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[UK] Study Report on Treatment for heroin and cocaine dependency

Title: Treatment for heroin and cocaine dependency
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A. Abstract

In Britain, around 11.3 million people have used an illicit drug at least once in their lifetime. Among all the illicit drugs, heroin and cocaine have the most devastating effects, including health impact to dependent individuals and the cost of drug related crime. This POSTnote looks at the current heroin and cocaine treatments, assesses new treatments and also examines the issues raised from them.

B. Background

Heroin and cocaine dependencies are the main focus of this note:
☐ Heroin: an opioid derived from a certain type of poppy plant.
☐ Cocaine: a drug extracted from cocoa leaves. It refers to both cocaine powder and ‘crack’ cocaine. Cocaine powder is water soluble and is snorted or injected, while ‘crack’ cocaine is not soluble in water and is smoked.

Advances in the understanding of how drugs act on the brain have led to the development of medicines to treat drug users. The understanding of drug effect on the brain is as follows:
☐ The brain stem: a region that controls critical functions such as breathing, heart rate and sleeping;
☐ The reward system: a system in the brain that ensures life sustaining activities are repeated by associating those activities with pleasure or reward. Dopamine is the chemical messenger to activate this system.

Untreated drug use imposes immense problems and costs on a country, including property crime, violence and expenses incurred by the criminal justice, healthcare systems and social services. In the UK, it is estimated that crime and health costs of class A drug use is 15.4 million pounds per year while a recent data shows that about 161,000 people are receiving drug treatment through community and a further 60,000 through the criminal justice system. Among those adults receiving treatment in England, two thirds are heroin dependent, 6% cocaine powder and another 6% crack cocaine. However, recently it has seen an increasing number in poly-drug use (opiates and crack).

Current government drugs policy

The UK government has a ten-year drug strategy (2008-2018) and the four themes included in the strategy are: protecting communities; preventing harm to children, young people and families; delivering new drug treatments; and public information and engagement. Through this strategy, the government wants to expand and improve drug treatment services. Methods adopted are:
☐ Tailoring drug treatment to individual needs;
☐ Achieving higher completion rates for people on treatment programmes;
☐ Improving understanding of addiction and identifying new forms of treatment and prevention.

Currently, the suggestions that the National Institute of Health and Clinical Excellence (NICE) gives to heroin drug treatment are medication, such as methadone or buprenorphine, and psychosocial interventions and, to cocaine treatment are psychosocial interventions and support from key workers. The major difference between the treatment for these two types of drugs is that there is no effective substitution for cocaine.

C. Heroin

‘Natural opioids’ – endorphins and heroin can both bind to the opioid receptors in the brain and indirectly stimulated the rewarding system by causing release of dopamine. This triggers a brief intense euphoria, followed by a few hours of a relaxed, contented state. Compared to other opioids, heroin penetrates the brain more rapidly than other opioids, which is why many addicts prefer it. Addiction and increased tolerance of heroin come along when it is

used frequently. Therefore, only larger doses can bring the same effect. Heroin use will also affect the brainstem. In a situation of overdose, respiratory centre may shut down breathing altogether, leading to death. Over-doses are likely to happen when heroin is taken with other sedative drugs, or is taken after a period of abstinence when tolerance is reduced or lost.

Withdrawal symptoms, including anxiety and drug cravings, dilated pupils, loss of appetite, shakes, muscle cramps and depression, is one of the major reasons that makes abstinence difficult and relapse common. Symptoms normally start after 6 to 8 hours from the last dose and reach the worst level after 48 to 72 hours. Phases of withdrawal symptoms last about one week.

Current treatments for heroin dependency
According to statistics taken in 2007/8 in the UK, heroin was the primary drug for 61% of drug addicts in treatment. The current treatment for heroin addiction is substitute medication, such as methadone, buprenorphine and naltrexone. Among all, methadone is the most widely used one.

Methadone Methadone treatment was recommended by NICE in 2007. It does not only mimic some of heroin pleasurable actions, but also will be metabolised more slowly than heroin, hence having longer effects. One single dose of methadone can keep a patient free from cravings for the whole day, compared with a heroin addict that normally needs 2-4 heroin hits per day. With methadone treatment, a patient's life can be stabilised gradually and therefore, possibly move toward abstinence. The following are four benefits of methadone treatment identified by the Advisory Council on the Misuse of Drugs (ACMD):
1. decreasing heroin use;
2. decreasing the number of people injecting drugs, therefore reducing the risk of transmission of viruses;
3. reducing overdose-caused death;
4. decreasing criminal activity.

Methadone treatment must be accompanied by appropriate psychosocial interventions to take effect. Whether to start a patient on methadone is a decision based on a detailed risk assessment. Besides, it is important to have a period of 3-month supervision on a new patient to ensure they take daily doses.

However, there are risks involved in methadone treatment. For one, methadone is a very addictive drug in its own right. It can be fatal in overdose and may also run the risk of potential abuse. For another, the difference between the dose needed for maintenance and the dose that can kill is very small. Thus, it is of great importance to maintain prescribing practice in line with clinical guidelines. However, figures collected between 2003-07 saw an increase in the number of deaths related to methadone use in England and Wales. Further research is required to explore the possible reasons for this.

Buprenorphine Since 1999 buprenorphine has been licensed for use in opioid dependency in the UK. It reduces a patient's use of other opioids by binding tightly to the opioid receptors in the brain. Compared to equivalent doses of methadone, buprenorphine has a milder, less euphoric and less sedating effect. However, it still alleviates opioid withdrawal and craving and, some patients respond to buprenorphine better than methadone.

Naltrexone Naltrexone binds opioid receptors so tightly that it blocks the euphoric effects of opioids, gradually reducing the patient's desire to take opioid drugs. However, before the first dose of naltrexone, the patient must be opioid-free for 7-10 days. Otherwise, naltrexone will quickly replace other opioids and send the patient into instant withdrawal. Naltrexone has no addicting effect on patients; hence there is no potential for abuse. However, the downside is that it lacks the effect on 'encouraging repeat behaviour', which may lead to patient non-compliance. Highly motivated patients are thus the best candidates for this treatment.

New treatments for heroin dependency
Current methadone treatments include a mixture of tow forms, with levo-methadone being the only one that is active at the opioid receptors. Attempts to separate the two forms have been made. The process developed by a German company proved to be too expensive, whereas an enzyme-based process created by scientists in Manchester is practically cheaper. The patent is now owned by Intellprogranix Ltd, which is eager to put both forms into clinical trials.

New delivery mechanisms
Long-term delivery of medication treatment has been developing. In 2008, a US company tested an implant that can deliver 6 month of continuous therapeutic levels of buprenorphine and proved to be effective, well-tolerated and safe in a small trial. On the other hand, a Russian study is investigating a long-term naltrexone implant that blocks opioid receptors for 8 to 10 weeks.

Treatments for withdrawal
Withdrawal symptoms result from the imbalanced chemicals in the brain when a drug user suddenly stops taking opioids. The drug lofexidine can reduce such physical symptoms by controlling some chemical release, although it can not stop the craving. NICE recommends that lofexidine can be used on people who want to detoxify within a short time period or who has mild or uncertain drug dependency.

D. Cocaine
Cocaine disturbs the brain function that is responsible to remove dopamine. The built-up dopamine therefore leads to over-stimulation of the reward system, causing extended and amplified sensations of pleasure. Following the 'artificial' euphoria comes a 'comedown' that can induce an immediate desire to take more.

The effects of cocaine injection wears off within an hour and therefore, cocaine injectors often increase the frequency of injection, leading to physical damage and possibly overdose. There are various effects that cocaine brings about, including increased heart rate and blood pressure, anxiety, panic, paranoia, confusion, dilated pupils, hallucinations, tremors and hyperactivity. When overdosed, it can cause heart attack or seizures, brain haemorrhage, increased body temperature, kidney failure, delirium, convulsions and death. As to cocaine withdrawal symptoms, it includes anxiety, depression, fatigue, sleep disturbances, appetite changes and irritability.

Current treatment for cocaine dependency
Without substitute medication, the primary treatment lies on psychosocial interventions, although various treatments are in development, such as substitutes and vaccines.

Cocaine substitute
A number of potential substitutes for cocaine dependency treatment are in development. In the US, there have been five promising medications in phase II clinical trials.

Treatments for cocaine dependence
Disulfiram is a drug used to treat alcohol dependency, but it seems to have potential to treat cocaine dependency. Research is under way to investigate whether it is an effective substitute for cocaine treatment.

Vaccines
Using vaccines to treat cocaine dependency is another potential strategy. Cocaine and other drugs are small enough to pass into the brain but not big enough to elicit an immune response in human body. To overcome this, researchers attached cocaine to larger molecules and successfully developed vaccines that can be recognised by the immune system. It is hoped that these antibodies will also bind to any cocaine molecules in the blood, forming a big complex that is too big to pass into the brain.

E. Ethics of drug treatment
Vaccines
Despite its potential benefits, cocaine vaccines also raise ethical issues. For instance: the suggestion of including the vaccine in a sentence where the criminal is known as a cocaine user is contentious. Questions of human rights and choices of lifestyle are in debate. As to therapeutic use, it is less problematic as an informed consent is obtained.

F. Clinical Trials

Considerable investment and patient compliance are two major challenges in developing new drugs to treat drug dependency. Big pharmaceutical companies have been reluctant to get involved in this field unless treatments can be proved to bring financial rewards. Also, it is difficult to gain cooperation from drug users to administer treatment and monitor its effects.

G. Overview

☐ Increasing understanding of addiction and improving drug treatment and prevention are major aims of the government's ten-year drug strategy (2008-2018).

☐ For heroin addiction, new formulations of existing medications, new substitutes and new treatments for withdrawals are all in development.

☐ For cocaine addiction, new vaccines for treatment are in development, however with some ethical concerns.

☐ Investment is required to develop new medicines for drug dependency.