid misuse, diversion or injection. This is not surprising, given the low level of availability of drugs in those countries for any indication, including OST, despite good evidence of established heroin/opium injecting populations in those countries³⁰⁶⁻³⁰⁸, some with very high HIV prevalence³⁰⁸.

In the **Ukraine**, 72% of HIV is attributable to IDU³⁰⁹. Recognition of the problem of injecting heroin use, with high risk of HIV transmission³¹⁰⁻³¹¹, has led to the introduction of OST and other injecting harm reduction projects in the country^{255, 312-314}. No reports of pharmaceutical opioid diversion were located for this report.

No reports of diversion, misuse or injection of pharmaceutical opioids in **Uzbekistan** or **Kazakhstan** were located in this review.

Table 6: Availability of pharmaceutical opioids in Eastern Europe and Central Asia, by country

	Opioid medications listed as available for medical and scientific use	Opioid substitution therapy	Average consumption of opioids defined in daily doses per million inhabitants per day
Armenia	Codeine, Fentanyl, Morphine, Piritramide, Trimeperidine	n/a	22
Azerbaijan	Codeine, Fentanyl, Morphine, Trimeperidine	Methadone	22
Belarus	Codeine, Dextropropoxyphene, Ethylmorphine, Fentanyl, Methadone, Morphine, Trimeperidine	n/a	61
Bosnia & Herzegovina	Codeine, Methadone, Morphine, Pethidine, Pholcodine, Thebaine, Tilidine	Methadone	95
Bulgaria	Codeine, Dextropropoxyphene, Dihydrocodeine, Ethylmorphine, Fentanyl, Methadone, Morphine, Pethidine, Tilidine	Methadone	540
Croatia	Alfentanil, Buprenorphine, Codeine, Ethylmorphine, Etorphine, Fentanyl, Hydromorphone, Methadone, Morphine, Oxycodone, Pethidine, Sufentanil, Tilidine	Methadone Buprenorphine	1,633
Czech Republic	Acetyldihydrocodeine, Alfentanil, Alphaprodine, Bezitramide, Buprenorphine, Codeine, Dextropropoxyphene, Dihydromorphone, Ecgonine, Ethylmorphine, Etorphine, Fentanyl, Heroin, Hydrocodone, Ketobemidone, Levorphanol, Methadone, Morphine, Norcodeine, Normethadone, Oxycodone, Oxymorphone, Pethidine, Piritramide, Remifentanil, Sufentanil, Thebaine, Tilidine	Methadone, Buprenorphine	1,283
Estonia	Alfentanil, Buprenorphine, Codeine, Dihydrocodeine, Ethylmorphine, Fentanyl, Hydromorphone, Ketobemidone, Methadone, Morphine, Oxycodone, Pethidine, Remifentanil, Sufentanil	Methadone, Buprenorphine	746
Georgia	Codeine, Fentanyl, Methadone, Morphine, Trimeperidine	Methadone	74
Hungary	Alfentanil, Codeine, Dextropropoxyphene, Dihydrocodeine, Diphenoxylate, Ethylmorphine, Etorphine, Fentanyl, Methadone, Morphine, Oxycodone, Pethidine, Sufentanil	Methadone	1,826
Kazakhstan	Codeine, Fentanyl, Morphine, Thebaine	n/a	69
Kyrgyzstan	Fentanyl, Methadone, Morphine, Trimeperidine	Methadone	129
Latvia	Buprenorphine, Codeine, Fentanyl, Ketobemidone, Methadone, Morphine, Oxycodone, Pethidine, Remifentanil, Trimeperidine	Methadone	858
Lithuania	Fentanyl, Methadone, Buprenorphine, Morphine, Pethidine, Rifentanil	Methadone, Buprenorphine	505
Moldova	Codeine, Ethylmorphine, Fentanyl, Methadone, Morphine, Pethidine, Piritramide, Thebaine, Trimeperidine	Methadone	74
Poland	Alfentanil, Buprenorphine, Codeine, Dextromoramide, Dihydrocodeine, Ethylmorphine, Fentanyl, Heroin, Methadone, Morphine, Oxycodone, Oxymorphone, Pethidine, Remifentanil, Sufentanil	Methadone	1,052
Romania	Codeine, Dihydrocodeine, Fentanyl, Methadone, Morphine, Oxycodone, Pethidine, Remifentanil, Sufentanil	Methadone, Buprenorphine	257
Russian Federation	Codeine, Dihydrocodeine, Fentanyl, Morphine, Thebaine, Trimeperidine	n/a	129
Slovakia	Buprenorphine, Codeine, Diphenoxylate, Ethylmorphine, Hydromorphone, Methadone, Morphine, Oxycodone, Pethidine, Remifentanil, Sufentanil, Thebaine, Tilidine	Methadone	901
Tajikistan	Codeine, Ethylmorphine, Etorphine, Fentanyl, Morphine, Trimeperidine	n/a	--
Turkmenistan	Codeine, Ethylmorphine, Fentanyl, Hydrocodone, Morphine, Trimeperidine	n/a	5
Ukraine	Buprenorphine, Codeine, Dextropropoxyphene, Fentanyl, Morphine, Thebaine, Trimeperidine	Methadone	106
Uzbekistan	Codeine, Fentanyl, Morphine, Remifentanil, Sufentanil, Thebaine, Trimeperidine	n/a	6

n/a: Opioid substitution treatment not available in this country according to official statistics

--: Indicates no data were available for this country

Note: Average consumption of the nine most consumed narcotic drugs, expressed in defined daily doses for statistical purposes (S-DDD) per million inhabitants per day, taken from the INCB annual estimated consumption reports^{18-19, 82, 315}

6.2. South Asia

In some South Asian countries, there have been marked problems related to pharmaceutical opioid misuse and increasingly, injection, particularly in **India, Nepal, Pakistan** and **Bangladesh**. The pharmaceutical opioids being misused in this region are typically lower potency opioids such as codeine, nalbuphine and dextropropoxyphene, in contrast to the pharmaceutical opioids being used by IDUs in other regions around the globe that include oxycodone and morphine, and high-dose buprenorphine.

Some have suggested that a shift from heroin smoking to pharmaceutical opioid injection may have been related to reduced availability or increased costs of heroin at certain times, the low cost and easy availability of pharmaceuticals, and legal controls introduced in India to address heroin supply³¹⁶⁻³¹⁷. Some of the reasons for shifting from heroin smoking to pharmaceutical opioid injecting deriving from studies in the region^{179, 318-319} include:

- non-availability of heroin for smoking;
- injecting less costly compared to heroin smoking;
- smoked/chased heroin failing to elicit the desired effect due to increased tolerance;
- the influence of peers;
- in order to give up heroin smoking (learnt by those who were admitted for drug treatment and treated with buprenorphine injection by the treating physicians); and
- consistent quality and better “high” of the pharmaceuticals compared to the heroin available on the streets.

These problems have occurred despite very low levels of licit opioid medication consumption for medical purposes in this region (Table 8) suggesting that misuse has not been avoided simply through having supplies of the drug for medical purposes. Consistent reports indicate that prescribing for all types of pain is inadequate in this region; OST is available in some countries but better coverage is needed, particularly since IDU is driving the HIV epidemic in some countries. HIV and HCV co-infection are common among IDUs in the region.

A recent United Nations Office on Drugs and Crime (UNODC) report concluded that the diversion of pharmaceutical opioids for misuse and trafficking is occurring on a large scale both within and outside the region primarily because “drug law enforcement agencies in the region such as police and customs have other primary responsibilities and hence drug law enforcement does not receive the attention it deserves. Often, the officers are also not adequately trained or equipped to undertake drug law enforcement” (p.4)³²⁰. Due to limited enforcement of pharmaceutical regulations, it is thought that **India** accounts for significant large-scale diversion both within the country and to other countries in the region³²¹, and to countries further afield through illegal online pharmacies based in India³²⁰.

Over the past 15 years, a decline in use of natural opiates in India has been accompanied by an increase in pharmaceutical opioid injection. Injection as a route of administration in general has increased in multiple states, particularly in the North East^{150, 153}. Buprenorphine was not originally recommended for international control³²² and in India its ease of availability over the counter at pharmacies, its purity, and lower cost probably led to misuse and diversion¹⁵³. It was available in injection ampoules of 2ml (equivalent to 0.6mg of buprenorphine) and also 0.2 mg sublingual tablets⁶. The first case of buprenorphine misuse was documented in 1987 and the problem has been growing ever since^{6, 323}. It was recently reported that considerable proportions of IDUs in India are using buprenorphine, dextropropoxyphene and pentazocine along with benzodiazepines and antihistamines¹⁵⁰. It has been

reported that in some urban centres, up to 100% of IDUs inject pharmaceutical opioids³¹⁶. One study in Darjeeling found that 42% of IDUs injected morphine, and 25% injected dextropropoxyphene¹⁷⁷. HIV prevalence among these IDUs was 12%, and HCV 48%¹⁷⁷. About 52% of IDUs had visited sex workers, and 15% had had a sexually transmitted infection (STI) during the same period¹⁷⁷. Among active female sex workers, 13% reported injection of propoxyphene³²⁴. In a sample of 35 Indian women in treatment for drug dependence, 60% were dependent upon opioids, almost all using pentazocine and dextropropoxyphene³²⁵. Most injected the drug, and a significant proportion had originally been prescribed opioids because of pain conditions³²⁵. Another study investigation “at-risk young people” found that 10% had used pharmaceutical opioids. Drug treatment in India is largely abstinence based, although there is some availability of slow release oral morphine as an OST³²⁶ and high-dose buprenorphine has been introduced as an OST. Nine percent of OST entrants reported pharmaceutical opioids as their primary drug problem in one study³²⁷; in another, 52% of IDUs receiving OST were injecting dextropropoxyphene (with or without heroin)³²⁸. With the exception of north-eastern states, NSPs are “the exception rather than the norm” (p.961)¹⁵³. HIV is prevalent among IDUs in the country – 10% in 2005¹⁵⁰ – but areas of very high prevalence have been documented (prevalence can range from 2-63%)¹⁵³.

In **Nepal**, buprenorphine has reportedly emerged as the favoured drug of injection among IDUs^{150, 153, 329} and is smuggled over the border from India¹⁵³. There is no specialised drug treatment sector; non-government organisations (NGOs) provide abstinence-oriented treatment, and methadone is no longer available¹⁵³. Among IDUs in Nepal, HIV prevalence may be 40%, with rates of 70% in Kathmandu¹⁵³; HIV is thought to have spread into this population from India rather than South East Asia³³⁰.

In **Bangladesh**, the most commonly injected drug among IDUs is buprenorphine^{150, 331-332}, which has been a shift from heroin smoking^{150, 153}. The common causes cited in one study for switching to injecting were low cost and easy availability of injectable preparations¹⁵⁰. There is also thought to be a problem with phensedyl[®], a codeine-based cough syrup, which is thought to be smuggled over the border from India^{331, 333} – many buprenorphine users reported typically combining it with other drugs including benzodiazepines in one study³³¹. Six percent of treatment entrants report using pharmaceutical opioids³³⁴. Among female drug users who injected drugs (many of whom sold sex), injection of buprenorphine was reportedly “common”³³⁵, and at the time of their last injection, most shared the ampoule of buprenorphine³³⁵. HIV prevalence has reached 7% among IDUs in Bangladesh³³⁶, and in some cities is as high as 10.5%³³⁶. Among female IDUs, HCV prevalence was found to be 16.5%³³⁵ but is reported to be much higher among males: 56% in Dhaka³³⁶. The introduction of NSPs is thought to have reduced needle sharing and other HIV risk behaviour among IDUs^{332, 337}, but coverage in the country is “suboptimal”¹⁵³. Drug treatment is very limited, and OST is not available¹⁵³.

In **Pakistan**, prescription of pain medication is only premitted through hospitals³³⁸, and as Table 8 shows, opioid medications are very seldom prescribed. In the general population, 18% of young people have ever used pharmaceutical opioids³³⁹. Not all heroin users inject³⁴⁰, but most IDUs inject heroin^{150, 341}. There have been some reports of very limited pharmaceutical opioid injection¹⁵³. “Synthetic drugs” may be more likely to be injected by younger, more at-risk IDUs¹⁵⁰. Sharing of injection equipment among heroin users is common³⁴¹ and many have poor HIV knowledge³⁴². Many current injectors have limited contact with treatment centres³⁴³, which appear to focus upon withdrawal and abstinence oriented approaches to treatment¹⁵³. In Pakistan, overall HIV prevalence may still be low among IDUs³⁴⁴, but HCV prevalence is high^{150, 179, 341}. In one setting in Quetta, HIV prevalence among IDUs was 24% and HCV 50%, with co-infection at 20%³⁴⁵. One source reported 80% of IDUs as being HCV positive³⁴⁴.

In the **Islamic Republic of Iran**, no opioids are available over the counter, and with the exception of codeine and tramadol, only medical specialists can prescribe them. Not surprisingly, given the proximity

to the world's largest opium producing areas, though, the population prevalence of illicit opioid dependence is thought to be very high: over one million people are thought to be currently dependent on the drug according to a population-based survey, the "Epidemiological Study of Drug Abuse in Iran, 2001"³⁴⁶. Most smoked opium, but 25% reportedly injected heroin³⁴⁶. According to the Iranian Drug Control headquarters, 1,000 tonnes of opioids are consumed annually in the country – it was not clear according to this source how much of this was opium, morphine and heroin³⁴⁶. Buprenorphine and methadone are being rapidly introduced around the country as OST for illicit opioid dependence³⁴⁷⁻³⁴⁸, given the high prevalence of dependent use and the rapid spread of HIV among risk populations, particularly prisoners.

Levels of *pharmaceutical* opioid misuse and injection in the Islamic Republic of Iran were difficult to ascertain for this report, although reports of buprenorphine "availability" were noted in a rapid assessment, presumably referring to buprenorphine on the black market³⁴⁹. There are reports of buprenorphine and methadone injection occurring in some areas³⁴⁹ but heroin remains the most commonly injected opioid³⁵⁰. In a school sample, 0.5% of male students but no female students reported pharmaceutical opioid use³⁵¹. Among at-risk youth, 1-8% reported using pharmaceutical opioids³³⁹. In a study of opioid use (including heroin) among pain patients, 29% used opioids at admission³⁵². There was no significant relation between opioid use and chronic pain, but there was a relationship with previous opioid use by friends, occupation, cigarette smoking, consultation for a psychological problem, and death of a spouse³⁵². In other words, among an Iranian pain population, the risk factors for opioid use were fairly similar to those in other pain populations in high income countries: comorbid drug use, mental health problems and traumatic life events.

In **Afghanistan**, narcotic analgesics are reportedly widely available over the counter³⁵³. According to a 2005 UNODC survey, 3.2% of Afghanistan's population use illicit drugs (920,000 people), with 0.2% using heroin, 0.6% using opium and 0.8% using "pharmaceuticals". Some evidence exists of the use and injection of pharmaceutical opioids among drug users³⁵⁴ and the transition to pharmaceutical opioid injection has been reported³⁵⁵ but heroin remains the dominant drug injected³⁵⁶. Among IDUs, high rates of needle sharing have also been reported.

Though use is thought to be very low, in **Bhutan** there have been anecdotal reports of some opioid use (presumably heroin or opium), including injecting¹⁵⁰. In the **Maldives**, heroin was mentioned as a drug of concern, but no reports of pharmaceutical opioid misuse were obtained in a recent rapid situation assessment³⁵⁷. In **Sri Lanka**, no reports of pharmaceutical opioid injection were located. It is estimated that there are currently about 45,000 regular heroin users in the country; very few (1-2%) are injecting the drug¹⁵⁰. In all of these three countries, HIV rates among IDUs is reported to be low³¹⁶.

Table 7: Availability of pharmaceutical opioids in South Asia, by country

	Opioid medications listed as available for medical and scientific use	Opioid substitution therapy	Average consumption of opioids defined in daily doses per million inhabitants per day
Afghanistan	Codeine, Dextropropoxyphene, Diphenoxylate, Morphine, Pethidine, Pholcodine	n/a	Not reported
Bangladesh	Fentanyl, Morphine, Pethidine, Pholcodine	n/a	4
Bhutan	Codeine, Dextropropoxyphene, Fentanyl, Morphine, Pethidine	n/a	Not reported
India	Buprenorphine, Codeine, Dextropropoxyphene, Diphenoxylate, Ethylmorphine, Fentanyl, Hydrocodone, Methadone, Morphine, Pethidine, Pholcodine, Sufentanil, Thebaine, Trimeperidine	Buprenorphine, Morphine	8
Islamic Republic of Iran	Alfentanil, Buprenorphine, Codeine, Diphenoxylate, Fentanyl, Morphine, Oxycodone, Pethidine, Remifentanil, Sufentanil, Thebaine	Methadone, Buprenorphine	597
Maldives	Fentanyl, Morphine, Pethidine	n/a	6
Nepal	Codeine, Dextropropoxyphene, Ethylmorphine, Etorphine, Fentanyl, Methadone, Morphine, Pethidine, Pholcodine	Methadone	7
Pakistan	Buprenorphine, Codeine, Dextropropoxyphene, Diphenoxylate, Fentanyl, Morphine, Fentanyl, Pethidine, Pholcodine	n/a	2
Sri Lanka	Codeine, Etorphine, Fentanyl, Methadone, Morphine, Pethidine	n/a	238

n/a: Opioid substitution treatment not available in this country according to official statistics

Note: Average consumption of the nine most consumed narcotic drugs, expressed in defined daily doses for statistical purposes (S-DDD) per million inhabitants per day, taken from the INCB annual estimated consumption reports^{18-19, 82, 315}

6.3. East and South East Asia

In East and South East Asia, pain relief has been noted as “poor” in this region³⁵⁸⁻³⁵⁹ with very poor availability of opioid medications (see Table 10), but some efforts are being made to increase coverage³⁶⁰. Few reports of pharmaceutical opioid diversion or injection were noted³⁶¹, with the exception of **Singapore**.

This was in contrast to the prominence of heroin as a drug of dependence in this region³⁶¹; all countries are close to the heroin producing region of the “Golden Triangle”. Opioid dependent users are presenting for treatment in this region, with considerable demand for OST. OST availability has traditionally been extremely limited, but in recent years, concerted efforts have been made to establish and roll out OST in several countries, particularly **China, Malaysia, Thailand** and **Indonesia**.

In **Cambodia**, use of pharmaceutical opioids among a very small percentage of medical staff has been reported (0.7% of clinical nurses) but no indication of more widespread use or injection was identified. IDU does occur in the country; NSPs have been implemented and OST is currently planned³⁶²⁻³⁶⁵.

In **China**, medical opioid coverage for pain is low (Table 10). In one hospital of Nanjing Military Region, there have been some increases in opioid purchases, but this was largely for pethidine; morphine and fentanyl were less commonly used³⁵⁹. Methadone is being quickly rolled out as an OST, given good evidence of large populations of heroin users^{361, 366}.

In the **Democratic People’s Republic of Korea**, there are reportedly adequate controls over narcotic drugs to the detriment of adequate medical access to opioids. The INCB recently urged the government to ensure appropriate coverage for medical purposes¹⁹.

In **Indonesia**, no reports of problems related to pharmaceutical opioid misuse or diversion were located in the research for this report³⁶⁷. Opioid prescribing levels are low, at six doses per million of population per day (Table 10). There is a substantial problem related to IDU, primarily heroin use, however, and recognition of increasing HIV among IDUs sparked the development of a comprehensive public health policy in the country, which includes methadone as an OST, from 2002^{287, 368}.

In **Japan**, in 1987, the Ministry of Health established a new policy on palliative care, edited manuals on palliative care for terminally ill cancer patients, which included guidelines on cancer pain management, and revised narcotics control measures in order to improve the accessibility of opioids to cancer patients³⁶⁰. The annual consumption of morphine for medical purposes was only 65 kg in 1986 in Japan, but it rose to 973 kg in 1999³⁶⁰. The current morphine consumption per capita in Japan is still less than one-sixth of the consumption in the United States³⁶⁰. Morphine is typically orally prescribed and two-thirds of morphine preparations consumed are MS Contin Tablets. Approximately 70% of medical and nursing schools in Japan initiated the educational curriculum for cancer pain relief and palliative care. There have been government-sponsored, medical, nursing and pharmaceutical societies-sponsored seminar courses on appropriate morphine use in cancer pain management, palliative care and opioid availability, all of which have increasingly strengthened postgraduate education³⁶⁰.

In **Malaysia**, methadone is widely used as an OST³⁶⁹⁻³⁷⁰. Naltrexone was introduced for the treatment of opioid dependence in 1999, buprenorphine was introduced in 2001, and methadone in 2003³⁶⁹. Agonist maintenance programmes were embraced rapidly by the medical community in Malaysia. Currently, over 30,000 opioid-dependent patients are treated with OST by more than 500 medical practitioners in Malaysia³⁶⁹.

Morphine injection in Malaysia has been reported as a problem for some IDUs^{361, 371}; in 2005, 25% of “drug addicts” used morphine³⁷¹. Some evidence of extensive diversion through over-prescription by a few doctors led to their investigation and prosecution, and increased controls on imports of buprenorphine, with apparently marked reductions in diversion resulting⁷.

In **Mongolia**, opioid medications are very limited in use³⁷². The National Trauma Hospital in Ulaanbaatar uses more opioids for the treatment of non-malignant pain than any other facility in Mongolia, but only used 1,300 ampoules of morphine and 1,470 ampoules of fentanyl in 2004, only for very severe pain and under very strict conditions³⁷². In 2006, doctors at the hospital became able to prescribe oral tramadol for the management of pain following discharge³⁷². Among morphine IDUs interviewed (n = 22) in a recent Mongolian rapid assessment, most had a history of chronic pain for which they were prescribed injectable morphine³⁷². These patients had developed dependence on morphine, using increasing doses and frequency, continuing to obtain the medication on prescription from pharmacies and supplementing with other means. Numbers presenting with such histories are reportedly very rare³⁷².

In the **Philippines**, there were reports of injection of nalbuphine hydrochloride in Manila, including among methamphetamine IDUs⁸⁰. It is unclear how widespread this practice is. There is a clear reticence to prescribe opioids for non-cancer pain, with very low levels of opioid consumption in the country³⁷³ (Table 10). Among doctors who typically possessed a narcotics licence, all of whom saw pain patients in their practice, 75% reportedly prescribed opioids, most commonly morphine, meperidine and nalbuphine³⁷³. It is unclear how the disparity between survey and official consumption data can be rectified, since only 15kg of the INCB allocation of 87kg are consumed every year³⁷³.

In **Singapore**, buprenorphine was initially not a controlled drug³⁷⁴; it was introduced in 2002 to address heroin dependence. It was widely available in the primary care setting³⁷⁵, and could be prescribed as an OST by GPs who, in the opinion of clinicians in the country, were “inexperienced” in treating the client group because of “grossly inadequate” training in addiction medicine (p.448)³⁷⁶. Fairly soon after its introduction, IDUs began presenting for treatment for their buprenorphine use, with 82% injecting³⁷⁷, small numbers presented to hospitals with sometimes serious injection-related problems^{180, 191, 374, 377-378}, and deaths related to the drug slowly increased^{235, 379-380}. One study of drug treatment entrants found that although many buprenorphine misusers had first started in order to attempt to cease heroin use, a significant proportion had initiated use out of “curiosity”³⁷⁷.

High rates of buprenorphine injection have been observed among IDUs presenting for drug dependence treatment in Singapore, with most combining it with other drugs³⁷⁷. Among a sample of dependent buprenorphine injectors entering treatment, HCV prevalence was 43%. Risks of HCV were 5.6 times higher among those sharing needles, and 6.3 times higher among those using with others (peers or partners)³⁸¹. It is considered the primary drug problem there, but recent data suggests that most buprenorphine users swallow the drug³⁶¹.

As a result of these increasing problems, in 2005, the Singapore Ministry of Health introduced a range of initiatives: clinical guidelines for the treatment of opioid dependence³⁸⁰, central logging of prescriptions³⁷⁴, and buprenorphine was made a controlled substance in 2006³⁸⁰. Takeaway doses, previously freely given, were discontinued, and all dosing supervised³⁸⁰. No new patients can now begin treatment, and a “voluntary rehabilitation programme” started, which essentially involved detoxification from the drug³⁸⁰. It is unclear to what extent this has had an impact on misuse, diversion, injecting, HIV or HCV.

In the **Taiwan Province of China**, use of opioid prescription medication for pain is very low³⁸². Heroin use appears to be the primary problem among IDU^{361, 383-384}; however, in one study methadone was

detected in 0.4% of urine samples of individuals from “at-risk-groups”³⁸⁵. HIV is of increasing concern in the country: IDUs accounted for 69% of new HIV-1 cases in 2006, and rates among IDUs may be 15%³⁸⁶. In recognition of the severity of the problem, both NSPs and methadone as OST were implemented in 2005, with positive impacts – a 10% reduction in new cases of HIV among IDUs in the following year³⁸⁶.

In **Thailand**, there is poor provision of opioids for pain relief³⁵⁸. There is a substantial problem related to illicit heroin dependence in the country^{361, 387}, with a high incidence and prevalence of IDUs who inject heroin³⁸⁸⁻³⁹², and prisons representing a risk environment for HIV infection³⁹³⁻³⁹⁴. Methadone programmes have been implemented as OST in the country as a result²⁸⁷. No reports were found of significant misuse or diversion of pharmaceutical opioids; methamphetamine and heroin use is seen as a more significant issue in this country^{387, 389, 391, 395}.

In **Vietnam**, no reports of pharmaceutical diversion or IDU were obtained for this report – heroin and opium appear to be the major drugs of injection in the country³⁹⁶⁻³⁹⁷. Pharmaceutical opioids are highly restricted, and one report noted that codeine is “the only practical opiate widely available both in and out of hospitals...many doctors are intimidated by the restrictions or fear of diversion. Most hospital pharmacies demand a return of used ampoules from the ward, doctor or patient before issuing a further supply”³⁹⁸. Not surprisingly, given this restriction, prescribing is very low in the country (Table 10) and pain relief is probably inadequate.

No reports of diversion, misuse or injection of pharmaceutical opioids in **Brunei Darussalam** or the **Republic of Korea** were located in this review.

Table 8: Availability of pharmaceutical opioids in East and South East Asia, by country

	Opioid medications listed as available for medical and scientific use	Opioid substitution therapy	Average consumption of opioids defined in daily doses per million inhabitants per day
Brunei Darussalam	Alfentanil, codeine, ecgonine, fentanyl, heroin, morphine, pethidine, remifentanil	n/a	47
Cambodia	Codeine, dextropropoxyphene, fentanyl, morphine, pethidine	n/a	2
China	Codeine, dextropropoxyphene, dihydrocodeine, diphenoxylate, fentanyl, hydrocodone, methadone, morphine, oxycodone, pethidine, pholcodine, remifentanil, sufentanil, thebaine, tilidine	Methadone	41
Democratic People's Republic of Korea	Codeine, dihydrocodeine, fentanyl, morphine, trimeperidine	n/a	40
Indonesia	Buprenorphine, codeine, ethylmorphine, fentanyl, heroin, methadone, morphine, pethidine, sufentanil	Methadone	6
Japan	Alfentanil, buprenorphine, codeine, dextropropoxyphene, dihydrocodeine, dihydromorphine, drotebanol, ethylmorphine, fentanyl, hydrocodone, hydromorphone, levorphanol, methadone, morphine, norlevorphanol, oxycodone, pethidine, remifentanil, sufentanil, thebaine	n/a	543
Lao People's Democratic Republic	Codeine, fentanyl, morphine, pethidine	n/a	2
Malaysia	Alfentanil, buprenorphine, codeine, dihydrocodeine, diphenoxylate, etorphine, fentanyl, heroin, hydrocodone, hydromorphone, methadone, morphine, oxycodone, pethidine, pholcodine, sufentanil	Buprenorphine, Methadone	99
Mongolia	Codeine, dihydrocodeine, fentanyl, morphine	n/a	22
Myanmar	Codeine, diphenoxylate, etorphine, fentanyl, morphine, pethidine	n/a	3
Philippines	Codeine, fentanyl, morphine, oxycodone, pethidine, sufentanil	n/a	11
Republic of Korea	Alfentanil, buprenorphine, codeine, dihydrocodeine, fentanyl, hydrocodone, hydromorphone, morphine, oxycodone, pethidine, remifentanil, sufentanil	n/a	249
Singapore	Alfentanil, alphaphrodine, aniferidine, buprenorphine, codeine, dextropropoxyphene, diphenoxylate, ethylmorphine, etorphine, fentanyl, heroin, hydrocodone, hydromorphone, levorphanol, methadone, morphine, oxycodone, oxymorphone, pethidine, pholcodine, remifentanil, sufentanil, thebaine, tilidine	Buprenorphine	505
Thailand	Codeine, dextropropoxyphene, diphenoxylate, fentanyl, heroin, hydrocodone, hydromorphone, methadone, oxycodone, pethidine, thebaine	Methadone	102
The Taiwan Province of China	--	Methadone ³⁸⁶	--
Timor Leste	Codeine, fentanyl, morphine, pethidine	n/a	Not reported ¹⁸
Viet Nam	Codeine,, dextropropoxyphene, fentanyl, methadone, morphine, pethidine, pholcodine, remifentanil, sufentanil	n/a	9

n/a: Opioid substitution treatment not available in this country according to official statistics

--: Indicates no data were available for this country

Note: Average consumption of the nine most consumed narcotic drugs, expressed in defined daily doses for statistical purposes (S-DDD) per million inhabitants per day, taken from the INCB annual estimated consumption reports^{18-19, 82, 315}

6.4. Caribbean

Coverage of opioids for medical purposes is clearly inadequate in many countries in this region (Table 12). Governments are preparing legislation to improve controls over pharmaceutical substances: this includes **the Bahamas** and **Dominica**¹⁹. Few data could be located on the extent of pharmaceutical opioid misuse, injection or diversion. Given the low levels of consumption, it seems likely that the extent of pharmaceutical opioid misuse and diversion is not great, but there is a need for much better coverage of opioid medications for the treatment of pain and for OST.

This is particularly the case in **Puerto Rico**, where IDU is a major cause of HIV transmission and heroin is the most commonly injected drug³⁹⁹⁻⁴⁰⁰. The general population prevalence of HCV in San Juan is 6.3%, with estimates of 39% for heroin injectors⁴⁰¹. HIV incidence rates are much higher among IDUs in Puerto Rico than in New York⁴⁰², whereas methadone and HIV treatment coverage is much worse³⁹⁹, although methadone has been piloted in prison settings⁴⁰³.

In **Cuba**, a comprehensive policy was taken at a national level in 1996 to address the limited use of medicines for major diseases, acknowledging the low levels of medicine use. A National Pharmacoepidemiology Network conducts regulatory, administrative, educational and information initiatives, including prescribing monitoring, training of health professionals, and monitoring of adverse events⁴⁰⁴. The use of opioids was not mentioned in a discussion of this network⁴⁰⁴ and pharmaceutical opioid consumption remains at low levels (Table 12).

Table 9: Availability of pharmaceutical opioids in the Caribbean, by country

	Opioid medications listed as available for medical and scientific use	Opioid substitution therapy	Average consumption of opioids defined in daily doses per million inhabitants per day
Antigua and Barbuda	Codeine, dihydrocodeine, diphenoxylate, fentanyl, morphine, oxycodone, pethidine, remifentanyl, sufentanyl	n/a	105
Bahamas	Codeine, dextropropoxyphene, ecgonine, fentanyl, heroin, hydrocodone, morphine, oxycodone, pethidine, sufentanyl, thebaine	n/a	321
Barbados	Codeine, fentanyl, methadone, morphine, oxycodone, pethidine, sufentanyl	n/a	1990
Commonwealth of Puerto Rico[#]	--	Methadone	--
Cuba	Codeine, dextropropoxyphene, dihydrocodeine, dihydromorphone, diphenoxylate, ecgonine, ethylmorphine, etorphine, fentanyl, heroin, hydrocodone, hydromorphone, methadone, morphine, pethidine, thebaine	n/a	61
Dominica	Fentanyl, morphine, pethidine	n/a	59
Dominican Republic	Alfentanil, codeine, dextropropoxyphene, dihydrocodeine, diphenoxylate, ecgonine, ethylmorphine, etorphine, fentanyl, heroin, hydrocodone, hydromorphone, ketobemidone, levorphanol, methadone, morphine, nicomorphine, norcodeine, oxycodone, oxymorphone, pethidine, pholcodine, remifentanyl, sufentanyl, thebacon, thebaine	n/a	23
Grenada	Alfentanil, codeine, dihydrocodeine, fentanyl, methadone, morphine, pethidine	n/a	93
Haiti	Codeine, fentanyl, morphine, pethidine	n/a	6
Jamaica	Codeine, fentanyl, morphine, pethidine	n/a	65
Saint Kitts and Nevis	Codeine, fentanyl, methadone, morphine, pethidine	n/a	113
Saint Lucia	Codeine, fentanyl, methadone, morphine, oxycodone, pethidine	n/a	133
Saint Vincent & Grenadines	Codeine, fentanyl, morphine, pethidine	n/a	52
Trinidad and Tobago	Alfentanil, codeine, fentanyl, heroin, methadone, morphine, pethidine, remifentanyl	n/a	Not reported

n/a: Opioid substitution treatment not available in this country according to official statistics

--: Indicates no data were available for this country

Note: Average consumption of the nine most consumed narcotic drugs, expressed in defined daily doses for statistical purposes (S-DDD) per million inhabitants per day, taken from the INCB annual estimated consumption reports^{18-19, 82, 315}

6.5. Latin America

The availability of pharmaceutical drugs in general is poor in many countries of Latin America. This is in part because of the high cost of drugs, but many countries in the region have developed methods for encouraging generic brands of these medications and ensure swift registration⁴⁰⁵.

Access to opioids for pain and drug dependence is inadequate; few mentions of pharmaceutical drugs in this region could be found, with most focus in this region being upon cocaine production, trafficking and use¹⁹. Access to opioid medication is very low^{89, 406}. A meeting of cancer pain physicians, researchers and government representatives over a decade ago considered the use of opioid medication in Latin America⁴⁰⁶ and concluded that opioids were severely under-utilised for the treatment of cancer pain in all countries in the region because of cost, bureaucratic requirements that dissuaded physicians from prescribing stronger opioids, a clinical orientation to short-term mild opioids for acute pain only, and limited training leading to fear of prescribing by doctors and failure to stock medications by pharmacists⁴⁰⁶.

In **Brazil**, pain prescribing is considered inadequate^{88, 407}. The INCB noted that the availability of opioids for medical purposes in **El Salvador** was very low¹⁹. In several countries, governments were recently preparing legislation to improve controls over controlled pharmaceutical substances¹⁹. In **Costa Rica**, this included the implementation of a national database to cross check sales of controlled substances, pharmacies and doctors¹⁹; the country has seen some improvement in morphine prescriptions for severe cancer pain over the past decade⁸⁸.

Efforts have been made to improve inadequate standards of care for dependent drug users. In **Nicaragua**, the government recently approved a bill for “minimum standards of care” for drug users¹⁹.

Use and injection of opioids in general (including heroin) is thought to be low in this region¹⁹. The exception to this is **Mexico**, which has an established population of heroin users (and injectors), and is one of the heroin producing countries of the world⁴⁰⁸. Heroin is the most common drug used by Mexican IDUs and increased poppy cultivation, greater security at the US border, and reduced prices may be related to the establishment of significant heroin use in the country⁴⁰⁸. Risky practices among IDUs are reportedly high and risk perception is low; there are some indications that HIV prevalence may be increasing among this group⁴⁰⁸, with estimates of 4% prevalence in 2003⁴⁰⁹. OST treatment has been available in Mexico since 2001⁴⁰⁸, but it is not widely available, usually only through private programmes rather than government-funded programmes. No reports of pharmaceutical opioid diversion were located from studies of treatment or out-of-treatment drug users^{408, 410}.

Table 10: Availability of pharmaceutical opioids in the Latin America, by country

	Opioid medications listed as available for medical and scientific use	Opioid substitution therapy	Average consumption of opioids defined in daily doses per million inhabitants per day
Argentina	Alfentanil, buprenorphine, codeine, dextropropoxyphene, ethylmorphine, fentanyl, heroin, hydrocodone, hydromorphone, methadone, morphine, oxycodone, oxymorphone, pethidine, pholcodine, remifentanil, sufentanil, thebaine	n/a	148
Belize	Codeine, fentanyl, hydrocodone, morphine, oxycodone, pethidine	n/a	
Bolivia	Alfentanil, codeine, dextropropoxyphene, ethylmorphine, fentanyl, methadone, morphine, oxycodone, pethidine, remifentanil, sufentanil	n/a	17
Brazil	Alfentanil, codeine, dextromoramide, dextropropoxyphene, difenoxin, dihydrocodeine, diphenoxylate, dipipanone, ethylmorphine, etorphine, fentanyl, heroin, hydrocodone, hydromorphone, ketobemidone, levorphanol, methadone, morphine, nicomorphine, norcodeine, normethadone, normorphine, pethidine	n/a	230
Chile	Alfentanil, codeine, ethylmorphine, fentanyl, methadone, morphine, oxycodone, pethidine, remifentanil, sufentanil	n/a	254
Colombia	Alfentanil, codeine, dextropropoxyphene, dihydrocodeine, diphenoxylate, ethylmorphine, hydrocodone, hydromorphone, methadone, morphine, oxycodone, oxymorphone, pethidine, remifentanil, sufentanil, thebaine	n/a	118
Costa Rica	Codeine, fentanyl, heroin, methadone, morphine, pethidine	n/a	174
Ecuador	Codeine, dextropropoxyphene, dihydrocodeine, diphenoxylate, fentanyl, hydrocodone, methadone, oxycodone, remifentanil	n/a	45
El Salvador	Buprenorphine, codeine, dextropropoxyphene, dihydrocodeine, fentanyl, hydrocodone, methadone, morphine, oxycodone, pethidine, remifentanil	n/a	148
Guatemala	Alfentanil, codeine, dextropropoxyphene, dihydrocodeine, diphenoxylate, fentanyl, hydrocodone, methadone, morphine, oxycodone, pethidine, pholcodine, remifentanil	n/a	4
Guyana	Codeine, fentanyl, morphine, pethidine	n/a	32
Honduras	Codeine, dextropropoxyphene, fentanyl, morphine, oxycodone, pethidine, pholcodine	n/a	1
Mexico	Buprenorphine, codeine, dextropropoxyphene, dihydrocodeine, diphenoxylate, etorphine, fentanyl, heroin, hydrocodone, hydromorphone, methadone, morphine, oxycodone, oxymorphone, pethidine, remifentanil, sufentanil, thebaine	Methadone	83
Nicaragua	Codeine, dextropropoxyphene, fentanyl, hydrocodone, morphine, pethidine	n/a	132
Panama	Codeine, fentanyl, methadone, morphine, oxycodone, pethidine, remifentanil	n/a	107
Paraguay	Alfentanil, codeine, ethylmorphine, fentanyl, morphine, oxycodone, pethidine	n/a	107
Peru	Codeine, dextropropoxyphene, fentanyl, methadone, morphine, oxycodone, pethidine, remifentanil	n/a	62
Suriname	Codeine, fentanyl, morphine, pethidine, piritramide, sufentanil	n/a	65
Uruguay	Alfentanil, codeine, dextropropoxyphene, dihydrocodeine, ethylmorphine, fentanyl, hydrocodone, methadone, morphine, oxycodone, pethidine, remifentanil, sufentanil	n/a	444
Venezuela	Alfentanil, codeine, diphenoxylate, fentanyl, methadone, morphine, oxycodone, pethidine, remifentanil	n/a	109

n/a: Opioid substitution treatment not available in this country according to official statistics

--: Indicates no data were available for this country

Note: Average consumption of the nine most consumed narcotic drugs, expressed in defined daily doses for statistical purposes (S-DDD) per million inhabitants per day, taken from the INCB annual estimated consumption^{18-19, 82, 315}

6.6. Oceania and the Pacific

Pharmaceutical opioid misuse was not noted as an issue in most countries in this region. This is almost certainly because of very minimal availability of these drugs for medical use. Most countries in this region will have significantly inadequate treatment of pain, given the levels of opioid consumption reported to the INCB¹⁸ (see Table 16). Two exceptions are Australia and New Zealand. These countries have comparatively high opioid consumption, including comparatively good levels of coverage for pain care¹⁸.

In **Australia**, the availability of OST for the treatment of illicit opioid dependence is very well established and coverage of the opioid dependent population is probably good. OST is highly regulated through systems that include: registration of patients receiving OST; requirements for an “authority to prescribe” OST for dependent opioid users; required accreditation for doctors to prescribe OST; and highly regulated availability of other opioid medications. Publicly funded treatment places are primarily provided, but private OST is also available⁴¹¹. OST is considered a “low threshold” treatment, in accordance with a policy designed to minimise harms associated with illicit opioid use. This means no restrictions on the length of time in treatment, less intensive or absent urine testing, and drug use while on the program does not necessarily result in expulsion from treatment⁴¹¹. Pregnant, indigenous, HIV-positive opioid users, or those recently released from prison all receive priority for entry into public methadone treatment programmes. Although low-threshold treatment programmes may offer less intensive services than more restricted treatment programmes, the aim is to make a greater public health impact by providing treatment to the greatest number of opioid users.

Markets for diverted opioids in Australia have been described as “small scale” and “disorganised”, through a network of small-scale doctor shopping and diversion^{57, 74-75}. In 2004, 3% of the general population reported having “misused” a pharmaceutical opioid⁴¹². However, most pharmaceutical opioid misuse and injection appears to occur primarily among established heroin injectors, tends to be sporadic, 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 where heroin has traditionally been less available, the injection of morphine and methadone tablets (prescribed for pain in this country) is more common among regular IDUs^{74, 155, 413}. Morphine injection is also more common among IDUs in rural areas where heroin availability is poorer than in larger cities⁷⁹, although morphine injection has increased among regular IDUs across the country against a backdrop of sustained reductions in heroin availability in this country^{54, 413}.

In 2006, 35% of regular IDUs in Australia reported that pharmaceutical opioids were the last drug they had injected⁴¹³. This was more commonly non-OST opioids (18% morphine) rather than OST opioids (8% methadone, 6% buprenorphine). Although 32% reported that these drugs were the most frequently injected drugs in the past month, few (5%) reported they were their preferred drug: heroin remains the most favoured opioid and the most commonly nominated favourite drug among this group (48%)⁴¹³. In 2005-2006, 4% of all non-OST drug treatment episodes in Australia were for the treatment of a primary problem with pharmaceutical opioids⁴¹⁴. In the 2006 annual NSP survey, 25% of IDUs reported that the last substance they had injected was a pharmaceutical opioid: 11% morphine, 8% methadone and 5% buprenorphine⁴¹⁵. HIV prevalence in 2006 among this group was less than 1%, and HCV was 70%⁴¹⁵.

The misuse and injection of OST differs across the country and has been associated with different treatment policies. In New South Wales (NSW), methadone syrup injection has at times been prevalent (but infrequent) among IDU, including some who are in treatment¹⁵⁸; buprenorphine injection is less

common⁴¹⁶. In contrast, methadone injection is considerably less common in Victoria²²² where doses are less commonly 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 in that state⁴¹⁷. Pharmacists suspect that 33 instances of non-adherence or diversion may occur per 100 patients per month⁴¹⁸. One NSW study of methadone injectors found that some began injecting methadone because they felt they were on inadequate doses¹⁸²; other factors included the “rush” and quicker onset of effects¹⁸².

In **New Zealand**, misuse and injection of prescription opioids has been a much more long-standing issue, related no doubt in large part to the poor availability of heroin for many years as a result of the disruption of a major heroin trafficking ring in the 1970s⁴¹⁹. In 1990, 81% of opioid users presenting to a drug treatment clinic for treatment of their opioid dependence reported the injection of buprenorphine within the past month, and 68% had injected morphine⁴²⁰. In 2006, 0.13% of the general population reported having misused pharmaceutical opioids in their lifetime⁴²¹. Following the introduction of buprenorphine-naloxone in 1991, among clients presenting for treatment, 25% were injecting buprenorphine-naloxone only, 32% buprenorphine and buprenorphine-naloxone, and 86% morphine⁴²⁰. Notably, the authors of this study observed that patients had learnt to inject buprenorphine-naloxone at doses and frequencies that would allow them to avoid the withdrawal precipitation that has been demonstrated in animal and experimental studies⁴²⁰.

In 2006, morphine, “homebake” heroin (made from codeine tablets) and opium extracted from poppy straw were commented upon by regular illicit drug users⁴²¹. Among regular IDUs, 77% had used morphine or homebake in the past six months, and 74% had used methadone⁴²¹; use was very regular among this group and 96% injected⁴²¹. HIV prevalence is zero and HCV is 52% among regular IDUs⁴²¹. Buprenorphine-naloxone has not been linked to any overdose deaths in the country⁴²⁰, but methadone and morphine have (overdose rates are not high)⁴²².

Table 11: Availability of pharmaceutical opioids in Oceania and the Pacific

	Opioid medications listed as available for medical and scientific use	Opioid substitution therapy	Average consumption of opioids defined in daily doses per million inhabitants per day
American Samoa #	Codeine, fentanyl, morphine, pethidine	n/a	27
Australia	Alfentanil, buprenorphine, codeine, dextromoramide, dextropropoxyphene, dihydrocodeine, diphenoxylate, ecgonine, ethylmorphine, etorphine, fentanyl, hydrocodone, hydromorphone, methadone, morphine, normorphine, oxycodone, oxymorphone, pethidine, pholcodine, remifentanil, sufentanil, thebaine, thiofentanyl	Methadone, buprenorphine	7070
Federated States of Micronesia	Codeine, fentanyl, morphine, pethidine	n/a	68
Fiji	Codeine, fentanyl, methadone, morphine, pethidine	n/a	--
French Polynesia #	Alfentanil, fentanyl, hydromorphone, methadone, morphine, pethidine, remifentanil, sufentanil	n/a	1205
Guam #	--	n/a	--
Kiribati	Codeine, fentanyl, morphine, pethidine	n/a	--
Marshall Islands	Codeine, diphenoxylate, fentanyl, hydrocodone, morphine, pethidine	n/a	76
Nauru	Codeine, fentanyl, morphine, pethidine	n/a	13
New Caledonia #	Alfentanil, codeine, fentanyl, hydromorphone, methadone, morphine, oxycodone, remifentanil, sufentanil	n/a	1148
New Zealand	Alfentanil, buprenorphine, codeine, dextromoramide, dextropropoxyphene, diphenoxylate, ethylmorphine, etorphine, fentanyl, heroin, hydromorphone, methadone, morphine, oxycodone, oxymorphone, pethidine, pholcodine, piritramide, remifentanil, sufentanil, thebaine	Methadone, Buprenorphine	5538
Palau	Codeine, dextropropoxyphene, fentanyl hydrocodone, methadone, morphine, oxycodone, pethidine	n/a	445
Papua New Guinea #	Codeine, dextropropoxyphene, diphenoxylate, fentanyl, methadone, morphine, pethidine, pholcodine	n/a	28
Samoa #	Codeine, fentanyl, morphine, pethidine	n/a	27
Solomon Islands	Dihydrocodeine, morphine, pethidine	n/a	21
Tonga	Alfentanil, codeine, fentanyl, morphine, pethidine, pholcodine	n/a	1265
Tuvalu	Codeine, fentanyl, morphine, pethidine	n/a	5946
Vanuatu	Codeine, dextropropoxyphene, dihydrocodeine, diphenoxylate, fentanyl, methadone, morphine, oxycodone, pethidine, pholcodine	n/a	13

n/a: Opioid substitution treatment not available in this country according to official statistics

--: Indicates no data were available for this country

Note: Average consumption of the nine most consumed narcotic drugs, expressed in defined daily doses for statistical purposes (S-DDD) per million inhabitants per day, taken from the INCB annual estimated consumption reports^{18-19, 82, 315}

6.7. Canada, United States and Western Europe

In terms of extra-medical use, injection and diversion, the **United States** appears to have the largest per capita problem in the world. Even the INCB voiced significant concern about the extent of problems in the country¹⁹. It accounted for half (49%) of the world's estimated morphine consumption in 2005, despite only comprising 4.7% of the world's population¹⁸. Controlled-release oxycodone is widely misused^{27, 113}, and the country accounts for 99% of the world's consumption of this opioid⁴²³. It has been estimated that 2.3% of the general population may misuse pharmaceutical opioids and 0.5% may be dependent⁴²⁴; 11% of students have reportedly misused pharmaceutical opioids⁴²⁵. It was estimated in 2001 that prescription opioid misuse cost US\$8.5 billion⁴²⁶; given that problems seem to be increasing, the figure is likely to be much larger today.

A total of 66,963 narcotic analgesic items were identified by federal, state, and local forensic laboratories in 2006. Hydrocodone (39%) and oxycodone (30%) accounted for the majority of all narcotic analgesics reported, followed by methadone (10%), morphine (6%), codeine (4%), propoxyphene (2%), hydromorphone (2%), dihydrocodeine (2%), fentanyl (2%), and buprenorphine (2%)⁴²⁷.

For 2005, the Drug Abuse Warning network (DAWN) estimated that 598,542 emergency department (ED) visits involved non-medical use of prescription or over-the-counter pharmaceuticals or dietary supplements. Of these visits, CNS agents composed 51% of non-medical-use visits. Among these, hydrocodone/combinations were seen in 51,225 ED visits, followed by oxycodone/combinations in 42,810 ED visits, and methadone in 41,216 ED visits. It is not possible to know, based on the documentation available in ED medical records, the extent to which these drugs came from legitimate prescriptions versus other sources, and it is not possible to distinguish methadone used for treatment of opioid dependence from the pill form that is prescribed for pain⁴²⁷.

Dependence, non-fatal and fatal overdoses related to pharmaceutical opioid misuse continue to increase across the country, particularly those due to misuse of fentanyl and oxycodone^{44, 47, 60, 113-114, 113, 115-118, 428}. Methadone is increasingly being used for pain management, and the number of dosage units of the tablets used for pain increased by 277% between 2000 and 2005, as compared to a 163% increase in diskettes used both for pain and opioid treatment, and a 99% increase in liquid used in opioid treatment⁴²⁹. Between 1999 and 2004, the number of poisoning deaths mentioning methadone increased by 390%, while the number of deaths mentioning other opiates such as oxycodone and hydrocodone increased by 90%⁴³⁰.

Multiple formulations of varied opioids are available, and many appear easily obtained from GPs for diffuse, non-specified pain conditions. It seems to be this feature of the US policy context that is in part related to the extent of the problem with oxycodone, but other important aspects play a part⁴³¹. The pharmaceutical company, Purdue Pharma, that manufactures the most popular of these products, OxyContin®, aggressively marketed the drug as a treatment for both cancer and chronic non-cancer pain to oncologists, palliative care physicians and pain specialists, claiming it had a low dependence liability¹⁰⁹. The drug was also heavily promoted to primary care and family practitioners, who were encouraged to prescribe it liberally¹¹⁰. There was a major marketing campaign targeted at patients, where dependence risks were minimised, and those liable to misuse the drug were alerted to its misuse potential by the product information, which said patients should *not* crush or dissolve the tablets because this released a large dose¹¹⁰. In May 2007, the company agreed to pay \$600 million in fines and other payments to resolve the criminal charge of "misbranding" its product¹¹².

OST availability in the United States has been traditionally poor despite the problems related to heroin and other opioid dependence. A recent study of attendees at OST found that among those with a history of prescription opioid misuse, the most commonly used forms were oxycodone (79%), hydrocodone (67%), methadone (40%) and morphine (29%)¹⁰⁵. One-third (33%) had injected them, and they were more likely to have injected morphine and hydrocodone than oxycodone. The most common sources of pharmaceutical opioids were their doctors, friends, families, or regular “dealers”. Prescription fraud and theft were rarely mentioned¹⁰⁵.

One study found that those patients who were identified during routine monitoring as misusing opioids were highly likely to have extensive histories of problematic drug use, suggesting that problematic use was a greater problem for those with established drug use histories⁴⁷. Notwithstanding this, there is clear evidence of initiation to opioid use among formerly opioid naïve users as well as the addition of prescription opioid drugs to an extensive drug repertoire including heroin among a group of treatment entrants⁴³².

In a recent study of rural pharmaceutical opioid users in the United States, 35% reported injection. Risky injecting practices were reported by current injectors, including receptive needle sharing (11%), distributive needle sharing (26%), and sharing of other injection paraphernalia (42%)⁴³³. Self-reported HCV prevalence was 14.8% (compared to 1.7% among non-injectors), prompting the authors to highlight the need to educate pharmaceutical opioid injectors on safe needle practices in order to curb the transmission of HIV, HCV and other infectious diseases⁴³³.

Some have claimed that the increase in problems is related to illegal internet sales of prescription medication¹⁹. Although a concern, it is not clear why the United States would experience a problem, with other countries apparently so much less likely to do so, *unless* this is occurring to sustain use and levels of demand for the drugs that have already developed. The liberal prescribing of opioids for chronic moderate to severe non-cancer pain, combined with aggressive marketing by pharmaceutical companies, appears to have driven this epidemic of use and problems. Efforts to control “diversion” have now been implemented in 25 states across the country¹⁹ using prescription monitoring systems, which enable prescribing physicians to find out if a patient is being prescribed opioids by another prescriber.

In **Canada**, there has been sustained research and community attention upon the misuse and injection of pharmaceutical opioids among regular illicit opioid users^{56, 434-436}, with evidence of increasing use and injection of pharmaceutical opioids among regular opioid users^{107, 437}, probably related to the inconsistent heroin supply in most areas of the country. Despite this, population level data on illicit opioid use (including heroin) are very limited. Data suggest that OST coverage in the country is around 23%⁴³⁶, representing a very substantial increase relative to the poor availability of OST until a decade ago⁴³⁸. There is no national monitoring system in place to identify and track the diversion and extra-medical use of prescription drugs⁴³⁹ although district-level systems are in place.

One cohort study of out-of-treatment opioid users found that the most commonly used opioid was hydromorphone (Dilaudid), used by 38% and more common than heroin (30%)¹¹⁶. Other evidence clearly shows that oxycodone misuse is increasing across the country⁴⁴⁰. A latent class analysis of opioid users has suggested three classes of extra-medical opioid users in Canada: prescription opioid users, distinguished by use of prescription opioids and benzodiazepines and high rates of pain disorders; non-injecting crack and heroin users; and injecting heroin and other drug users²⁰⁹. Levels of risk behaviours and HCV infection differed among the groups, with the prescription opioid group having the lowest levels of risk and HCV infection²⁰⁹.

Among Canadian patients entering OST, 83% were using prescription opioids, which were most commonly oxycodone and codeine⁴³², followed by morphine and hydrocodone. Significant proportions

had pain disorders; injection of these drugs was uncommon⁴³². A further study found that compared to non-injecting regular opioid users, those injecting opioids (largely pharmaceuticals) were more likely to be more socially disadvantaged and have poorer mental health and more severe current drug use problems⁴⁴¹. Most current non-injectors had, however, injected at some point, with the authors suggesting that this provided further impetus for examination of effective interventions for encouraging IDUs to adopt non-injecting routes of administration⁴⁴¹.

Data suggest that diversion occurs from numerous sources. In one study of persons misusing pharmaceutical opioids, the drugs were largely obtained from doctors' prescriptions, friends and family, and on the street from regular dealers; theft or forgery of prescriptions was uncommon among users⁸¹. It is likely that those dealing diverted pharmaceutical opioids are involved in larger scale diversion that includes theft from pharmacies⁴⁴⁰. Population data on prescription forgeries suggests that oxycodone is most prominent⁴⁴⁰, which is consistent with the high levels of use among those misusing opioids described above. Among detections of diversion, codeine and oxycodone rank most highly⁴⁴⁰.

Of concern were the findings from one study, in which hydromorphone use in particular remained a significant predictor of non-fatal overdose among IDUs in Canada⁴⁴², probably related to the high potency of this opioid. Deaths attributed to injection of fentanyl derived from patch formulations have been observed in some cities¹⁹⁹; this is not surprising, given the very high attractiveness of this opioid for IDUs in the country⁶². Heroin use has found to predict HIV seroconversion among IDUs, whereas methadone was protective⁴⁴³⁻⁴⁴⁴, probably related to reductions in injecting risk behaviours among methadone treatment clients⁴⁴⁵.

In Western Europe, there is certainly less population-level consumption of these drugs compared to Canada and the United States (Table 18), and it is not related to OST coverage; in many countries (e.g. France) OST coverage is decidedly superior. Some countries had notably low levels of pharmaceutical opioid consumption, such as **Albania, Andorra, Serbia, and Montenegro**, and no data could be located on the existence or extent of misuse or diversion in these countries (Table 19). There is a need for better coverage of OST in some of these areas, however, given evidence of heroin dependence and HIV prevalence among these populations⁴⁴⁶.

Misuse and diversion is occurring in this region. Although very good monitoring occurs through the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA), routine reporting does not appear to differentiate between heroin and pharmaceutical opioids. As a result, it is not clear in some countries to what extent problems related to these pharmaceuticals are a concern. Future monitoring might separate heroin from other opioids.

In **Finland**, there have been very high levels of well-documented diversion of buprenorphine from OST for some years⁴⁴⁷. In 2004, 26% of drug treatment entrants⁴⁴⁸ and 96% of outpatient clients treated for opioid dependence^{148, 259} used pharmaceutical opioids as their primary drug. In 2005, 29% of drug treatment clients reported having misused buprenorphine¹⁴⁷. Buprenorphine has been identified as the most frequently injected drug among IDUs attending a NSP⁴⁴⁷ (73%) and also among the majority of clients entering OST (90%)⁴⁴⁹. It is reported that buprenorphine is commonly used among injectors to avoid withdrawal and because of the poor availability of heroin⁴⁴⁷. Some evidence has suggested that it might be a more common problem among younger drug users⁴⁴⁷.

There has been some evidence that Finnish drug users have been obtaining prescriptions in France and taking them back for diversion in Finland^{63, 450}. Since the introduction of buprenorphine-naloxone, many IDUs said that they had injected the drug (68%) but 80% of these users reported a negative experience⁶³; the street price of this formulation was also reportedly half that of buprenorphine⁶³. Overdose deaths are likely to involve buprenorphine, but overdose rates in the country are low.

In **France**, a problem has been reported with buprenorphine injection^{162, 184, 450-454}, but much of the misuse appears to be among users enrolled in treatment, which is widely available and dispensed through pharmacies¹⁶². In 2000, 30% of those in buprenorphine maintenance treatment had injected buprenorphine in the last month⁴⁵². A 1997 study found 59% of NSP attendees had injected the drug as well as evidence of a younger cohort of IDUs who *only* injected buprenorphine (not heroin or cocaine) compared to an older group who also injected these other drugs, they injected drugs more frequently and were more likely to be enrolled in buprenorphine treatment¹⁶². Another study found that buprenorphine injectors were more likely to be polydrug users⁴⁵⁵. As noted earlier, there is evidence of doctor shopping and prescription fraud among OST clients: one study found two profiles for forged prescriptions: males under 45 years, presenting with stolen prescription forms and requesting opioids; and women aged over 45 years presenting with altered prescriptions for benzodiazepines or opioids⁴⁵⁶.

It should be noted that other pharmaceutical opioids such as morphine have also been reported as being misused⁴⁵⁷.

These harms need to be placed in the context of documented benefits of OST, and buprenorphine in particular, in the form of population-level reductions in opioid overdose, and lower population rates (by a factor of 14 times) of overdose due to buprenorphine compared to methadone when adjusted for the number in treatment for each of these OST forms⁴⁵⁸. Additionally, the prevalence of HIV infection *and* HIV risk behaviours were significantly lower among buprenorphine injectors¹⁶².

In **Germany**, 17% of medications misused by outpatient clients in 2004 were OST medications; 8% using buprenorphine, 7% methadone, and 2% levomethadone⁴⁵⁹. After concerns about increases during the late 1990s in methadone-related deaths following a rapid expansion of easy access to takeaway one-week methadone doses⁴⁶⁰, the proportion of drug-related deaths where OST also played a role is now decreasing, from 40% in 2002 to 25% in 2005⁴⁵⁹. The injection of pharmaceutical opioids has also been reported among outpatients in drug treatment⁴⁵⁹. Among the general population, 0.3% had misused pharmaceutical opioids¹⁴⁸.

In **Austria**, most OST clients are continuing clients; demand exceeds the number of places and calls have been made for expansion of the programme⁴⁶¹. Slow release oral morphine has been trialled as an additional OST to methadone and buprenorphine, with conflicting findings in comparison to these other OST⁴⁶²⁻⁴⁶³. Some evidence of low levels of pharmaceutical opioid misuse has been reported in a study of OST clients, with around 3-5% of patients screening positively for morphine at some point during a four-year trial, with some evidence it was more likely among younger clients²⁰⁷. No prevalence data specific to IDUs injecting pharmaceutical opioids could be found, but among IDUs generally HIV is almost zero and HCV 40%⁴⁶⁴.

In **Belgium**, morphine consumption for medical purposes is reportedly lower than less potent opioids such as Tramadol, and also lower than much more potent opioids such as fentanyl⁴⁶⁵. In a sample of drug users, 35% report having used methadone, 12% buprenorphine and 17% codeine⁴⁶⁶; around one-fifth had injected methadone or buprenorphine⁴⁶⁶. Prescribing of methadone has increased in recent years, with reports that the availability of methadone on the black market has also increased⁴⁶⁷. Small numbers of methadone-related fatalities have been recorded (32 cases over a six-year period), often involving other drugs such as benzodiazepines and most with blood levels within "therapeutic ranges"⁴⁶⁷.

In **Denmark**, there has been an expansion of the methadone programme as a form of OST in recent years, with evidence of population level decreases in overall overdose rates⁴⁶⁸⁻⁴⁶⁹. Significant problems have been reported, however, with respect to methadone-related deaths⁴⁶⁸⁻⁴⁶⁹. Increasing proportions of the Danish population are also using pharmaceutical opioids via prescription, typically weaker opioids,

but including oxycodone, fentanyl and buprenorphine patches⁴⁷⁰. Repeat users of these strong forms of opioid were often new opioid users⁴⁷⁰.

In **Ireland**, rapid increases in heroin-related mortality⁴⁷¹ prompted the introduction of OST, particularly methadone, into the country. Further, among one sample of heroin-dependent persons, HIV prevalence was 17% and HCV 79%⁴⁷². There has been evidence that methadone, widely provided for OST, has been diverted by opioid dependent persons, but data on its extent were not located. Methadone was detected in half of the opioid-related fatalities in Dublin in 1999⁴⁷³. In the general population, 0.5% reported using opioids other than heroin¹⁴⁸.

In **Italy**, opioids are available, yet traditionally under-utilised for pain management and OST (both methadone and buprenorphine are available as OST^{218, 474-477}). In one study of terminally ill cancer patients (1993-2000), it was found that only one-third (38%) of prescriptions were adequate, and on average 56 defined daily doses *per patient* were warranted, yet not prescribed⁴⁷⁸. A further survey of their doctors found knowledge of opioid medications inadequate, and it was thought that this contributed to under-prescription⁴⁷⁸. Notably, the country has taken steps to address this with the development of a national pain and palliative care plan in collaboration with the international Pain & Policy Studies Group (PPSG)²⁹⁵.

A study of OST clients in Italy also concluded that treatment was being delivered at inadequate doses in over 80% of cases⁴⁷⁹. Nevertheless, there is some evidence to suggest that overdose rates declined following the expansion of OST in the early 1990s⁴⁸⁰, and data suggest that riskier and more dependent clients as well as those who are HIV positive are given priority for OST⁴⁸¹. Given this context, it is probably no surprise that no discussions or papers examining diversion were located for this review. Only very low levels of pharmaceutical opioid use by outpatient opioid clients was reported: 0.3% had used misused methadone and 0.5% other pharmaceutical opioids²⁵⁹.

In the **United Kingdom**, multiple forms of OST have been available for over a century, including prescription of diamorphine for heroin dependence^{144, 482} and relatively liberal prescribing policies, with GPs being allowed to prescribe strong opioids for varied conditions. At times, this has led to doctors apparently over-prescribing some patients, with several high profile cases involving doctors who were unwittingly supplying very large black markets for sizeable populations of opioid dependent populations⁴³¹. Buprenorphine is increasingly used for OST^{237, 483}; and there is some evidence that doctors are unwilling to prescribe heroin for OST¹⁴³. There has been clear evidence of injection of buprenorphine among IDUs⁴⁸⁴.

In one of few cross-national investigations of heroin and methadone overdose in comparison to treatment policy, Hall et al compared overdose mortality related to heroin and methadone in the United Kingdom with that of Australia, and also considered the relative treatment coverage of methadone in each country⁴⁸⁵. Despite methadone being more widely used in Australia (population adjusted), mortality related to methadone was relatively greater in the United Kingdom than in Australia (although methadone still accounted for fewer deaths in the country than heroin⁴⁸⁶). The treatment policies differed widely: in Australia, takeaway dosing of methadone was comparatively limited, whereas provision often occurred without supervision in the United Kingdom and large takeaway doses were often available⁴⁸⁵. Interestingly, following changes in prescribing and treatment practices and guidelines in the United Kingdom, with greater limitations upon takeaway dosing provisions, methadone-related mortality dropped significantly⁴⁸⁷.

Among the general population in **England** and **Wales**, 0.1% reportedly had used opioids other than heroin¹⁴⁸. In the United Kingdom, in 2004, 5% of outpatient opioid treatment patients had misused methadone and 4% had misused other opioids²⁵⁹.

In **Switzerland**, heroin is available in a highly controlled manner for opioid dependent patients considered “treatment resistant”^{145, 488-490}; protective effects for mortality have been demonstrated for this group relative to illicit heroin injectors⁴⁹¹. One study located reports of misuse and injection: in a sample of clients maintained on methadone, 43% of patients indicated ever having injected methadone, 21% had injected in the preceding month with a mean frequency of 10.3 injections⁴⁹².

Table 12: Availability of pharmaceutical opioids in Canada, United States and Western Europe, by country

	Opioid medications listed as available for medical and scientific use	Opioid substitution therapy	Average consumption of opioids defined in daily doses per million inhabitants per day
Albania	Codeine, fentanyl, methadone, morphine, pethidine, pholcodine, sufentanil	Methadone	45
Andorra	Fentanyl, heroin, methadone, morphine, pethidine, remifentanil	n/a	1034
Austria	Alfentanil, buprenorphine, codeine, dextropropoxyphene, dihydrocodeine, ethylmorphine, fentanyl, heroin, hydrocodone, hydromorphone, methadone, morphine, nicocodine, oxycodone, pethidine, piritramide, remifentanil, sufentanil, tilidine	Methadone, Buprenorphine, slow release Morphine	7730
Belgium	Acetyldihydrocodeine, alfentanil, alphacetylmethadol, bezitramide, buprenorphine, codeine, dextromoramide, dextropropoxyphene, difenoxin, dihydrocodeine, diphenoxylate, dipipanone, ecgonine, ethylmorphine, etorphine, etoxeridine, fentanyl, heroin, hydrocodone, hydromorphone, isomethadone, ketobemidone, levomoramide, levorphanol, methadone, morphine, nicomorphine, normethadone, normorphine, oxycodone, pethidine, phenazocine, phenoperidine, pholcodine, piritramide, racemethorphan, remifentanil, sunfentanil, thebacon, thebaine, tilidine	Methadone	17018
Canada	Alfentanil, alphaphrodine, anileridine, codeine, dextropropoxyphene, difenoxin, dihydrocodeine, dihydromorphine, diphenoxylate, ethylmorphine, etorphine, fentanyl, heroin, hydrocodone, hydromorphone, isomethadone, levorphanol, methadone, morphine, normethadone, oxycodone, oxymorphone, pethidine, remifentanil, sufentanil, thebaine	Methadone	12840
Denmark	Alfentanil, alphacetylmethadol, buprenorphine, codeine, dextromoramide, dextropropoxyphene, dihydrocodeine, diphenoxylate, ecgonine, etorphine, fentanyl, heroin, hydrocodone, hydromorphone, ketobemidone, levorphanol, methadone, morphine, nicomorphine, oxycodone, oxymorphone, pethidine, pholcodine, remifentanil, sufentanil, thebacon, thebaine	Methadone	12545
Finland	Acetylmethadol, alfentanil, buprenorphine, codeine, dextropropoxyphene, ecgonine, ethylmorphine, etorphine, fentanyl, heroin, hydromorphone, methadone, morphine, norcodeine, oxycodone, pethidine, pholcodine, remifentanil, sufentanil, thebaine	Buprenorphine, Methadone	3856
France	Acetyldihydrocodeine, Alfentanil, alphacetylmethadol, alphamethadol, alphaphrodine, anileridine, bezitramide, buprenorphine, codeine, dextromoramide, dextropropoxyphene, dihydrocodeine, dihydromorphine, diphenoxylate, dipipanone, ecgonine, ethylmorphine, etonitazene, etorphine, fentanyl, heroin, hydrocodone, hydromorphone, isomethadone, methadone, morphine, oxycodone, pethidine, phenoperidine, pholcodine, piritramide, remifentanil, sufentanil, thebaine, tilidine	Buprenorphine, Methadone	4218
Germany	Alfentanil, buprenorphine, codeine, dextromoramide, dextropropoxyphene, dihydrocodeine, dihydromorphine, ecgonine, ethylmorphine, etonitazene, etorphine, fentanyl, heroin, hydrocodone, hydromorphone, hydromorphinol, hydromorphone, ketobemidone, levorphanol, methadone, methyldihydromorphine, morphine, noracymethadol, norcodeine, normorphine, oxycodone, oxymorphone, pethidine, pholcodine, piritramide, remifentanil, sufentanil, thebacon, thebaine, tilidine	Methadone	10802
Greece	Alfentanil, buprenorphine, codeine, dextropropoxyphene, fentanyl, methadone, morphine, pethidine, remifentanil	Methadone, Buprenorphine	1571

	Opioid medications listed as available for medical and scientific use	Opioid substitution therapy	Average consumption of opioids defined in daily doses per million inhabitants per day
Iceland	Alfentanil, codeine, dextropropoxyphene, difenoxin, dihydrocodeine, diphenoxylate, ethylmorphine, etorphine, fentanyl, heroin, hydrocodone, hydromorphone, methadone, morphine, oxycodone, pethidine, sufentanil	n/a	6138
Ireland	Alfentanil, buprenorphine, codeine, dextromoradomide, dextropropoxyphene, dihydrocodeine, dipipanone, ecgonine, ethylmorphine, etorphine, fentanyl, heroin, hydrocodone, hydromorphone, levorphanol, methadone, morphine, normorphine, oxycodone, pethidine, pholcodine, remifentanil, sufentanil, thebaine, tilidine	Methadone	6605
Italy	Alfentanil, buprenorphine, codeine, dextropropoxyphene, dihydrocodeine, ecgonine, ethylmorphine, fentanyl, heroin, hydromorphone, methadone, morphine, oxycodone, oxymorphone, pethidine, pholcodine, remifentanil, sufentanil, thebaine	Methadone	3067
Liechtenstein	--	--	--
Luxembourg	Alfentanil, codeine, dextropropoxyphene, dihydrocodeine, fentanyl, hydrocodone, hydromorphone, methadone, morphine, oxycodone, pethidine, piritramide, remifentanil, sufentanil, thebacon, tilidine	Methadone, Buprenorphine	6840
Malta	Alfentanil, codeine, fentanyl, heroin, methadone, morphine, pethidine, remifentanil, sufentanil	Methadone	2857
Monaco	--	--	--
Montenegro	Alfentanil, codeine, methadone, morphine, pethidine, pholcodine, remifentanil, sufentanil, tilidine	Methadone	309*
Netherlands	Alfentanil, buprenorphine, codeine, dextromoradomide, dextropropoxyphene, ethylmorphine, etorphine, fentanyl, heroin, hydrocodone, methadone, morphine, nicomorphine, oxycodone, oxymorphone, pethidine, pholcodine, piritramide, remifentanil, sufentanil, thebaine	Methadone	5159
Norway	Alfentanil, buprenorphine, codeine, dextropropoxyphene, ethylmorphine, ketobemidone, morphine, opium, oxycodone, pethidine, pholcodine, thebaine	Methadone	6273
Portugal	Buprenorphine, codeine, dextropropoxyphene, dihydrocodeine, ecgonine, ethylmorphine, etorphine, fentanyl, heroin, hydrocodone, hydromorphone, ketobemidone, methadone, morphine, norcodeine, normorphine, oxycodone, oxymorphone, pethidine, pholcodine, piritramide, remifentanil, sufentanil, thebaine	Methadone	4590
San Marino	--	--	--
Serbia	Alfentanil, codeine, methadone, morphine, pethidine, pholcodine, remifentanil, sufentanil, tilidine	Methadone	309*
Slovenia	Alfentanil, codeine, dihydrocodeine, fentanyl, hydromorphone, methadone, morphine, oxycodone, pethidine, piritramide, remifentanil, sufentanil	Methadone	3951
Spain	Acetylmorphine, alfentanil, buprenorphine, codeine, desomorphine, dextropropoxyphene, dihydrocodeine, diphenoxylate, ecgonine, ethylmorphine, etorphine, fentanyl, heroin, hydrocodone, hydromorphone, levorphanol, methadone, morphine, oxycodone, pethidine, pholcodine, piritramide, remifentanil, thebaine, tilidine	Methadone	7551
Sweden	Alfentanil, buprenorphine, codeine, dextropropoxyphene, diphenoxylate, ecgonine, ethylmorphine, etorphine, fentanyl, heroin, hydrocodone, hydromorphone, ketobemidone, methadone, morphine, oxycodone, pethidine, piritramide, remifentanil, sufentanil	Methadone	4280
Switzerland	Alfentanil, buprenorphine, codeine, dextromoradomide,	Heroin,	11345

	Opioid medications listed as available for medical and scientific use	Opioid substitution therapy	Average consumption of opioids defined in daily doses per million inhabitants per day
	dextropropoxyphene, difenoxin, dihydrocodeine, ethylmorphine, etorphine, fentanyl, heroin, hydrocodone, hydromorphone, methadone, morphine, nicomorphine, oxycodone, oxymorphone, pethidine, pholcodine, remifentanyl, sufentanyl, thebaine, tilidine	Methadone Buprenorphine	
The Former Yugoslav Republic of Macedonia	Alfentanyl, codeine, fentanyl, methadone, morphine, pholcodine, piritramide, remifentanyl, sufentanyl, thebaine, tilidine	Methadone	989
United Kingdom	Alfentanyl, buprenorphine, codeine, dextromoramide, dextropropoxyphene, dihydrocodeine, dihydromorphone, diphenoxylate, dipipanone, ethylmorphine, etorphine, fentanyl, heroin, hydrocodone, hydromorphone, ketobemidone, levorphanol, methadone, morphine, oxycodone, pethidine, pholcodine, remifentanyl, sufentanyl, thebaine, tilidine	Heroin, Methadone, Buprenorphine	3664
United States	Acetylmethadol, alfentanyl, allylprodine, alphacetylmethadol, alphaprodine, betacetylmethadol, betameprodne, betamethadol, betaprodine, buprenorphine, codeine, dextropropoxyphene, difenoxin, dihydrocodeine, dihydromorphone, diphenoxylate, ecgonine, ethylmorphine, etorphine, fentanyl, heroin, hydrocodone, hydromorphone, hydroxypethidine, isomethadone, levomethorphan, methadone, morphine, noracetylmethadol, norlevorphanol, normethadone, oxycodone, oxymorphone, pethidine, propiram, remifentanyl, sufentanyl, thebaine, trimeperidine	Methadone, Buprenorphine	29500

n/a: Opioid substitution treatment not available in this country according to official statistics

--: Indicates no data were available for this country

Note: Average consumption of the nine most consumed narcotic drugs, expressed in defined daily doses for statistical purposes (S-DDD) per million inhabitants per day, taken from the INCB annual estimated consumption reports^{18-19, 82, 315}

6.8. Middle East and Northern Africa

According to the INCB, pharmaceutical preparations containing controlled substances are easily obtained on unregulated markets in this region, with considerable unregulated sale of pharmaceuticals over the counter without prescriptions occurring¹⁹. Misuse of these preparations is reported to be taking place among persons “in all social strata” but no data were available to quantify this¹⁹. Drug control legislation prohibiting such practices is in place in most countries, but it is often not adequately implemented and enforced. Due to insufficient funds, there is a shortage of trained pharmacists and pharmacy inspectors in many African countries, which is often exacerbated by a lack of funds to fill vacancies. The INCB also recently voiced concern about controlled drugs being sold via illegally operating internet pharmacies in larger cities¹⁹. Data on the extent of this possible problem are seriously lacking (Table 21).

In **Cyprus**, among outpatient clients in treatment for opioid use, 0.7% had misused methadone 0.7% and had misused buprenorphine. No other information on the misuse of pharmaceutical opioids was identified²⁵⁹.

In an **Israeli** study of patients in methadone substitution therapy, after one year of treatment, benzodiazepine users more frequently reported social problems (single, prison history, unemployment, family history of drug dependence/mental illness), problematic drug use (initiated illicit drug use at a younger age, more frequent illicit drug use) and psychopathology and negative mood. They had significantly higher rates of HCV seroprevalence and reported higher rates of injection-related HIV/HCV risk behaviours²¹⁴.

Little information was on the use of pharmaceutical opioids in **Kuwait**; however, it was reported that opioids are rarely detected in patients undergoing toxicology screening⁴⁹³. In **Lebanon**, few data exist on the scale of the problem. At a recent conference it was reported that prescription opioid use was a problem⁴⁹⁴ and it is reported that 11% of admitted psychiatric patients are opioid dependent. No additional data could be found to verify magnitude of pharmaceutical opioid misuse. It was reported that HIV is an issue among IDUs and 2,700 persons were living with HIV in 2003⁴⁹⁴. At a recent forum in Lebanon, it was suggested that buprenorphine might be available for opioid substitution treatment but there were no further details on this⁴⁹⁴.

There is no mention of opioids in the drug overdose data for **Oman**⁴⁹⁵. No specific information on pharmaceutical opioid misuse was identified in this review.

Medication for severe pain is inadequate in supply in many countries in the region (Table 20). In **Tunisia**, there are limited pain medications available. Efforts are underway to increase the availability of opioids for cancer pain, with some promising signs⁴⁹⁶. Pharmacists in Tunisia thought opioids important, although only 86% had them (this included hospitals) and only 30% thought that the seven-day limit upon prescribing should be relaxed because of fears about fraud and dependence⁴⁹⁷.

Turkey is located on the main overland connection between Asia and Europe through which heroin is trafficked from Afghanistan to European markets; problems related to heroin use have been clearly identified as a serious concern in the country. There have been reports of pharmaceutical opioid use in the country but the extent is unknown⁴⁹⁸. Between 1997 and 2001, opioids were mentioned in 92% of drug overdoses in the country. Small numbers mentioned codeine, fentanyl and methadone; large numbers involving morphine were probably heroin-related deaths⁴⁹⁸.

Table 13: Availability of pharmaceutical opioids in the Middle East and Northern Africa, by country

	Opioid medications listed as available for medical and scientific use	Opioid substitution therapy	Average consumption of opioids defined in daily doses per million inhabitants per day
Algeria	Algeria, buprenorphine, codeine, dextropropoxyphene, etorphine, fentanyl, morphine, pholcodine, sufentanil	n/a	437
Bahrain	Alfentanil, etorphine, fentanyl, methadone, morphine, oxycodone, pethidine, remifentanil	n/a	132
Cyprus	Alfentanil, codeine, dextropropoxyphene, dihydrocodeine, diphenoxylate, etorphine, fentanyl, heroin, hydrocodone, methadone, morphine, oxycodone, oxymorphone, pethidine, remifentanil, sufentanil, thebaine	n/a	Not reported
Egypt	Codeine, dihydrocodeine, diphenoxylate, fentanyl, morphine, oxycodone, pethidine, pholcodine, remifentanil, sufentanil	n/a	60
Iraq	Codeine, dextropropoxyphene, diphenoxylate	n/a	2
Israel	Buprenorphine, codeine, dextropropoxyphene, morphine, oxycodone, pethidine	Methadone	3452
Jordan	Codeine, dextropropoxyphene, diphenoxylate, morphine, pethidine	n/a	100
Kuwait	Alfentanil, codeine, dextropropoxyphene, fentanyl, hydrocodone, methadone, morphine, oxycodone, pethidine, remifentanil, sufentanil	n/a	76
Lebanon	Alfentanil, codeine, dextropropoxyphene, fentanyl, methadone, morphine, pethidine, pholcodine, remifentanil, sufentanil	n/a	216
Libyan Arab Jamahiriya	Alfentanil, fentanyl, morphine, pethidine	n/a	41
Morocco	Alfentanil, codeine, dextropropoxyphene, dihydrocodeine, fentanyl, morphine, pethidine, pholcodine, sufentanil	n/a	346
Oman	Alfentanil, codeine, dextropropoxyphene, dihydrocodeine, ecgonine, etorphine, fentanyl, heroin, hydrocodone, methadone, morphine, pethidine, pholcodine, remifentanil, sufentanil	n/a	53
Qatar	Alfentanil, dihydrocodeine, etorphine, fentanyl, morphine, pethidine, remifentanil	n/a	164
Saudi Arabia	Alfentanil, codeine, dextropropoxyphene, dihydrocodeine, etorphine, fentanyl, hydromorphone, methadone, morphine, oxycodone, pethidine, remifentanil, sufentanil	n/a	141
Sudan	Fentanyl, morphine, pethidine	n/a	1
Syrian Arab Republic	Alfentanil, codeine, dextropropoxyphene, diphenoxylate, fentanyl, morphine, pethidine, remifentanil, sufentanil	n/a	24
Tunisia	Alfentanil, alphaphrodine, anileridine, bezitramide, codeine, dextromoradomide, dextropropoxyphene, difenoxin, dihydrocodeine, diphenoxylate, dipipanone, ecgonine, ethylmorphine, etorphine, fentanyl, heroin, hydrocodone, hydromorphone, ketobemidone, levorphanol, methadone, morphine, nicomorphine, normethadone, normorphine, oxycodone, oxymorphone, pethidine, phenoperidine, pholcodine, piritramide, remifentanil, sufentanil, thebacon, thebaine, tilidine	n/a	105
Turkey	Alfentanil, codeine, diphenoxylate, ethylmorphine, fentanyl, morphine, pethidine, remifentanil, sufentanil	n/a	214
United Arab Emirates	Alfentanil, codeine, dextropropoxyphene, dihydrocodeine, diphenoxylate, etorphine, fentanyl, hydrocodone, methadone, oxycodone, pethidine, remifentanil	n/a	245
Yemen	Codeine, fentanyl, morphine, pethidine, pholcodine, remifentanil, sufentanil	n/a	2

n/a: Opioid substitution treatment not available in this country according to official statistics

--: Indicates no data were available for this country

Note: Average consumption of the nine most consumed narcotic drugs, expressed in defined daily doses for statistical purposes (S-DDD) per million inhabitants per day, taken from the INCB annual estimated consumption reports^{18-19, 82, 315}

6.9. Sub-Saharan Africa

Provision of pharmaceutical opioids for the management of severe pain is severely limited in this region and repeated calls are being made for dramatic changes to availability and use. There are significant structural barriers to the provision of medication in some countries, and doubtless fears of limited capacity to control diversion add to difficulties in achieving change.

An added issue is the fact that many African countries now serve as routes for the trafficking of illegal drugs, including heroin, through to the richer markets of Europe. This has led to the development of noticeable drug problems in multiple transit countries⁴⁹⁹, with many countries unequipped with national policy frameworks to address these issues⁴⁹⁹⁻⁵⁰⁰. Policies are being introduced across the continent to address illegal drug use and related harm⁴⁹⁹. The development of populations of dependent heroin users is an issue of significant concern, given the very high population prevalence of HIV already existing in the region. OST should be introduced as a matter of priority in countries where heroin injection has become an issue.

In **Djibouti**, there is currently limited capacity for the government to monitor and control internationally controlled substances¹⁹, although there are no data on the extent of drug misuse in the country and the INCB recently called for a rapid assessment into drug use in the country¹⁹.

In **Malawi**, there is inadequate availability of opioids for pain management¹⁹. The INCB recently urged the government to assess the medical and scientific needs of the country, and ensure that sufficient supplies of opioids were available¹⁹.

In **Mauritius**, the HIV epidemic shifted dramatically in the past decade from sexual to IDU transmission. Heroin injection is a considerable issue in the country and buprenorphine has been introduced as an OST as a result. Recently, a shortage of heroin to supply the existing population of IDUs, is thought to have led to a move by traffickers to import buprenorphine, which has been reflected in increasing seizures of the drug and increases in injection among IDUs¹⁹.

In **Sierra Leone**, opioid treatment of severe pain is almost non-existent⁵⁰¹. Under Sierra Leonean law, morphine may only be handled by a pharmacist or doctor, but there are only 100 doctors – one for every 54,000 people, compared with one for every 350 in the United States⁵⁰¹. Given the low coverage of the population with antiretroviral treatment (ART), there is an urgent need not only for management of cancer pain but also for pain related to the end stages of AIDS⁵⁰¹.

Limited prescription of opioid analgesics occurs in primary care settings in **South Africa**⁵⁰². It has been claimed that delays and bureaucracy mean that the country takes four times longer than the international average to approve new medicines; and although recommended and considered extremely important for the country, regulations allowing nurses to prescribe medications, including antiretrovirals (ARVs), remain lacking⁵⁰³. Lack of knowledge about cancer pain management by both patients and providers were commonly cited problems that limited access in a study of opioid availability in South Africa⁵⁰⁴.

Some diversion and/or misuse of pharmaceutical opioids is occurring, however, usually involving lower potency opioids. In South Africa, analgesic misuse occurred in a significant minority of drug treatment attendees. It was usually codeine-containing medicines, many of which are available over the counter – they were used by 3-7% of drug treatment attendees in 2005⁵⁰⁵. Older people and women were more likely to have this drug class as their primary drug problem; men were more likely to be using a range of drugs⁵⁰⁶.

Injecting is reportedly increasing in **Tanzania** and HIV infection has been detected in up to 95% of syringes in some neighbourhoods⁵⁰⁷. Heroin seems to be the major drug of injection, and injecting is increasing in this country⁵⁰⁷⁻⁵⁰⁸. No reports were obtained of the provision of OST for heroin dependence. No reports of pharmaceutical opioid diversion in this country were found for this report.

Limited provision of morphine in **Uganda** deriving from confusion and complexity in storage and authorisation rules led to discontinuation of opioid pain management at the patient level, and public fear of opioids led to under-prescribing. This is being addressed through a national public health approach, including free oral morphine, increasing education of physicians, dedicated palliative care professionals and allowing nurses to prescribe to patients⁵⁰⁹⁻⁵¹².

Different reports documenting drug use in **Cameroon**⁵¹³, **Ethiopia**⁵¹⁴, **Kenya**⁵¹⁵⁻⁵¹⁶ and **Nigeria**^{496, 517-518} did not report the injection or misuse of pharmaceutical opioids.

Table 14: Availability of pharmaceutical opioids in Sub-Saharan Africa, by country

	Opioid medications listed as available for medical and scientific use	Opioid substitution therapy	Average consumption of opioids defined in daily doses per million inhabitants per day
Angola	Alfentanil, codeine, dextromoradomide, fentanyl, morphine, pethidine, sufentanil	n/a	
Benin	Codeine, fentanyl, morphine, pethidine, sufentanil	n/a	
Botswana	Alfentanil, codeine, dihydrocodeine, dipipanone, fentanyl, morphine, pethidine, sufentanil, tilidine	n/a	
Burkina Faso	Dextromoradomide, etorphine, fentanyl, morphine, pethidine, phenoperidine	n/a	
Burundi	Codeine, diphenoxylate, fentanyl, morphine, pethidine	n/a	
Cameroon	Codeine, dextromoradomide, etorphine, fentanyl, morphine, pethidine	n/a	
Cape Verde	Alfentanil, fentanyl, morphine, pethidine	n/a	7
Central African Republic	Codeine, fentanyl, morphine, pethidine	n/a	798
Chad	Fentanyl, morphine, pethidine	n/a	1
Comoros	Dextromoradomide, fentanyl, morphine, pethidine, phenoperidine	n/a	2
Côte d'Ivoire	Codeine, dextropropoxyphene	n/a	1
Democratic Republic of the Congo	Alfentanil, codeine, diphenoxylate, fentanyl, methadone, morphine, pethidine	n/a	16
Djibouti	Alfentanil, fentanyl, morphine, pethidine, sufentanil	n/a	2
Equatorial Guinea	Codeine, diphenoxylate, fentanyl, methadone, tilidine	n/a	Not reported
Eritrea	Codeine, fentanyl, morphine, pethidine	n/a	2
Ethiopia	Codeine, morphine, pethidine	n/a	Not reported
Gabon	Alfentanil, codeine, dextromoradomide, dextropropoxyphene, fentanyl, morphine, pethidine, phenoperidine, pholcodine	n/a	1
Gambia	codeine, dihydrocodeine, heroin, morphine, pethidine, thebaine	n/a	Not reported
Ghana	Codeine, dextropropoxyphene, dihydrocodeine, fentanyl, heroin, methadone, morphine, pethidine, thebaine	n/a	50
Guinea	Codeine, fentanyl, morphine, pethidine	n/a	3
Guinea-Bissau	Morphine, pethidine	n/a	53
Kenya	Codeine, dextropropoxyphene, dihydrocodeine, etorphine, fentanyl, heroin, morphine, pethidine, remifentanil	n/a	1
Lesotho	Dihydrocodeine, fentanyl, morphine, pethidine	n/a	9
Liberia	Codeine, dihydrocodeine, morphine, pethidine	n/a	11
Madagascar	Codeine, dextropropoxyphene, ethylmorphine, morphine	n/a	1
Malawi	Alfentanil, codeine, etorphine, fentanyl, methadone, morphine, pethidine, sufentanil, tilidine	n/a	Not reported
Mali	Alfentanil, anileridine, codeine, dextromoradomide, dextropropoxyphene, ethylmorphine, etorphine, fentanyl, heroin, hydrocodone, hydromorphone, levorphanol, methadone, morphine, nicomorphine, normethadone, oxycodone, oxymorphone, pethidine, phenoperidine, pholcodine, piritramide, remifentanil, sufentanil, thebacon, thebaine	n/a	19
Mauritania	Codeine, dextromoradomide, dextropropoxyphene, fentanyl, morphine, pethidine	n/a	
Mauritius	Alfentanil, buprenorphine, codeine, fentanyl, heroin, methadone, morphine, pethidine	Methadone, buprenorphine	83
Mozambique	Codeine, diphenoxylate, fentanyl, morphine, pethidine, pholcodine	n/a	6
Namibia	Alfentanil, codeine, dipipanone, etorphine, fentanyl, methadone, morphine, pethidine, remifentanil, sufentanil, tilidine	n/a	94
Niger	Codeine, fentanyl, morphine, pethidine	n/a	Not reported
Nigeria	Codeine, dihydrocodeine, fentanyl, morphine, pethidine, pholcodine	Methadone	Not reported
Republic of the Congo	Congo, fentanyl, morphine, pethidine	n/a	Not reported
Rwanda	Alfentanil, codeine, dextromoradomide, dihydrocodeine, etorphine, fentanyl, morphine, pethidine, remifentanil	n/a	Not reported
Sao Tome and Principe	Alfentanil, fentanyl, morphine, pethidine	n/a	68
Senegal	Alfentanil, codeine, dextromoradomide, fentanyl, morphine,	n/a	3

	Opioid medications listed as available for medical and scientific use	Opioid substitution therapy	Average consumption of opioids defined in daily doses per million inhabitants per day
	pethidine, sufentanil		
Seychelles	codeine, fentanyl, morphine, pethidine	n/a	266
Sierra Leone	Codeine, dihydrocodeine, diphenoxylate, methadone, morphine, pethidine	n/a	17
Somalia	Codeine, morphine, pethidine	n/a	Not reported
South Africa	Alfentanil, codeine, dextropropoxyphene, dihydrocodeine, dihydromorphine, diphenoxylate, dipipanone, ecgonine, etorphine, fentanyl, heroin, hydromorphone, methadone, morphine, norcodeine, normorphine, pethidine, pholcodine, remifentanil, sufentanil, tilidine	Methadone	546
Swaziland	Alfentanil, codeine, dihydrocodeine, dipipanone, fentanyl, methadone, morphine, pethidine, tilidine	n/a	16
Togo	Alfentanil, fentanyl, morphine, pethidine	n/a	1
Uganda	Codeine, etorphine, fentanyl, morphine, pethidine	n/a	26
United Republic of Tanzania	Codeine, etorphine, heroin, methadone, morphine, pethidine, thebaine	n/a	9
Zambia	Codeine, dextropropoxyphene, dihydrocodeine, diphenoxylate, etorphine, fentanyl, heroin, methadone, morphine, pethidine, pholcodine, thebaine, tilidine	n/a	31
Zimbabwe	Alfentanil, codeine, dextropropoxyphene, diphenoxylate, dipipanone, etorphine, fentanyl, methadone, morphine, pethidine, pholcodine, sufentanil, tilidine	n/a	30

n/a: Opioid substitution treatment not available in this country according to official statistics

--: Indicates no data were available for this country

Note: Average consumption of the nine most consumed narcotic drugs, expressed in defined daily doses for statistical purposes (S-DDD) per million inhabitants per day, taken from the INCB annual estimated consumption reports^{18-19, 82, 315}

7. Discussion

Pharmaceutical opioids have an important role in the treatment of a range of medical and psychological conditions, but, globally, they are inadequately prescribed for the conditions for which we know they are highly effective. Patients (particularly those who are terminally ill) should be given relief from severe pain, and OST should be introduced to help dependent users and avoid the significant risks of HIV transmission and other harm.

Diversion and injection of pharmaceutical opioids is occurring in many countries, but it is important to consider this within the context and the manner of licit availability. Considering the level of concern about its occurrence, there is comparatively little data with which to understand the extent and nature of extra-medical use in each country, but it seems reasonable to expect some level of diversion will occur.

Responses to misuse, diversion and injection should *not* further discourage what we know are inadequate levels of medical use of opioids for the treatment of pain. Unfortunately, there has been little research examining the relative benefits of different policy interventions, a gap that would benefit from systematic research examining different contexts and policy responses across countries⁴³¹, and there seems to be few cases where national policies spanning palliative care, HIV and AIDS, OST and other pain management have been produced. There is much that is not known about how, why, where, and how much diversion is occurring.

For users who have developed dependent use, treatment should be provided: it has positive impacts upon illicit drug use, physical and mental health, and public amenity. OST is an effective HIV prevention strategy that should be considered for implementation as a treatment for IDUs with opioid dependence in communities at risk of HIV epidemics²⁹. We summarise some ways to limit the extent of diversion, injection and related harms in this section; future research requirements are highlighted throughout.

7.1. Epidemiology

Surprisingly little is known about the misuse, diversion and injection of pharmaceutical opioids, despite the tight scheduling of these drugs, and the likelihood that in some low income countries, this is the most commonly injected drug type. Monitoring of trends in South Asia and South East Asia is important – these countries are likely to account for the majority of users injecting pharmaceutical opioids. The evidence of associated harms of pharmaceutical injection is dominated by research in high income countries where use and diversion of pharmaceutical opioids probably differs from low and middle income countries.

7.1.1. Evidence on extra-medical use and injection

Different opioids have different dependence potential, and the forms available may also affect the likelihood of misuse and diversion for injection. There needs to be much more routine monitoring work conducted on this issue, to provide data on the extent of the problem (or otherwise).

There appears to be a general tendency for those opioids that are more available to be those which are more likely to be misused. If a range of pharmaceuticals is available, those which are more potent appear to be more sought after and misused. In countries where strong opioids are not available (e.g. India) other less potent opioids are still used and injected. Where pharmaceutical opioids (even those which are less potent ones) are introduced without sufficient regulation, it seems that there is a risk of misuse and diversion (e.g. United States and Singapore). The challenge, discussed below, is ensuring that such problems do not lead to overly restrictive policy implementation⁹⁶.

On the basis of the current evidence, misuse, diversion and injection of pharmaceutical opioids appears to be a significant problem for the United States, South Asia, South East Asia and some Eastern European countries. The nature of the populations injecting these pharmaceuticals seems very different across

countries. For example, in India, populations of IDUs appear to be developing dependent, injecting use of these drugs; in Australia, injection may be more common among IDUs whose preference is heroin and for whom injection of pharmaceutical opioids is less frequent; in the United States, a generalised epidemic of pharmaceutical opioid use appears to have been driven by overly liberal prescribing for non-specific pain states, leading to a new cohort of dependent opioid users who may switch to injecting their medication, or to injection of heroin if pharmaceutical opioid availability becomes overly restricted.

In terms of injecting risk, the evidence on this topic is limited. Some studies have suggested increased injecting risk among pharmaceutical opioid injectors compared to other IDUs; others have not. The context of opioid use – whether it is among IDUs in contexts where OST is currently available, or whether pharmaceuticals are largely used by otherwise naïve IDUs – may be related to this. The prevalence of HIV and HCV among this group of IDUs is poorly documented in almost every country, except where these drugs are the major drugs of injection. The evidence on the magnitude of HIV risk associated with pharmaceutical opioid injecting – relative to other opioids such as heroin – is limited, although it may be lower if injection occurs less frequently.

7.1.2. Evidence on diversion

Several different mechanisms through which diversion occurs were apparent across different countries. One important factor includes whether injection of these drugs has emerged among existing populations of illicit opioid injectors. A second factor concerns diversion because of inadequate or absent regulation of these drugs. A third involves more limited diversion or injection of OST by those in treatment.

Notwithstanding arguments about their share of the “market”, patients represent a major possible source of diverted medication in every country where opioids can be obtained on prescription. Not all patients are at the same risk of diverting medication. Unfortunately, discussions of “diversion” rarely examine this issue with clarity. All too often, very diverse patient groups are somehow treated as one group, the group being discussed is not explicitly stated, and/or conclusions are made about diversion that might be inappropriately extended to other groups at different diversion risk.

Better monitoring of use, risks and harm among known at-risk populations is required. Problematic use seems concentrated within high-risk groups in many countries; population prevalence estimates of past year use are of limited usefulness for providing information about the extent to which use is causing harm. Treatment data should not be taken to accurately reflect levels of problematic use, since misuse or diversion may reflect a reluctance to enter formal drug treatment for many opioid IDUs in some countries. Such routine data collections are also absent in many countries. Data on patterns of use among at-risk groups should be collected wherever possible, and reported regularly.

More detail is required if effective demand and harm-reduction responses are to be appropriately formulated. Issues such as the patterns of misuse, methods of preparation and extent of other risk behaviours associated with pharmaceutical injection must be investigated.

7.2. Clinical uses of pharmaceutical opioids

Despite clear evidence that pharmaceuticals are highly effective in the treatment of pain and in the treatment of illicit opioid dependence, they typically remain under-utilised for the conditions for which they are most effective: severe malignant pain, severe chronic non-malignant pain, and as a treatment for illicit opioid dependence.

Conversely, in some countries where opioid prescription occurs more liberally and can be provided by GPs with limited training in chronic pain, there may be some over-prescribing to patients presenting with conditions causing chronic non-malignant pain. We consider some guidelines for these three indications, and some general principles are summarised below:

- More education for physicians on how to manage pain and avoid over-prescribing
- Careful and considered diagnoses

- Clear therapeutic goals
- Use of non-drug therapies where appropriate
- Prescription of appropriate type, quantity and formulation of pharmaceuticals
- Education for patients on risks of dependence and effects of medications (and interactions)
- Regular medication reviews
- Monitoring of patients with intractable pain who require ongoing opioid medication

One expert wrote of the US situation that “the more immediate question for doctors in the US and elsewhere is how they should control their own prescribing so that interference by regulators does not discourage appropriate medical use of opiates” (p.812)⁹⁶. This summarises one of the core issues that threaten appropriate treatment of pain conditions that health professionals face if prescribing of pharmaceuticals is to continue without being threatened by over-regulation.

7.2.1. Treatment of cancer and AIDS-related pain

Education of physicians in pain management must be improved, because it is a prerequisite for better assessment and treatment of patients suffering from pain¹⁰⁹ and there is inadequate coverage of pain with opioid pharmaceuticals.

The WHO has developed guidelines for the management of cancer pain. These consist of a staged approach, beginning with non-opioid analgesics before progressing to moderate then high-potency opioids. The use of combination therapy with opioids and non-opioids or other adjuvant modalities is encouraged. This model has been validated, and is reportedly effective in achieving relief in up to 88% of patients¹⁰⁹.

Patients suffering from cancer pain are generally considered to be unlikely to divert their medication. Regulatory controls will serve to minimise risks of others diverting medications intended for this source in many countries.

7.2.2. Treatment of chronic non-malignant pain

As noted in the beginning of this report, the term “chronic pain” refers to many conditions with different aetiologies. The experience of chronic pain is affected by premorbid conditions of the individual and the cultural context of the expression and experience of pain. There is a clear need to better understand both these conditions and the uncertainty about the best ways in which opioids can be used for chronic pain. It seems clear that research is needed to investigate which patients benefit from this form of therapy, and in which circumstances⁹⁶.

This gap is important. There were clear indications that when opioids are available and generally prescribed for this condition, a significant risk for misuse and diversion exists. The striking US example of poorly managed and relatively unregulated use of opioid medications for diffuse pain conditions, which included liberal prescribing by GPs without sufficient experience in pain management, lay testament to the problems inherent in prescribing a drug of dependence for a chronic condition without careful assessment, differential diagnosis, and ongoing supervision. It is highly unlikely that the doctors prescribing oxycodone for pain patients in the United States are sufficiently trained, or are monitoring patient progress carefully, yet experts warn that this is a critical task⁵¹⁹.

7.2.3. Opioid substitution treatment for dependent opioid users

OST should be available for the treatment of IDUs who have developed dependent use of pharmaceutical opioids^{135, 520}. OST is associated with reductions in the frequency of illicit opioid use, fewer injections and injection-related HIV risk behaviours, lower HIV prevalence and incidence, and lower HCV incidence^{135, 521-523}. OST is generally superior to non-drug and antagonist treatments.

OST must be delivered in accordance with evidenced-based guidelines²⁹. In countries where such guidelines have not been developed, this must be addressed. Guidelines need to address²⁹: criteria to define eligibility for substitution treatment; contra-indications; best practice guidelines and relevant

government regulations. Adequate training must be provided for those who will be prescribing OST to ensure appropriate clinical care and patient assessment and monitoring.

Higher methadone doses are associated with longer treatment retention⁵²⁴ and improved outcomes, especially reduced heroin use. The concurrent provision of additional medical services may further improve patient functioning⁴¹¹. Ancillary services such as counselling and primary health care also provide a positive contribution to the outcomes of OST⁴¹¹.

Flexible dosing policies instead of dose restrictions are associated with better retention, and the length of time in treatment is associated with enhanced outcomes. The difference in uptake of buprenorphine and methadone in France can be seen as an illustration of the impact of treatment accessibility⁵²⁵. Methadone is dispensed daily from registered clinics with compulsory urine testing, whereas buprenorphine is prescribed by GPs with no urine testing and takeaway doses permitted. Buprenorphine recipients outnumber methadone recipients by nearly eight to one⁵²⁵.

Supervised administration of dosing is a common feature of OST²⁹. The obvious rationale is to reduce the likelihood of diversion of this medication. Takeaway dosing is nonetheless available in numerous countries. The extent to which takeaway doses may be associated with extensive misuse or diversion probably varies across pharmaceutical opioid preparations. One Australian study found that takeaway methadone dosing was associated with greater diversion and injection among IDUs (diversion and injection was also related to heroin availability, drug preferences and treatment availability in general)⁵²⁶. Similarly, where buprenorphine is dispensed through community pharmacies (as opposed to specialist drug treatment clinics), pharmacists suspect a high level of diversion⁴¹⁸. Further policies such as diluting takeaway doses, closer monitoring of supervised doses, and increased dosages, have been suggested as ways to reduce the levels of OST injecting¹⁵⁹.

The unattractiveness of OST for some dependent opioid users may arise from overly restrictive requirements⁵²⁷. Methadone often requires daily attendance at a dispensing clinic or pharmacy, which limits a client's movements and his/her ability to work, especially if extended travel is involved. Some treatment services may also require regular supervised urine samples and high levels of security at the clinic, contributing to the treatment's unattractiveness. Patients often have clear ideas about which treatment they want and dissatisfaction in being allocated an unwanted treatment is one common reason for early drop-out of randomised controlled trials. It is important that a range of treatment options is available and patients are informed about these options.

7.3. Regulatory responses to ensure medical availability and minimise diversion

"Optimally-designed" drug diversion control programmes have three goals: a) to limit access to only those with a legitimate need for the drug; b) to track and identify cases where control over this access is compromised; and c) to minimise the effect of these controls upon legitimate medical practice⁵²⁸. These general principles must be used to produce a mix of strategies to apply to the context of a given country. The question is: how does a country balance the needs and risks? The "solution" most countries have chosen is very clear: limit supply, at the expense of sufficient availability of opioids for medical and scientific purposes²⁹⁵.

In some countries – particularly in Africa – there is little apparent misuse; there is also inadequate treatment of severe pain for patients that could be relieved. At the other end of the spectrum, there are case examples of countries where access to pharmaceuticals is relatively good for those experiencing even diffuse pain – the United States is a particularly notable one. This access appears to have been aided by relatively liberal regulations allowing GPs to prescribe opioids for those patients who appear to be suffering from pain – both cancer and chronic non-cancer, combined with highly aggressive marketing by pharmaceutical companies selling the products. This has come at the expense of considerable misuse, diversion, and, ultimately, injection among populations of established IDUs, but

certainly in the case of the United States, has also meant all too ready access for a group of otherwise relatively drug naïve persons who are now suffering from established dependent patterns of use.

Diversion of opioid medication should not be considered an issue to be addressed primarily by those involved in the drug and alcohol field (either treatment or research). The work of experts in the area of pain is an important avenue through which responses to this issue are more appropriately focused. Policies and programmes aimed at providing effective treatment for the multiple patient groups considered here should be led by pain specialists.

7.3.1. International regulations

International bodies can and do play an important role in determining pharmaceutical opioid availability. The INCB in particular can place pressure upon countries to increase or further regulate pharmaceutical opioid availability. They have urged many countries to make opioids better available for the effective management of pain, and this is an important change that must be made.

The INCB can also play an important part in ensuring the availability of opioids for OST where illicit opioid dependence is an issue. Given the documented benefits of widespread OST implementation – reduced HIV transmission, reduced opioid overdose, improved wellbeing for patients and improved public amenity – there is a clear public health imperative that should encourage international agencies to assist countries to make OST available where it is required.

The retention of opioid drugs such as buprenorphine under the 1971 UN Convention is important, particularly in countries where more potent opioids are difficult to introduce as OST. It is also appropriate: buprenorphine has effects that are significantly different from morphine (which determines a drug's inclusion under the 1961 Convention); it is a competitive partial agonist, with clear ceiling effects and comparatively lower dependence potential.

7.3.2. National policies on palliative care and pain management

Palliative care, whether for people with HIV or for others with chronic illness, is an essential part of any health care system. The WHO has identified three foundation measures to scaling up the provision of such care⁵²⁹. The following is taken directly from the WHO report on this topic:

“1. Development of a national policy: Palliative care is not recognized in many government plans. For example, Uganda is the only country in sub-Saharan Africa that has adopted WHO's foundation measures for establishing a palliative care service. While a handful of other countries in the region have some provision for palliative care, this is provided outside the government health service. Advocacy for provision of palliative care as part of the essential health service system by the government will be a move towards ensuring some budget allocation for provision of care for those with chronic illnesses.

2. Training for health workers and public education: Understanding of what palliative is, and training to carry it out, is necessary for policy makers, health professionals and families. For HIV, such training needs to be linked to training on areas specific to HIV such as transmission and control of transmission, issues of stigma and discrimination, and respect for confidentiality.

3. Pain control: Pain is as important in HIV infection as it is in cancer. Some studies have shown that pain is reported as a primary symptom by more than half of people with HIV. In many countries, this will require training and awareness raising among health professionals, and advocacy to change laws to make effective pain relief available.”⁵²⁹

Innovative work is being conducted by pain experts to aid countries to develop more effective policies and regulations regarding pharmaceutical opioids²⁹⁵. The US PPSG has developed methods and resources to assist governments and pain and palliative care groups to examine national policies and make regulatory changes, and has already worked with Romania, India, and Italy (who had overly restrictive policies towards opioid availability). It is developing a training program for fellows from low and middle income countries, enhanced support of collaborators working on opioid availability, an internet course in international pain policy, an improved website with policy resources and country

profiles, and new approaches to the study of opioid consumption indicators²⁹⁵. The comparative over-emphasis of most research and policy work on illicit opioid use and IDU has been at the expense of the much larger group of patients who require pain relief.

7.3.3. Opioid availability and regulation

More opioid medications should be developed and registered in many countries. As the tables in this report show, many countries not only have highly inadequate opioid supply, they also do not stock the medicines listed by WHO as essential in the treatment of acute and chronic pain of cancer and non-cancer types. Fewer still stock the model medicines for treatment of illicit opioid dependence.

Pharmaceutical regulation is a highly challenging task. Simplistic attempts to restrict availability are liable to have negative therapeutic implications for legitimate patients⁴⁹, both those suffering from chronic pain *and* those who wish to address their dependent opioid use. Over-regulation will inappropriately reduce supply for pain patients and for persons who have developed opioid dependence. If unaccompanied by other interventions, efforts directed at reducing the supply of one type of pharmaceutical might lead to the increased use of another⁵⁰.

The case of India, where additional regulations were introduced in 1985, is an excellent example of what can go wrong: in the 12 years following the introduction of laws aimed at reducing the extent of diversion of morphine, the country's morphine consumption had fallen by 97%⁵. **The careful development of policies for provision of opioids for severe pain, and trial of outpatient treatment, has seen successful treatment of thousands of patients with limited or no diversion by either patients or medical professionals⁵.**

When changes are made to such systems, changes will occur in the level of prescriptions. In Spain, treatment of cancer pain was considered inadequate due to excessive paperwork required of physicians; when the restrictions were relaxed, with less paperwork required for patient prescriptions to be made, prescriptions increased in Spain, particularly for slow release oral morphine⁵³⁰.

In countries where OST is not currently available but where illicit opioid dependence is an issue, OST should be introduced. The following regulatory issues need to be considered: legislative and regulatory controls over access; registration or accreditation of treatment providers; registration of individuals receiving OST; and mechanisms for monitoring treatment quality and outcomes²⁹.

7.3.4. Monitoring of drug marketing

Pharmaceutical companies can and will play an important role in opioid pharmaceutical use and misuse. The US example of oxycodone highlights the fact that unbalanced depictions of dependence risk and overly generalised marketing to health professionals may pose a very significant risk for populations that are predisposed to taking up medications for a variety of health conditions^{27, 112-113}.

Pharmaceutical companies have considerable resources, often much greater than a country does for regulation. In the case of Italy, government responses to inadequate prescription of pharmaceutical opioids led to changes in government regulations for doctors' prescribing, which had no impact^{19, 531}. In contrast, changes in the costs of fentanyl patches, and a massive marketing drive by the company selling them in Italy, resulted in a large increase in the prescription and use of this form of medication as a first line treatment (despite recommendations advising otherwise)⁵³¹.

One way in which availability needs to be regulated therefore includes monitoring of drug company promotion of pharmaceutical opioids to the medical profession and the broader community to ensure that appropriate use occurs.

7.3.5. Prescription monitoring and professional standards for prescribers

Prescribers play an obvious role in ensuring appropriate provision of opioids for patients who need them, while minimising the risks for misuse and diversion among their patients. There is a need for appropriate training to be provided to medical professionals about the characteristics of different opioid

medications, strategies that might be used to reduce diversion, and methods to suggest to patients to reduce the likelihood of over-dosing and misuse. Prescribers must be given adequate training.

Prescription monitoring systems – whereby medical professionals are required to fill in multiple forms to prescribe, with forms being sent to health authorities for recording – will attenuate “inappropriate” (or ill-considered) prescribing. There is a high risk, however, that under-prescribing of pain medications may be exacerbated by programs that monitor prescriptions. They typically involve greater paperwork, and sometimes multiple bureaucratic steps. These sorts of systems may lead to the substitution of less potent drugs and under-treatment of pain^{528, 532-533}. There is evidence from multiple countries to suggest that the introduction of overly onerous reporting mechanisms deters doctors from prescribing these drugs where such drugs might have proven useful^{192, 532-533}. Such systems need to be carefully developed.

In the United States, some states have implemented methods of monitoring prescriptions in which the prescriber writes a prescription for controlled drugs on a pre-printed, serially numbered prescription form in either duplicate or triplicate, with one copy being sent by the dispenser to the state regulatory agency who enters it into a database. The database can then be used to monitor aberrant prescribing and dispensing, as well as doctor-shopping by patients. The limitation of electronic data transfer systems is that the majority of pharmacies must have computer capabilities⁵²⁸ – these systems are well outside the capacity of many low income countries, but they should be implemented in countries with sufficient resources.

7.4. Drug preparations and formulations

7.4.1. Less injectable formulations and preparations

The pharmacological formulation of different pharmaceuticals may impact on their potential for misuse and/or injection⁵³⁴. Research in this area should be continued for obvious public health reasons.

There is increasing debate among experts in this field about the ways in which formulations less prone to being misused or injected can be developed⁵³⁴⁻⁵³⁹. One example is a formulation of both buprenorphine and naloxone, developed to deter injection of buprenorphine^{194, 540}. When taken sublingually, the effects of the buprenorphine-naloxone combination are the same as for buprenorphine alone (no appreciable amounts of naloxone are absorbed²³), but when injected by heroin or methadone-dependent persons, naloxone may precipitate unpleasant withdrawal symptoms^{viii, 23, 540-542}. Other agonist-antagonist preparations are being investigated including a mixed methadone-naloxone preparation⁶⁶.

Even formulations developed to be less prone to injection (and diversion) will not be completely successful. There is evidence that some users continue to inject buprenorphine-naloxone⁴²⁰, at least in situations where heroin or methadone supply is inconsistent on the illicit market. In some contexts, those who inject buprenorphine-naloxone may have adapted to continue injecting the formulation while also avoiding withdrawal symptoms. In other cases, this formulation may be injected by heroin injectors when in withdrawal, thereby *reducing* the intensity of heroin withdrawal symptoms.

The preparation may also deter injection among some IDUs. Dilution of methadone syrup may decrease the likelihood that it is injected⁵⁴³. In the case of temazepam (a benzodiazepine), the removal of a gel capsule preparation in Australia following persistently high levels of injection among regular IDUs^{11, 544} was associated with reductions in the injection of this drug, and in some states, a reduction in benzodiazepine injection overall⁵⁴⁵. There may have been some unintended shifting of harms for some users in areas where illicit drug availability is traditionally low, with some evidence that injection of benzodiazepine tablets or antihistamine gel capsule formulations began after temazepam gel capsules were removed⁷⁴.

^{viii} Louisa Degenhardt, Briony Larance and Richard P. Mattick have received an untied educational grant from Reckitt Benckiser to examine the extent of misuse, diversion and injection of buprenorphine-naloxone in Australia, 2006-2008.

Notably, these responses to diversion for injection, even if totally effective in stopping *injection*, will not necessarily impact upon *misuse* generally.

7.4.2. Injectable formulations for opioid substitution treatment

Not all people who inject drugs will cease injecting, and some will inject a formulation or preparation that is designed not to be injected. Some countries have considered injectable formulations to be provided under treatment to some IDUs who have not responded to standard OST^{141, 546-548}. This includes injectable morphine and heroin, which have been trialled and implemented in some countries, with an emphasis upon improving patient acceptability of the OST formulation so that treatment-resistant users are more motivated to enter and continue in treatment⁵⁴⁹, because they have pharmacokinetic profiles mimicking diacetylmorphine, with rapid peak concentrations of diacetylmorphine and 6-acetylmorphine⁵⁴⁶. Some have concluded that there is a “mounting onus on the realm of politics to translate the largely positive data from completed HAT [heroin assisted treatment] science into corresponding policy and programming in order to expand effective treatment options for the high-risk population of illicit opioid users” that this form of treatment aims to help (p.552)⁵⁴⁹.

The use of injectable formulations involves a number of logistical and clinical issues^{142, 550-556}. No studies have compared the effectiveness of injectable methadone/heroin with the provision of oral methadone delivered in optimal treatment conditions (e.g. high dose >80mg, <100mg; daily supervised administration; psychosocial support, etc.), although there is a large randomised trial underway in the United Kingdom¹⁴². The cost of injectable opioids is likely to be high if given under medically supervised conditions, as in Switzerland.

Notwithstanding this, **for those dependent opioid injectors who have tried other OST forms and repeatedly struggled to remain in treatment, injectable heroin or morphine may represent one alternative to allow them to become more stabilised**⁵⁵⁷. Further research is needed to examine the feasibility and cost effectiveness of such OST forms. This form of treatment is obviously applicable only in countries where OST is currently available and there is a demonstrated population of treatment-resistant opioid dependent persons.

7.5. Harm reduction

7.5.1. Opioid substitution treatment

As described early in this report, OST reduces the level of HIV risks and HIV transmission^{29, 135} and allows for stabilisation of persons who have already contracted HIV¹³⁶⁻¹⁴⁰. The expansion of OST provision in some countries is thought to underlie the reductions in HIV incidence where IDU was in an important vector¹⁴⁰. It is also thought to underlie the reduction in opioid overdose and AIDS mortality rates in countries which significantly expanded their OST coverage⁵⁵⁸⁻⁵⁵⁹.

OST can therefore be seen as an HIV harm-reduction measure in addition to an intervention to reduce demand for diverted pharmaceutical opioids.

7.5.2. Needle and syringe programmes

NSPs have been shown to reduce HIV transmission and injecting risk behaviour. Injecting equipment must be made available as a matter of priority in regions where access is currently limited, yet pharmaceutical opioid injection is occurring, and HIV risk behaviours are common, such as South Asia.

Although sharing of injecting equipment is generally perceived as dangerous by IDUs, a considerable proportion of them reportedly share them in South Asian settings – the driving force being individual economics, as most of them are poor. There are also some misperceptions that stand in the way of safer injecting practices in some instances¹⁸³, underscoring the importance of education for people who inject drugs. A rapid assessment in 2006 of AusAID/United Nations Development Program (UNDP) supported Harm Reduction Projects in Nepal by nine non-governmental organisation (NGO) partners across the

country clearly revealed that the project management unit of UNDP played a very crucial role in managing and monitoring these projects, with some sites recording near zero sharing of injection equipment by IDUs⁵⁶⁰.

Another issue is whether injecting equipment that facilitates injection of pharmaceutical preparations (e.g. pill filters, large barrels/needles and vein infusion kits) should be made available. Some have recommended *reducing* the availability of equipment for injection of non-injectable formulations such as methadone syrup⁵⁴³. Not all IDUs will cease injecting, however. Among those IDUs who continued to inject methadone syrup after equipment was banned, there was greater re-use of equipment, with the recommendation that additional policy initiatives were required to further address this issue¹⁵⁹. There is a tension, then, between providing equipment that facilitates injection of these non-injectable drugs, and reducing overall injection at the expense of those who choose to continue doing so. It has been suggested that more comprehensive responses (e.g. including dilution of methadone syrup) are required¹⁸², since removing access to equipment for injecting methadone syrup clearly has not led to a complete cessation of injecting for some IDUs.

7.5.3. Education for injecting drug users

Particularly in countries where pharmaceutical opioid injection is occurring, attempts should be made to provide factual information to IDUs about the risks of injecting these medications, and ways in which harm can be reduced. This includes:

- Education among IDUs regarding overdose risk, HIV/HCV risk behaviour and risks associated with non-sterile injecting practices.
- Education regarding risks associated with injecting pharmaceuticals intended for oral administration – vascular damage and infectious/non-infectious complications.

7.6. HIV treatment

Interventions to address HIV among those who inject pharmaceutical opioids should be consistent with the UNAIDS essential package for prevention and care of injecting drug users^{ix}. Some of these have already been discussed above. The package includes:

- information, education and communication (IEC);
- full range of OST options;
- implementation of harm-reduction measures;
- voluntary confidential HIV counselling and testing;
- prevention of sexual transmission of HIV;
- access to primary health care;
- access to antiretroviral therapy; and
- promotion, protection and respect for human rights – and particularly anti-stigma and discrimination measures.

OST should be integrated with other HIV preventive interventions and services, and with treatment and care of people living with HIV²⁹. HAART should be available to those who need it⁵⁶¹. In low and middle income countries, access to such treatment is often especially difficult. Discussions of treatment

^{ix} See for example http://data.unaids.org/UNA-docs/cco_idupolicy_en.pdf

coverage are beyond the scope of this review, but access to effective treatment for HIV will vary importantly across the globe for persons with HIV, including those who are opioid dependent.

Poor adherence to HIV medication may be more common among those who have untreated drug use problems⁵⁶²⁻⁵⁶⁴. Persons presenting with opioid dependence who are also HIV positive should be encouraged to address their drug use⁵⁶²; OST has been shown to increase HIV treatment adherence among this population⁵⁶⁵.

Those actively using drugs should be offered treatment for HIV, but clinicians should provide good support to assist clients with adhering to medication⁵⁶². Part of good clinical practice involves assessment for potential non-adherence and this should be conducted carefully. This should be ongoing but evidence suggests that a particular focus should be placed upon maintaining adherence in the first four to six months of treatment, which has been found to be an important factor in improving the treatment outcome⁵⁶².

7.7. Future research

There is an imperative for good research on this topic⁵⁶⁶. Concerns about inappropriate responses to evidence of diversion and injection can no longer preclude research into this issue. Lack of data on the topic will only serve to maintain the status quo, which appears to be a tendency to limit availability for pharmaceutical opioids for medical and scientific purposes. Some areas of research need include but are not limited to:

- systematic collection of detailed data on pharmaceutical opioid availability for medical purposes;
- regular collection of data on the extent and nature of extra-medical use of pharmaceutical opioids, including injection;
- studies examining the relationship between pharmaceutical opioid injection among IDUs and the availability of other illicit drugs;
- studies examining the reasons for pharmaceutical opioid extra-medical use and injection among users from different country contexts and different subpopulations of users within countries;
- studies examining the factors that maximise attractiveness of OST while minimising diversion risk;
- research documenting the prevalence of HIV and HCV among those who inject pharmaceutical opioids;
- research into formulations of pharmaceutical opioids that reduce the risk of injection;
- research into formulations of pharmaceutical opioids that pose less risk of harmful use;
- evaluation of national policies for regulation of pharmaceutical opioids in low and middle income countries;
- research to examine the feasibility and cost effectiveness of injectable forms of OST for those clients who have not succeeded in standard forms of OST;
- further research into the ways in which opioids can be used for chronic pain: which patients benefit from this form of therapy, and in which circumstances;
- research examining the influence of policy in both facilitating and restricting health promotion and harm reduction among those who inject pharmaceutical opioids; and
- review of current national and international legislation through which pharmaceutical companies can be held accountable for policies and procedures that facilitate large scale diversion of their products.

8. Conclusions

Pharmaceuticals have a legitimate and important role in the treatment of a range of medical and psychological conditions. They are under-utilised globally for the indications for which they have been demonstrated and regarded as essential. These medications must be provided to patients who would benefit from them. Diversion should be anticipated to occur and steps should be taken to limit its extent and mitigate the negative consequences of this practice.

On the basis of the current evidence, misuse, diversion and injection of pharmaceutical opioids appears to be a significant problem for the United States, South Asia, some Eastern European countries, and, to a lesser extent, Canada, New Zealand and Australia. The nature of the populations injecting these pharmaceuticals seems very different across countries. The prevalence of HIV among those injecting these drugs also probably varies widely across countries but was not specifically reported for the vast majority of countries.

The current review of the evidence on the epidemiology, and consideration of responses, leads to the following recommendations:

- International regulations that do not place pharmaceutical opioids under overly restrictive schedules under International Treaties.
- Development of comprehensive national policies on palliative care, pain management and OST.
- Adequate provision of pharmaceutical opioids for the treatment of pain.
- Expansion of OST in countries where illicit opioid dependence has developed.
- Regulation of pharmaceutical opioids including consideration of prescription monitoring.
- Training and continuing education for those prescribing opioids on safe levels of prescribing, precautions required to ensure patients have optimum doses while minimising overdose risk, and other mechanisms to ensure appropriate care of patients.
- Systematic collection of data on pharmaceutical availability for medical purposes, compiled with data on patterns of injecting drug use, including pharmaceutical opioid injection, and considering the availability of other illicit drugs.

9. References

1. The Warsaw declaration: A framework for effective action on HIV/AIDS and injecting drug use. (2003) 2nd International Policy Dialogue on HIV/AIDS: 12-14 November 2003, Warsaw, Poland.
2. Joint United Nations Programme on HIV/AIDS (UNAIDS)/World Health Organization. (2006) AIDS epidemic update.
3. HIV/AIDS prevention, treatment and care among injecting drug users and in prisons. (2005) Ministerial meeting on "Urgent response to the HIV/AIDS epidemics in the Commonwealth of Independent States": 31 March 2005 - 1 April 2005, Moscow.
4. Cleaver H. (2007) Georgian drug misusers switch to Western heroin substitute. *BMJ*; 334(7598): 821.
5. Rajagopal MR, Joranson DE, Gilson AM. (2001) Medical use, misuse, and diversion of opioids in India. *The Lancet*; 358: 139-143.
6. Basu D, Mattoo SK, Malhotra A, Gupta N, Malhotra R. (2000) A longitudinal study of male buprenorphine addicts attending an addiction clinic in India. *Addiction*; 95(9):1363-1372.
7. Mazlan M, Schottenfeld R, Chawarski M. (2006) New challenges and opportunities in managing substance abuse in Malaysia. *Drug and Alcohol Review*; 25(5): 473-478.
8. Compton WM, Volkow ND. (2006) Major increases in opioid analgesic abuse in the United States: Concerns and strategies. *Drug and Alcohol Dependence*; 81(2): 103-107.
9. Larance B, Degenhardt L, Dillon P, Copeland J. (2005) Rapid assessment of performance and image enhancing drugs (PIEDs) in New South Wales: Feasibility study 2005. Sydney: National Drug and Alcohol Research Centre, University of New South Wales.
10. Ross J, Darke S. (2000) The nature of benzodiazepine dependence among heroin users in Sydney, Australia. *Addiction*; 95(12): 1785-1793.
11. Dobbin M, Martyres RF, Clode D, Champion De Crespigny FE. (2003) Association of benzodiazepine injection with the prescription of temazepam capsules. *Drug & Alcohol Review*; 22(2): 153-157.
12. Longo LP, Johnson B. (2000) Addiction: Part I. Benzodiazepines – side effects, abuse risk and alternatives. *American Family Physician*; 61(7): 2121-2128.
13. World Health Organisation. (2007) Lexicon of alcohol and drug terms. Geneva: World Health Organization.
14. United Nations Office on Drugs and Crime. (2007) World Drug Report 2006. Vienna: United Nations.
15. Wartell J, La Vigne NG. (2004) Prescription fraud. Problem-oriented guide for police. Problem-specific guides series. Guide No. 24; US Department of Justice.
16. Inciardi JA, Surratt H, Kurtz SP, Burke JJ. (2006) The diversion of prescription drugs by health care workers in Cincinnati, Ohio. *Substance Use & Misuse*; 41: 255-264.
17. Drugs and Crime Prevention Committee. (2006) Inquiry into the misuse/abuse of benzodiazepines and other forms of pharmaceutical drugs in Victoria. Interim Report. Melbourne: DCPC, Parliament of Victoria.
18. International Narcotics Control Board. (2006) Narcotic Drugs: Estimated World Requirements for 2006. Vienna: United Nations.
19. International Narcotics Control Board. (2007) Annual Report of the INCB 2006. Vienna: United Nations.
20. Ward J, Mattick RP, Hall W (eds). (1998) *Methadone Maintenance Treatment and Other Opioid Replacement Therapies*. Amsterdam: Harwood Academic Publishers.
21. World Health Organization. (year?) WHO Essential medicines library.
22. Carrieri MP, Amass L, Lucas GM, Vlahov D, Wodak A, Woody GE. (2006) Buprenorphine use: The international experience. *Clinical Infectious Diseases*; 43(4): S197-S215.
23. Elkader AS, B. (2005) Buprenorphine: Clinical pharmacokinetics in the treatment of opioid dependence. *Clinical Pharmacokinetics*; 44(7): 661-680.
24. Geib A-J, Babu K, Ewald MB, Boyer EW. (2006) Buprenorphine/naloxone. CNS depression and respiratory insufficiency after inadvertent administration in infants: 5 case reports. *Pediatrics*; 118(4): 1746-1751.
25. Dum J, Blasig J, Herz A. (1981) Buprenorphine: demonstration of physical dependence liability. *European Journal of Pharmacology*; 70: 293-300.
26. Quinn DI, Wodak A, Day RO. (1997) Pharmacokinetic and pharmacodynamic principles of illicit drug use and treatment of illicit drug users. *Clin Pharmacokinetics*; 33(5): 344-400.
27. Davis M, Varga J, Dickerson D, Walsh D, LeGrand S, Lagman R. (2003) Normal-release and controlled-release oxycodone: pharmacokinetics, pharmacodynamics, and controversy. *Supportive Care in Cancer*; 11(2): 84-92.
28. MIMS Online. (2007) MIMS Online website.
29. World Health Organisation/United Nations Office of Drugs and Crime/ Joint United Nations Programme on HIV/AIDS. (2004) WHO/UNODC/UNAIDS position paper: Substitution maintenance therapy in the management of opioid dependence and HIV/AIDS prevention. Geneva: World Health Organization.
30. Mitra S, Sinatra RS. (2004) Perioperative Management of Acute Pain in the Opioid-dependent Patient. *Anesthesiology*; 101(1): 212-227.
31. Savage SR. (1999) Opioid therapy of chronic pain: Assessment of consequences. *Acta Anaesthesiologica Scandinavica*; 43(9): 909-917.
32. American Psychiatric Association. (1994) *Diagnostic and Statistical Manual of Mental Disorders* (4th ed). Washington, DC.
33. World Health Organization. (1993) The ICD-10 Classification of Mental and Behavioural Disorders – Clinical descriptions and diagnostic guidelines. Geneva: World Health Organization.
34. Wall R, Rehm J, Fischer B, Brand's B, Gliksman L, Stewart J, et al. (2000) Social costs of untreated opioid dependence. *Journal of Urban Health*; 77(4): 688-722.
35. White AG, Birnbaum HG, Mareva MN, Daher M, Vallow S, Schein J, et al. (2005) Direct costs of opioid abuse in an insured population in the United States. *Journal of Managed Care Pharmacy*; 11(6): 469-479.
36. Degenhardt L, Hall W, Lynskey M, Warner-Smith M. (2004) Chapter 13. Illicit drug use. In: Ezzati M, Lopez AD, Rodgers A, Murray R (eds). *Comparative Quantification of Health Risks: Global and Regional Burden of Disease Attributable to Selected Major Risk Factors*. 2nd ed, Geneva: World Health Organization: 1109-1176.

37. Degenhardt L, Hall W, Warner-Smith M. (2006) Using cohort studies to estimate mortality among injecting drug users that is not attributable to AIDS. *Sexually Transmitted Infections*; 82: 56-63.
38. Bigelow GE. (1991) Human drug abuse liability assessment: opioids and analgesics. *Addiction*; 86(12): 1615-1628.
39. Compton WM, Volkow ND. (2006) Abuse of prescription drugs and the risk of addiction. *Drug and Alcohol Dependence*; In press.
40. Carter LP, Griffiths RR, Sues PE, Casada JH, Wallace CL, Roache JD. (2007) Relative abuse liability of indiplon and triazolam in humans: A comparison of psychomotor, subjective, and cognitive effects. *Journal of Pharmacology And Experimental Therapeutics*; jpet.107.119693.
41. Jaffe JH, Bloor R, Crome I, Carr M, Alam F, Simmons A, et al. A postmarketing study of relative abuse liability of hypnotic sedative drugs. *Addiction* 2004;99(2):165-173.
42. Comer SD, Collins ED. (2002) Self-Administration of intravenous buprenorphine and the buprenorphine/naloxone combination by recently detoxified heroin abusers. *J Pharmacol Exp Ther*; 303(2): 695-703.
43. Joranson DE, Ryan KM, Gilson AM, Dahl JL. (2000) Trends in Medical Use and Abuse of Opioid Analgesics. *JAMA*; 283(13): 1710-1714.
44. Gilson AM, Ryan KM, Joranson DE, Dahl JL. (2004) A reassessment of trends in the medical use and abuse of opioid analgesics and implications for diversion control: 1997-2002. *Journal of Pain and Symptom Management*; 28(2): 176-188.
45. Fischman MW, Mello NK. (1989) *Testing for abuse liability of drugs in humans*. Rockville: US Department of Health and Human Services, National Institute on Drug Abuse.
46. Fudala PJ, Johnson RE. (2006) Development of opioid formulations with limited diversion and abuse potential. *Drug and Alcohol Dependence*; 83(Suppl 1): S40-S47.
47. Cicero TJ, Inciardi JA, Munoz A. (2005) Trends in Abuse of OxyContin(R) and Other Opioid Analgesics in the United States: 2002-2004. *The Journal of Pain*; 6(10): 662-672.
48. Farre M, Cami J. (1991) Pharmacokinetic considerations in abuse liability evaluation. *Addiction*; 86(12): 1601-1606.
49. Quigley PA. (2001) Public health dimensions of benzodiazepine regulation. *Critical Public Health*; 11(4).
50. Topp L. (2006) Pharmaceutical diversion: Accidental harm reduction? *Of Substance*; 4(2): 6-9.
51. Clark NC, Lintzeris N, Muhleisen P. (2002) Severe opiate withdrawal in a heroin user precipitated by a massive buprenorphine dose. *Medical Journal of Australia*; 176: 167-168.
52. McCabe SE, Cranford JA, Boyd CJ, Teter CJ. (2007) Motives, diversion and routes of administration associated with nonmedical use of prescription opioids. *Addictive Behaviors*; 32(3): 562-575.
53. Daniulaityte R, Carlson RG, Kenne DR. (2006) Initiation to pharmaceutical opioids and patterns of misuse: Preliminary qualitative findings obtained by the Ohio Substance Abuse Monitoring Network. *Journal of Drug Issues*; 36(4): 787-808.
54. Degenhardt L, Black E, Breen C, Bruno R, Kinner S, Roxburgh A, et al. (2006) Trends in morphine prescriptions, illicit morphine use and associated harms among regular injecting drug users in Australia. *Drug and Alcohol Review*; 25(5): 403-412.
55. Vlahov D, O'Driscoll P, Mehta SH, Ompad DC, Gern R, Galai N, et al. (2007) Risk factors for methadone outside treatment programs: Implications for HIV treatment among injecting drug users. *Addiction*; 102(5): 771-777.
56. Fischer B, Rehm J, Brissette S, Brochu S, Bruneau J, El-Guebaly N, et al. (2005) Illicit opioid use in Canada: Comparing social, health, and drug use characteristics of untreated users in five cities (OPICAN Study). *Journal of Urban Health*; 82(2): 250-266.
57. O'Reilly B, Leibrick F, Huxtable D, Chenhall R. (2004) Benzodiazepine and pharmaceutical opioid misuse and their relationship to crime: An examination of illicit prescription drug markets in the Northern Territory. NDLERF Monograph No. 20. Tasmania: National Drug Law Enforcement Research Fund.
58. Fraser S, Hopwood M, Treloar C, Brener L. (2004) Needle fixations: Medical constructions of needle fixation and the injecting drug user. *Addiction Research and Theory*; 12(1).
59. McBride AJ, Pates RM, Arnold K, Ball N. (2001) Needle fixation, the drug user's perspective: A qualitative study. *Addiction*; 96(7): 1049-1058.
60. Dasgupta N, Kramer ED, Zalman M, Carino Jr S, Smith M, Haddox D, et al. (2006) Association between non-medical and prescriptive usage of opioids. *Drug & Alcohol Dependence*; 82: 135-142.
61. Butler SF, Benoit C, Budman S, Fernandez K, McCormick C, Venuti SW, et al. (2006) Development and validation of an Opioid Attractiveness Scale: A novel measure of the attractiveness of opioid products to potential abusers. *Harm Reduction Journal*; 3(5).
62. Sellers EM, Schuller R, Romach MK, Horbay GLA. (2006) Relative abuse potential of opioid formulations in Canada: a structured field study. *Journal of Opioid Management*; 2(4): 219-227.
63. Alho H, Sinclair D, Vuori E, Holopainen A. (2007) Abuse liability of buprenorphine-naloxone tablets in untreated IV drug users. *Drug and Alcohol Dependence*; 88(1): 75-78.
64. Brookoff D. (1993) Abuse potential of various opioid medications. *J Gen Int Med*; 8: 688-690.
65. Fountain J, Strang J, Gossop M, Farrel M, Griffiths P. (2000) Diversion of prescribed drugs by drug users in treatment: analysis of the UK market and new data from London. *Addiction*; 95(3): 393-406.
66. Loimer N, Presslich O, Grunberger J, Linzmayer L. (1991) Combined naloxone/methadone preparations for opiate substitution therapy. *Journal of Substance Abuse Treatment*; 8: 157-160.
67. World Health Organization. (2000) Achieving balance in national opioid drugs control policy: A guideline for assessment. Geneva: World Health Organization.
68. Pain and Policy Studies Group. (2002) Availability of Opioid Analgesics in Eastern Europe. Madison: Wisconsin, University of Wisconsin: Pain & Policy Studies Group/WHO Collaborating Center for Policy and Communications in Cancer Care.
69. World Health Organization. (1986) Cancer pain relief. Geneva.
70. Pain and Policy Studies Group. (2002) Opioid analgesics: Trends, Guidelines, Resources. Madison, Wisconsin: Pain & Policy Studies Group, WHO Collaborating Center for Policy and Communications in Cancer Care.
71. Forman RF. (2003) Availability of Opioids on the Internet. *JAMA*; 290(7): 889.
72. McCabe SE, Boyd CJ. (2005) Sources of prescription drugs for illicit use. *Addictive Behaviours*; 30: 1342-1350.
73. Inciardi JA, Surratt HL, Kurtz SP, Cicero TJ. (2007) Mechanisms of Prescription Drug Diversion Among Drug-Involved Club- and Street-Based Populations. *Pain Medicine*; 8(2): 171-183.

74. Bruno R. (2004) Benzodiazepine and pharmaceutical opioid misuse and their relationship to crime: An examination of illicit prescription drug markets in Tasmania. NDLERF Monograph No. 19. Tasmania: National Drug Law Enforcement Research Fund.
75. Smith B, Miller P, O'Keefe B, Fry C. (2004) Benzodiazepine and pharmaceutical opioid misuse and their relationship to crime: An examination of illicit prescription drug markets in Melbourne. NDLERF Monograph No. 18. Tasmania: National Drug Law Enforcement Research Fund.
76. Stelfox HT, Redelmeier DA. (2003) An analysis of one potential form of health care fraud in Canada. *Canadian Medical Association Journal*; 169(2): 118-119.
77. Fountain J, Griffiths P, Farrell M, Gossop M, Strang J. (1998) Diversion tactics: How a sample of drug misusers in treatment obtained surplus drugs to sell on the illicit market. *International Journal of Drug Policy*; 9(3): 159-167.
78. Hurwitz W. (2005) The Challenge of Prescription Drug Misuse: A Review and Commentary. *Pain Medicine*; 6(2): 152-161.
79. Day C, Conroy E, Lowe J, Page J, Dolan K. (2006) Patterns of drug use and associated harms among rural injecting drug users: Comparisons with metropolitan injecting drug users. *Australian Journal of Rural Health*; 14(3): 120-125.
80. Dangerous Drugs Board. (2005) A pilot study on nalbuphine hydrochloride abuse in Cebu and metro Manila. Manila: Dangerous Drugs Board of the Philippines.
81. Haydon E, Rehm J, Fischer B, Monga N, Adlaf E. (2005) Prescription drug abuse in Canada and the diversion of prescription drugs into the illicit drug market. *Canadian Journal of Public Health*; 96(6): 459-461.
82. Incardi JA, et al. (2006) The Diversion of Prescription Drugs by Health Care Workers in Cincinnati, Ohio. *Substance Use & Misuse*; 41: 255-264.
83. Selva C. (1997) International control of opioids for medical use. *European Journal of Palliative Care*; 4(6): 194-198.
84. American Academy of Pain Medicine and American Pain Society. (1997) The use of opioids for the treatment of chronic pain: A consensus statement from the American Academy of Pain Medicine and the American Pain Society.
85. Beubler E, Jaksch W, Devulder J, Le Poloin B, Bo Honsen O, Meynadier J, et al. (2006) The white paper on opioids and pain: A pan-European challenge: The European white paper on the use of opioids in chronic pain management. *Journal of Pain & Palliative Care Pharmacotherapy*; 20(3): 79-87.
86. Resnik DB, Rehm M, Minard RB. (2001) The undertreatment of pain: scientific, clinical, cultural, and philosophical factors. *Med Health Care Philos*; 4: 277-288.
87. United Nations Commission on Narcotic Drugs. (2005) Report on the forty-eighth session (19 March 2004 and 7-11 March and 7-8 December 2005). Economic and Social Council Official Records 2005. New York: United Nations.
88. Salas-Herrera IG, Monestel R. (2002) Costa Rica marks improvement in morphine consumption [8]. *Journal of Pain & Symptom Management*; 24(3): 286-288.
89. Liliana De Lima MH, Sakowski JA, Stratton Hill C, Bruera E. (2001) Legislation analysis according to WHO and INCB criteria on opioid availability: A comparative study of 5 countries and the state of Texas. *Health Policy*; 56(2): 99-110.
90. Angarola R. (1990) National and international regulation of opioid drugs: Purpose, structures, benefits and risks. *Journal of Pain and Symptom Management*; 5(1): 6-11.
91. Rajagopal MR, Joranson DE, Gilson AM. (2001) Medical use, misuse, and diversion of opioids in India.[see comment]. *The Lancet*; 358(9276): 139-143.
92. World Health Organization. (2004) A Community Health Approach to Palliative Care for HIV/AIDS and Cancer Patients. Geneva.
93. Bloodworth D. (2005) Issues in opioid management. *American Journal of Physical Medicine & Rehabilitation*; 84(3 Suppl): S42-55.
94. Portenoy R, Farrar J, Backonja M, Cleeland C, Yang K, Friedman M, et al. (2007) Long-term Use of Controlled-release Oxycodone for Noncancer Pain: Results of a 3-year Registry Study. *Clinical Journal of Pain*; 23(4): 287-299.
95. Eriksen J, Sjogren P, Bruera E, Ekholm O, Rasmussen NK. (2006) Critical issues on opioids in chronic non-cancer pain: An epidemiological study.[see comment]. *Pain*; 125(1-2): 172-179.
96. Ballantyne JC. (2007) Regulation of opioid prescribing. *British Medical Journal*; 334(7598): 811-812.
97. American Academy of Pain Medicine and American Pain Society. (1997) The use of opioids for the treatment of chronic pain: A consensus statement from the American Academy of Pain Medicine and the American Pain Society.
98. Ballantyne JC. (2006) Opioids for chronic pain: Taking stock. *Pain*; 125: 3-4.
99. Baca C, Grant K. (2007) Mortality from opioid analgesics must not be ignored.[comment]. *Pain*; 128(3): 288; author reply 288-289.
100. Lipman AG. (2007) Treatment options for chronic pain management: Opioids revisited. *Managed Care*; 16(2 Suppl 3): 5-9.
101. Franklin GM, Mai J, Wickizer T, Turner JA, Fulton-Kehoe D, Grant L. (2005) Opioid dosing trends and mortality in Washington State Workers' Compensation, 1996-2002. *American Journal of Industrial Medicine*; 48(2): 91-99.
102. Manchikanti L, Cash KA, Damron KS, Manchukonda R, Pampati V, McManus CD. (2006) Controlled substance abuse and illicit drug use in chronic pain patients: An evaluation of multiple variables. *Pain Physician*; 9(3): 215-226.
103. Passik SD, Hays L, Eisner N, Kirsh KL. (2006) Psychiatric and pain characteristics of prescription drug abusers entering drug rehabilitation. *Journal of Pain & Palliative Care Pharmacotherapy*; 20(2): 5-13.
104. Seppala M. (2006) Patients with pain and addiction: What's a doctor to do? *Minnesota Medicine*; 89(9): 41-43.
105. Rosenblum A, et al. (2007) Prescription opioid abuse among enrollees into methadone maintenance treatment. *Drug and Alcohol Dependence*; 90: 64-71.
106. Edlund MJ, Steffick D, Hudson T, Harris KM, Sullivan M. (2007) Risk factors for clinically recognized opioid abuse and dependence among veterans using opioids for chronic non-cancer pain. *Pain*; 129(3): 355-362.
107. Fischer B, Cruz MF, Rehm J. (2006) Illicit opioid use and its key characteristics: A select overview and evidence from a Canadian multisite cohort of illicit opioid users (OPICAN). *Canadian Journal of Psychiatry*; 51(10): 624-634.
108. Ives TJ, Chelminski PR, Hammett-Stabler CA, Malone RM, Perhac JS, Potisek NM, et al. (2006) Predictors of opioid misuse in patients with chronic pain: A prospective cohort study. *BMC Health Services Research*; 6: 46.
109. Collins GG, McAllister MC. (2006) Combating Abuse and Diversion of Prescription Opiate Medications. *Psychiatric Annals*; 36(6).
110. General Accounting Office. (2003) Prescription drugs: OxyContin abuse and diversion and efforts to address the problem (GAO-04-110).
111. Anonymous. (2007) OxyContin drug company sued for millions. *Pharmaceutical News*.

112. Meier B. (2007) U.S. maker of OxyContin painkiller to pay \$600 million in guilty plea. *International Herald Tribune*; 11 May 2007.
113. Cicero TJ, Inciardi JA, Surratt H. (2007) Trends in the use and abuse of branded and generic extended release oxycodone and fentanyl products in the United States. *Drug and Alcohol Dependence*; In Press, Corrected Proof.
114. Novak S, Nemeth WC, Lawson KA. (2004) Trends in Medical Use and Abuse of Sustained-Release Opioid Analgesics: A Revisit. *Pain Medicine*; 5(1): 59-65.
115. Anonymous. (2006) Controlled prescription drug abuse at epidemic level. *Journal of Pain & Palliative Care Pharmacotherapy*; 20(2): 61-64.
116. Cicero TJ, Inciardi JA. (2005) Diversion and Abuse of Methadone Prescribed for Pain Management. *JAMA*; 293(3): 297-298.
117. Cicero TJ, Inciardi JA, Munoz A. (2005) Trends in abuse of OxyContin and other opioid analgesics in the United States: 2002-2004. *Journal of Pain*; 6(10): 662-672.
118. Manchikanti L. (2006) Prescription drug abuse: What is being done to address this new drug epidemic? Testimony before the Subcommittee on Criminal Justice, Drug Policy and Human Resources.[see comment]. *Pain Physician*; 9(4): 287-321.
119. United Nations Office on Drugs and Crime. (2004) 2004 World Drug Report. Geneva: United Nations.
120. Hartnoll R. (1997) Cross-validating at local level. In: European Monitoring Centre for Drugs and Drug Addiction. *Estimating the prevalence of problem drug use in Europe*. Luxembourg: Office for Official Publications of the European Communities; 247-261.
121. Goldstein A, Herrera J. (1995) Heroin addicts and methadone treatment in Albuquerque: A 22 year follow-up. *Drug and Alcohol Dependence*; 40: 139-150.
122. Hser YI, Hoffman V, Grella CE, Anglin MD. (2001) A 33-year follow-up of narcotics addicts. *Archives of General Psychiatry*; 58(5): 503-508.
123. Gerstein DR, Harwood H. (1990) *Treating drug problems volume 1: A study of effectiveness and financing of public and private drug treatment systems*. Washington: National Academy Press.
124. Maddux J, Desmond D. (1992) Methadone maintenance and recovery from opioid dependence. *American Journal of Drug and Alcohol Abuse*; 18: 63-74.
125. Ball J, Shaffer J, Nurco D. (1983) The day-to-day criminality of heroin addicts in Baltimore – a study in the continuity of offence rates. *Drug and Alcohol Dependence*; 12: 119-142.
126. Amato L, Davoli M, Perucci CA, Ferri M, Faggiano F, Mattick RP. (2005) An overview of systematic reviews of the effectiveness of opiate maintenance therapies: Available evidence to inform clinical practice and research. *Journal of Substance Abuse Treatment*; 28: 321-329.
127. Mattick RP, Breen C, Kimber J, Davoli M. (2003) Methadone maintenance therapy versus no opioid replacement therapy for opioid dependence. *Cochrane Database Syst Rev*; 2: CD002209.
128. Hall W. (1996) *Methadone maintenance treatment as a crime control measure*. Sydney: NSW Bureau of Crime Statistics and Research.
129. Ling W, Smith D. (2002) Buprenorphine: Blending practice with research. *Journal of Substance Abuse Treatment*; 23: 87-92.
130. Hall W, Ward J, Mattick RP. (1998) The effectiveness of methadone maintenance treatment 1: Heroin use and crime. In: Ward J, Mattick RP, Hall W (eds). (1998) *Methadone Maintenance Treatment and Other Opioid Replacement Therapies*. Amsterdam: Harwood Academic Publishers.
131. Ward J, Mattick RP, Hall W. (1998) The effectiveness of methadone maintenance treatment 2: HIV and infectious hepatitis. In: Ward J, Mattick RP, Hall W (eds). (1998) *Methadone maintenance treatment and other opioid replacement therapies*. Australia: Harwood Academic Publishers.
132. Padaiga Z, Subata E, Vanagas G. (2007) Outpatient methadone maintenance treatment program. Quality of life and health of opioid-dependent persons in Lithuania. *Medicina (Kaunas, Lithuania)*; 43(3): 235-241.
133. Wong K-h, Lee S-s, Lim W-l, Low H-k. (2003) Adherence to methadone is associated with a lower level of HIV-related risk behaviors in drug users. *Journal of Substance Abuse Treatment*; 24(3): 233-239.
134. Van Griensven F, Keawkungwal J, Tappero JW, Sangkum U, Pitisuttithum P, Vanichseni S, et al. (2004) Lack of increased HIV risk behavior among injection drug users participating in the AIDSVAxB/E HIV vaccine trial in Bangkok, Thailand. *Aid*; 18(2): 295-301.
135. Sullivan LE, Metzger DS, Fudala PJ, Fiellin DA. (2005) Decreasing international HIV transmission: The role of expanding access to opioid agonist therapies for injection drug users. *Addiction*; 100: 150-158.
136. Ball AL, Rana S, Dehne KL. (1998) HIV prevention among injecting drug users: Responses in developing and transitional countries. *Public Health Reports*; 113(1): 170-181.
137. Kerr T, Wodak A, Elliott R, Montaner JS, Wood E. (2004) Opioid substitution and HIV/AIDS treatment and prevention. *The Lancet*; 364(9449): 1918-1919.
138. Langendam MW, van Brussel GHA, Coutinho RA, van Ameijden EJC. (2000) Methadone maintenance and cessation of injecting drug user: Results from the Amsterdam Cohort Study. *Addiction*; 95(4): 591-600.
139. Sullivan LE, Fiellin DA. (2005) Buprenorphine: Its Role in Preventing HIV Transmission and Improving the Care of HIV-Infected Patients with Opioid Dependence. *Clinical Infectious Diseases*; 41: 891-896.
140. Sullivan LE, Metzger DS, Fudala PJ, Fiellin DA. (2005) Decreasing international HIV transmission: The role of expanding access to opioid agonist therapies for injection drug users. *Addiction*; 100(2): 150-158.
141. Blanken P, Hendriks VM, Koeter MWJ, Van Ree JM, Van Den Brink W. (2005) Matching of treatment-resistant heroin-dependent patients to medical prescription of heroin or oral methadone treatment: Results from two randomized controlled trials. *Addiction*; 100(1): 89-95.
142. Lintzeris N, Strang J, Metreblian N, Byford S, Hallam C, Lee S, et al. (2006) Methodology for the Randomised Injecting Opioid Treatment Trial (RIOTT): Evaluating injectable methadone and injectable heroin treatment versus optimised oral methadone treatment in the UK. *Harm Reduction Journal*; 3(28): 1-13.
143. Metreblian N, Carnwath T, Stimson GV, Storz T. (2002) Survey of doctors prescribing diamorphine (heroin) to opiate-dependent drug users in the United Kingdom. *Addiction*; 97(9): 1155-1161.
144. Carnwath T. (2004) Heroin prescription for heroin addiction – An English view. *Acta Neuropsychiatrica*; 16(5): 275-280.
145. Rehm J, Gschwend P, Steffen T, Gutzwiller F, Dobler-Mikola A, Uchtenhagen A. (2001) Feasibility, safety, and efficacy of injectable heroin prescription for refractory opioid addicts: A follow-up study. *The Lancet*; 358(9291): 1417-1420.

146. Pradel V, Thirion X, Ronfle E, Masut A, Micallef J, Begaud B. (2004) Assessment of doctor-shopping for high dosage buprenorphine maintenance treatment in a French region: Development of a new method for prescription database. *Pharmacoepidemiology & Drug Safety*; 13: 473-481.
147. EMCDDA. (2006) 2006 REITOX National Report on the Drug Situation in Finland. Lisbon: EMCDDA.
148. EMCDDA. (2007) Annual report 2007: Selected issues. Luxembourg: European Monitoring Centre for Drugs and Drug Addiction.
149. International Society for the Study of Pain. (2004) Global Year Against Pain: 2004-2005 Campaign: Right to Pain Relief – "The Relief of Pain should be a Human Right".
150. Kumar S. (2006) Injecting of pharmaceutical drugs in the SAARC region: A Review. Chennai.
151. United Nations Office on Drugs and Crime. (2007) South Asia 2005-2007: Strategic Programme Framework. Vienna: United Nations Office on Drugs and Crime.
152. Panda S, Kumar MS, Lokabiraman S, et al. (2005) Risk Factors for HIV Infection in Injection Drug Users and Evidence for Onward Transmission of HIV to Their Sexual Partners in Chennai, India. *Journal of Acquired Immune Deficiency Syndrome*; 39(1): 9.
153. Panda S, Sharma M. (2006) Needle Syringe Acquisition and HIV Prevention Among Injecting Drug Users: A Treatise on the "Good" and "Not So Good" Public Health Practices in South Asia. *Substance Use & Misuse*; 39: 9.
154. Panda S, Chatterjee A, Bhattacharya SK. (2000) Transmission of HIV from injecting drug users to their wives in India. *International Journal of STD & AIDS*; 11(7): 468-473.
155. Humeniuk R, Ali R, McGregor C, Darke S. (2003) Prevalence and correlates of intravenous methadone syrup administration in Adelaide, Australia. *Addiction*; 98(4): 413-418.
156. Darke S, Ross J, Hall W. (1996) Prevalence and correlates of the injection of methadone syrup in Sydney, Australia. *Drug and Alcohol Dependence*; 43: 191-198.
157. Darke S, Ross J, Hall W. (1995) The injection of methadone syrup in Sydney, Australia. Sydney: National Drug and Alcohol Research Centre, University of New South Wales.
158. Darke S, Topp L, Ross J. (2002) The injection of methadone and benzodiazepines among Sydney injecting drug users 1996-2000: 5-year monitoring of trends from the Illicit Drug Reporting System. *Drug and Alcohol Review*; 21(1): 27-32.
159. Hopwood M, Southgate E, Kippax S, Bammer G, Isaac-Toua G, MacDonald M. (2003) The injection of methadone syrup in New South Wales: Patterns of use and increased harm after partial banning of injecting equipment. *Australian and New Zealand Journal of Public Health*; 27(5): 551-555.
160. Obadia Y, Perrin V, Feroni I, Vlahov D, Moatti JP. (2001) Injecting misuse of buprenorphine among French drug users. *Addiction*; 96(2): 267-272.
161. Toufik A. (2007) Preliminary results of the first national Low Threshold and harm reduction agencies survey.
162. Obadia Y, Perrin V, Feroni I, Vlahov D, Moatti JP. (2001) Injecting misuse of buprenorphine among French drug users. *Addiction*; 96(2): 267-272.
163. Blanchon T, Boissonnas A, Vareseon I, Vidal-Trecan G. (2003) Homelessness and high-dosage buprenorphine misuse. *Substance Use & Misuse*; 38: 429-442.
164. World Health Organisation/ United Nations Office on Drugs and Crime/Joint United Nations Programme on HIV/AIDS. (2004) Substitution maintenance therapy in the management of opioid dependence and HIV/AIDS prevention. Geneva: World Health Organisation.
165. Bruce RD, McCance-Katz E, Kharasch ED, Moody DE, Morse GD. (2006) Pharmacokinetic Interactions between Buprenorphine and Antiretroviral Medications. *Clinical Infectious Diseases*; 43(S4): S216-S223.
166. Wood E, Montaner JSG, Yip B, Tyndall MW, Schechter MT, O'Shaughnessy MV, et al. (2004) Adherence to antiretroviral therapy and CD4 T-cell count responses among HIV-infected injection drug users. *Antiviral Therapy*; 9: 229-235.
167. Tyndall M, McNally M, Lai C, Zhang R, Wood E, Kerr T, et al. (2007) Directly observed therapy programmes for antiretroviral treatment amongst injection drug users in Vancouver: Access, adherence and outcomes. *International Journal of Drug Policy*; 18: 281-287.
168. de Maat MMR, Ekhart GC, Huitema ADR, Koks CHW, Mulder JW, Beijnen JH. (2003) Drug Interactions Between Antiretroviral Drugs and Comedicated Agents. *Clinical Pharmacokinetics*; 42(3): 223-282.
169. Maas B, Kerr T, Fairbairn N, Montaner JSG, Wood E. (2006) Pharmacokinetic interactions between HIV antiretroviral therapy and drugs used to treat opioid dependence. *Expert Opinion on Drug Metabolism and Toxicology*; 2(4): 533-543.
170. McCance-Katz EF. (2005) Treatment of Opioid Dependence and Coinfection with HIV and Hepatitis C Virus in Opioid-Dependent Patients: The Importance of Drug Interactions between Opioids and Antiretroviral Agents. *Clinical Infectious Diseases*; 41: S89-S95
171. Rainey PM, Friedland G, McCance-Katz EF, Andrews L, Mitchell SM, Charles C, et al. (2000) Interaction of Methadone with Didanosine and Stavudine. *Journal of Acquired Immune Deficiency Syndromes*; 24(3): 241-248.
172. McCance-Katz EF, Rainey PM, Smith P, Morse G, Friedland G, Gourevitch M, et al. (2004) Drug Interactions between Opioids and Antiretroviral Medications: Interaction between Methadone, LAAM, and Nelfinavir. *American Journal on Addictions*; 13(2): 163-180.
173. McCance-Katz EF, Rainey PM, Friedland G, Jatlow P. (2003) The Protease Inhibitor Lopinavir-Ritonavir May Produce Opiate Withdrawal in Methadone-Maintained Patients. *Clinical Infectious Diseases*; 37: 476-482
174. Antoniou T, Tseng AL. (2002) Interactions between recreational drugs and antiretroviral agents. *The Annals of Pharmacotherapy*; 36(10): 1598-1613.
175. Shirin T, Ahmed T, Iqbal A, Islam M, Islam MN. (2000) Prevalence and risk factors of hepatitis B virus, hepatitis C virus, and human immunodeficiency virus infections among drug addicts in Bangladesh. *Journal of Health Population and Nutrition Research*; 18: 145-150.
176. Saha MK, Chakrabarti S, Panda S. (2000) Prevalence of HCV and HBV infection amongst HIV seropositive intravenous drug users and their non-injecting wives in Manipur, India. *Indian Journal of Medical Research*; 111: 37-39.
177. Sarkar K, Bal B, Mukherjee R, Chakraborty S, Niyogi SK, Saha MK, et al. (2006) Epidemic of HIV coupled with hepatitis C virus among injecting drug users of Himalayan West Bengal, Eastern India, Bordering Nepal, Bhutan, and Bangladesh. *Substance Use & Misuse*; 41(3): 341-352.
178. Sarkar K, Mitra S, Bal B, Chakraborty S, Bhattacharya SK. (2003) Rapid spread of hepatitis C and needle exchange programme in Kolkata, India. *The Lancet*; 361: 1301-1302.

179. UNODCCP, UNAIDS. (1999) Baseline study of the relationship between injecting drug use, HIV and hepatitis C among male injecting drug users in Lahore. Lahore: UNODCCP/UNAIDS.
180. Yeo AKS, Chan C-Y, Chia K-H. (2006) Complications relating to intravenous buprenorphine abuse: a single institution case series. *Annals of Academy of Medicine*; 35(7): 487-491.
181. Sunjic S, Howard J. (1996) "Non injectables": Methadone syrup and benzodiazepine injection by methadone-maintained clients. *Drug and Alcohol Review*; 15(3): 245-250.
182. Southgate E, Kippax S, Bammer G, Isaac-Toua G, MacDonald M, Hopwood M, et al. (2001) Methadone injection in New South Wales. Sydney: University of New South Wales.
183. Panda S, Chatterjee A, Bhattacharya SK. (1998) HIV, hepatitis B and sexual practices in the street-recruited injecting drug users of Calcutta: Risk perception versus observed risks. *International Journal of STD & AIDS*; 9(4): 214-218.
184. Reisinger M. (2006) Injecting buprenorphine tablets: A manageable risk. *Heroin Addiction & Related Clinical Problems*; 8(4): 29-39.
185. Robinson GM, Kemp R, Lee C, Cranston D. (2000) Patients in methadone maintenance treatment who inject methadone syrup: A preliminary study. *Drug and Alcohol Review*; 19(4): 447-450.
186. MIMs Australia. (2005) *MIMs Annual*. 29th ed. Hong Kong: MIMs.
187. Office of the British Pharmacopoeia Commission. (1993) *British Pharmacopoeia*. Cambridge: Office of the British Pharmacopoeia Commission.
188. Feeney, Fairweather. (2003) Groin tissue necrosis requiring skin graft following parenteral abuse of buprenorphine tablets. *Drug and Alcohol Review*; 22(3): 359-361.
189. Pierre-Alexandre J, Francois P, Abdellah S, Karim T, Christian G, Frederique C. (2007) An unusual case of livedoid and necrotic lesions in a drug addict. *American Journal of Dermatopathology*; 29(1): 72-74.
190. Seet RCS, Oh VMS, Lim ECH. (2007) Complications arising from intravenous buprenorphine abuse. *QJM*; 100(5): 312-313.
191. Loo HW, Yam AKT, Tan TC, Peng YP, Teoh LC. (2005) Severe upper limb complications from parenteral abuse of Subutex. *Annals Academy of Medicine*; 34(9): 576-578.
192. Goldman B. (1998) The news on the street: prescription drugs on the black market. *CMAJ*; 159: 149-150.
193. Cassoux N, Bodaghi B, Lehoang P, Edel Y. (2002) Presumed ocular candidiasis in drug misusers after intravenous use of oral high dose buprenorphine (Subutex) [missing journal name, issue?]: 940-941.
194. Chiang CN, Hawks RL. (2003) Pharmacokinetics of the combination tablet of buprenorphine and naloxone. *Drug and Alcohol Dependence*; 70(2 Supp 1): S39-S47.
195. Lalhmingliana C. (2004) The physical effects of Propoxyphene: A ten year study (from 1993-2003). Mizoram: Presbyterian Hospital, Durtlang.
196. Panda S. (2006) Drug use in the northeastern states of India: UNODC Regional Office for South Asia and the Ministry of Social Justice and Empowerment, Government of India.
197. Hughes AA, Dart RC, Bailey JE. (2005) Lick or stick: The common routes of the misuse and abuse of fentanyl. *Clinical Toxicology*; 43(6): 668-669.
198. Jost U, Wolter E, Böhler H. (2004) Repeated improper intravenous injection of fentanyl from a transdermal system. *Dtsch Med Wochenschr*; 129(7): 313-314.
199. Martin TL, Woodall KL, McLellan BA. (2006) Fentanyl-Related Deaths in Ontario, Canada: Toxicological Findings and Circumstances of Death in 112 Cases (2002-2004). *Journal of Analytical Toxicology*; 30(8): 603-610(8).
200. Segal A, Dowling J, Ireton H, Rhodes H, Thomas G, Kerr P, et al. (1998) Granulomatous glomerulonephritis in intravenous drug users: A report of three cases in oxycodone addicts. *Human Pathology*; 29(11): 1246-1249.
201. Aboltins CA, Daffy JR, Allen P. (2005) Fungal endophthalmitis in intravenous drug users injecting buprenorphine contaminated with oral *Candida* species. *MJA*; 182(8): 427.
202. Cazorla C, Grenier de Cardenal D, Schuhmacher H, Thomas L, Wack A, May T, et al. (2005) Infectious complications and misuse of high-dose buprenorphine. *Presse Medicale*; 34(10): 719-724.
203. Etchepare F, Coutaux A, Edel Y, Bourgeois P. (2005) Enterobacter cloacae spondylodiscitis through misuse of high-dose intravenous buprenorphine. *Presse Medicale*; 34(10): 725-727.
204. Sharma V, Vasoo S, Ong B. (2005) Myofasciitis and polyneuritis related to buprenorphine abuse. *Neurol Clin Neurophysiol*; [missing pages, issue no.?] 2.
205. Bramness JG, Kornor H. (2009) Benzodiazepine prescription for patients in opioid maintenance treatment in Norway. *Drug and Alcohol Dependence*; In Press, Corrected Proof.
206. Nielsen S, Dietze P, Lee N, Dunlop A, Taylor D. (2007) Concurrent buprenorphine and benzodiazepines use and self-reported opioid toxicity in opioid substitution treatment. *Addiction* 2007;102(4):616-622.
207. Giacomuzzi SM, Ertl M, Pavlic M, Libiseller K, Riemer Y, Kemmler G, et al. Maintenance treatment of opioid dependence and patterns of non-prescribed drug use: Results of a 4-year trial. *Letters in Drug Design & Discovery* 2006;3(10):731-740.
208. Forsyth AJ, Farquhar D, Gemmell M, Shewan D, Davies JB. The dual use of opioids and temazepam by drug injectors in Glasgow (Scotland). *Drug & Alcohol Dependence* 1993;32(3):277-80.
209. Monga N, Rehm J, Fischer B, Brissette S, Bruneau J, El-Guebaly N, et al. (2007) Using latent class analysis (LCA) to analyze patterns of drug use in a population of illegal opioid users. *Drug & Alcohol Dependence*; 88(1): 1-8.
210. Burns JM, Martyres RF, Clode D, Boldero JM. (2004) Overdose in young people using heroin: Associations with mental health, prescription drug use and personal circumstances. *Medical Journal of Australia*; 181 (7 Suppl): S25-28.
211. Fischer B, Cruz MF, Rehm J. (2006) Illicit opioid use and its key characteristics: A select overview and evidence from a Canadian multisite cohort of illicit opioid users (OPICAN).[see comment]. *Canadian Journal of Psychiatry*; 51(10): 624-634.
212. Backmund M, Meyer K, Henkel C, Soyka M, Reimer J, Schatz C. (2005) Co-consumption of benzodiazepines in heroin users, methadone-substituted and codeine substituted patients. *Journal of Addictive Diseases*; 24(4): 17-29.
213. Bleich A, Gekopf M, Weizman T, Adelson M. (2002) Benzodiazepine abuse in a methadone maintenance treatment clinic in Israel: Characteristics and a pharmacotherapeutic approach. *Israel Journal of Psychiatry & Related Sciences*; 39(2): 104-112.
214. Bleich A, Gekopf M, Schmidt V, Hayward R, Bodner G, Adelson M. (1999) Correlates of benzodiazepine abuse in methadone maintenance treatment. A 1 year prospective study in an Israeli clinic. *Addiction*; 94(10): 1533-1540.
215. De Wet C, Reed L, Glasper A, Moran P, Bearn J, Gossop M. (2004) Benzodiazepine co-dependence exacerbates the opiate withdrawal syndrome. *Drug & Alcohol Dependence*; 76(1): 31-35.

216. Darke S, Hall W, Ross M, Wodak A. (1992) Benzodiazepine use and HIV risk-taking behaviour among injecting drug users. *Drug and Alcohol Dependence*; 31(1): 31-36.
217. Ross J, Darke S, Hall W. (1996) Benzodiazepine use among heroin users in Sydney: Patterns of use, availability and procurement. *Drug and Alcohol Review*; 15(3): 237-243.
218. Gerra G, Borella F, Zaimovic A, Moi G, Bussandri M, Bubici C, et al. (2004) Buprenorphine versus methadone for opioid dependence: Predictor variables for treatment outcome. *Drug & Alcohol Dependence*; 75(1): 37-45.
219. Darke S, Ross J, Hall W. (1996) Overdose among heroin users in Sydney, Australia: I. Prevalence and correlates of non-fatal overdose. *Addiction*; 91(3): 405-411.
220. Kerr T, Fairbairn N, Tyndall M, Marsh D, Li K, Montaner J, et al. (2007) Predictors of non-fatal overdose among a cohort of polysubstance-using injection drug users. *Drug and Alcohol Dependence*; 87(1): 39-45.
221. Gueye PN, Megarbane B, Borron SW, Adnet F, Galliot-Guilley M, Ricordel I, et al. (2002) Trends in opiate and opioid poisonings in addicts in north-east Paris and suburbs, 1995-99. *Addiction*; 97: 1295-1304.
222. Lintzeris N, Lenne M, Ritter A. (1999) Methadone injecting in Australia: A tale of two cities. *Addiction*; 94(8): 1175-1178.
223. Boyd J, Randell T, Luurila H, Kuisma M. (2003) Serious overdoses involving buprenorphine in Helsinki. *Acta Anaesthesiologica Scandinavica*; 47(8): 1031-1033.
224. Cho CS, Calello DP, Osterhoudt KC. (2006) Exploratory Buprenorphine Ingestion in an Infant. *Annals of Emergency Medicine*; 48(1): 109.
225. Hartung DM, Middleton L, Haxby DG, Koder M, Ketchum KL, Chou R. (2007) Rates of adverse events of long-acting opioids in a state medicare program. *Annals of Pharmacotherapy*; 41(6): 921-928.
226. Kuhlman JJJ, McCaulley R, Valouch TJ, Behonick GS. (2003) Fentanyl Use, Misuse, and Abuse: A Summary of 23 Postmortem Cases *Journal of Analytical Toxicology*; 27(7): 499-504(6).
227. Tharp AM, Winecker RE, Winston DC. (2004) Fatal Intravenous Fentanyl Abuse: Four Cases Involving Extraction of Fentanyl From Transdermal Patches. *American Journal of Forensic Medicine & Pathology*; 25(2): 178-181.
228. Reeves MD, Ginifer CJ. (2002) Fatal intravenous misuse of transdermal fentanyl. *Medical Journal of Australia*; 177: 552-553.
229. Kronstrand R, Druid H, Holmgren P, Rajs J. (1997) A cluster of fentanyl-related deaths among drug addicts in Sweden. *Forensic Science International*; 88(3): 185-195.
230. Berson A, Gervais A, Cazals D, Boyer N, Durand F, Bernuau J, et al. (2001) Hepatitis after intravenous buprenorphine misuse in heroin addicts. *Journal of Hepatology*; 34(2): 346-350.
231. Gibson A, Degenhardt L. (2007) Mortality related to pharmacotherapies for opioid dependence: A comparative analysis of coronial records. *Drug and Alcohol Review*; 26: 405-410.
232. Kintz P. (2002) A new series of 13 buprenorphine-related deaths. *Clinical Biochemistry*; 35: 513-516.
233. Pirnay S, Borron SW, Giudicelli CP, Torneau J, Baud FJ, Ricordel I. (2004) A critical review of the causes of death among post-mortem toxicological investigations: Analysis of 34 buprenorphine-associated and 25 methadone-associated deaths. *Addiction*; 99: 978-988.
234. Kintz P. (2001) Deaths involving buprenorphine: A compendium of French cases. *Forensic Science International*; 121: 65-69.
235. Lai SH, Yao YJ, Lo DST. (2006) A survey of buprenorphine related deaths in Singapore. *Forensic Science International*; 162(1-3): 80-86.
236. Reynaud M, Petit G, Potard D, Courty P. (1998) Six deaths linked to concomitant use of buprenorphine and benzodiazepines. *Addiction*; 93(9): 1385-1392.
237. Schifano F, Corkery J, Gilvarry E, Deluca P, Oyefeso A, Ghodse AH. (2005) Buprenorphine mortality, seizures and prescription data in the UK, 1980-2002. *Human Psychopharmacology: Clinical and Experimental*; 20(5): 343-348.
238. Morgan O, Griffiths C, Hickman M. (2006) Association between availability of heroin and methadone and fatal poisoning in England and Wales 1993-2004. *International Journal of Epidemiology*; 35(6): 1579-1585.
239. Zador DA, Sunjic SD. (2002) Methadone-related deaths and mortality rate during induction into methadone maintenance, New South Wales, 1996. *Drug and Alcohol Review*; 21: 131-136.
240. Sunjic S, Zador D. (1999) Methadone syrup-related deaths in New South Wales, Australia, 1990-95. *Drug and Alcohol Review*; 18(4): 409-415.
241. Fugelstad A, Stenbacka M, Leifman A, Nylander M, Thiblin I. (2007) Methadone maintenance treatment: the balance between life-saving treatment and fatal poisonings. *Addiction*; 102(3): 406-412.
242. Seymour A, Black M, Jay J, Cooper G, Weir C, Oliver J. (2003) The role of methadone in drug-related deaths in the west of Scotland. *Addiction*; 98: 995-1002.
243. Shah N, Lathrop SL, Landen MG. (2005) Unintentional methadone-related overdose death in New Mexico (USA) and implications for surveillance, 1998-2002. *Addiction*; 100: 176-188.
244. Zador D, Sunjic S. (2000) Deaths in methadone maintenance treatment in New South Wales, Australia 1990-1995. *Addiction*; 95(1): 77-84.
245. Caplehorn JR, Drummer OH. (1999) Mortality associated with New South Wales methadone programs in 1994: Lives lost and saved.[see comment]. *Medical Journal of Australia*; 170(3): 104-109.
246. Maxwell JC, Pullum TW, Tannert K. (2005) Deaths of clients in methadone treatment in Texas: 1994-2002. *Drug & Alcohol Dependence*; 78(1): 73-81.
247. Mueller MR, Shah NG, Landen MG. (2006) Unintentional Prescription Drug Overdose Deaths in New Mexico, 1994-2003. *American Journal of Preventive Medicine*; 30(5): 423-429.
248. Koski A, Ojanpera I, Vuori E. (2002) Alcohol and Benzodiazepines in Fatal Poisonings. *Pharmacology and Cell Metabolism. Alcoholism: Clinical & Experimental Research*; 26(7): 956-959.
249. Cone EJ, Fant RV, Rohay JM, Caplan YH, Ballina M, Reder RF, et al. (2004) Oxycodone Involvement in Drug Abuse Deaths. II. Evidence for Toxic Multiple Drug-Drug Interactions. *Journal of Analytical Toxicology*; 28(4): 217-225.
250. Cone EJ, Fant RV, Rohay JM, Caplan YH, Ballina M, Reder RF, et al. (2003) Oxycodone Involvement in Drug Abuse Deaths: A DAWN-Based Classification Scheme Applied to an Oxycodone Postmortem Database Containing Over 1000 Cases. *Journal of Analytical Toxicology*; 27(2): 57-67(11).
251. UNESCO. (2005) HIV/AIDS in Armenia: Socio-Cultural Approach. UNESCO.
252. Grigoryan S, Busel A, Papoyan A. (2002) Rapid assessment of the situation on spread of injecting drug use and HIV infection in Yerevan, Armenia. *International Journal of Drug Policy*; 13(5): 433-436.

253. Anonymous. (2004) Pharmaceutical Policy in Armenia: Policy paper.
254. Lelevich V, Kozlovsky A, Vinitskaya A, Maksimchuk V. (2006) Drug abuse and illegal drug trafficking in Belarus. Grodno: Programme of Assistance for the Prevention of Drug Abuse and Drug Trafficking in Belarus, Ukraine and Moldova (BUMAD).
255. WORLD HEALTH ORGANIZATION. (2004) The Practices and Context of Pharmacotherapy of Opioid Dependence in Central and Eastern Europe. Geneva: World Health Organisation, Department of Mental Health and Substance Abuse.
256. Kostikova LI, Firsova NP, Vasilevskaia AE, Skripko SM, Serovkaia TI. (1999) An analysis of an outbreak of HIV infection in the city of Svetlogorsk, the Republic of Byelarus, among persons using injected narcotics. *Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii*; (1): 18-19.
257. Haseci H, Mehi-Basara N, Pokrajac M, Marjanovi-Cengi S, Selman S, Ploski S, et al. (2003) Use of methadone therapy at the Institute for Alcoholism and Drug Addiction in the Canton of Sarajevo. *Medicinski Arhiv*; 57(5-6 Suppl 1): 29-32.
258. EMCDDA. (2004) 2004 REITOX National Report on the Drug Situation in Bulgaria. Lisbon: EMCDDA.
259. European Monitoring Centre for Drugs and Drug Addiction. (2006) State of the Drugs Problem in Europe 2006. Lisbon: European Monitoring Centre for Drugs and Drug Addiction.
260. EMCDDA. (2006) 2006 REITOX National Report on the Drug Situation in Bulgaria. Lisbon: EMCDDA.
261. PHARE. (2000) National Report on the drugs situation in Bulgaria. *Phare Project on Drug Information Systems Bridging Phase*. Amsterdam: MSDP/ European Commission.
262. Iliev Y, Akabaliev V. (2002) Acute poisonings with psychoactive substances – Sociodemographic characteristics and trends. *Bulgarian Medicine*; 10(4): 22-26.
263. Vasilev GN, Alexieva DZ, Pavlova RZ. (2006) Safety and efficacy of oral slow release morphine for maintenance treatment in heroin addicts: A 6-month open noncomparative study. *European Addiction Research*; 12(2): 53-60.
264. Sakoman S. (2000) Substance abuse in the Republic of Croatia and National Program for Drug Control. *Croatian Medical Journal*; 41(3): 270-286.
265. Ivanic A. (2003) Methadone Treatment in Croatia. *SEEA ADDICTION*; 4(1-2): 15-17.
266. EMCDDA. (2005) 2005 REITOX National Report on the Drug Situation in the Czech Republic. Lisbon: EMCDDA.
267. EMCDDA. (2006) 2006 REITOX National Report on the Drug Situation in the Czech Republic. Lisbon: EMCDDA.
268. Hampl K. (2002) Methadone treatment of heroin addiction in out-patient facilities. *Ceska a Slovenska Psychiatrie*; 98(2): 86-91.
269. Wilczek H. (1998) Problems with maintenance therapy in opiate dependence and the clinical importance of methadone. *Casopis Lekarů Ceskych*; 137(23): 725-728.
270. Mravcik V, Coufalova M, Popov P, Zabransky T, Prochazka R. (2005) Questionnaire study of general practitioners regarding experience and attitude to opioid substitution therapy. *Epidemiologie, Mikrobiologie, Immunologie*; 54(1): 27-33.
271. Nespor K, Csemy L. (2006) Abuse of buprenorphine becomes a problem of the Czech Republic. *Cas Lek Cesk*; 145(1): 59-60.
272. Nespor K, Csemy L. (2005) Buprenorphine abuse has become a problem in the Czech Republic. *Psychiatrie*; 9(4): 333-334.
273. Wilczek H, Urbanek P. (2003) Prevalence of serological markers of viral hepatitis B and hepatitis C in drug-dependent individuals treated at the Drop Methadone Center in Prague. *Casopis Lekarů Ceskych*; 142(4): 240-243.
274. EMCDDA. (2006) 2006 REITOX National Report on the Drug Situation in Estonia. Lisbon: EMCDDA.
275. EMCDDA. (2005) 2005 REITOX National Report on the Drug Situation in Estonia. Lisbon: EMCDDA.
276. EMCDDA. (2004) 2004 REITOX National Report on the Drug Situation in Estonia. Lisbon: EMCDDA.
277. Platt L, Bobrova N, Rhodes T, Uuskula A, Parry JV, Ruutel K, et al. (2006) High HIV prevalence among injecting drug users in Estonia: Implications for understanding the risk environment. *Aids*; 20(16): 2120-2123.
278. Shapatava E, Nelson KE, Tsertsvadze T, Rio C. (2006) Risk behaviors and HIV, hepatitis B, and hepatitis C seroprevalence among injection drug users in Georgia. *Drug & Alcohol Dependence*; 82(Suppl 1): S35-S38.
279. Gyarmathy VA, Neaigus A. (2005) Marginalized and socially integrated groups of IDUs in Hungary: Potential bridges of HIV infection. *Journal of Urban Health*; 82(Suppl 4): iv101-iv112.
280. Racz J, Gyarmathy VA, Neaigus A, Ujhelyi E. (2007) Injecting equipment sharing and perception of HIV and hepatitis risk among injecting drug users in Budapest. *AIDS Care*; 19(1): 59-66.
281. Gerevich J, Szabo L, Polgar P, Bacskai E. (2006) Innovations: Alcohol & drug abuse: Methadone maintenance in Europe and Hungary: degrees of sociocultural resistance. *Psychiatric Services*; 57(6): 776-778.
282. Szabo L, Polgar P, Gerevich J. (2005) Methadone maintenance: adoption of a new harm reduction approach in Hungary. *Orvosi Hetilap*; 146(32): 1685-1691.
283. EMCDDA. (2005) 2005 REITOX National Report on the Drug Situation in Hungary. Lisbon: EMCDDA.
284. Adambekov DA, Mamaev TA. (2005) Prevention and control of HIV infection in the Osh region of the Kyrgyz Republic. *Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii*; (1): 75-78.
285. Reitox National Focal Point. (2005) 2005 National Report (2004 data) to the EMCDDA. "Latvia": New Developments, Trends and in-depth information on selected issues: State Addiction Agency/European Monitoring Centre for Drugs and Drug Addiction.
286. Galdikas J. (1997) Confirmation of the approved procedure of Substitution Therapy to opioid addicts. *The Ministry of Health of the Republic of Lithuania*; 702: 1-13.
287. World Health Organization. (2005) WHO Collaborative Study on Substitution Therapy of Opioid Dependence and HIV/AIDS: Preliminary results of study implementation in Indonesia, Lithuania, and Thailand. Geneva: World Health Organization.
288. EMCDDA. (2005) 2005 REITOX National Report on the Drug Situation in Lithuania. Lisbon: EMCDDA.
289. Pain and Policy Studies Group. (2004) Overview of Opioid Availability. *Open Society Institute Seminar Series Palliative Care for HIV/AIDS Patients*. Kiev: World Health Organization Collaborating Center for Policy and Communications in Cancer Care Pain & Policy Studies Group/University of Wisconsin Comprehensive Cancer Center.
290. Open Society Fund. (2002) Moldova – Palliative care service provision.
291. Stapiski A, Mazurkiewicz W, Ochelska B, Gluska T. (1990) Rapid spread of HIV infections among narcotic addicts. *Przegląd Dermatologiczny*; 77(3): 197-200.
292. EMCDDA. (2005) 2005 REITOX National Report on the Drug Situation in Poland. Warsaw: EMCDDA.
293. Radomska M, Pach J, Chrostek Maj J. (2001) Use of buprenorphine as a substitute treatment for opiate dependence in the Toxicology Clinics – introductory clinical report. *Przegląd Lekarski*; 58(4): 351-353.

294. Mosoiu P, Ryan KM, Joranson DE, Garthwaite JP. (2006) Reform of drug control policy for palliative care in Romania. *Lancet*; 367: 2110-2117.
295. Joranson DE, Ryan KM. (2007) Ensuring Opioid Availability: Methods and Resources. *Journal of Pain & Symptom Management*; 33(5): 527-532.
296. EMCDDA. (2005) 2005 REITOX National Report on the Drug Situation in Romania. Lisbon: EMCDDA.
297. Rhodes T, Sarang A, Bobrik A, Bobkov E, Platt L. (2004) HIV transmission and HIV prevention associated with injecting drug use in the Russian Federation. *International Journal of Drug Policy*; 15(1): 1-16.
298. Sarang A, Stuijckte R, Bykov R. (2007) Implementation of harm reduction in Central and Eastern Europe and Central Asia. *International Journal of Drug Policy*; 18(2): 129-135.
299. Parfitt T. (2006) Vladimir Mendeleevich: Fighting for drug substitution treatment. [see comment]. *The Lancet*; 368(9532): 279.
300. Maremmani I, Pacini M, Pani PP, Parrino M. (2006) Say 'yes' to methadone and buprenorphine in Russian Federation. *Heroin Addiction & Related Clinical Problems*; 8(2): 5-22.
301. Finnerty E. (2006) Opiate substitution treatment in the former Soviet Union. [comment]. *The Lancet*; 368(9541): 1066.
302. Csemy L, Kubicka L, Nociar A. (2002) Drug scene in the Czech Republic and Slovakia during the period of transformation. *European Addiction Research*; 8(4): 159-65.
303. EMCDDA. (2005) 2005 REITOX National Report on the Drug Situation in Slovakia. Lisbon: EMCDDA.
304. Hudec R, Tisonova J, Bozekova L, Foltan V. (2004) Trends in consumption of opioid analgesics in Slovak Republic during 1998-2002. *European Journal of Clinical Pharmacology*; 60(6): 445-448.
305. EMCDDA. (2006) 2006 REITOX National Report on the Drug Situation in Slovakia. Lisbon: EMCDDA.
306. Renton A, Gzirishvili D, Gotsadze G, Godinho J. (2006) Epidemics of HIV and sexually transmitted infections in Central Asia. Trends, drivers and priorities for control. *International Journal of Drug Policy*; 17(6): 494-503.
307. Stachowiak JA, et al. (2006) Marked ethnic differences in HIV prevalence and risk behaviors among injection drug users in Dushanbe, Tajikistan. *Drug & Alcohol Dependence*; 82(Suppl 1): S7-S14.
308. Sanchez JL, Todd CS, et al. (2006) High HIV prevalence and risk factors among injection drug users in Tashkent, Uzbekistan, 2003-2004. *Drug & Alcohol Dependence*; 82(Suppl 1): S15- S22.
309. Kerr C. (2005) Injection Drug Use fuels HIV-AIDS epidemic across Euroasia. *The Lancet*; 5: 539.
310. Booth RE, Kwiatkowski CF, Brewster JT, Sinitsyna L, Dvoryak S. (2006) Predictors of HIV sero-status among drug injectors at three Ukraine sites. *Aids*; 20(17): 2217-2223.
311. Iakobchuk AV. (2000) [The HIV/AIDS epidemic and the trends in the behavior of people using injection narcotics (IDU)]. *Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii*; (4): 100-103.
312. Kitsenko NA, Semikop TE, Kiunov VN. (2000) The prevention of HIV/AIDS among injection narcotics users in the city of Odessa. *Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii*; (4): 96-98.
313. Zalati O, Iatsiuk A, Nepomniashchaia T. (2000) The introduction of projects to prevent HIV infection among people using injection narcotics and women in the sex business in the city of Simferopol. *Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii*; (4): 106-108.
314. Bruce D, Dvoryak S, Sylla L, Altice FL. (2007) HIV treatment access and scale-up for delivery of opiate substitution therapy with buprenorphine for IDUs in Ukraine – programme description and policy implications. *International Journal of Drug Policy*; 18: 326-328.
315. International Narcotics Control Board. (2006) Psychotropic Substances: 2005 Assessments of Annual Medical and Scientific Requirements. Vienna: United Nations.
316. Kumar S. (2006) Medical consequences of injecting pharmaceutical drugs: HIV/AIDS. *Injecting pharmaceuticals and the HIV epidemic in South Asia. 11-13 December 2006*. New Delhi, India.
317. Tandon T. (2006) Policy environment for drug control in South Asia: Findings from a legal and political review of IDU harm reduction in SAARC. *Injecting pharmaceuticals and the HIV epidemic in South Asia. 11-13 December 2006*. New Delhi, India.
318. Panda S, Chatterjee A, Sarkar S, et al. (1997) Injection drug use in Calcutta: A potential focus for an explosive HIV epidemic. *Drug and Alcohol Review*; 16: 17-23.
319. Stimson G. (1993) The global diffusion of injecting drug use: Implications for human immunodeficiency virus infection. *Bulletin on Narcotics*; XLV(1): 3-17.
320. United Nations Office on Drugs and Crime Regional Office for South Asia. (2005) South Asia 2005-2007: Strategic Programme Framework: United Nations Office on Drugs and Crime.
321. Indian Express. (2003) 72,000 Morphine injections seized. *Indian Express*.
322. WHO Expert Committee on Drug Dependence. (2003) Thirty-third report. WHO Technical Report Series No. 915. Geneva: World Health Organization.
323. Chowdhury AN, Chowdhury S. (1990) Buprenorphine abuse: Report from India. *British Journal of Addiction*; (85): 1349-1350.
324. Lal Kapoor S. (2006) A study of women substance users and sex trade workers in India. UNDCP- ROSA study. Mumbai: Mukti Sadan Foundation.
325. Grover S, Irpati AS, Saluja BS, Mattoo SK, Basu D. (2005) Substance-dependent women attending a de-addiction center in North India: Sociodemographic and clinical profile. *Indian Journal of Medical Sciences*; 59(7): 283-291.
326. Rao RV, Dhawan A, Sapra N. (2005) Opioid maintenance therapy with slow release oral morphine: Experience from India. *Journal of Substance Use*; 10(5): 259-261.
327. Ambekar A, Dhawan A. (2006) Buprenorphine maintenance: The experience of NDDTC. *Injecting pharmaceuticals and the HIV epidemic in South Asia. 11-13 December 2006*. New Delhi, India.
328. Kumar S. (2006) Opioid substitution therapy (OST) with sublingual buprenorphine in India: Time for a large scale program. *Injecting pharmaceuticals and the HIV epidemic in South Asia. 11-13 December 2006*. New Delhi, India.
329. Chatterjee A, Uprety L, CHapagain M, Kafle K. (1996) Drug abuse in Nepal: A rapid assessment study. *Bulletin on Narcotics*; 48: 11-33.
330. Oelrichs RB, Shrestha S, Anderson D, Deacon N. (2000) The Explosive Human Immunodeficiency Virus Type 1 Epidemic among Injecting Drug Users of Kathmandu, Nepal, is Caused by a Subtype C Virus of Restricted Genetic Diversity. *Journal of Virology*; 74(3): 1149-1157.
331. Ahmed SK, Ara N. (2001) An exploratory study of Buprenorphine use in Bangladesh: A note. *Substance Use & Misuse*; 36(8): 1071-1083.

332. Jenkins C, Rahman H, Saidel T, Jana S, Hussain AM. (2001) Measuring the impact of needle exchange programs among injecting drug users through the National Behavioural Surveillance in Bangladesh. *AIDS Education & Prevention*; 13(5): 452-461.
333. United Nations Office on Drugs and Crime Regional Office for South Asia. (2007) South Asia 2005-2007: Strategic Programme Framework: United Nations Office on Drugs and Crime.
334. Patwary A. (2006) Prevention and control of injecting drugs, including pharmaceuticals: Country profile and lessons learned. *Injecting pharmaceuticals and the HIV epidemic in South Asia. 11-13 December 2006*. New Delhi, India.
335. Azim T. (2006) Vulnerability to HIV infection among sex worker and non-sex worker female injecting drug users in Dhaka, Bangladesh: Evidence from the baseline survey of a cohort study. *Harm Reduction Journal*; 3: 33.
336. Azim T. (2007) Serological HIV surveillance data for 2006, Bangladesh. In: Degenhardt L, (ed).
337. Azim T, Husseine N, Kelly R. (2005) Effectiveness of harm reduction programmes for injecting drug users in Dhaka city. *Harm Reduction Journal*; 2(22).
338. Shahzad F. (2007) Regulation of narcotic psychotropic and other controlled substances in Pakistan. In: Personal communication to Secretariat of the Reference Group to the United Nations on HIV and IDU, editor.
339. de Kort G, Batra S, Pasaribu R, Vazirian M, Ul-Hassan S. (2005) Young people and drugs: Towards a comprehensive health promotion policy. Chiang Mai: Asian Harm Reduction Network.
340. Ahmed MA, Zafar T, Brahmabhatt H, Imam G, Hassan SU, Baretta JC, et al. (2003) HIV/AIDS Risk Behaviors and Correlates of Injection Drug Use among Drug Users in Pakistan. *Journal of Urban Health*; 80(2): 321-329.
341. Parviz S, Fatmi Z, Altaf A, McCormick JB, Fischer-Hoch S, Rahbar M, et al. (2006) Background demographics and risk behaviors of injecting drug users in Karachi, Pakistan. *International Journal of Infectious Diseases*; 10(5): 364-371.
342. Zafar T, Brahmabhatt H, Imam G, Ul Hassan S, Strathdee SA. (2003) HIV knowledge and risk behaviors among Pakistani and Afghani drug users in Quetta, Pakistan. *Journal of Acquired Immune Deficiency Syndromes: JAIDS*; 32(4): 394-398.
343. Strathdee SA, et al. (2003) Rise in needle sharing among injection drug users in Pakistan during the Afghanistan war. *Drug and Alcohol Dependence*; 71: 17-24.
344. Zindagi N. (2006) Critical contributing factors of pharmaceutical injecting in Pakistan. *Injecting pharmaceuticals and the HIV epidemic in South Asia. 11-13 December 2006*. New Delhi, India.
345. Achakzai M, Kassi M, Kasi PM. (2007) Seroprevalences and co-infections of HIV, hepatitis C virus and hepatitis B virus in injecting drug users in Quetta, Pakistan. *Tropical Doctor*; 37(1): 43-45.
346. Farnam R. (2007) Substance abuse in Iran: A brief overview. *Drug abuse problems in the Middle East*. Egypt.
347. Ahmadi J. (2002) Buprenorphine maintenance treatment of heroin dependence: The first experience from Iran. *Journal of Substance Abuse Treatment*; 22(3): 157-159.
348. Ahmadi J. (2002) A controlled trial of buprenorphine treatment for opium dependence: The first experience from Iran. *Drug and Alcohol Dependence*; 66: 111-114.
349. Razzaghi E, Movaghar A. (2003) Rapid assessment and response multi-center project on injection drug use in Tehran. Tehran: World Health Organization.
350. Razzaghi EM, Movaghar AR, Green TC, Khoshnood K. (year?) Profiles of risk: A qualitative study of injecting drug users in Tehran, Iran. *Journal*.
351. Ahmadi J, Hasani M. (2003) Prevalence of substance use among Iranian high school students. *Addictive Behaviors*; 28(2): 375-379.
352. Rahimi-Movaghar V, Rakhshani F, Mohammadi M, Rahimi-Movaghar A. (2004) Opioid use in patients presenting with pain in Zahedan, Islamic Republic of Iran. *Eastern Mediterranean Health Journal*; 10(1-2): 82-89.
353. World Bank. (2006) HIV/AIDS in Afghanistan. November 2006.
354. Reid G, Costigan G. (2002) Revisiting "The Hidden Epidemic": A situation assessment of drug use in Asia in the context of HIV/AIDS. Melbourne: Burnet Institute Centre for Harm Reduction.
355. Koehler U. (2006) Critical contributing factors of pharmaceutical injecting in Afghanistan. *Injecting pharmaceuticals and the HIV epidemic in South Asia. 11-13 December 2006*. New Delhi, India.
356. Todd CS, Abed A, Strathdee SA, Scott P, Botros B, Safi N, et al. (2007) HIV, hepatitis C and hepatitis B infections and associated risk behavior in injection drug users, Kabul, Afghanistan. *Emerging Infectious Diseases*; 13(9): 1327-1331.
357. Republic of Maldives Narcotics Control Board. (2003) Rapid situation assessment of drug abuse in Maldives, 2003. Maldives: Narcotics Control Board.
358. Spencer M. (2003) Pain relief in Thailand. *Journal of Pain & Palliative Care Pharmacotherapy*; 17(3-4): 53-61; discussion 63-64.
359. Song HT, Xiang SS, Kang LP, Chen L, Fu X. (2006) The use of narcotic analgesics in Fuzhou General Hospital of Nanjing Military Region during 2002-2004. *Pharmaceutical Care & Research (Yaoxue Fuwu Yu Yanjiu)*; 6(1): 34-37.
360. Takeda F. (2001) The development of use of oral morphine within the last 10 years in Japan. *European Journal of Pain: Ejp*; 5(Suppl A): 79-82.
361. United Nations Office on Drugs and Crime Regional Centre for East Asia and the Pacific. (2007) Patterns and trends of amphetamine-type stimulants (ATS) and other drugs of abuse in East Asia and the Pacific 2006. Bangkok: United Nations Office on Drugs and Crime Regional Centre for East Asia and the Pacific.
362. Sullivan SG, Wu Z. (2007) Rapid scale up of harm reduction in China. *International Journal of Drug Policy*; 18(2): 118-128.
363. Tang YL, Hao W. (2007) Improving drug addiction treatment in China. *Addiction*; 102(7): 1057-1063.
364. Tang Y-L, Zhao D, Zhao C, Cubells JF. (2006) Opiate addiction in China: Current situation and treatments. *Addiction*; 101(5): 657-665.
365. Wu Z, Sullivan SG, Wang Y, Rotheram-Borus MJ, Detels R. (2007) Evolution of China's response to HIV/AIDS.[see comment]. *The Lancet*; 369(9562): 679-690.
366. Humeniuk R, Ali R. (2005) The first methadone clinic in Beijing. *Drug & Alcohol Review*; 24(3): 285-287.
367. Sagung Sawitri AA, Sumantera GM, Wirawan DN, Ford K, Lehman E. (2006) HIV testing experience of drug users in Bali, Indonesia. *AIDS Care*; 18(6): 577-588.
368. Winarso I, Irawati I, Eka B, Nevendorff L, Handoyo P, Salim H, et al. (2006) Indonesian National Strategy for HIV/AIDS control in prisons: A public health approach for prisoners. *International Journal of Prisoner Health*; 2(3): 243-249.
369. Mazlan M, Schottenfeld RS, Chawarski MC. (2006) New challenges and opportunities in managing substance abuse in Malaysia. *Drug & Alcohol Review*; 25(5): 473-478.

370. Reid G, Kamarulzaman A, Sran SK. (2007) Malaysia and harm reduction: The challenges and responses. *International Journal of Drug Policy*; 18(2): 136-140.
371. Tsay W. (2006) Highlights of AMCEWG meeting 2006. Taipei: Taiwan National Bureau of Controlled Drugs.
372. World Health Organization Regional Office for the Western Pacific. (2006) A rapid assessment and response to HIV and drug use in Mongolia. Manila: World Health Organization Regional Office for the Western Pacific.
373. Javier FO, Magpantay LA, Espinosa EL, Harder SM, Unite MA. (2001) Opioid use in chronic pain management in the Philippines. *European Journal of Pain*; 5 Suppl A: 83-85.
374. Chua S-M, Lee T-S. (2006) Abuse of prescription buprenorphine, regulatory controls and the role of the family physician. *Annals of Academy of Medicine Singapore*; 35(7): 492-495.
375. Chua SM, Lee TS. (2006) Abuse of prescription buprenorphine, regulatory controls and the role of the primary physician. *Annals of the Academy of Medicine, Singapore*; 35(7): 492-495.
376. Peh ALH, Ng BY. (2006) Medicalising the treatment of opioid dependence. *Annals of the Academy of Medicine, Singapore*; 35(7): 447-449.
377. Winslow M, Ng W-L, Mythily S, Song G, Yiong H-C. (2006) Socio-demographic profile and help-seeking behaviour of buprenorphine abusers in Singapore. *Annals of Academy of Medicine*; 35(7): 451-456.
378. Lo HY, Leong CSL. (2006) Surgical complications in parenteral Subutex abusers. *Singapore Medical Journal*; 47(11): 924-927.
379. Lai SH, Teo CES. (2006) Buprenorphine-associated deaths in Singapore. *Annals of the Academy of Medicine, Singapore*; 35(7): 508-511.
380. Lee CE. (2006) Tackling Subutex abuse in Singapore. *Singapore Medical Journal*; 47(11): 919-921.
381. Winslow M, Subramaniam M, Ng WL, Lee A, Song G, Chan YH. (2007) Seroprevalence of hepatitis C in intravenous opioid users presenting in the early phase of injecting drug use in Singapore. *Singapore Medical Journal*; 48(6): 504-508.
382. Su TP, Chen TJ, Hwang SJ, Chou LF, Fan AP, Chen YC. (2002) Utilization of psychotropic drugs in Taiwan: An overview of outpatient sector in 2000. *Chinese Medical Journal (Taipei)*; 65(8): 378-391.
383. Lee T-H. (2005) Prevalence and related factors of needle-sharing behavior among female prisoners. *Journal of Medical Sciences*; 25(1): 27-31.
384. Liu C, Li JH, Tsay WI, Hsu J. (2005) Drug use and profile of individuals arrested on drug-related charges in Taiwan. *Journal of Food & Drug Analysis*; 13(2): 101-106, 193.
385. Lua AC, Lin BF, Tseng YT, Chen TH, Chen TC, Chiang CK. (2002) Drugs of abuse pattern in Taiwan. *Journal of Food & Drug Analysis*; 10(1): 69-74.
386. Chen YM, Kuo S-S. (2007) HIV-1 in Taiwan. *The Lancet*; 369(9562): 623-625.
387. Wiewel EW, Go VF, Kawichai S, Beyrer C, Vongchak T, Srirak N, et al. (2005) Injection prevalence and risks among male ethnic minority drug users in northern Thailand. *AIDS Care*; 17(1): 102-110.
388. Kulsudjarit K. (2004) Drug problem in southeast and southwest Asia. *Annals of the New York Academy of Sciences*; 1025: 446-457.
389. Verachai V, Phutiprawan T, Sawanpanyalert P. (2005) HIV infection among substance abusers in Thanyarak Institute on Drug Abuse, Thailand, 1987-2002. *Journal of the Medical Association of Thailand*; 88(1): 76-79.
390. Srirak N, Kawichai S, Vongchak T, Razak MH, Jittiwutikarn J, Tovanabutra S, et al. (2005) HIV infection among female drug users in Northern Thailand. *Drug & Alcohol Dependence*; 78(2): 141-145.
391. Razak MH, Jittiwutikarn J, Suriyanon V, Vongchak T, Srirak N, Beyrer C, et al. (2003) HIV prevalence and risks among injection and noninjection drug users in northern Thailand: Need for comprehensive HIV prevention programs. *Journal of Acquired Immune Deficiency Syndromes: JAIDS*; 33(2): 259-266.
392. Hu DJ, Subbarao S, Vanichseni S, Mock PA, Ramos A, Nguyen L, et al. (2005) Frequency of HIV-1 dual subtype infections, including intersubtype superinfections, among injection drug users in Bangkok, Thailand. *Aids*; 19(3): 303-308.
393. Buavirat A, Page-Shafer K, Van Griensven GJP, Mandel JS, Evans J, Chuaratanaphong J, et al. (2003) Risk of prevalent HIV infection associated with incarceration among injecting drug users in Bangkok, Thailand: Case-control study. *British Medical Journal*; 326(7384): 308-310.
394. Beyrer C, Jittiwutikarn J, Teokul W, Razak MH, Suriyanon V, Srirak N, et al. (2003) Drug use, increasing incarceration rates, and prison-associated HIV risks in Thailand. *AIDS & Behavior*; 7(2): 153-161.
395. Vanichseni S, Kitayaporn D, Mastro TD, Mock PA, Raktam S, Des Jarlais DC, et al. (2001) Continued high HIV-1 incidence in a vaccine trial preparatory cohort of injection drug users in Bangkok, Thailand. *AIDS*; 15(3): 397-405.
396. Nguyen TA, Hoang LT, Pham VQ, Detels R. (2001) Risk factors for HIV-1 seropositivity in drug users under 30 years old in Haiphong, Vietnam. *Addiction*; 96(3): 405-413.
397. Thao LTL, Lindan CP, Brickley DB, Giang LT. (2006) Changes in high-risk behaviors over time among young drug users in South Vietnam: A three-province study. *AIDS & Behavior*; 10(Suppl 1): S47-S56.
398. Jacka D. (2007) Pharmaceutical opioid availability in Vietnam. In: Personal communication to Secretariat of the Reference Group to the United Nations on HIV and IDU, editor.
399. Robles RR, Matos TD, Deren S, Colon HM, Sahai H, Marrero CA, et al. (2006) Drug treatment disparities among Hispanic drug-using women in Puerto Rico and New York City. *Health Policy*; 75(2): 159-169.
400. Cohen J. (2006) HIV/AIDS in Latin America & Caribbean: Rich Port, Poor Port. *Science*; 313: 375-376.
401. Perez C, Suarez E, Torres E, Roman K, Colon V. (2005) Seroprevalence of hepatitis C virus and associated risk behaviours: A population-based study in San Juan, Puerto Rico. *International Journal of Epidemiology*; 34: 593-599.
402. Deren S, Kang SY, Colon HM, Andia J, Robles RR. (2004) HIV Incidence Among High-Risk Puerto Rican Drug Users: A Comparison of East Harlem, New York, and Bayamon, Puerto Rico. *Journal of Acquired Immune Deficiency Syndrome*; 36: 1067-1074.
403. Heimer R, Catania H, Newman R, Zambrano J, Brunet A, Ortiz A. (2006) Methadone maintenance in prison: Evaluation of a pilot program in Puerto Rico. *Drug & Alcohol Dependence*; 83: 122-129.
404. Diogene E, Perez Pena J, Figueras A, Furonos J, Debessa F, Laporte J, et al. (2003) The Cuban experience in focusing pharmaceuticals policy to health population needs: Initial results of the National Pharmacoepidemiology Network (1996-2001). *Pharmacoepidemiology & Drug Safety*; 12: 405-407.
405. Homedes N, Ugalde A. (2005) Multisource drug policies in Latin America: Survey of 10 countries. *Bulletin of the World Health Organization*; 83(1): 64-70.

406. Stjernsward J, Bruera E, Joranson D, Allende S, Montejo G, Tristan LQ, et al. (1995) Opioid availability in Latin America: The declaration of Florianopolis. *Journal of Pain & Symptom Management*; 10(3): 233-236.
407. Noto AR, Carlini EDA, Mastroianni PC, Alves VC, Galduroz JCF, Kuroiwa W, et al. (2002) Analysis of prescription and dispensation of psychotropic medications in two cities in the State of Sao Paulo, Brazil. *Revista Brasileira de Psiquiatria*; 24(2): 68-73.
408. Bucardo J, Brouwer KC, Magis-Rodriguez C, Ramos R, Fraga M, Perez SG, et al. (2005) Historical trends in the production and consumption of illicit drugs in Mexico: Implications for the prevention of blood borne infections. *Drug & Alcohol Dependence*; 79(3): 281-293.
409. Magis-Rodriguez C, Brouwer KC, Morales S, Gayet C, Lozada R, Ortiz-Mondragon R, et al. (2005) HIV prevalence and correlates of receptive needle sharing among injection drug users in the Mexican-U.S. border city of Tijuana. *Journal of Psychoactive Drugs*; 37(3): 333-339.
410. Maxwell JC, Cravioto P, Galvan F, Ramirez MC, Wallisch L, Spence RT. (2006) Drug use and risk of HIV/AIDS on the Mexico-USA border: A comparison of treatment admissions in both countries. *Drug & Alcohol Dependence*; 82(Suppl 1): S85-S93.
411. Ward J. (1995) Factors influencing the effectiveness of methadone maintenance treatment: change and innovation in New South Wales, Australia 1985-1995. Sydney: University of New South Wales, Faculty of Medicine.
412. Australian Institute of Health and Welfare. (2005) 2004 National Drug Strategy Household Survey: First results. Canberra: Australian Institute of Health and Welfare.
413. O'Brien S, Black E, Roxburgh A, Degenhardt L, Bruno R, Campbell G, et al. (2006) Australian Drug Trends 2006: Findings from the Illicit Drug Reporting System (IDRS). NDARC Monograph No. 60. Sydney: National Drug and Alcohol Research Centre, University of New South Wales.
414. Australian Institute of Health and Welfare. (2006) Alcohol and other drug treatment services in Australia 2005-06: Report on the National Minimum Data Set. Drug Treatment Series No. 6. Canberra: AIHW.
415. National Centre in HIV Epidemiology and Clinical Research. (2007) Australian NSP survey national data report 2002-2006. Sydney, New South Wales: National Centre in HIV Epidemiology and Clinical Research, University of New South Wales.
416. Black E, Roxburgh A, Degenhardt L. (2007) New South Wales Drug Trends 2006: Findings from the Illicit Drug Reporting System (IDRS). NDARC Technical Report No. 270. Sydney: National Drug and Alcohol Research Centre, University of New South Wales.
417. Jenkinson R, Clark NC, Fry CL, Dobbin M. (2005) Buprenorphine diversion and injection in Melbourne, Australia: An emerging issue? *Addiction*; 100: 197-205.
418. Nielsen S, Dietze P, Dunlop A, Muhleisen P, Lee N, Taylor D. (2007) Buprenorphine supply by community pharmacists in Victoria, Australia: Perceptions, experiences and key issues identified. *Drug & Alcohol Review*; 26(2): 143-151.
419. Newbold G. (2000) *Crime in New Zealand*. Palmerston North: Dunsmore Press.
420. Robinson GM, Dukes PD, Robinson BJ, Cooke RR, Mahoney GN. (1993) The misuse of buprenorphine and a buprenorphine-naloxone combination in Wellington, New Zealand. *Drug and Alcohol Dependence*; 33: 81-86.
421. Wilkins C, Girling M, Sweetsur P. (2006) Recents trends in drug use in New Zealand, 2006. Findings from the Illicit Drug Monitoring System (IDMS). Auckland: Massey University.
422. Reith DM, Fountain JS, Tilyard M. (2005) Opioid poisoning deaths in New Zealand (2001-2002). *New Zealand Medical Journal*; 118(1209).
423. Manchikanti L. (2007) National drug control policy and prescription drug abuse: Facts and fallacies. *Pain Physician*; 10(3): 399-424.
424. Blanco C, Alderson D, Ogburn E, Grant BF, Nune E, Hatzenbuehler M, et al. (2007) Changes in the prevalence of non-medical prescription drug use and drug use disorders in the United States: 1991-1992 and 2001-2002. *Drug & Alcohol Dependence*; 90: 252-260.
425. Sung H-E, Richter L, Vaughan R, Johnson PB, Thom B. (2005) Nonmedical use of prescription opioids among teenagers in the United States: Trends and correlates. *Journal of Adolescent Health*; 37(1): 44-51.
426. Birnbaum HG, White AG, Reynolds JL, Greenberg PE, Zhang M, Vallow S, et al. (2006) Estimated costs of prescription opioid analgesic abuse in the United States in 2001: A societal perspective. *Clinical Journal of Pain*; 22(8): 667-676.
427. Substance Abuse and Mental Health Services Administration Office of Applied Studies. (2007) Drug Abuse Warning Network, 2005: National Estimates of Drug-Related Emergency Department Visits. DAWN Series D-29, DHHS Publication No. (SMA) 07-4256. Rockville, MD: Substance Abuse and Mental Health Services Administration, Office of Applied Studies.
428. Woody GE, Senay A, Geller A, Adams EH, Inciardi JA, Schnoll S, et al. (2003) An independent assessment of MEDWatch reporting for abuse/dependence and withdrawal from Ultram (tramadol hydrochloride). *Drug & Alcohol Dependence*; 72: 215-203.
429. Drug Enforcement Administration. (2006) Automation of Reports and Consolidated Orders System (ARCOS), special data report run, 31 May 2006.
430. Fingerhut L. (2005) Increases in Methadone-Related Deaths: 1999-2004.
431. Hall W, Degenhardt L. Regulating opioid prescribing to provide access to effective treatment while minimising diversion: an overdue topic for research. *Addiction*; in press.
432. Brands B, et al. (2004) Prescription opioid abuse in patients presenting for methadone maintenance treatment. *Drug and Alcohol Dependence*; 73: 199-207.
433. Havens JR, Walker R, Leukefeld CG. (2007) Prevalence of opioid analgesic injection among rural nonmedical opioid analgesic users. *Drug and Alcohol Dependence*; 87(1): 98-102.
434. Fischer B, Rehm J, Patra J, Cruz MF. (2006) Changes in illicit opioid use across Canada. *Canadian Medical Association Journal*; 175(11): 1385-1387.
435. Fischer B, Rehm J. (2006) Illicit opioid use and treatment for opioid dependence: Challenges for Canada and beyond. *Canadian Journal of Psychiatry*; 51(10): 621-623.
436. Popova S, Rehm J, Fischer B. (2006) An overview of illegal opioid use and health services utilization in Canada. *Public Health*; 120(4): 320-328.
437. Fischer B, Rehm J, Cruz MF. (2007) Illicit opioid use and its key characteristics: A select overview and evidence from a Canadian multisite cohort of illicit opioid users. *Canadian Journal of Psychiatry*; 52(5): 335-336.

438. Strike CJ, Urbanoski K, Fischer B, Marsh DC, Millson M. (2005) Policy changes and the methadone maintenance treatment system for opioid dependence in Ontario, 1996 to 2001. *Journal of Addictive Diseases*; 24(1): 39-51.
439. Weeks J. (2007) Prescription Drug Abuse FAQs. In: (CCSA) CCoSA, editor: 10.
440. Sproule B. (2006) Preventing the Problematic Use of Psychotropic Pharmaceuticals: Overview and Issues. *Prescription Abuse National Workshop*. Ottawa: Centre for Addiction and Mental Health and University of Toronto.
441. Fischer B, Manzoni P, Rehm J. (2006) Comparing injecting and non-injecting illicit opioid users in a multisite Canadian sample (OPICAN cohort). *European Addiction Research*; 12(4): 230-239.
442. Fischer B, Brissette S, Brochu S, Bruneau J, el-Guebaly N, Noel L, et al. (2004) Determinants of overdose incidents among illicit opioid users in 5 Canadian cities.[see comment]. *Canadian Medical Association Journal*; 171(3): 235-239.
443. Miller CL, Kerr T, Frankish JC, Spittal PM, Li K, Schechter MT, et al. (2006) Binge drug use independently predicts HIV seroconversion among injection drug users: implications for public health strategies.[see comment]. *Substance Use & Misuse*; 41(2): 199-210.
444. Miller CL, Wood E, Spittal PM, Li K, Frankish JC, Braitstein P, et al. (2004) The future face of coinfection: Prevalence and incidence of HIV and hepatitis C virus coinfection among young injection drug users. *Journal of Acquired Immune Deficiency Syndromes: JAIDS*; 36(2): 743-749.
445. Millson P, Challacombe L, Villeneuve PJ, Strike CJ, Fischer B, Myers T, et al. (2007) Reduction in injection-related HIV risk after 6 months in a low-threshold methadone treatment program. *AIDS Education & Prevention*; 19(2): 124-136.
446. Kilibarda M. (1993) HIV infection among drug abusers in the Belgrade area. *Bulletin on Narcotics*; 45(1): 135-146.
447. Partanen A, Maki J. (2004) Buprenorphine more common as a problem drug in Finland. *Nordisk Alkohol Och Narkotikatidskrift*; 21: 156-161.
448. EMCDDA. (2005) 2005 REITOX National Report on the Drug Situation in Finland. Lisbon: EMCDDA.
449. Aalto M, Halme J, Visapaa JP, Salaspuro M. (2007) Buprenorphine misuse in Finland. *Substance Use & Misuse*; 42(6): 1027-1028.
450. Tacke U. (2002) Abuse of buprenorphine by intravenous injection – The French connection. *Addiction*; 97(10): 1355.
451. Varescon I, Vidal-Trecan G, Nabet N, Boissonnas A. (2002) Buprenorphine deviated from normal use: The buprenorphine injection. *Encephale*; 28(5): 397-402.
452. Guichard A, Lert F, Calderon C, Gaigi H, Maguet O, Soletti J, et al. (2003) Illicit drug use and injection practices among drug users on methadone and buprenorphine maintenance treatment in France. *Addiction*; 98(11): 1585-1597.
453. Courty P. (2003) High dosage buprenorphine and injection practices. A study of 303 patients. *Annales de Medecine Interne*; 154(Spec Iss 1): 1S35-1S45.
454. EMCDDA. (2005) Annual report 2005: Selected issues. Luxembourg: European Monitoring Centre for Drugs and Drug Addiction.
455. Vidal-Trecan G, Varescon I, Nabet N, Boissonnas A. (2003) Intravenous use of prescribed sublingual buprenorphine tablets by drug users receiving maintenance therapy in France. *Drug and Alcohol Dependence*; 69(2): 175-181.
456. Boeuf O, Lapeyre-Mestre M. (2007) French Network of Centers for Evaluation and Information. Survey of forged prescriptions to investigate risk of psychoactive medications abuse in France: Results of OSIAP survey. *Drug Safety*; 30(3): 265-276.
457. EMCDDA. (2005) 2005 REITOX National Report on the Drug Situation in France. Lisbon: EMCDDA.
458. Auriacombe M, Franques P, Tignol J. (2001) Deaths attributable to methadone vs buprenorphine in France. *JAMA*; 285(1): 3.
459. EMCDDA. (2006) 2006 REITOX National Report on the Drug Situation in Germany. Lisbon: EMCDDA.
460. Heinemann A, Iversen-Bergmann S, Stein S, Schmoldt A, Püschel K. (2000) Methadone-related fatalities in Hamburg 1990-1999: Implications for quality standards in maintenance treatment? *Forensic Science International*; 113: 449-455.
461. EMCDDA. (2005) 2005 REITOX National Report on the Drug Situation in Austria. Lisbon: EMCDDA.
462. Giacomuzzi S, Kemmler G, Ertl M, Riemer Y. (2006) Opioid addicts at admission vs slow-release oral morphine, methadone, and sublingual buprenorphine maintenance treatment participants. *Substance Use & Misuse*; 41(2): 223-244.
463. Kraigher D, Ortner R, Eder H, Schindler S, Fischer G. (2002) Slow release of morphine hydrochloride for maintenance therapy of opioid dependence. *Wiener Klinische Wochenschrift*; 114(21-22): 904-910.
464. Baklan Z, Gorisek JR, Poljak M, Pisek A. (2004) Prevalence of HIV, hepatitis B, C and G virus infections among injecting drug users on methadone maintenance treatment in Maribor. *Wiener Klinische Wochenschrift*; 116 Suppl 2: 5-7.
465. De Conno F, Ripamonti C, Brunelli C. (2005) Opioid purchases and expenditure in nine western European countries: "Are we killing off morphine?" [see comment][erratum appears in Palliat Med 2005 Dec; 19(8): 663]. *Palliative Medicine*; 19(3): 179-184.
466. EMCDDA. (2006) 2006 REITOX National Report on the Drug Situation in Belgium. Lisbon: EMCDDA.
467. Denooz R, Charlier C. (2006) Case review of methadone fatal intoxication: Recent observations at the CHU (University Hospital Center) of Liege. *Acta Clinica Belgica*; 61(Suppl 1): 32-36.
468. EMCDDA. (2006) 2006 REITOX National Report on the Drug Situation in Denmark. Lisbon: EMCDDA.
469. Steentoft A, Teige B, Holmgren P, Vuori E, Kristinsson J, Hansen AC, et al. (2006) Fatal poisoning in Nordic drug addicts in 2002. *Forensic Science International*; 160(2-3): 148-156.
470. Rosenzweig M, Nielsen AST. (2006) The use of analgesics in Denmark, 2000-2004. *Ugeskrift for Laeger*; 168(20): 1975-1981.
471. Kelleher MJA, Keown PJ, O'Gara C, Keaney F, Farrell M, Strang J. (2005) Dying for heroin: The increasing opioid-related mortality in the Republic of Ireland, 1980-1999. *European Journal of Public Health*; 15(6): 589-592.
472. Fitzgerald M, Barry J, O'Sullivan P, Thornton L. (2001) Blood-borne infections in Dublin's opiate users. *Irish Journal of Medical Science*; 170(1): 32-34.
473. Ward M, Barry J. (2001) Opiate-related deaths in Dublin. *Irish Journal of Medical Science*; 170(1): 35-37.
474. Di Petta G, Leonardi C. (2005) Buprenorphine high-dose, broad spectrum, long-term treatment: A new clinical approach to opiate alkaloid dependency. *Heroin Addiction & Related Clinical Problems*; 7(3): 21-25.
475. Davoli M, Perucci CA. (2003) Appropriateness of methadone maintenance treatment for opiate addiction: Treatment goals and effectiveness. *Sozial- und Praventivmedizin*; 48(Suppl 1): S21-S22.
476. Cozzolino E, Guglielmino L, Vigezzi P, Marzorati P, Silenzio R, De Chiara M, et al. (2006) Buprenorphine treatment: A three-year prospective study in opioid-addicted patients of a public out-patient addiction center in Milan. *American Journal on Addictions*; 15(3): 246-251.

477. Vigezzi P, Guglielmino L, Marzorati P, Silenzio R, De Chiara M, Corrado F, et al. (2006) Multimodal drug addiction treatment: A field comparison of methadone and buprenorphine among heroin- and cocaine-dependent patients. *Journal of Substance Abuse Treatment*; 31(1): 3-7.
478. Salvato C, Aretini G, Serraglia D, Terrazzani G, Debetto P, Giusti P, et al. (2003) Opioid prescription for terminally ill outpatients in a district of northern Italy: A retrospective survey. *Pharmacological Research*; 48(1): 75-82.
479. Schifano P, Bargagli AM, Belleudi V, Amato L, Davoli M, Diecidue R, et al. (2006) Methadone treatment in clinical practice in Italy: Need for improvement. *European Addiction Research*; 12(3): 121-127.
480. Bargagli AM, Sperati A, Davoli M, Forastiere F, Perucci CA. (2001) Mortality among problem drug users in Rome: An 18-year follow-up study, 1980-97. *Addiction*; 96(10): 1455-1463.
481. Bargagli AM, Schifano P, Davoli M, Faggiano F, Perucci CA, Group VES. (2005) Determinants of methadone treatment assignment among heroin addicts on first admission to public treatment centres in Italy. *Drug & Alcohol Dependence*; 79(2): 191-199.
482. Carnwath T. (2005) Prescribing heroin. *American Journal on Addictions*; 14(4): 311-318.
483. De Wet C, Reed L, Bearn J. (2005) The rise of buprenorphine prescribing in England: Analysis of NHS regional data, 2001-2003. *Addiction*; 100: 495-499.
484. Lavelle TL, Hammersley R, Forsyth A. (1991) The use of buprenorphine and temazepam by drug injectors.[see comment]. *Journal of Addictive Diseases*; 10(3): 5-14.
485. Hall W, Lynskey M, Degenhardt L. (2000) Trends in opiate-related deaths in the United Kingdom and Australia, 1985-1995. *Drug and Alcohol Dependence*; 57(3): 247-254.
486. Hickman M, Madden P, Henry J, Baker A, Wallace C, Wakefield J, et al. (2003) Trends in drug overdose deaths in England and Wales 1993-98: Methadone does not kill more people than heroin. *Addiction*; 98(4): 419-425.
487. Zador D, Mayet S, Strang J. (2006) Commentary: Decline in methadone-related deaths probably relates to increased supervision of methadone in UK. *International Journal of Epidemiology*; 35(6): 1586-1587.
488. Guttinger F, Gschwend P, Schulte B, Rehm J, Uchtenhagen A. (2003) Evaluating long-term effects of heroin-assisted treatment: The results of a 6-year follow-up. *European Addiction Research*; 9(2): 73-79.
489. Copeman M, Rehm J, Fischer B, Krausz M, Gschwend P, Uchtenhagen A. (2002) Heroin prescription for opioid addicts (multiple letters). *The Lancet*; 359(9309): 889-890.
490. Brehmer C, Iten PX. (2001) Medical prescription of heroin to chronic heroin addicts in Switzerland – A review. *Forensic Science International*; 121(1-2): 23-26.
491. Rehm J, Frick U, Hartwig C, Gutzwiller F, Gschwend P, Uchtenhagen A. (2005) Mortality in heroin-assisted treatment in Switzerland 1994-2000. *Drug & Alcohol Dependence*; 79(2): 137-143.
492. Waldvogel D, Uehlinger C. (1999) Frequency of injection of oral methadone solutions at treatment center for opiate dependence. *Fortschr Neurol Psychiatr*; 67(6): 281-283.
493. Radovanovic Z, Pilcher CW, al-Nakib T, Shihab-Eldeen A. (2000) On substance abuse in Kuwait (1992-1997). Evidence from toxicological screening of patients. *Journal of Substance Abuse*; 12(4): 363-371.
494. Hadda R. (2007) Substance abuse and treatment: Lebanon experience. *Drug abuse problems in the Middle East*. Egypt.
495. Zaidan ZAJ, Burke DT, Dorvlo ASS, Al-Naamani A, Al-Suleimani A, Al-Hussaini A, et al. (2002) Deliberate self-poisoning in Oman. *Tropical Medicine & International Health*; 7(6): 549-556.
496. Abdelmoula M, Haddad-Triqui M. (2001) Profile and limitations of pain management in cancer patients: Experience of the Rabta pain center in Tunis, Tunisia. *Douleurs*; 2(6): 277-279.
497. Ayed FB, Rais H, Gharbi N, Khalfallah S, Mezlini A, Riahi B, et al. (2001) Opioid dispensation by pharmacists in Tunisia. *Therapie*; 56(6): 711-717.
498. Colak B, Baer L, Yayci N, Etiler N, Inanici MA. (2006) Deaths from drug overdose and toxicity in Turkey: 1997-2001. *American Journal of Forensic Medicine & Pathology*; 27(1): 50-54.
499. Affinnih YH. (2002) Revisiting sub-Saharan African countries' drug problems: Health, social, economic costs, and drug control policy. *Substance Use & Misuse*; 37(3): 265-290.
500. Obot IS. (2004) Assessing Nigeria's drug control policy, 1994-2000. *International Journal of Drug Policy*; 15(1): 17-26.
501. McNEIL Jr. D. (2007) Drugs Banned, Many of World's Poor Suffer in Pain. *New York Times*.
502. Truter I. (1997) Patterns of analgesic prescribing in a South African primary care setting. *Journal of Clinical Pharmacy & Therapeutics*; 22(1): 33-37.
503. Kapp C. (2007) South African AIDS policy lurches into new crisis. *The Lancet*; 370: 727-728.
504. Beck SL. (1998) A systematic evaluation of opioid availability and use in the Republic of South Africa. *Journal of Pharmaceutical Care in Pain & Symptom Control*; 6(4): 5-22.
505. Pluddemann A, Parry C, Cerff P, Bhana A, Harker N, Potgieter H, et al. (2006) Monitoring alcohol and drug abuse trends in South Africa (July 1996-December 2005). Cape Town: South African Community Epidemiology Network on Drug Use (SACENDU).
506. Myers B, Siegfried N, Parry CDH. (2003) Over-the-counter and prescription medicine misuse in Cape Town – Findings from specialist treatment centres. *South African Medical Journal*; 93(5): 367-370.
507. McCurdy SA, Ross MW, Kilonzo GP, Leshabari MT, Williams ML. (2006) HIV/AIDS and injection drug use in the neighborhoods of Dar es Salaam, Tanzania. *Drug & Alcohol Dependence*; 82(Suppl 1): S23-S27.
508. McCurdy SA, Williams ML, Kilonzo GP, Ross MW, Leshabari MT. (2005) Heroin and HIV risk in Dar es Salaam, Tanzania: Youth hangouts, mageto and injecting practices. *AIDS Care*; 17(Suppl 1): S65-S76.
509. Jagwe J, Merriman A. (2007) Uganda: Delivering Analgesia in Rural Africa: Opioid Availability and Nurse Prescribing. *Journal of Pain & Symptom Management*; 33(5): 547-551.
510. Livingstone H. (2003) Pain relief in the developing world: the experience of hospice Africa-Uganda. *Journal of Pain & Palliative Care Pharmacotherapy*; 17(3-4): 107-118; discussion 119-120.
511. Logie DE, Harding R. (2005) An evaluation of a morphine public health programme for cancer and AIDS pain relief in Sub-Saharan Africa. *BMC Public Health*; 5: 82.
512. Ramsay S. (2003) Leading the way in African home-based palliative care: Free oral morphine has allowed expansion of model home-based palliative care in Uganda. *The Lancet*; 362(9398): 1812-1813.

513. Wansi E, Sam-Abbenyi A, Befidi-Mengue R, Enyme FN, Ntone FN. (1996) Rapid assessment of drug abuse in Cameroon. *Bulletin on Narcotics*; 48(1-2): 79-88.
514. Selassie S, Gebre A. (1996) Rapid assessment of drug abuse in Ethiopia. *Bulletin on Narcotics*; 48(1-2): 53-63.
515. Beckerleg S, Telfer M, Hundt GL. (2005) The rise of injecting drug use in East Africa: A case study from Kenya. *Journal*.
516. Beckerleg S, Telfer M, Sadiq A. (2006) A rapid assessment of heroin use in Mombasa, Kenya. *Substance Use & Misuse*; 41(6-7): 1029-1044.
517. Makanjuola AB, Daramola TO, Obembe AO. (2007) Psychoactive substance use among medical students in a Nigerian university. *World Psychiatry*; 6(2): 48-50.
518. Eneh AU, Stanley PC. (2004) Pattern of substance use among secondary school students in Rivers State. [erratum appears in *Niger J Med*. 2004 Apr-Jun; 13(2): 211]. *Nigerian Journal of Medicine: Journal of the National Association of Resident Doctors of Nigeria*; 13(1): 36-39.
519. Fishman SM, Wilsey B, Yang J, Reisfield GM, Bandman TB, Borsook D. (2000) Adherence Monitoring and Drug Surveillance in Chronic Opioid Therapy. *Journal of Pain and Symptom Management*; 20(4): 293-307.
520. Sullivan LE, Fiellin DA. (2005) Buprenorphine: Its Role in Preventing HIV Transmission and Improving the Care of HIV-Infected Patients with Opioid Dependence. *Clinical Infectious Diseases*; 41: 891-896
521. Hallinan R, Byrne A, Amin J, Dore GJ. (2004) Hepatitis C virus incidence among injecting drug users on opioid replacement therapy. *Australian & New Zealand Journal of Public Health*; 28(6): 576-578.
522. Patterson TL, Semple SJ. (2003) Sexual risk reduction among HIV-positive drug-using men who have sex with men. *Journal of Urban Health*; 80(4 Suppl 3).
523. Reback CJ, Larkins S, Shoptaw S. (2004) Changes in the meaning of sexual risk behaviors among gay and bisexual male methamphetamine abusers before and after drug treatment. *AIDS & Behavior*; 8(1): 87-98.
524. Anderson JF, Warren LD. (2004) Client retention in the British Columbia methadone program, 1996-1999. *Canadian Journal of Public Health*; 95(2): 104-109.
525. Auriacombe M, Fatseas M, Dubernet J, Daulouede JP, Tignol J. (2004) French field experience with buprenorphine. *American Journal on Addictions*; 13: S17-S28.
526. Ritter A, Di Natale R. (2005) The relationship between take-away methadone policies and methadone diversion. *Drug and Alcohol Review*; 24(4): 347-352.
527. Mattick RP, Oliphant D, Ward J, Hall W. (1998) The effectiveness of other opioid replacement therapies: LAAM, heroin, buprenorphine, naltrexone and injectable maintenance. In: Ward J, Mattick RP, Hall W (eds). (1998) *Methadone maintenance treatment and other opioid replacement therapies*. Australia: Harwood Academic Publishers.
528. Simoni-Wastila L, Tompkins C. (2001) Balancing diversion control and medical necessity: The case of prescription drugs with abuse potential. *Substance Use & Misuse*; 36(9-10): 1275-1296.
529. Joint United Nations Programme on HIV/AIDS. (2000) AIDS: Palliative care. *UNAIDS Technical Update Best Practice Collection*.
530. Garcia del Pozo J, Carvajal A, Rueda AM, Cano del Pozo M, Martin Arias LH. (1999) Opioid consumption in Spain – the significance of a regulatory measure. *European Journal of Clinical Pharmacology*; 55: 681-683.
531. Chinellato A, Terrazzani G, Walley T, Giusti P. (2003) Opioids in Italy: Is marketing more powerful than the law? *The Lancet*; 362: 78.
532. Fishman SM, Papazian JS, Gonzalez S, Riches PS, Gilson A. Regulating opioid prescribing through prescription monitoring programs: Balancing drug diversion and treatment of pain. *Pain Medicine* 2004;5(3):309-324.
533. Fishman SM, Papazian JS, Gonzalez S, Riches PS, Gilson A. (2004) Regulating Opioid Prescribing Through Prescription Monitoring Programs: Balancing Drug Diversion and Treatment of Pain: 309-324.
534. Grudzinskas C, Balster RL, Gorodetzky CV, Griffiths RR, Henningfield JE, Johanson C-E, et al. (2006) Impact of formulation on the abuse liability, safety and regulation of medications: The expert panel report. *Drug and Alcohol Dependence Drug Formulation and Abuse Liability*; 83(Suppl 1): S77-S82.
535. Sellers EM, Schuster CR. (2006) Conference on drug formulations and abuse liability. Editorial. *Drug and Alcohol Dependence*; 83(Suppl 1): S1-S3.
536. Schuster CR. (2006) History and current perspectives on the use of drug formulations to decrease the abuse of prescription drugs. *Drug & Alcohol Dependence*; 83(Suppl 1): S8-S14.
537. Sapienza FL. (2006) Abuse deterrent formulations and the Controlled Substances Act (CSA). Paper presented at the College on Problems of Drug Dependence Conference "Impact of Drug Formulation on Abuse Liability, Safety and Regulatory Decisions", North Bethesda, Maryland, April 2005. *Drug and Alcohol Dependence*; 83(Suppl 1): S23-S30.
538. McColl S, Sellers EM. (2006) Research design strategies to evaluate the impact of formulations on abuse liability. *Drug and Alcohol Dependence*; 83(Suppl 1): S52-S62.
539. Fudala PJ, Johnson RE. (2006) Development of opioid formulations with limited diversion and abuse potential. Paper presented at the College on Problems of Drug Dependence Conference "Impact of Drug Formulation on Abuse Liability, Safety and Regulatory Decisions", North Bethesda, Maryland, April 2005. *Drug and Alcohol Dependence*; 83 Suppl 1: S40-S47.
540. Mendelson J, Jones RT. (2003) Clinical and pharmacological evaluation of buprenorphine and naloxone combinations: Why the 4:1 ratio for treatment? *Drug and Alcohol Dependence*; 70: S29-S37.
541. Bell J, Byron G, Gibson A, Morris A. (2004) A pilot study of buprenorphine-naloxone combination tablet (Suboxone™) in the treatment of opioid dependence. *Drug and Alcohol Review*; 23: 311-317.
542. Strain EC, Stoller K, Walsh SL, Bigelow GE. (2000) Effects of buprenorphine versus buprenorphine/naloxone tablets in non-dependent opioid abusers. *Psychopharmacology*; 148(4): 374-383.
543. Fiellin DA, Lintzeris N. (2003) Methadone syrup injection in Australia: A sentinel finding? *Addiction*; 98: 385-386.
544. Breen C, Degenhardt L, Bruno R, Roxburgh A, Jenkinson R. (2004) The impact of the restriction of publicly subsidised 10mg temazepam capsules upon benzodiazepine use among injecting drug users in Australia. *Medical Journal of Australia*; 181(6): 300-305.
545. Degenhardt L, Roxburgh A, van Beek I, Ross J, Hall W, Mant A, et al. (2009) Changes in benzodiazepine use among regular injecting drug users following the withdrawal of temazepam gel capsules in Australia. *Drug & Alcohol Review* in press.
546. Klous MG, Van den Brink W, Van Ree JM, Beijnen JH. (2005) Development of pharmaceutical heroin preparations for medical co-prescription to opioid dependent patients. *Drug & Alcohol Dependence*; 80(3): 283-295.

547. Spruit IP. (2002) The effectiveness of the medical prescription of heroin studied by randomized trials in the Netherlands, watched suspiciously by parliament and neighborhoods. *Substance Use & Misuse*; 37(4): 555-563.
548. Bammer G, van den Brink W, Gschwend P, Hendriks V, Rehm J. (2003) What can the Swiss and Dutch trials tell us about the potential risks associated with heroin prescribing?[see comment]. *Drug & Alcohol Review*; 22(3): 363-371.
549. Fischer B, Oviedo-Joekes E, Blanken P, Haasen C, Rehm J, Schechter MT, et al. (2007) Heroin-assisted treatment (HAT) a decade later: A brief update on science and politics. *Journal of Urban Health*; 84(4): 552-562.
550. Hall W. (2002) Breaking the deadlock over an Australian trial of injectable opioid maintenance. *Medical Journal of Australia*; 176.
551. Metrebian N, Shanahan W, Wells B, Stimson GV. (1998) Feasibility of prescribing injectable heroin and methadone to opiate-dependent drug users: Associated health gains and harm reductions. *Medical Journal of Australia*; 168: 596-600.
552. Sell L, Zador D. (2004) Patients prescribed injectable heroin or methadone; their opinions and experiences of treatment. *Addiction* ; 99(4): 442-449.
553. Stoermer R, Drewe J, Dursteler-Mac Farland KM, Hock C, Mueller-Spahn F, Ladewig D, et al. (2003) Safety of injectable opioid maintenance treatment for heroin dependence. *Biological Psychiatry*; 54(8): 854-861.
554. Strang J, Marsden J, Cummins M, Farrell M, Finch E, Gossop M, et al. (2000) Randomised trial of supervised injectable versus oral methadone maintenance: Report of feasibility and 6-month outcome. *Addiction*; 95(11): 1631-1645.
555. Wodak A. (1998) Prescribing heroin: Nothing to fear but fear itself? *Medical Journal of Australia*; 168: 590-591.
556. Zador D. (2001) Injectable opiate maintenance in the UK: Is it good clinical practice?; 547-553.
557. March JC, Oviedo-Joekes E, Perea-Milla E, Carrasco F. (2006) Controlled trial of prescribed heroin in the treatment of opioid addiction. *Journal of Substance Abuse Treatment*; 31(2): 203-211.
558. Anonymous. (2006) Buprenorphine replacement therapy: A confirmed benefit. *Prescrire International*; 15(82): 64-70.
559. Brugal MT, Domingo-Salvany A, Puig R, Barrio G, De Garcia Olalla P, De La Fuente L. (2005) Evaluating the impact of methadone maintenance programmes on mortality due to overdose and aids in a cohort of heroin users in Spain. *Addiction*; 100(7): 981-989.
560. Panda S, Thirumagal V. (2006) Rapid Assessment of AusAID/UNDP supported harm reduction project of 9 NGO partners in Nepal. Calcutta, India.
561. Hammer S, Saag M, Schechter M, Montaner J, Schooley R, Jacobsen D, et al. (2006) Treatment for adult HIV infection. 2006 recommendations of the International AIDS Society – USA Panel. *Journal of the American Medical Association*; 295(7): 827-843.
562. Eramova I, Matic S, Munz M (eds). (2006) HIV/AIDS Treatment and Care for Injecting Drug Users: Clinical Protocol for the WHO European Region. Copenhagen: World Health Organization Regional Office for Europe.
563. Reback CJ, Larkins S, Shoptaw S. (2003) Methamphetamine abuse as a barrier to HIV medication adherence among gay and bisexual men. *AIDS Care*; 15(6): 775-785.
564. Hinkin C, Barclay T, Castellon S, Levine A, Durvasula R, Marion S, et al. (2007) Drug Use and Medication Adherence among HIV-1 Infected Individuals. *AIDS and Behavior*; 11(2): 185-194.
565. Palepu A, Tyndall MW, Joy R, Kerr T, Wood E, Press N, et al. (2006) Antiretroviral adherence and HIV treatment outcomes among HIV/HCV co-infected injection drug users: The role of methadone maintenance therapy. *Drug & Alcohol Dependence*; 84(2): 188-194.
566. Hall W, Degenhardt L. (2007) Regulating opioid prescribing to provide access to effective treatment while minimising diversion: an overdue topic for research. *Addiction*; 102(11).

Appendix A: Method

This study comprised a desk-based literature review of peer-reviewed and grey literature.

Searches of the electronic databases of Medline and EMBASE (via the OVID platform) and PubMed were conducted. Further details of these searches are given below.

The following drug and alcohol databases and related online libraries were searched for grey literature: The Australian National Drug and Alcohol Research Centre (NDARC) library; The Alcohol and other Drugs Council of Australia (ADCA); The CORK network catalogue; Asian Harm Reduction Network (AHRN). Searches of the internet using the Google search engine were also conducted on a country-by-country basis.

Material retrieved from these searches was deemed appropriate for inclusion in this review if it was an original research study, a commentary, a policy analysis, a review or report that described any of the following: availability of pharmaceutical opioids for medical use; controls on availability and use of pharmaceutical opioids; the diversion of pharmaceutical opioids; the prevalence or incidence of extra-medical use of pharmaceutical opioids by injected and non-injected routes of administration; harms associated with extra-medical use of pharmaceutical opioids; HIV prevalence and risk behaviours extra-medical pharmaceutical opioid users; treatment and policy addressing extra-medical use of opioid pharmaceuticals.

In addition, UNODC and WHO country and regional offices were requested to provide any relevant material available to them.

Additional literature cited within the retrieved material was also consulted.

As a general principle, more recent literature was preferred over older data. In all estimates of prevalence, the most recent data only were included in tables.

For some of the grey literature, material retrieved data on sample sizes, methodology, and/or the organisation conducting the research could not be identified. If a country has no estimate, it means that either no data was available.

Medline Search Strategy

The following keywords and “MeSH” terms (in **bold**) were used in the searches of the literature for each region:

Injecting Drug Use

IDU OR IDUs OR “injecting drug” OR “intravenous drug” OR “intravenous substance” OR “injecting substance” OR **exp substance abuse, intravenous/**

Drugs and drug use

heroin OR cocaine OR amphetamine\$ OR methamphetamine\$ OR opioid\$ OR opium OR opiate OR drug abuse OR drug use\$ OR drug misuse OR drug dependenc\$ OR substance abuse OR substance use\$ OR substance misuse OR substance dependenc\$ OR addict\$ OR **exp designer drugs/ OR exp street drugs/ OR exp Cocaine/ OR exp crack cocaine/ OR exp amphetamines/ OR exp amphetamine/ OR exp methamphetamine/ OR exp Opium/ or exp Heroin/ OR exp substance-related disorders/ OR exp amphetamine-related disorders/ OR exp cocaine-related disorders/ OR exp opioid-related disorders/ OR exp heroin dependence/ OR exp morphine dependence/ OR exp psychoses, substance-induced/**

HIV/AIDS

OR HIV or AIDS OR HIV/AIDS OR “Human Immunodeficiency Virus” OR “Human Immune Deficiency Virus” OR “Acquired Immunodeficiency Syndrome” OR “Acquired Immune Deficiency Syndrome” OR **exp HIV/ OR exp HIV-1/ OR exp HIV-2/ OR exp HIV infections/ OR exp acquired immunodeficiency syndrome/ OR HIV seropositivity/ OR exp HIV seroprevalence/ OR exp AIDS serodiagnosis/**

Pharmaceuticals

“prescription drug\$” OR pharmaceutical\$ OR **exp prescriptions, drug/ OR exp pharmaceutical preparations/**

Pharmaceuticals ‘misuse’

“self medication” OR “non medical use”
exp self medication/

Pharmaceutical opioids

“pharmaceutical opioid\$” or biodone OR suboxone OR alfentanil OR alphaprodine OR “opioid analgesics” OR benzomorphans OR buprenorphine OR butorphanol OR codeine OR cyclazocine OR dextromoramide OR dextrorphan OR dihydromorphine OR diphenoxylate OR diprenorphine OR ethylketocyclazocine OR ethylmorphine OR etorphine OR fentanyl OR hydrocodone OR hydromorphone OR levallorphan OR levorphanol OR meperidine OR meptazinol OR methadone OR methadyl acetate OR morphinans OR morphine derivatives OR morphine OR nalbuphine OR nalorphine OR narcotic\$ OR noscapine OR opiate alkaloids OR oxycodone OR xymorphone OR pentazocine OR phenazocine OR henoperidine OR pirinitramide OR promedol OR ropoxyphene OR sufentanil OR thebaine OR tilidine OR tramadol OR **exp alfentanil/ OR exp alphaprodine/ OR exp analgesics, opioid/ OR exp benzomorphans/ OR exp buprenorphine/ OR exp butorphanol/ OR exp codeine/ OR exp cyclazocine/ OR exp dextromoramide/ OR exp dextrorphan/ OR exp dihydromorphine/ OR exp diphenoxylate/ OR exp diprenorphine/ OR exp ethylketocyclazocine/ OR exp ethylmorphine/ OR exp etorphine/ OR exp fentanyl/ OR exp hydrocodone/ OR exp hydromorphone/ OR exp levallorphan/ OR exp levorphanol/ OR exp meperidine/ OR exp meptazinol/ OR exp methadone/ OR exp methadyl acetate/ OR exp morphinans/ OR exp morphine derivatives/ OR exp morphine/ OR exp nalbuphine/ OR exp nalorphine/ OR exp narcotics/ OR exp noscapine/ OR exp opiate alkaloids/ OR exp oxycodone/ OR exp oxymorphone/ OR exp pentazocine/ OR exp phenazocine/ OR exp phenoperidine/ OR exp pirinitramide/ OR exp promedol/ OR exp propoxyphene/ OR exp sufentanil/ OR exp thebaine/ OR exp tilidine/ OR exp tramadol/ OR exp narcotic antagonists/ OR exp buprenorphine/ OR exp butorphanol/ OR exp cyclazocine/ OR exp diprenorphine/ OR exp levallorphan/ OR exp meptazinol/ OR exp nalbuphine/ OR exp nalorphine/ OR exp naloxone/ OR exp naltrexone/ OR exp pentazocine/**

PubMed Search Strategy

The following keywords and “MeSH” terms (in **bold**) were used in the searches of the literature for each region:

Injecting drug use

IDU OR IDUs OR “injecting drug” OR “intravenous drug” OR “intravenous substance” OR “substance abuse, intravenous” OR **“substance abuse, intravenous”** [MH]

Drug use

“Drug abuse” OR “drug use” OR “drug user” OR “drug users” OR “drug misuse” OR “drug dependence” OR “drug dependency” OR “drug dependent” OR “substance abuse” OR “substance use” OR “substance user” OR “substance users” OR “substance misuse” OR “substance dependence” OR “substance dependency” OR “substance dependent” OR addict OR addicts OR addiction OR “substance-related disorders” OR “amphetamine-related disorders” OR “cocaine-related disorders” OR “opioid-related disorders” OR “heroin dependence” OR “morphine dependence” OR **“substance-related disorders”** [MH] OR **“amphetamine-related disorders”** [MH] OR **“cocaine-related disorders”** [MH] OR **“opioid-related disorders”** [MH] OR **“heroin dependence”** [MH] OR **“morphine dependence”** [MH]

HIV/AIDS

HIV OR AIDS OR AIDS [sb] OR “HIV/AIDS” OR **“Human Immunodeficiency Virus”** OR **“Acquired Immunodeficiency Syndrome”** OR **“HIV-1”** OR **“HIV-2”** OR **“HIV seropositivity”** OR **“HIV seroprevalence”** OR **“AIDS serodiagnosis”** OR **“HIV-1”** [MH] OR **“HIV-2”** [MH] OR **“HIV seropositivity”** [MH] OR **“HIV seroprevalence”** [MH] OR **“AIDS serodiagnosis”** [MH]

Pharmaceuticals

“prescription drug*” OR pharmaceutical* OR **prescriptions, drug** [MH] OR **pharmaceutical preparations/**

Pharmaceuticals ‘misuse’

“self medication” OR “non medical use” OR **self medication** [MH]

Pharmaceutical opioids

“pharmaceutical opioid*” or biodone OR suboxone OR alfentanil OR alphaprodine OR “opioid analgesics” OR benzomorphans OR buprenorphine OR butorphanol OR codeine OR cyclazocine OR dextromoramide OR dextrorphan OR dihydromorphine OR diphenoxylate OR diprenorphine OR ethylketocyclazocine OR ethylmorphine OR etorphine OR fentanyl OR hydrocodone OR hydromorphone OR levallorphan OR levorphanol OR meperidine OR meptazinol OR methadone OR methadyl acetate OR morphinans OR morphine derivatives OR morphine OR nalbuphine OR nalorphine OR narcotic\$ OR noscapine OR opiate alkaloids OR oxycodone OR xymorphone OR pentazocine OR phenazocine OR henoperidine OR piritramide OR promedol OR ropoxyphene OR sufentanil OR thebaine OR tilidine OR tramadol OR **exp alfentanil** [MH] OR **alphaprodine** [MH] OR **analgesics, opioid** [MH] OR **benzomorphans** [MH] OR **buprenorphine** [MH] OR **butorphanol** [MH] OR **codeine** [MH] OR **cyclazocine** [MH] OR **dextromoramide** [MH] OR **dextrorphan** [MH] OR **dihydromorphine** [MH] OR **diphenoxylate** [MH] OR **diprenorphine** [MH] OR **ethylketocyclazocine** [MH] OR **ethylmorphine** [MH] OR **etorphine** [MH] OR **expfentanyl** [MH] OR **hydrocodone** [MH] OR **hydromorphone** [MH] OR **levallorphan** [MH] OR **levorphanol** [MH] OR **meperidine** [MH] OR **meptazinol** [MH] OR **methadone** [MH] OR **methadyl acetate** [MH] OR **morphinans** [MH] OR **morphine derivatives** [MH] OR **morphine** [MH] OR **nalbuphine** [MH] OR **nalorphine** [MH] OR **narcotics** [MH] OR **noscapine** [MH] OR **opiate alkaloids** [MH] OR **oxycodone** [MH] OR **oxymorphone** [MH] OR **pentazocine** [MH] OR **phenazocine** [MH] OR **phenoperidine** [MH] OR **piritramide** [MH] OR **promedol** [MH] OR **propoxyphene** [MH] OR **sufentanil** [MH] OR **thebaine** [MH] OR **tilidine** [MH] OR **tramadol** [MH] OR **narcotic antagonists** [MH] OR **buprenorphine** [MH] OR **butorphanol** [MH] OR **cyclazocine** [MH] OR **diprenorphine** [MH] OR **levallorphan** [MH] OR **meptazinol** [MH] OR **nalbuphine** [MH] OR **nalorphine** [MH] OR **naloxone** [MH] OR **naltrexone** [MH] OR **pentazocine** [MH]

EMBASE Search Strategy

The following keywords and "EMTREE" terms (in **bold**) were used in the searches of the literature for each region:

Injecting Drug Use

IDU OR IDUs OR "injecting drug" OR "intravenous drug" OR "intravenous substance" OR "injecting substance" OR **exp intravenous drug abuse/**

Drug use

Drug abuse OR drug use\$ OR drug misuse OR drug dependenc\$ OR substance abuse OR substance use\$ OR substance misuse OR substance dependenc\$ OR addict\$ OR **exp substance abuse/ OR exp drug abuse/ OR exp analgesic agent abuse/ OR exp drug abuse pattern/ OR exp drug misuse/ OR exp drug traffic/ OR exp multiple drug abuse/ OR exp addiction/ OR exp drug dependence/ OR exp cocaine dependence/ OR narcotic dependence/ OR exp heroin dependence/ OR exp morphine addiction/ OR exp opiate addiction/**

HIV/AIDS

HIV OR AIDS OR HIV/AIDS OR Human Immunodeficiency Virus OR Acquired Immunodeficiency Syndrome OR HIV status OR HIV diagnosis OR HIV screening OR HIV test\$ OR HIV pre-test counselling OR HIV post-test counselling OR HIV notification OR AIDS sero\$ OR HIV sero\$ OR **exp human immunodeficiency virus/ OR exp human immunodeficiency virus 1/ OR exp human immunodeficiency virus 2/ OR exp acquired immune deficiency syndrome/ OR exp aids related complex/ OR exp acquired immune deficiency syndrome/ OR exp aids related complex/ OR exp Human Immunodeficiency Virus Infection/ OR exp human immunodeficiency virus prevalence/**

Pharmaceuticals

"prescription drug\$" OR pharmaceutical\$ OR **exp prescription/**

Pharmaceuticals 'misuse'

"self medication" OR "non-medical use" OR **exp self medication/**

Pharmaceutical opioids

"pharmaceutical opioid\$" or biodone OR suboxone OR alfentanil OR alphaprodine OR "opioid analgesics" OR benzomorphans OR buprenorphine OR butorphanol OR codeine OR cyclazocine OR dextromoramide OR dextrophan OR dihydromorphine OR diphenoxylate OR diprenorphine OR ethylketocyclazocine OR ethylmorphine OR etorphine OR fentanyl OR hydrocodone OR hydromorphone OR levallorphan OR levorphanol OR meperidine OR meptazinol OR methadone OR methadyl acetate OR morphinans OR morphine derivatives OR morphine OR nalbuphine OR nalorphine OR narcotic\$ OR noscapine OR opiate alkaloids OR oxycodone OR xymorphone OR pentazocine OR phenazocine OR henoperidine OR pirinitramide OR promedol OR ropoxyphene OR sufentanil OR thebaine OR tilidine OR tramadol OR **exp narcotic agent/ OR exp narcotic analgesic agent/ OR exp acetorphine/ OR exp acetylcodeine/ OR exp acetylmethadol/ OR exp alphaprodine/ OR exp anileridine/ OR exp azidomorphine/ OR exp bezitramide/ OR exp bremazocine/ OR exp brompton mixture/ OR exp buprenorphine/ OR exp buprenorphine plus naloxone/ OR exp butorphanol/ OR exp butorphanol tartrate/ OR exp ciramadol/ OR exp cocodamol/ OR exp cocodaprin/ OR exp codeine/ OR exp codeine iodide/ OR exp codeine phosphate/ OR exp codeine plus diclofenac/ OR exp codeine sulfate/ OR exp codydramol/ OR exp cyclazocine/ OR exp dextromethorphan plus morphine/ OR exp dextromoramide/ OR exp dextropropoxyphene/ OR exp dextropropoxyphene napsilate/ OR exp dextropropoxyphene plus paracetamol/ OR exp dextrophan/ OR exp dezocine/ OR exp diamorphine/ OR exp diconal/ OR exp digesic/ OR exp dihydrocodeine/ OR exp dihydroetorphine/ OR exp dihydromorphine/ OR exp dipipanone/ OR exp "dynorphin a [1-8][1 (n methyltyrosine) 7 (n methylarginine) 8 dextro leucine n ethylamide]"/ OR exp enadoline/ OR exp eptazocine/ OR exp ethylketazocine/ OR exp ethylmorphine/ OR exp etonitazene/ OR exp etorphine/ OR exp etoxeridine/ OR exp furethidine/ OR exp gelonida/ OR exp hydrocodone/ OR exp hydrocodone bitartrate/ OR exp hydrocodone bitartrate plus ibuprofen/ OR exp hydrocodone bitartrate plus paracetamol/ OR exp hydromorphone/ OR exp ibuprofen plus oxycodone/ OR exp isomethadone/ OR exp ketazocine/ OR exp ketobemidone/ OR exp ketogan/ OR exp kytorphin/ OR exp lefetamine/ OR exp levacetylmethadol/ OR exp levomethadone/ OR exp levorphanol/ OR exp meptazinol/ OR exp metazocine/ OR exp methadone/ OR exp**

morphine/ OR exp morphine 6 acetate/ OR exp morphine 6 glucuronide/ OR exp morphine sulfate/ OR exp morphinomimetic agent/ OR exp morphinone/ OR exp nalbuphine/ OR exp nicodine/ OR exp nicomorphine/ OR exp noracymethadol/ OR exp nordextropropoxyphene/ OR exp normorphine/ OR exp norpethidine/ OR exp norpropoxyphene/ OR exp opiate/ OR exp oripavine/ OR exp oxycodone/ OR exp oxymorphone/ OR exp pentamorphone/ OR exp pentazocine/ OR exp percocet/ OR exp percodan/ OR exp pethidine/ OR exp phenadoxone/ OR exp phenaridine/ OR exp phenazocine/ OR exp phencyclidine/ OR exp phencyclidine derivative/ OR exp phenoperidine/ OR exp picenadol/ OR exp piritramide/ OR exp profadol/ OR exp propiram/ OR exp propiram fumarate/ OR exp thebaine/ OR exp tifludom/ OR exp tilidine/ OR exp tonazocine/ OR exp tonazocine mesilate/ OR exp tramadol/ OR exp trimeperidine/ OR exp valoron n/ OR exp valtran/ OR exp fentanyl derivative/ OR exp alfentanil/ OR exp brifentanil/ OR exp carfentanil/ OR exp carfentanil citrate/ OR exp droperidol plus fentanyl/ OR exp fentanyl/ OR exp fentanyl citrate/ or exp fentanyl isothiocyanate/ or exp beta hydroxymefentanyl/ OR exp hypnorm/ OR exp lofentanil/ OR exp lofentanil oxalate/ OR exp mefentanyl/ OR exp mefentanyl isothiocyanate/ OR exp "3 [4 methoxycarbonyl 4 (n phenylpropionamido)piperidino]propionic acid"/ OR exp mirfentanil/ OR exp remifentanil/ OR exp sufentanil/ OR exp sufentanil citrate/ OR exp trefentanil/ OR exp narcotic agent/ OR exp n allylnormetazocine/ OR exp alphacetylmethadol/ OR exp paregoric/ OR exp narcotic antagonist/ OR exp buprenorphine plus naloxone/ OR exp butorphanol/ OR exp butorphanol tartrate/ OR exp chlornaltrexamine/ OR exp ciramadol/ OR exp dextrallorphan/ OR exp dezocine/ OR exp diprenorphine/ OR exp beta funaltrexamine/ OR exp levallorphan/ OR exp n methyllevallorphan mesylate/ OR exp n methyllevallorphan/ OR exp nalbuphine/ OR exp nalmefene/ OR exp nalorphine/ OR exp naloxazone/ OR exp naloxonazine/ OR exp naloxone/ OR exp naloxone 6 spirohydantoin/ OR exp naltrexamine/ OR exp 6alpha naltrexamine/ OR exp 6beta naltrexamine/ OR exp naltrexol/ OR exp naltrexonazine/ OR exp naltrexone/ OR exp picenadol/ OR exp profadol/

Reference Group to the United Nations on
HIV and injecting drug use

www.idurefgroup.unsw.edu.au

National Drug and Alcohol Research Centre
UNIVERSITY OF NEW SOUTH WALES
Sydney, Australia

