Cocaine and opioid overdose:
Awareness
Identification
Management
Incorporated in 1990, *Point de Repères* is a community based organization which was established in response to the emergence of HIV among injection drug users (IDUs). Recognized as a leading centre for HIV prevention, *Point de Repères* administers a needle exchange program in the Lower Town area of Quebec City. Since its inception, the centre has made it its mission to prevent the spread of sexually-transmitted and blood-borne diseases in the IDU community. *Point de Repères* promotes harm reduction practices, including the distribution of sterile injection materials and condoms to IDUs. It also maintains a presence in the social milieu of drug users (e.g., parks, streets, shooting galleries, and the penal system) and carries out a number of educational activities. Over time, *Point de Repères* has fine-tuned its practices, adjusting them to the needs of clients and maintaining a person-centred approach.

www.pointdereperes.com
Summary: Traditionally, harm reduction campaigns have placed the greatest emphasis on reducing the transmission of HIV among IDUs. Overdoses, which have received less attention, also constitute a significant and pressing problem in this community. In North America, cocaine and heroin are the drugs most commonly implicated in overdoses. The problem of cocaine overdose is less clearly defined and less well understood than heroin and opioid overdose. Cocaine intoxication is the term usually employed, and defined by a set of signs and symptoms. Toxicity cannot be attributed to a specific dose and it is linked to the mode of administration and the combination of substances consumed. Generally speaking, cocaine overdose is characterized by tremors, convulsions and delirium. Arrhythmia and cardiovascular failure can ensue and sometimes prove fatal. The manifestations of cocaine overdose vary depending on the individual and do not necessarily include loss of consciousness. Like cocaine overdose, opioid overdose, or acute opioid intoxication, is not associated with a specific dose, but rather with the practice of mixing drugs, as well as with fluctuations in tolerance levels and the changing purity of street drugs. It is characterized by three key symptoms: reduced mental clarity, miotic pupils, and respiratory depression.
ABOUT THIS GUIDE …

In consultations with social/health care workers at Point de Repères, the issue of drug overdoses emerged as a major priority. This guide is specifically designed to address the information needs formulated by community workers, as well as to help them improve their practices.

Interestingly, the subject of overdoses is regularly raised by clients of our organization. In fact, the questions raised by injection drug users (IDUs) are often similar to those raised by workers: What are the signs of an overdose? How should I deal with an overdose?

This desire to obtain information on overdoses could not be more timely, since overdoses rank among the major causes of mortality and morbidity among IDUs. Canada is estimated to have 100,000 IDUs. Of this number, between 500 and 1,000 die each year from overdoses, a trend that has held for the past ten years.

The drugs most often implicated in fatal overdoses are cocaine and opioids. The overdoses induced by these various drugs differ in terms of their definition, symptoms, and risk factors.

How to use this guide

This document provides information which was drawn from the recent literature on cocaine and opioid overdoses and is likely to be of practical interest to workers in the field. It begins with a series of evidence-based recommendations which social/health care workers can apply, based on the resources at their disposal and the preferences of their clients. Each drug is dealt with separately; this includes a review of the unique characteristics of each substance (route of use, drug mixing, circumstances, signs and symptoms, complications, risk factors). General preventive interventions are grouped together in a separate section. It bears repeating that injection drug users are interested in the issue of overdoses and are receptive to information on this subject.

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* This document was developed through a rigorous but non-systematic review of recent articles published in specialized scientific journals. The articles were collected through several databases, including Current Contents, Cochrane Library and MEDLINE. Additional materials listed in the references to certain articles were also consulted. We believe that this approach provided a sufficient number of relevant works to form a basis for our recommendations.
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**About the BTEC…**

The *Bureau de transfert et d'échange de connaissances* (BTEC) was born out of the desire to develop a research culture for health professionals. The BTEC seeks to promote users’ ownership and appreciation of meaningful evidence in their decision-making processes and interventions at the clinical and community levels.

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**Recommendations**  

<table>
<thead>
<tr>
<th>Practice</th>
<th>Strength of evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ Encourage clients, as well as members of their network(s) and families, to take appropriate measures when overdoses occur, by teaching them how to recognize the signs of overdose, how to access emergency services, and other actions they need to take in such situations.</td>
<td>1</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Prevention</th>
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</thead>
<tbody>
<tr>
<td>• Sensitize clients to the dangers of mixing drugs.</td>
<td>1</td>
</tr>
<tr>
<td>• Remind clients of the importance of only injecting when someone else is present.</td>
<td>1</td>
</tr>
<tr>
<td>• Inform clients that they are at increased risk when they take cocaine in hot weather.</td>
<td>3</td>
</tr>
<tr>
<td>• Target at-risk clienteles (e.g., polydrug users, people returning to drugs after a period of abstinence) and conduct one-on-one interventions with the purpose of reducing the factors that render users vulnerable to overdose.</td>
<td>3</td>
</tr>
</tbody>
</table>

*Interpretation of strength of evidence levels*

This guide was developed on the basis of a critical review of evidence derived from a variety of recent publications, as well as the opinions of experts. The recommendations presented in these pages should be interpreted on the basis of the strength of evidence assigned to each of these information sources, as outlined below.

<table>
<thead>
<tr>
<th>LEVEL</th>
<th>INTERPRETATION</th>
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<tbody>
<tr>
<td>1</td>
<td>Recommendation based on data derived from meta-analyses, systemic reviews, or randomized trials</td>
</tr>
<tr>
<td>2</td>
<td>Recommendation based on the results of at least one study which, although not randomized, was well-conducted (clinical study or quasi-experimental study).</td>
</tr>
<tr>
<td>3</td>
<td>Recommendation based on the results of well-conducted, non experimental descriptive studies (comparative studies, correlational studies, or case studies).</td>
</tr>
<tr>
<td>4</td>
<td>Recommendation based on the advice of recognized experts, in the form of reports, opinions or clinical experience.</td>
</tr>
</tbody>
</table>
Glossary

Aortic dissection: occurs when the inner wall of the aorta (an important artery located near the heart) tears. The tear spreads rapidly and without timely treatment the prognosis is poor.

Bradycardia: slowing of the heart rate to less than 60 beats per minute (antonym: tachycardia).

Cardiomyopathy: group of diseases that attack the cardiac muscle (myocardium), affecting its structure and functioning.

Delirium: extreme alteration of orientation, perception, affect, excitation and attention. People with delirium frequently exhibit combative behaviour.

Dysarthria: speech disorder characterized by imperfect articulation due to damage to the motor speech centre.

Half-life: time required for half of the total quantity of a substance to be eliminated from the human body.

Infarction: destruction of a small area of the heart muscle (myocardium) which occurs when the coronary artery that irrigates the area is blocked, preventing oxygenated blood from reaching the muscle.

Ischemia: inadequate supply of blood to an organ or tissue. For example, injecting cocaine directly into an artery induces vasoconstriction, which can result in ischemia.

Mydriasis: prolonged and excessive dilation of the pupil (antonym: myosis).

Myosis: exaggerated contraction of the pupil (antonym: mydriasis).

Rhabdomyolysis: damage to muscle fibres resulting in the destruction of muscle. Toxic components are released and enter the bloodstream, sometimes resulting in kidney failure.

Tachycardia: heart rate acceleration to more than 100 beats per minute (antonym: bradycardia).

Notes:
COCAINEx

Cocaine is involved in the majority of overdoses that occur in the United States. Between 1990 and 1998, fully 70% of fatal overdoses were linked to the use of cocaine, frequently in combination with opioids.18

Overdose vs. intoxication

Lewis defines an overdose as an exaggerated version of the physical and psychological signs of cocaine toxicity (see Appendix I for a discussion of the mode of action of this substance in the brain).20 Cocaine exerts a toxic effect on almost all the organs of the human body, but it is the heart that experiences the most dramatic effects.7

The acute effects of cocaine may be intense but they are usually of short duration, given that cocaine has a half-life of 30 to 90 minutes in the body.6 The duration of cocaine’s half-life is dependent on the route of use, the dose and the subject. With medical attention, people tend to recover fairly quickly from an overdose, but it is important to note that there is no antidote† to the toxic effects of cocaine.

Key fact

The term “overdose” is misleading, since the toxicity of cocaine is not dependent on the amount or dose taken. There is considerable overlap between the range of doses used to achieve the drug’s desired effects and those sufficient to induce an overdose.

Route of use

Taking cocaine intravenously or by inhaling it (freebase, crack) greatly increases the risk of overdose, compared with the intranasal route (“snorting”). The speed in which cocaine enters the bloodstream is essentially the same whether it is injected or inhaled, while consumption through the intranasal route involves a greater delay.20-22 When smoked, cocaine reaches the brain in 6-8 seconds; when injected it takes 12-16 seconds; and when taken intranasally, it takes 3-5 minutes.6

Risk of overdose: inhalation ≈ injection >> intranasal

<table>
<thead>
<tr>
<th>Route of Use</th>
<th>Onset</th>
<th>Peak</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inhalation</td>
<td>6-8 seconds</td>
<td>1-3 minutes</td>
<td>5-15 minutes</td>
</tr>
<tr>
<td>Injection</td>
<td>12-16 seconds</td>
<td>3-5 minutes</td>
<td>20-60 minutes</td>
</tr>
<tr>
<td>Intranasal</td>
<td>3-5 minutes</td>
<td>15-20 minutes</td>
<td>60-90 minutes</td>
</tr>
</tbody>
</table>

Drug mixing

Most cocaine users report that they concurrently use other drugs.5 It is a well-known fact that the risk of overdose increases when cocaine is taken with other substances such as heroin or alcohol.5,18

† In fact, few substances have an antidote. For example, the use of milk as an “antidote” is based on false assumptions. Milk does not neutralize the toxicity of any substance; it acts to dilute or adsorb a product taken by mouth.
Heroin. “Speedballing” (mixing cocaine and heroin) increases the risk of overdose, compared to taking cocaine by itself. Cocaine exacerbates the respiratory depression induced by heroin.5

Key fact

The likelihood of experiencing harmful effects from mixing drugs increases with the number of substances consumed concurrently.3 The dose taken, the nature of the substances, and the person’s condition must also be taken into account.

Alcohol. Popular belief says that alcohol increases cocaine use and vice versa. This belief is supported by studies in which a majority of cocaine users have reported using alcohol as a means of attenuating the effects of cocaine.23,24

In fact, the alcohol/cocaine combination is far from benign.7 This mixture produces an active metabolite—cocaethylene—which increases the euphoric effects of cocaine. This metabolite is more toxic than cocaine taken on its own.5,25 For example, cocaethylene has a half-life that is three times greater than that of cocaine; it is also more cardiotoxic than the drug itself.9,23,26 A number of authors consider this mixture to be the most dangerous of all, since it increases the risk of liver damage and sudden death.20

In practice

People frequently use alcohol to help them “come down” from a cocaine high. Alternative strategies should be explored with those who have adopted this practice.

Moreover, alcohol and cocaine both accelerate the heart rate and increase the sensation of intoxication in those who consume them. When combined, their effects in terms of heart rate acceleration can be more than additive.23 In practice, this means that concurrent use of the two substances results in the presence of three heart rate accelerants: alcohol, cocaine, and the ‘alcohol X cocaine’ interaction (see Sidebar 1).
Sidebar 1: A MORE THAN ADDITIVE EFFECT

To illustrate the concept of a "more than additive" effect, let us take the example of George, a drug user who is celebrating the New Year. On December 30, George consumes alcohol, which causes his heart rate to accelerate by approximately 10%. The next day, he takes cocaine. Due to the quantity of cocaine he consumes and his general condition, George's heart rate rises by 30%. On January 2, George mixes alcohol and cocaine. He drinks the same amount of alcohol as he did two days before and consumes the same quantity of cocaine as the night before. George would be surprised to learn that his heart rate has accelerated by 50% rather than 40%, as he might have expected. This is because the 'alcohol X cocaine' interaction also contributes to heart rate acceleration. In other words, the effect of combining alcohol and cocaine is more than additive.

Increase in George's heart rate after mixing alcohol and cocaine (both were consumed at the same time):

<table>
<thead>
<tr>
<th>Source</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol</td>
<td>10%</td>
</tr>
<tr>
<td>Cocaine</td>
<td>30%</td>
</tr>
<tr>
<td>Alcohol X cocaine</td>
<td>10%</td>
</tr>
<tr>
<td>Total</td>
<td>50%</td>
</tr>
</tbody>
</table>

Interestingly, this 'more than additive' effect is dependent on the order in which alcohol and cocaine are consumed. The blood concentration of cocaine is higher when alcohol is consumed before or during cocaine absorption. Indeed, the concentration of cocaine in the bloodstream increases by 30% at these times. However, the concentration of alcohol is not increased when cocaine is consumed, a phenomenon that may be attributable to the vasoconstriction induced by cocaine, which in turn reduces the absorption of alcohol.23

Therefore, by reversing the order of consumption, the "booster effect" of alcohol on cocaine blood concentration can be eliminated and the 10% increase in heart rate, attributable to the alcohol-cocaine interaction, can be avoided. In fact, when cocaine is taken 30 minutes before alcohol, its concentration in the bloodstream remains equivalent to that observed when the drug is taken on its own. Moreover, the signs of toxicity that are secondary to the cocaine-alcohol combination (e.g., feeling “high”) are not amplified when alcohol is ingested after cocaine.23

Other substances. Several other substances interact with cocaine (see Appendix II). Cannabis can potentiate the toxic effects of cocaine by increasing plasma concentration of the drug.25

Like cocaine, cigarettes induce vasoconstriction of the coronary arteries (the vessels that irrigate the cardiac muscle). This combination markedly increases the risk of cardiac complications.7
The case of benzodiazepines also warrants attention. Although the interaction of these substances with cocaine has not been documented, those who have witnessed overdoses frequently report that benzodiazepines were administered to counter the effects of cocaine. Doctors who deal with overdoses sometimes resort to this strategy. It is important to understand, however, that this is a medical decision: it should not be taken by a lay person, since it is not always an appropriate course of action.

In practice
Drug interactions are sometimes discovered through the experimentation of drug users. Not all of the potential interactions between cocaine and other substances are known since not all of them have been tested and/or reported. Users can play an important role in preventing overdoses by reporting the symptoms they experience as a result of combining drugs.

See Appendix II for a table of primary interactions.

Circumstances

Overdoses most commonly occur in the home of the user or a friend. Although a second person is present in most cases, only a small proportion of overdoses are referred to emergency services. In this sense, one might say that the larger the number of people present, the smaller the chances are that someone will intervene. Still, most people familiar with the drug culture are able to identify the signs and symptoms of an overdose with considerable accuracy. It is their reaction that is usually inadequate. It is interesting to note that women are more likely to provide assistance and to take the appropriate action when faced with a victim of an overdose.

Few people perform cardiopulmonary resuscitation (CPR) when confronted with an overdose. In one study, it was reported that CPR had been performed in only 13% of cases in which another person had been present. However, many people reported administering another drug (e.g. heroin or benzodiazepines) to counter the effects of cocaine. This intervention can increase the risk of mortality, since the depressive effect of opioids and benzodiazepines do not provide protection against a cocaine overdose.

Finally, studies have demonstrated that the number of fatal overdoses increases when the ambient temperature is high. Cocaine raises body temperature, even at low doses. In very hot weather, the cocaine user may have difficulty maintaining a normal body temperature.

Danger of overdose today
Cocaine becomes particularly dangerous when the ambient temperature exceeds 31.1°C.

‡ Benzodiazepines are not an antidote to cocaine. They are used for their sedative properties to treat the hypertension induced by cocaine.
Signs and symptoms

Attention: The signs of cocaine overdose and/or intoxication can vary from person to person (e.g., depending on their cardiovascular condition) and do not necessarily include loss of consciousness.

- **Delirium** (can cause cardiac arrest and death; more common in chronic users)\(^5,9,13,20\)
- **Increased body temperature**\(^1,5,6,13,20\) and **intense perspiration**\(^5,13\)
- **Tremors**\(^5,9\)
- Nausea/vomiting\(^5\)
- Respiratory problems
  - irregular breathing, respiratory distress
- Neurological signs
  - **mydriasis**\(^6,9\)
  - **convulsions**\(^9,13\)
- Cardiovascular problems (particularly during the first hour post-consumption)\(^7,32\)
  - chest pain\(^5,7,13\)
  - accelerated pulse, palpitations, arrhythmia\(^5,6,9,13,20\)
  - hypertension\(^6,9,13,20\)
  - **ischemia** or **myocardial infarction**\(^7,13,20\)
  - seizure / heart attack\(^5\)
- Loss of consciousness and associated symptoms\(^5,20\)
  - eyes rolling back\(^5\)
  - frothing at the mouth\(^5\)
  - collapse\(^5\)
- **Indicator behaviours**
  - extreme anxiety and agitation\(^5,9,13,20\)
  - aggressive behaviour
  - paranoia and hallucinations\(^5,20\)

<table>
<thead>
<tr>
<th>Cardiovascular problems</th>
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<tbody>
<tr>
<td>Most infarctions and ischemias occur <strong>less than an hour</strong> after consumption.</td>
</tr>
<tr>
<td>Cardiovascular complications most commonly occur <strong>within 12 hours of an overdose</strong>.</td>
</tr>
</tbody>
</table>

**Lethal complications**

Seizures, cardiac arrhythmia, respiratory distress, and cardiovascular complications are some of the potentially lethal consequences of cocaine use. Hyperthermia can also contribute to increasing the mortality associated with cocaine.\(^5,33\) Cocaine-related deaths usually occur within 12 hours after the drug is taken\(^7,32\) and are frequently caused by:

- cardiac arrhythmia\(^5,21,25\)
- respiratory failure\(^5\)
• cerebral hemorrhage\textsuperscript{5,26}
• kidney failure\textsuperscript{5}
• hyperthermia (especially in hot weather [\(>31.1^\circ\text{C}\)])\textsuperscript{5}
• convulsions\textsuperscript{26}
• cardiac arrest\textsuperscript{26}

[Captions around human figure – original page 7]

Left side:
Intense perspiration
Dilated pupils
Irregular breathing
Respiratory distress
Tremors

Right side:
Extreme anxiety and agitation
Aggressive behaviour
Paranoia and hallucinations
Increased body temperature
Frothing at the mouth, convulsions
Other symptoms associated with loss of consciousness
Cardiovascular problems:
• chest pain
• rapid pulse, palpitations, arrhythmia
• hypertension
• ischemia or myocardial infarction
• Seizure / heart attack

Other complications

While recovery from a cocaine overdose is usually fairly rapid, chronic use can accelerate the development of serious cardiac pathologies, including atherosclerosis of the coronary arteries, ventricular hypertrophy (which increases the risk of myocardial infarction),\textsuperscript{5,21,34} ischemia and arrhythmia.\textsuperscript{5,21,29}

The literature mentions other complications of long-term cocaine use, including a number of medical problems affecting the cardiovascular, respiratory, neurological, gastro-intestinal and urinary systems. Psychiatric and sexual disorders are also reported. Appendix III provides a list of these complications.
Risk factors

*Use-related behaviours*

- Association between the route of use and the risk of experiencing an overdose:
  - inhalation ≈ intravenous >> intranasal
    - (smoking) (injecting) (“snorting”)
- Concurrent use of other substances (e.g., alcohol, heroin)

*Individual characteristics*

- Being a woman (causes unknown: possible link with the hormonal effect of progesterone on the formation of the toxic metabolite norcocaine)
- Long-term use
- Recognized drug dependence
- History of multiple drug consumption
HEROIN AND OPIOIDS

Overdose is the primary cause of premature death and morbidity among heroin users.\textsuperscript{4,16,29,35} Moreover, 23-33\% of users experience non-fatal overdoses every year.\textsuperscript{36}

**Route of use**

The risk of overdose is greatly diminished when heroin is smoked rather than injected.\textsuperscript{4,16,28,35,37}

**Drug mixing**

A large number of fatal and non-fatal overdoses are linked to the concomitant use of heroin and other drugs, including alcohol,\textsuperscript{4,13,16,18,35,38} benzodiazepines,\textsuperscript{4,16,28,35,39} tricyclic antidepressants (non-fatal overdoses),\textsuperscript{35} and cocaine (see Appendix II for the primary known interactions).\textsuperscript{4} More than half of all deaths linked to opioid, cocaine or alcohol overdose are attributable to the mixing of these substances.\textsuperscript{18}

**Cocaine.** ‘Speedball’ injection (in which heroin and cocaine are combined) is linked to an increased risk of overdose.\textsuperscript{4,5}

**Central nervous system depressants.** Benzodiazepines and alcohol are central nervous system depressants; when consumed with heroin, they potentiate the latter’s depressant effect on the respiratory system by contributing to a reduction in respiratory frequency.\textsuperscript{35}

The mixing of methadone and heroin is linked to an increasing number of fatal overdoses (overdoses due to methadone alone are rare).\textsuperscript{§} Such overdoses most commonly occur 12-14 hours after taking methadone, at night (sleep increases respiratory depression), and after meals (food increases the absorption of methadone). Manifestations of overdose include vomiting, as well as absence of tolerance (beginning of treatment) or loss of tolerance to methadone, creating a predisposition to overdose.\textsuperscript{40}

Given the fact that specific methadone/street drug interactions have not been reported in the literature, this topic is not addressed in this guide. The expertise of IDUs should be solicited to help fill this gap (see Appendix II).

**Circumstances**

Most heroin users have witnessed an overdose. As in the case of cocaine overdose, other people are usually present and yet no intervention occurs in most instances.\textsuperscript{4,16,35,36,41,42}

\textsuperscript{§} When methadone is prescribed in the appropriate dose, heroin use induces no euphoric effect.
Memory aid – common products

Opioids
Heroin, MS-Contin, Codeine, Dilaudid, Demerol, methadone

Benzodiazepines
Xanax, Lectopam, Valium, Ativan, Dalmane, Mogadon, Restoril, Rivotril

Tricyclic antidepressants
Sinequan, Tofranil, Surmontil

See Appendix IV for a more complete list

Signs and symptoms

- Diminished consciousness, drowsiness$^{5,13,20,39}$
- Myosis$^{5,13,39}$
- Tachycardia and bradycardia$^{13}$
- Hypotension and reduced body temperature$^{13}$
- Respiratory depression** (lips turn blue)$^{5,13,36,39}$
- Hallucinations and euphoria$^{13}$

Memory aid – opioid overdose

Altered consciousness, when accompanied by one of the following, is strongly suggestive of an opioid overdose:
- Respiratory frequency < 12/min.**
- Myosis OR
- Known heroin use.

Contact emergency services immediately.

Complications

Death by heroin overdose usually occurs one to three hours after injection.$^{36}$

The complications associated with long-term opioid use are primarily linked to injection (e.g., HIV, abscesses, hepatitis, endocarditis, etc.). The literature on the long-term damage to various systems of the human body caused by heroin is less exhaustive than on the complications associated with chronic cocaine abuse. However, opioid use has been associated with pulmonary complications, duodenal ulcers, endocrine disorders, and cerebrovascular disease.$^{11}$

Risk factors

A number of myths surround the issue of heroin overdose.$^{43}$ For example, it is commonly assumed that the purer the drug, the greater the risk of acute intoxication; it is also assumed that the risk of overdose is greater for young, inexperienced users. In fact, only a moderate proportion of overdoses are linked to the purity of the

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** Normal frequency is between 16 and 20 respirations per minute.
product and overdoses generally occur among users who have been taking the drug for several years.\[16,35,38\]

The literature suggests that persons who exhibit a range of individual and behavioural characteristics that place them in an ‘at-risk’ category (e.g., those who inject themselves in areas other than the arms, long-term users, etc.) are also more at risk of overdosing.\[4\] However, while a high rate of depression and an increased risk of suicide are reported in this population (14 times greater than in the general population),\[16,35,41\] it is important to note that intentional heroin overdoses are quite rare.\[4,35,41\]

**Individual characteristics**

- The role of gender is unclear: a number of studies report that men are at greater risk of a fatal overdose,\[18,28,35\] while other studies suggest that women are at a higher risk.\[4\]
- The effect of age as a risk enhancer manifests itself in several ways:
  - relatively young age of initiation into injecting drugs.\[4\]
  - average age in cases of fatal overdose: early thirties. These overdoses frequently occur after 5-10 years of heroin use.\[16,18,28,35,36,39\]
- A larger number of overdoses has been observed among persons of bisexual orientation.\[42\]
- Long-term dependence.\[4,35\]
  - risk increases by 6% for every year of heroin use.\[4\]
- People who have already experienced an overdose are at increased risk of overdosing again.\[4,16\]
- People with a history of criminal activity are over-represented among overdose cases.\[4\]
- Overdoses occur more frequently among people who live alone.\[42\]
- Health status:
  - in general, poor physical health results in reduced tolerance to the drug.\[29\]
  - HIV-positive status, hepatitis, poor nutrition, and cardiac changes are potential risk factors, since all are associated with intravenous abuse of central stimulants and opioids.\[35,39,44\]
- Insecure living conditions:
  - poverty\[16\]
  - homelessness\[42\]
- Being in treatment is associated with a decreased risk of experiencing a fatal or non-fatal overdose.\[35\]

**Use-related behaviours**

- Daily use of cocaine and/or poppers.\[42\]
- Injecting in public places.
- Changes in use patterns:
  - After a period of abstinence (e.g., prison) or treatment (e.g., methadone), a physiological loss of tolerance occurs, increasing the risk of overdose.\[4,13,16,28,35,36,38,39,41\]
  - The drug-use pattern of heroin users generally shows reduced consumption in the period preceding death, but with increased consumption of other drugs, such as alcohol.\[4,29,38\] Loss of tolerance is therefore something to look out for in older users.
In practice...

Even though people who use injection drugs are usually in poor health, they seldom seek medical attention.¹⁰⁻¹² When they do turn to the medical system, their problems have usually by then deteriorated considerably.⁶,¹⁴

The role of social/health care workers is crucial in this area.¹⁵ It has been shown that when community workers have a relationship of trust with users and encourage them to make use of health services, users tend to follow such recommendations.¹⁷
Briefly…

When intoxication is suspected (e.g., history of drug use), the next step consists of determining which drug the person has taken. Four categories of signs and symptoms should be checked:

- vital signs;
- ocular symptoms;
- mental state (e.g., coma, stupor, lethargy, delirium, agitation, confusion, degree of alertness); and
- muscle tone.\(^{45}\)

### Table: Differential signs of intoxication: cocaine and opioids~

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<thead>
<tr>
<th></th>
<th>Cocaine</th>
<th>Opioids</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vital signs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blood pressure</td>
<td>↑</td>
<td>↓</td>
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<td>Heart rate</td>
<td>↑</td>
<td>↓</td>
</tr>
<tr>
<td>Temperature</td>
<td>↑</td>
<td>↓</td>
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<tr>
<td><strong>Ocular signs</strong></td>
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<td></td>
</tr>
<tr>
<td>mydriasis*</td>
<td></td>
<td>myosis</td>
</tr>
<tr>
<td><strong>Mental state</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>agitation</td>
<td></td>
<td>depression**</td>
</tr>
<tr>
<td><strong>Muscle tone</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>dyskinesia and rigidity</td>
<td></td>
<td>rigidity***</td>
</tr>
</tbody>
</table>

~ Absence of the indicated symptoms does not necessarily mean that the substance is not implicated in the syndrome being observed, since concomitant use of other substances with potentially different effects is the rule rather than the exception. * The pupil retains a degree of responsiveness to light, as opposed to when intoxication is caused by an anticholinergic drug.\(^{45}\) ** The term depression should be understood to mean a general diminishment of the person’s physiological condition, rather than the illness of the same name. *** Applies only to Fentanyl, a synthetic opioid.
Preventive intervention

Target clientele

- Overdoses primarily occur among IDUs, but they also occur in non-IDUs.
- Due to the potential effects of drug mixing, those who consume alcohol, benzodiazepines (e.g., Ativan), or tricyclic antidepressants (e.g., Tofranil) constitute a population at risk of overdose.
- Among heroin users, the group at greatest risk are long-term users who are not in treatment.\(^35,37\)

Secondary prevention

- Since cocaine overdoses usually occur within an hour of consumption, any person who complains of chest pains during this period should be closely monitored.\(^7\)
  - If symptoms persist for more than an hour without improvement, it is important to be in a position to intervene in case cardiovascular complications ensue (e.g., arrhythmia, infarction, cerebrovascular accident, respiratory arrest).\(^32\)
- Since the serious complications associated with cocaine overdose occur within 12 hours of consumption, vigilance is in order during this critical period.\(^7,32\)

Education

Educational interventions that focus on the transfer of practical information

- Educate users about overdoses.
- Teach users, as well as members of their social networks and families to:\(^29\)
  - recognize the signs and symptoms of overdose;
  - access the medical system by calling an ambulance immediately when an overdose occurs (appropriate use of 911),\(^35\)
    - (users respond better when the emergency medical system and the police have agreed on an emergency protocol that limits police intervention in cases of overdose.\(^35\) When people’s fear of being arrested is removed, fatal overdoses can sometimes be avoided.\(^35,46\)
  - practice CPR (see Appendix V).\(^4,16,35,39,46,47\)
- Educate people about the harmful effects of chronic use.
- Drug users can play an important role in overdose prevention by reporting the symptoms they experience when they mix substances (see Appendix II).

Educational interventions that focus on reducing risk factors

- Inform users about the risks they incur when they mix heroin or cocaine with other drugs or alcohol.\(^4,35,41\)
- Educate users about the risk of overdosing after a period of abstinence (particularly those who have been using for a long time).\(^35\)
• Encourage users to inject drugs only when someone else is present.
• Intervene specifically to reduce the behaviours associated with overdoses.  
  ➢ change the route of use: encourage people to use non-injection routes, in 
  order to reduce the risk of overdose;  
  ➢ encourage people to alter their patterns of use (e.g., avoid mixing 
  substances).  
• Encourage people who are addicted to heroin to get treatment, since 
  treatment reduces the frequency of overdoses.

Paths of intervention for the future

• Supervised injection sites, which can reduce overdose rates.
• Pharmacological alternatives to methadone, such as buprenorphine.
• About Narcan® (naloxone):
  ➢ Narcan® is used to treat respiratory depression or coma in cases of opioid 
    overdose.  This product is an antagonist—which is to say a 
    competitor of narcotics—that reverses the effects of acute narcosis, such 
    as respiratory depression, sedation and hypotension.  In the absence of 
    opioids, naloxone has no pharmacological activity.  Its half-life is briefer 
    than that of opioids.  Naloxone’s properties have led some to promote its 
    widescale distribution through needle exchange programs, pharmacies, 
    clinics, etc.
  ➢ However, the idea of establishing a take-home Narcan® program 
    provoked a general outcry among researchers.  Some practitioners are in 
    favour of it, while others are opposed.  However, even supporters 
    admit that, despite the encouraging results of pilot case studies, further 
    substantiation is needed before widescale distribution of Narcan® can be 
    contemplated.
  ➢ Based on current knowledge, and given the potential negative 
    repercussions of administering Narcan® inappropriately, the most 
    recommendable option for dealing with opioid overdoses remains airway 
    maintenance and an immediate call to emergency medical services.

Notes:

‡ According to the Piquerie project conducted in 2002 in cooperation with Point de Repères, 41% of 
users reported shooting up alone.
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Mountain D. Take home naloxone for opioid addicts. Big conclusions are drawn from little evidence. *BMJ* 2001; **323**: 934; author reply 5.


Blackwood G. Take home naloxone for opioid addicts. Figures in Jersey give no support to scheme’s effectiveness. *BMJ* 2001; **323**: 934-5; author reply 5.


APPENDIX 1: How does cocaine act on the brain?

Central nervous system functioning depends on the circulation of information through complex networks of neurons, which are the basic units of the nervous system. Neurons are connected to one another by synapses (junctions between neurons), forming a neural circuit. Information is transmitted between neurons through the synapses, in the form of nervous impulses. This information is conveyed by neurotransmitters, which are chemical substances secreted by the transmitter (or pre-synaptic) neuron which travel through the synapse to the receptor (or post-synaptic) neuron. Adrenaline, serotonin and dopamine are examples of neurotransmitters. Depending on the situation, they may excite, inhibit or modify the response of the receptor neuron.

Biologically speaking, pleasure is dependent on the action of neurotransmitters. For example, sexual desire is accompanied by the release of large quantities of noradrenaline, dopamine and phenylethylamine in the brain. Certain substances, such as amphetamines, also act this way; in fact, their structure is so similar to that of neurotransmitters that they mime the action of these chemicals in the brain, inducing the characteristic euphoria. Specifically, the hypothalamus is where neurotransmitters and analogue substances are captured (Figure 1*). In addition to acting as the pleasure centre, this part of the brain performs numerous functions related to temperature control, fluid balance, appetite, thirst, cardiovascular regulation, and sexual activity.

For its part, cocaine acts on the transport of norepinephrine, serotonin and dopamine. The euphoria induced by cocaine is due to the fact that this substance inhibits dopamine reuptake (Figure 2). By remaining in the synapses, it causes continuous stimulation of the post-synaptic neurons, thus prolonging its euphoric effect. Cocaine, which begins by stimulating the pleasure centre will, over time, exhaust this centre. The build-up of dopamine in the synapses ultimately leads to dopamine depletion, such that the reserves found in the brain are no longer sufficient to maintain euphoria. Production can no longer keep up with elimination, with the result that the “pleasure circuits” run dry. At this point, the user becomes more anxious and is unable to experience pleasure without taking more cocaine.

This is how dependence develops. The user needs cocaine to feel pleasure, but each time cocaine is used, the reserves of dopamine are depleted further. Intense, chronic use can result in major depletion of dopamine reserves; at this point no pleasure is possible and profound depression sets in. Cocaine dependence is therefore very difficult to treat; moreover the medications prescribed to combat cravings for the drug take a long time to act and most clients ultimately abandon treatment.

Still, it is important to note that studies are underway and that valuable findings have already been published.54

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* The figures are derived from NIDA material (2004).
Figure 1. – Hypothalamus

Figure 2.  

A. Transmitter neuron  

B. Dopamine in vesicles

Dopamine transport is normal

Dopamine transport is blocked by cocaine

Dopamine receptors

Cocaine

Receptor neuron

Figure 2.  

A. In the normal process of communication, dopamine is released by the neuron into the synapse where it can bind with the dopamine receptors of nearby neurons. Dopamine is then recycled by the transmitter neuron with the aid of a specialized protein, the dopamine transporter.  

B. If cocaine is present, it binds with the transporter and blocks the recycling process. Dopamine accumulates in the synapse, prolonging the effect of the cocaine (euphoria). If cocaine use continues, tolerance develops and the user requires larger and more frequent doses to attain the same level of euphoria.
Appendix II: Known primary interactions between cocaine, opioids and various common substances* (adapted from Ben Amar, 2004)**

<table>
<thead>
<tr>
<th></th>
<th>COCAINE</th>
<th>OPIOIDS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>OPIOIDS</td>
<td>Potentiation of euphoria</td>
<td>Potentiation of euphoria</td>
<td>COCAINE</td>
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<tr>
<td></td>
<td>Attenuation of undesirable effects</td>
<td>Attenuation of undesirable effects</td>
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<tr>
<td></td>
<td>Increased risk of toxicity (e.g., respiratory depression with strong doses)</td>
<td>Increased risk of toxicity (e.g., respiratory depression with strong doses)</td>
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<tr>
<td>BENZODIAZEPINES</td>
<td>Potentiation of CNS depressant effects</td>
<td>Increased risk of respiratory depression (variable)</td>
<td>BENZODIAZEPINES</td>
</tr>
<tr>
<td>ALCOHOL</td>
<td>Potentiation of euphoria</td>
<td>↑ CNS depressant effects (variable)</td>
<td>ALCOHOL</td>
</tr>
<tr>
<td></td>
<td>Attenuation of undesirable effects</td>
<td></td>
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<tr>
<td></td>
<td>Increase in intensity and duration of cocaine effect (formation of cocaethylene)</td>
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</tr>
<tr>
<td></td>
<td>Increased risk of toxicity (variable)</td>
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<tr>
<td>TRICYCLIC ANTIDEPRESSANTS</td>
<td>↓ obsessive need to take cocaine</td>
<td>Potentiation of CNS depressant effects (variable)</td>
<td>TRICYCLIC ANTIDEPRESSANTS</td>
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<tr>
<td></td>
<td>↓ vasoconstriction</td>
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<tr>
<td>CANNABIS</td>
<td>↑ heart rate or blood pressure</td>
<td>↑ analgesic, sedative and euphoric effects (variable)</td>
<td>CANNABIS</td>
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<tr>
<td></td>
<td>↓ anxiety caused by cocaine</td>
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</table>

APPENDIX II (CONT.). Other reported interactions between cocaine and various substances*

<table>
<thead>
<tr>
<th>Characteristics of cocaine consumed</th>
<th>Other substance(s) consumed (e.g., characteristics; order consumed; quantity, etc.)</th>
<th>Effects reported** (e.g., duration, delay, intensity, etc.)</th>
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<td>Date and initials***<strong>/</strong>/__/ __</td>
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*Enter into this table all other relevant information that can help to improve your intervention methods by calling upon the expertise of the clients that you meet. **The effects reported in the table of known interactions (e.g., ↑ or ↓ heart rate, etc.) can serve as a guide for evaluating the effects reported by clients. ***Initials of social/health care worker.
APPENDIX II (CONT.). Other reported interactions between opioids and various substances*

<table>
<thead>
<tr>
<th>Characteristics of opioids consumed</th>
<th>Other substance(s) consumed (e.g., characteristics; order consumed; quantity, etc.)</th>
<th>Effects reported** (e.g., duration, delay, intensity, etc.)</th>
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*Enter into this table all other relevant information that can help to improve your intervention methods by calling upon the expertise of the clients that you meet.  **The effects reported in the table of known interactions (e.g., ↑ or ↓ heart rate, etc.) can serve as a guide for evaluating the effects reported by clients.  ***Initials of social/health care worker.
APPENDIX II (CONT.). Other reported interactions between various substances* (other than cocaine and opioids)

<table>
<thead>
<tr>
<th>Characteristics of cocaine consumed</th>
<th>Other substance(s) consumed (e.g., characteristics; order consumed; quantity, etc.)</th>
<th>Effects reported** (e.g., duration, delay, intensity, etc.)</th>
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*Enter into this table all other relevant information that can help to improve your intervention methods by calling upon the expertise of the clients that you meet.  **The effects reported in the table of known interactions (e.g., ↑ or ↓ heart rate, etc.) can serve as a guide for evaluating the effects reported by clients.  ***Initials of worker.
APPENDIX III: Complications associated with long-term cocaine abuse

**Cardiovascular**
- Heart rate disturbances, arrhythmia\(^6,7,20,21,25\)
- Myocardial infarction\(^6,20,21,25,55\)
- Ischemia\(^6,25\)
- Aortic dissection\(^6,7\)
- Heart failure
- Cardiomyopathy\(^7,20\)
- Hypotension\(^25\) and hypertension\(^20,25\)
- Endocarditis\(^7\)

**Respiratory**
- Thoracic pain\(^21\)
- Respiratory depression\(^20,21\)
- Chronic cough
- Bronchospasm\(^6,20,55\)
- Pulmonary infections, pulmonary hemorrhage, pulmonary edema (particularly among freebase users)\(^6,20,55\)

**Neurological**
- Seizure\(^6,20,55\)
- Headaches\(^20,21\)
- Insomnia\(^21\)
- Tourette’s syndrome\(^6,20\)
- Depression\(^20\)
- Hallucinations\(^20\)
- Tremors\(^20\)
- Vision disturbances\(^20\)
- Dysarthria\(^20\)
- Cerebral infarction\(^55\)
- Intracranial hemorrhage\(^55\)

**Gastro-intestinal**
- Abdominal pain\(^21\)
- Nausea\(^20,21\)
- Ischemia, sometimes resulting in gastric ulcers and/or gangrene\(^6,20\)
- Dehydration\(^20\)
- Weight loss\(^20\)

**Urinary**
- Kidney failure\(^6\)
- Rhabdomyolysis, causing kidney failure\(^6,55\)

**Psychiatric**
Psychiatric disorders are reported in 60-70% of cocaine users.\(^6\) These disorders include:
- Mood disorders\(^6\)
- Bipolar disorder\(^6\)
- Attention deficits\(^6\)
- Panic attacks\(^6\)
- Paranoid ideation\(^6\)
- Violent behaviour\(^6\)
- Agitated delirium\(^6\)
- Suicide attempts\(^20\)

**Sexual**
- Erectile and ejaculatory difficulties\(^20\)
- Loss of interest in sex\(^20\)
- Development of abnormal sexual behaviours in women\(^20\)
APPENDIX IV: Generic names of common products in the primary classes of benzodiazepines, tricyclic antidepressants and opioids

BENZODIAZEPINES

- **Treatment of anxiety**
  - Alprazolam (*Xanax*)
  - Bromazepam (*Lectopam*)
  - Chlordiazepoxide (*Apo-chlordiazepoxide*)
  - Clorazepate (*Apo-Clorazepate*)
  - Diazepam (*Valium*)
  - Lorazepam (*Ativan*)
  - Oxazepam (*Apo-Oxazepam*)

- **Treatment of insomnia**
  - Flurazepam (*Dalmane*)
  - Midazolam (*Apo-Midazolam*)
  - Nitrazepam (*Mogadon*)
  - Temazepam (*Restoril*)
  - Triazolam (*Halcion*)

- **Anticonvulsants**
  - Clobazam (*Frisium*)
  - Clonazepam (*Rivotril*)

TRICYCLIC ANTIDEPRESSANTS

- Amitriptyline (*Apo-Amitriptyline*)
- Clomipramine (*Anafranil*)
- Desipramine (*Norpramine*)
- Doxepine (*Sinequan*)
- Imipramine (*Tofranil*)
- Maprotiline (*Novo-Maprotiline*)
- Nortriptyline (*Aventyl*)
- Trimipramine (*Surmontil*)

OPIOIDS

- **Natural opioids**
  - Opium
  - Morphine: Kadian, Morphine HP, M-Eslon, M.O.S., MS-Contin, MS-IR
  - Codeine: Codeine, Codeine Contin, in association with numerous products (e.g., Empracet)

- **Semi-synthetic opioids**
  - Buprenorphine: Buprenex (United States), Subutex (Europe)
  - Heroin: Diacetylmorphine, Diamorphine

- **Synthetic opioids**
  - AGONISTS
    - Alfentanil: *Alfenta*
    - Diphenoxylate: Lomotil
    - Fentanyl: Duragesic
    - Hydrocodone: Hycodan
    - Hydromorphone: Dilaudid, Hydromorph Contin
    - Meperidine or Pethidine: Demerol
    - Methadone: Metadol, Methadone
    - Oxydodezone: OxyContin, Oxy-IR, Percocet, Percodan, Supeudol
    - Oxymorphone: Numorphan
    - Propoxyphene: Darvon-N
    - Remifentanil: Ultiva
    - Sufentanil: Sufenta
AGONIST-ANTAGONISTS
  Butorphanol: Stadol NS
  Nalbuphine: Nubain
  Pentazocine: Talwin
ANTAGONISTS
  Naloxone: Narcan (injectable)
  Naltrexone: ReVia (oral)
APPENDIX V: ABCs of cardiopulmonary resuscitation (CPR) - summary

Assess the scene: ensure that no hazards are present (e.g., electrical wires, fire) and determine whether the person is conscious. This can be done by calling the person’s name out loud, by pinching the trapezius muscles (shoulders), or by clapping your hands near their ears.

Ambulance: If the victim does not respond, immediately request that someone call an ambulance and that they specify the person’s condition, age (approximate) and sex, as well as the substances he/she has consumed. Ask the caller to return to the scene once the call has been made.

A: Airways – ensure that the airways are clear by tilting the head back and lifting the chin (while the person is lying down). Watch the chest to make sure it rises and falls; listen for breathing by bringing your ear near the person’s mouth. Do you feel air on your cheek?

B. Breathing - if the person is not breathing, give two slow, deep breaths by pinching the nose and blowing into the mouth.

C. Circulation – look for signs of circulation by checking the person’s carotid pulse (neck) for 10 seconds.

If the person is not breathing but has a pulse, give a breath every 5 seconds and recheck the pulse after one minute.

If the person is not breathing and does not have a pulse: 4 complete cycles comprising 15 compressions and 2 breaths. Recheck pulse for 10 seconds and resume procedure until help arrives.

As you perform these steps, there is a strong likelihood that the person will vomit. If this happens, turn the person on his or her side; make sure the mouth is completely empty before resuming the ABC resuscitation procedure.

TWO PEOPLE TO SAVE ONE LIFE, NO MORE NO LESS

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