

ACMD

Advisory Council on the Misuse of Drugs

Chair: Professor Les Iversen

Secretary: Zahi Sulaiman

1st Floor (NE), Peel Building

2 Marsham Street

London

SW1P 4DF

Tel: 020 7035 1121

Email: ACMD@homeoffice.gsi.gov.uk

Rt Hon. Theresa May, MP

Home Secretary

Home Office

2 Marsham Street

London

SW1P 4DF

Rt Hon. Jeremy Hunt, MP

Secretary of State for Health

Department of Health

79 Whitehall

London

SW1A 2NS

12 March 2015

Dear Home Secretary and Secretary of State for Health,

Re: ACMD's report on Cocaine Powder

The Advisory Council on the Misuse of Drugs (ACMD) is pleased to provide you with the attached report: '*Cocaine Powder: Review of the evidence of use, harms and public health implications*'.

The ACMD undertook this review of cocaine powder use, its associated harms and public health implications, due to its awareness and concern around the increasing prevalence of cocaine use and the perception that the drug is safe. This review does not consider the classification of cocaine. The ACMD considers that the harms of cocaine are significant and clearly delineate it as a Class A drug.

The use of cocaine powder, however casually, can lead to significant harm. It can also lead to dependence. Many of the adulterants used as cutting agents can cause serious medical harms in their own right. The harms associated with the use of cocaine include acute and

chronic physical and psychological harms as well as social and societal. The financial resources required for policing and healthcare as a result of the cocaine market are significant.

The key findings within the review include:

- The prevalence of cocaine powder use increased between 1996 and 2008/9 but there are signs that this increase may since have abated. In the same period, the demographic and social spread of those that use cocaine has widened.
- A two-tier distribution market has developed, categorised by drug purity and consequent price, which we believe has influenced prevalence and patterns of use.
- There are strong links between powder cocaine use, the night time economy and alcohol consumption.
- Whilst evidence concerning effective treatment and prevention is sparse, treatment methods such as including cognitive behavioural therapy and contingency management have been shown to be effective.
- In light of the possibility of unintended consequences, the ACMD does not believe that it would be appropriate, or helpful, for mass education initiatives to specifically highlight cocaine powder.

We would welcome the opportunity to discuss these recommendations.

Yours sincerely,



Professor Les Iversen
ACMD Chair



Dr Tim Millar
ACMD Cocaine Working Group Chair

CC: Lynne Featherstone MP, Minister for Crime Prevention
Jane Ellison MP, Parliamentary Under Secretary of State for Public Health
Mark Drakeford AM, Minister for Health and Social Services (Wales)
Michael Matheson MSP, Minister for Public Health (Scotland)
Jim Wells MLA, Minister for Health, Social Services and Public Safety (NI)
Bernard Silverman (Home Office Chief Scientific Adviser)
Dan Greaves (Home Office, Head of Drugs and Alcohol Unit)
Jo Wallace (Home Office, Head of Home Office Science Secretariats)
Rosanna O'Connor (Public Health England)
John McCracken (Department of Health)
Mark Prunty (Department of Health)

ACMD

Advisory Council on the Misuse of Drugs

Cocaine Powder: Review of the evidence of prevalence and patterns of use, harms, and implications

Contents

Executive Summary	5
Chapter 1: Introduction	11
Chapter 2: Prevalence and Patterns of Cocaine Powder Use	13
Chapter 3: Cocaine Purity and Adulterants (Cutting Agents)	21
Chapter 4: Harms Associated with Cocaine Powder	27
Chapter 5: Treatment for Cocaine Powder Users	39
Chapter 6: Over-arching Issues	44
Appendix 1: The History of Cocaine	51
Appendix 2: Cocaine Trade	54
Appendix 3: Contributions to this Review	56
Appendix 4: Members of the Advisory Council on the Misuse of Drugs	57
References	59

Executive Summary

1. The Advisory Council on the Misuse of Drugs (ACMD) has undertaken this review due to concern about the apparent increase in the prevalence of cocaine powder use and the possible public perception that it is a 'safe' drug.
2. This report considers only cocaine powder, the use of which has increased considerably in recent years.

Prevalence and Patterns of Cocaine Powder Use

3. There is strong evidence that the prevalence of cocaine powder use increased between 1996 and 2008/09. There are signs that this increase may since have abated. Although use is confined to a small minority of the population, cocaine powder is the second most commonly used illegal drug, after cannabis.
4. There is strong evidence that the use of cocaine has spread to a wider social and demographic spectrum than was the case during the 1990s.
5. The use of cocaine powder is strongly associated with simultaneous use of alcohol and with the night-time economy.
6. The majority of users consume cocaine powder relatively infrequently and, even among users, there appears to be a reasonable level of awareness that cocaine powder is not a 'safe' drug. As noted in Chapter 4, even occasional use confers a risk of significant acute harm.

Cocaine Powder Purity and Adulterants ("Cutting Agents")

7. The purity of the cocaine powder available in the UK market is highly variable. There is evidence of a two-tier market, with most of the cocaine powder that is available to consumers being of very low purity. The availability of low-purity, cheaper, cocaine powder is very likely to have been associated with the increased prevalence of use and the changed demographic profile of users.
8. A variety of inert and pharmaceutically active cutting agents are found in cocaine powder seized in the UK. Many of the active cutting agents can cause serious medical harm.
9. The ACMD welcomes new legislation designed to disrupt the supply of cutting agents. It is hoped that disrupted availability of conventional cutting agents will result in a shift towards the use of less harmful inert substances. However, there is the potential for suppliers to

seek new and potentially more dangerous substances to use for this purpose. This could increase the risk of harm to users.

Harms Associated with Cocaine Powder

10. Much of the available literature does not distinguish the harms associated with use of cocaine powder from those associated with use of crack cocaine.
11. Acute harms from cocaine can affect any user: they can occur in first-time users as well as chronic, dependent users. Cocaine causes psychomotor and cardiovascular stimulation. Clinical features of acute toxicity include agitation, psychosis, convulsions and hypertension. Chest pain (angina) related to acute coronary syndrome is also an important clinical feature of acute cocaine toxicity; it is important that clinicians managing patients with chest pain consider cocaine as the cause because the management differs from other causes of chest pain.
12. During 2008, when survey data showed that the population rates for cocaine powder use peaked, there were 282 deaths recorded in the UK in which cocaine (of any type) was involved. Mention that a drug is involved in a death does not necessarily mean that it is the cause of the death.
13. Use of cocaine powder confers a risk of becoming dependent. Survey data (from the Crime Survey for England and Wales (CSEW)) suggest that a small minority of individuals use cocaine powder in the regular, frequent, persistent pattern that is likely to be indicative of dependent use.
14. Chronic physical harms are associated with heavy dependent use and include cardiomyopathy (heart failure) and coronary atherosclerosis as well as necrosis of the nasal septum associated with snorting.
15. Cocaine use is associated with high-risk sexual behaviour and with HIV progression *in vitro*. Cocaine use during pregnancy can be associated with a number of complications. Anxiety, irritability, restlessness and insomnia are commonly associated with cocaine use. Cocaine can also be associated with agitated delirium and longer-term psychosis and depression. It may also be associated with cognitive deficits.
16. The evidence indicates that cocaine powder is very frequently used in combination with alcohol. The evidence does not indicate that its metabolite when used with alcohol, cocaethylene, is in itself more cardiotoxic. However, the use of cocaine does seem to enable an individual to continue binge drinking alcohol to very high levels which, itself, conveys additional risks of harm.
17. It is important to recognise that the international trade in cocaine and other drugs has political, social, environmental, and economic consequences that reach far beyond the

effects on individual users. For example, cocaine cultivation is a significant contributor to deforestation, soil erosion, and environmental contamination in producer countries.

Treatment for Cocaine Powder Users

18. The available evidence does not support definitive conclusions about levels of treatment need and treatment accessibility for cocaine powder users. However, the CSEW indicates that a minority of those who use cocaine powder do so on the frequent, persistent basis that may signify dependent patterns of use and the numbers who seek treatment is of an equivalent order of magnitude. Nevertheless, it is important to ensure that addiction treatment services have the capacity and expertise to address the needs of cocaine powder users and that treatment services should be accessible to this group.
19. The existing evidence provides weak, if any, support for the use of pharmacological treatment for cocaine abuse and dependence (European Monitoring Centre for Drugs and Drug Addiction (EMCDDA), 2014; Reed *et al.*, 2014; Lingford-Hughes, 2012; National Institute on Drug Abuse (NIDA), 2010; Baker, 2004; Effective Interventions Unit, 2002).
20. Psychosocial Interventions (such as cognitive behavioural therapy (CBT) and Contingency Management) have proven effectiveness in the treatment of cocaine users and are recommended as the Standard of Care (EMCDDA, 2014; Lingford-Hughes, 2012). There is also a substantial recognition amongst experts that 12-step interventions are helpful.

Over-arching Issues

21. We have noted evidence that cocaine powder is commonly used jointly with alcohol. It is desirable that policy responses to cocaine powder recognise its close association with alcohol use and the risks that this entails.
22. Given the relatively widespread use of cocaine powder, as demonstrated by findings from the CSEW and other sources, as described in Chapter 6, and the potential for some users to develop acute or chronic problems, it is important that such opportunities for early intervention as may exist are acted upon. There are promising indications that Assessment and Brief Intervention approaches may be effective in this respect.
23. The need for early intervention for substance users is generic, but there may be settings that offer particular opportunities for identification, and early intervention, specifically in respect of cocaine powder use. Potential examples are criminal justice (police, Offender Management Service) and emergency medicine settings.
24. We recognise the complexity inherent in delivering preventative interventions, a subject which is addressed in detail in a previous ACMD briefing paper: *Prevention of drug and alcohol dependence*. Preventing cocaine powder use and related harm, as with other

substance use, is extremely challenging, with a limited evidence base to guide practice. The ACMD supports the UK Government and Devolved Administrations' broad social and life skills approach to drug education and prevention that includes information on specific substances.

25. It is evident that cocaine powder continues to account for a substantial level of criminal justice activity in the UK, particularly in respect of policing of the Misuse of Drugs Act 1971. In addition to this activity, local police forces deal also with the consequences of cocaine powder use, including public nuisance within the night-time economy and cocaine's strong association with organised crime. As noted in Chapter 2, much cocaine powder consumption in the UK is in combination with alcohol and may impact on the night-time economies of cities and towns across the UK.

LIST OF RECOMMENDATIONS:

Recommendation 1:

Police teams working with the night-time economy, police and Local Authority licensing teams, along with local substance misuse agencies, should be encouraged to work with night-time venues to ensure that they are equipped to recognise signs of acute problems related to the effects of cocaine powder and to mitigate the associated risks.

Public Health England, Public Health Wales and Education Scotland and the Public Health Agency for Northern Ireland should work with Local Authority community safety and public health teams to ensure that supporting information materials on the effects of cocaine powder are available to night-time economy venues.

**Action: Police teams working with the night-time economy
Police and Local Authority licensing teams, local substance misuse agencies
Public Health England, Public Health Wales, Education Scotland and the Public Health Agency for Northern Ireland.**

Recommendation 2:

The ACMD recommends that the National Crime Agency should continue its ENDORSE initiative. This is a key and significant source of information about drug seizures and includes intelligence regarding cutting agents. This will allow the ACMD, Home Office and Department of Health to monitor emerging trends related to cocaine powder.

Action: National Crime Agency

Recommendation 3:

Public Health England, the Home Office and Devolved Administrations to continue monitoring the outputs of the population surveys and treatment presentations for any emerging indications of an increase in the prevalence of cocaine powder dependence.

Action: Public Health England, Home Office and Devolved Administrations

Recommendation 4:

a) Local Authority based public health commissioners (and the equivalent in Devolved Administrations) of drug treatment services to ensure that local services for the treatment of cocaine powder are sufficient to meet local needs and should ensure that these services are properly accessible to the cocaine powder user group.

b) Drug treatment service providers to ensure that their workforce is competent to deliver cocaine powder treatment/interventions.

Action: Local authority public health commissioners of drug treatment services (and the equivalent in Devolved Administrations) and drug treatment service providers

Recommendation 5:

Public Health England and the Devolved Administrations to seek further expert advice from suitable health professionals and academics regarding the development of assessment and brief intervention models for cocaine powder and other substances, for use in generic settings.

Action: Public Health England, Devolved Administrations

Recommendation 6:

The Department of Health, NHS England, the Ministry of Justice and Devolved Administrations to ensure that key staff working in primary and acute health services, and criminal justice services, be better equipped to identify problems that may be related to illicit drug use; including cocaine powder (and cutting agents), to ensure early identification and appropriate intervention including referral for treatment, where indicated.

Action: Department of Health, NHS England, Ministry of Justice and Devolved Administrations

Recommendation 7:

In line with the ACMD's Prevention briefing, the ACMD recommends that Public Health England, Local Authorities and schools ensure the issues surrounding cocaine powder are embedded within education initiatives about generic substance use prevention.

The ACMD does not consider that it would be appropriate, or helpful, for mass education initiatives that specifically highlight cocaine powder.

Action: Public Health England, Local Authorities and schools

Recommendation 8:

Law enforcement agencies to ensure that their officers are aware of the signs and potential consequences of cocaine powder use, in particular, in terms of the potential for aggression and the elevated risk of cardiovascular problems during arrest and custody supervision and care.

Action: Law enforcement agencies

Chapter 1: Introduction

Scope of this Review

1. The ACMD has undertaken this review due to concern about the apparent increase in the prevalence of cocaine powder use and the possible public perception that it is a 'safe drug'. There is a range of potentially harmful impacts of the drug, including the potential for dependence.
2. The Crime Survey for England and Wales (CSEW) indicates a substantial increase in the prevalence of cocaine powder use between 1996 and 2008/09: in 1996, 0.6% of respondents (16- to 59-year-olds) reported using cocaine in the past year, compared to 3% in 2008/09 (Home Office, 2014).
3. Findings from the CSEW suggest that the prevalence of power cocaine use may have declined, somewhat, since 2008/09 (Home Office, 2014). However, during 2013/14 an estimated 743,000 (range 667,000–820,000) individuals in England and Wales, aged 16 to 59 years, had used cocaine powder in the past year (Home Office, 2014), meaning that it remains the second most widely used illegal drug after cannabis. Furthermore, the latest (2013/14) wave of the CSEW highlights a recent increase in the prevalence of past-year cocaine powder use which "*has made a major contribution to the increase in overall drug use between 2012/13 and 2013/14*" (Home Office, 2014).
4. Importantly, although this review is focused on cocaine powder, we stress that cocaine powder should not be dealt with in isolation. In particular, the use of cocaine is often associated with the use of alcohol and many other drugs.
5. This report considers only cocaine powder, the use of which has increased considerably in recent years. The prevalence of crack cocaine use is much lower (the estimated number of crack cocaine users in 2012/13 was 166,640, with a range between 161,621 and 173,706 – Hay *et al.*, 2014) and appears to have remained reasonably static (Home Office, 2014; Hay *et al.*, 2014). We have, therefore, not considered crack cocaine use; although crack cocaine and cocaine powder are often not considered separately in the published literature, where possible we have reported on cocaine powder.
6. This review does not consider the classification of cocaine. The ACMD considers that the potential harms of cocaine are significant and clearly delineate it as a Class A drug.
7. We would like to thank David Liddell and the subgroup responsible for an initial report for their invaluable contribution, which has to a great extent informed the content of this revised version.

Purpose of the Review

8. The purpose of the review was to consider:

- The available evidence about the prevalence of cocaine powder use and changes therein;
- Evidence about current patterns of cocaine powder use and the population groups involved;
- The harms associated with cocaine powder use, and specifically those arising from substances used as adulterants or “cutting agents”;
- Approaches to treatment intervention for cocaine powder users;
- Whether there are grounds to develop specific responses to cocaine powder use.

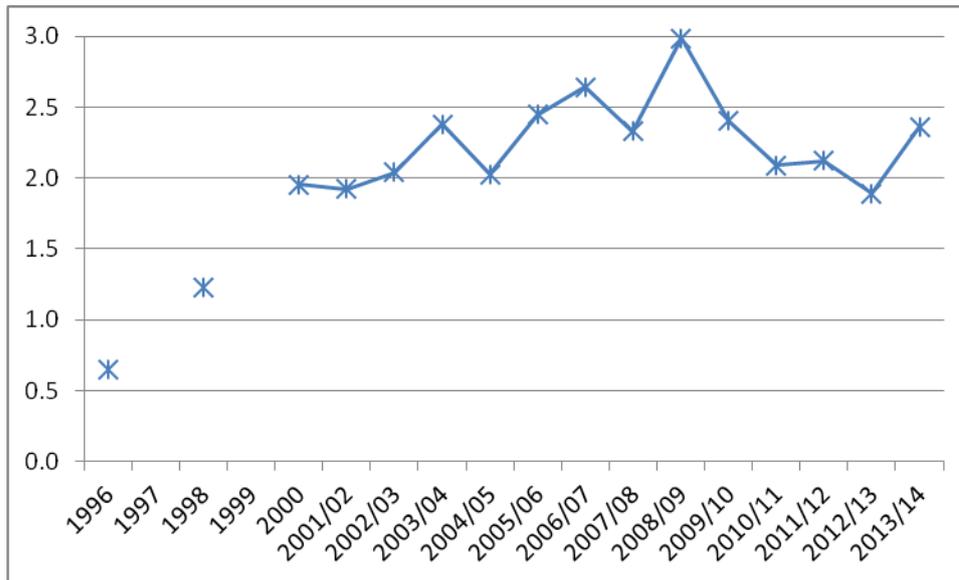
Chapter 2: Prevalence and Patterns of Cocaine Powder Use

9. A variety of sources are helpful in illuminating the epidemiology of cocaine use in the UK. Foremost among these, the CSEW (Home Office, 2014), formerly the British Crime Survey, is an annual household survey of approximately 35,000 adults that includes a drug misuse component and which provides the most temporally comprehensive and detailed published information. The Northern Ireland Crime Survey and Scottish Crime and Justice Survey provide additional information about drug misuse in the latter jurisdictions, albeit that methodologies differ and that trend data are less extensive. Insofar as the primary focus here is on trends in use, the CSEW is the major source of information. Such figures for the Devolved Administrations as could be located are included, below. A variety of other survey sources are available, some of which focus on specific population groups such as students, clubbers and LGBT populations. In the main, these rely on self-selected samples which is, methodologically, a very weak approach to measuring the prevalence of use. They are also less useful for clarifying trends.

Prevalence and Patterns of Cocaine Powder Use

10. During 2013/14, an estimated 743,000 (range 667,000–820,000) individuals in England and Wales, aged 16 to 59 years, had used cocaine powder in the past year (Home Office, 2014). Cocaine powder was the second most common illicit drug used by CSEW respondents in 2013/14, after cannabis (Home Office, 2014). Population estimates for other UK jurisdictions are not available. Note that use in the past-year use includes individuals who have used just once, or occasionally; thus, this estimate comprises frequent, regular and infrequent users (see below). Whilst use in the past year is the preferred indicator of current use, it is notable that 9.4% of 16-to-59-year-old participants in the 2013/14 CSEW reported that they had used cocaine powder during their lifetime (Home Office, 2014).

Figure 1: Proportion (percent) of respondents aged 16 to 59 years reporting use of cocaine powder in the last year, 1996 to 2013/14: Crime Survey for England and Wales 2013/14



Source: Extent and trends in illicit drug use among adults: Drug misuse 2013 to 2014

(<https://www.gov.uk/government/statistics/tables-for-drug-misuse-findings-from-the-2013-to-2014-csew>)

Accessed 10/11/2014.

11. Findings from the CSEW suggest an increase in the proportion of respondents in England and Wales who acknowledged using cocaine powder at least once in the previous year, from a baseline of 0.6% in the 1996 survey to a peak of 3% in the 2008/09 survey (Figure 1), with some annual fluctuation¹. The proportion acknowledging past-year use declined following 2008/09, but there was a statistically significant increase between 2012/13 and 2013/14. It is too early to determine whether the latter increase indicates an upturn in that decreasing trend. The overall increase between 1996 and 2013/14 was statistically significant.

12. The CSEW observed statistically significant increases in past-year cocaine powder use among respondents in Wales and in most English Regions between 1996 and 2013/14, except for the North East and South West. Rates of use in London have consistently been higher than in other areas, as is the case for many forms of drug use, and trend data indicate that the observed increase in use began earlier in London than in other Regions.

13. Findings from the Scottish Crime and Justice Survey suggest levels of past-year use among adults (1.7%) during 2012/13 (Robertson, 2014) were similar to those observed for that year in England and Wales (1.9% – Home Office, 2013). Findings from the equivalent Northern Ireland survey (Toner and Freel, 2010) indicate lower levels of past-year use (1.1% of respondents in 2008/09) than in England and Wales (3% in 2008/09 – Home Office, 2014).

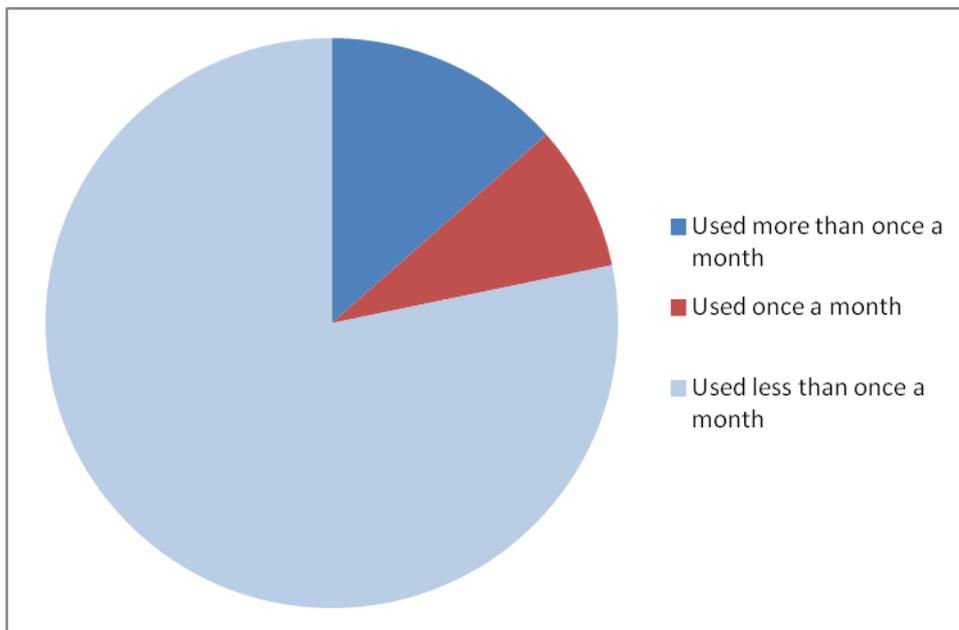
14. Notwithstanding differences in methodology and the time periods observed, European comparisons suggest that, over the past decade, levels of cocaine powder use in the UK

¹ Figures are not available for 1997 and 1999. The period for use in the last year extends prior to the survey year.

have consistently been higher than those in most other European countries, with prevalence and the trend therein most closely resembling those in Spain (EMCDDA, 2014). Most of those European countries with the highest prevalence of use exhibit a similar overall pattern, with an increasing trend until 2008 and a decline thereafter.

15. It is important to recognise (Figure 2) that a minority of past-year users of cocaine powder reported using frequently (more than once per month, 2013/14; 13%) or regularly (once per month, 2013/14; 8%) (Home Office, 2014). Thus, frequent or regular use of cocaine powder was reported by less than 1% of CSEW respondents in 2013/14. The remainder (78%) of past-year cocaine powder users had used less than once per month during the previous year, which may include one-off use. Some 60% of past-year users in the 2013/14 CSEW reported using cocaine powder only once or twice per year, with around 4% using weekly or more often² (Home Office, 2014). Two-fifths of past-year adult cocaine powder users in the Scottish Crime and Justice Survey reported that they had tried it just once or twice, whereas just 2% indicated that they considered themselves dependent (Robertson, 2014): the CSEW does not report comparable figures for dependence. Infrequent use, if it does not escalate, is unlikely to lead to problems of dependence or chronic harms, although the risk of significant acute harm remains (see Chapter 4 of this report).

Figure 2: Proportion (percent) of cocaine powder users who were frequent or less frequent users, 16-to-59-year-old last-year drug users, Crime Survey for England and Wales 2013/14



Source: Frequent drug use: Drug misuse 2013 to 2014 (<https://www.gov.uk/government/statistics/tables-for-drug-misuse-findings-from-the-2013-to-2014-csew>) Accessed 10/11/2014.

² The number of respondents reporting frequent use is small and the proportion stated here should be treated with caution as it may be subject to random fluctuation from year to year.

16. The vast majority of CSEW respondents (97%), and two-thirds of past-year users, indicated that they consider the use of cocaine powder to be unsafe (Home Office, 2013). Thus, even among users, there is a reasonable level of awareness that cocaine is not a 'safe' drug. Around 7% of adults thought that it was acceptable to take cocaine occasionally; the majority (93%) thought that it was never acceptable (Home Office, 2013).

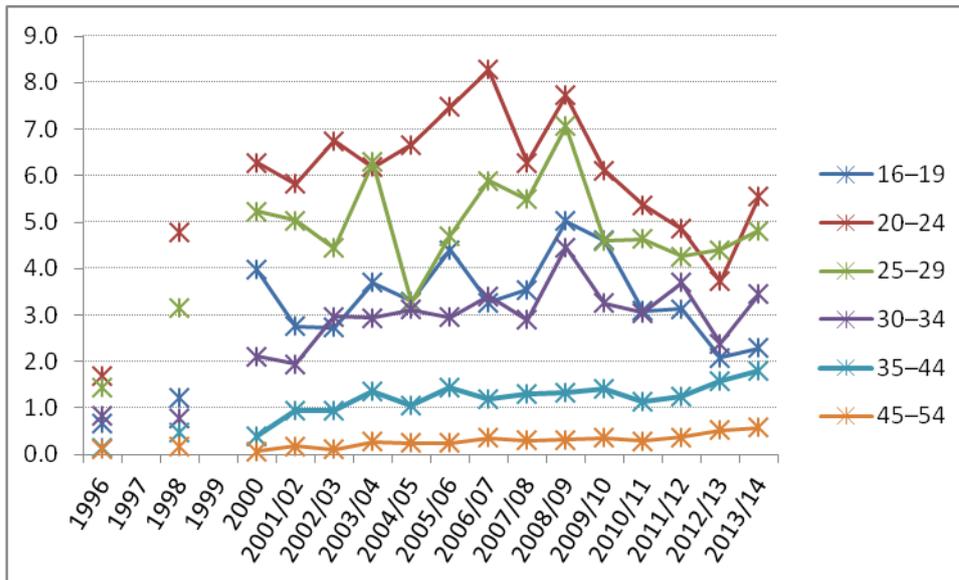
Demographic Profile of Cocaine Powder Users

17. Consistently, over the time period considered here (1996 to 2013/14), cocaine powder use has been more common among male than female CSEW respondents (3.3% versus 1.4% of respondents, respectively, during 2013/14) and a similar gender difference is observed in Scotland (ISD Scotland, 2011). In England and Wales, there was a statistically significant increase for both genders between 1996 and 2013/14; similar gender patterns and trends are observed for a range of other drug types (Home Office, 2014).

18. Around 3% of CSEW respondents report that they are gay or bisexual. Past-year use of cocaine powder use was considerably more common among gay or bisexual respondents during 2013/14 (men aged 16 to 59 years, 9.9%; women aged 16 to 59 years, 4.5%) than among those identifying as heterosexual (2.9% and 1.1%, respectively) (Home Office, 2014).

19. As for other drugs, the prevalence of past-year use varies according to age group (Figure 3). In England and Wales, past-year cocaine powder use has consistently been more common among respondents aged 20 to 24 and 25 to 29 years, followed by younger adults (those aged 16 to 19 years) and those aged 30 to 34 years. Use among older adults (aged 35 to 44 and 45 to 54 years) has been less common, particularly in the latter group. However, it is notable that there have been statistically significant increases (1996 to 2013/14) across all age groups up to the age of 54 years; a phenomenon that has not been observed in respect of other drug types (Home Office, 2014). It is not possible, on the basis of published data, to determine whether this indicates initiation of cocaine powder use across the age spectrum, or continued use among an ageing user cohort. However, among older adults (35 to 44 and 45 to 59 years) the modal age group for first use of cocaine powder was reported to be at age 20 years (Hoare and Moon, 2010), consistent with the latter hypothesis.

Figure 3: Proportion (percent) of respondents aged 16 to 54 years reporting use of cocaine powder in the last year, 1996 to 2013/14, by age group, Crime Survey for England and Wales 2013/14



Source: Illicit drug use by personal, household and area characteristics and lifestyle factors: Drug misuse 2013 to 2014 second edition (<https://www.gov.uk/government/statistics/tables-for-drug-misuse-findings-from-the-2013-to-2014-csew>) Accessed 10/11/2014.

20. Rates of cocaine powder use are lower among those under the age of 16 years than among young adults: for example, 1.6% of 15-year-old children surveyed in the 2013 Smoking Drinking and Drug Use survey for England reported past-year use (Fuller and Hawkins, 2014), although a higher rate (3%) was observed among their Scottish equivalents in 2010 (ISD Scotland, 2011).

21. CSEW categorises respondents according to the Classification of Residential Neighbourhoods (ACORN),³ a tool designed to classify households according to their neighbourhood demographic, employment and housing characteristics. The 2013/14 CSEW provides an analysis of trends in past-year cocaine powder use according to these classifications (Home Office, 2014). CSEW findings for 2001/02 suggest much higher prevalence of use among households in areas of “Urban Prosperity” (characterised as prosperous professionals, young urban professionals and students living in town and city areas). Although levels of past-year use among this group have remained higher than those in other categories, it is notable that over the period from 2001/02 to 2013/14, the only statistically significant increase in annual levels of past-year use was observed among households in areas classed as “Hard Pressed” (characterised as low-income families, residents in council areas, people living in high-rise and inner-city estates). Nonetheless, there were statistically significant increases between 2012/13 and 2013/14 in past-year use among respondents living in areas classed as “Comfortably Off” (characterised as young couples, secure families, older couples

³ <http://acorn.caci.co.uk/>

living in the suburbs and pensioners) and of “Moderate Means” (characterised as Asian communities, post-industrial families and skilled manual workers). Taken together, these observations suggest that an increasingly wide social spectrum is involved in cocaine powder use; although use remains more common in areas of “Urban Prosperity” the proportion of users accounted for by this group has fallen.

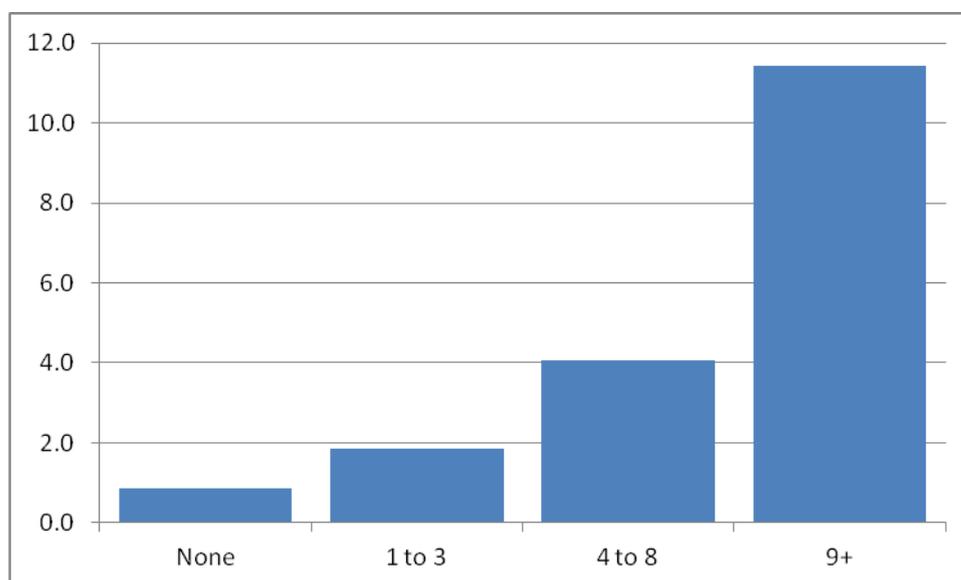
22. The CSEW also reports trends in past-year use according to household income. These trends accord with cocaine powder being used among an increasingly wide social spectrum. Whereas in 2001/02 use was more common among those in households with an annual income of more than £50,000, between 2001/02 and 2013/14 there were statistically significant increases among respondents across all other household income groups (<£10,000, £10,000–£19,999, £20,000–£29,999, £30,000–£39,999, £40,000–£49,999) (Home Office, 2014).

23. We have noted, elsewhere in this report (Chapter 3), the emergence of a two-tier market, with indications that low-purity cocaine powder comprises the bulk of that market. It is highly likely that increased availability of lower-quality, cheaper, cocaine powder is both a consequence of and a factor that has driven market expansion.

Use of Cocaine Powder with Alcohol

24. The CSEW indicates that use of cocaine powder is more common among those who frequently visit nightclubs and pubs (Home Office, 2014), consistent with its use in entertainment settings and indicative of use in settings where alcohol is available. The majority (91%) of cocaine powder users in England and Wales report that on the last occasion they used cocaine powder, they also used alcohol (Home Office, 2012), a larger proportion than for most drug types. Cocaine use may be more likely among those reporting heavy episodic drinking (Lightowler and Sumnall, 2013).

Figure 4: Proportion (percent) of 16- to 59-year-olds reporting use of cocaine powder in the last year by frequency of pub visits in the past month, 2013/14, Crime Survey for England and Wales 2013/14



Source: Illicit drug use by personal, household and area characteristics and lifestyle factors: Drug misuse 2013 to 2014 second edition (Home Office, 2014)

(<https://www.gov.uk/government/statistics/tables-for-drug-misuse-findings-from-the-2013-to-2014-csew>) Accessed 10/11/2014.

25. Figure 4 shows that almost 12% of those who had visited a pub more than nine times in the previous month had used cocaine powder in the past year, a much larger proportion than for those who had visited a pub four to eight times (just over 4%), one to three times (less than 2%) or who had not visited a pub at all in the past month (less than 1%). However, between 1998 and 2013/14 there was a statistically significant increase in the proportion of respondents acknowledging past-year use across all categories of pub visitor (Home Office, 2014).

26. An analysis of past-year use according to the frequency of nightclub visits in the past month provides a similar perspective, with use being more common among frequent (four or more visits) visitors (10.3%) than among non-attendees (1.6%) (Home Office, 2014). However, whilst the change in past-year cocaine use among frequent nightclub visitors (from 6.7% to 10.3%) was not statistically significant, between 1998 and 2013/14 there were significant increases in acknowledged past-year use among infrequent visitors (from 2.8% to 5.8%) and non-attendees (from 0.6% to 1.6%).

27. Wastewater analysis in the UK indicates variation in the consumption of cocaine such that there is considerably more use at weekends and highlights that co-administration of cocaine and alcohol is more common at weekends; consistent with weekend use in the night-time economy (Baker *et al.*, 2014; Jones *et al.*, 2014).

28. In view of the strong links between cocaine powder use and the night-time economy it is desirable that venues are equipped to manage cocaine-related risks. This should include policies and procedures for dealing with cocaine use and cocaine-related emergencies on premises and will require that staff, especially security staff, have the necessary knowledge and competence.

29. **Recommendation 1:**

Police teams working with the night-time economy, police and Local Authority licensing teams, along with local substance misuse agencies, should be encouraged to work with night-time venues to ensure that they are equipped to recognise signs of acute problems related to the effects of cocaine powder and to mitigate the associated risks.

Public Health England, Public Health Wales and Education Scotland and the Public Health Agency for Northern Ireland should work with Local Authority community safety and public health teams to ensure that supporting information materials on the effects of cocaine powder are available to night-time economy venues.

**Action: Police teams working with the night-time economy
Police and Local Authority licensing teams, local substance misuse agencies
Public Health England, Public Health Wales, Education Scotland and the Public Health Agency for Northern Ireland.**

Summary

30. According to the CSEW, it is clear that the prevalence of cocaine powder use has increased in recent decades and that its use has spread to a wider social spectrum. Use in combination with alcohol appears to be common. The majority of users consume cocaine powder relatively infrequently and, even among users, there appears to be a reasonable level of awareness that cocaine powder is not a 'safe' drug. As noted in Chapter 4, even occasional use confers a risk of significant acute harm.

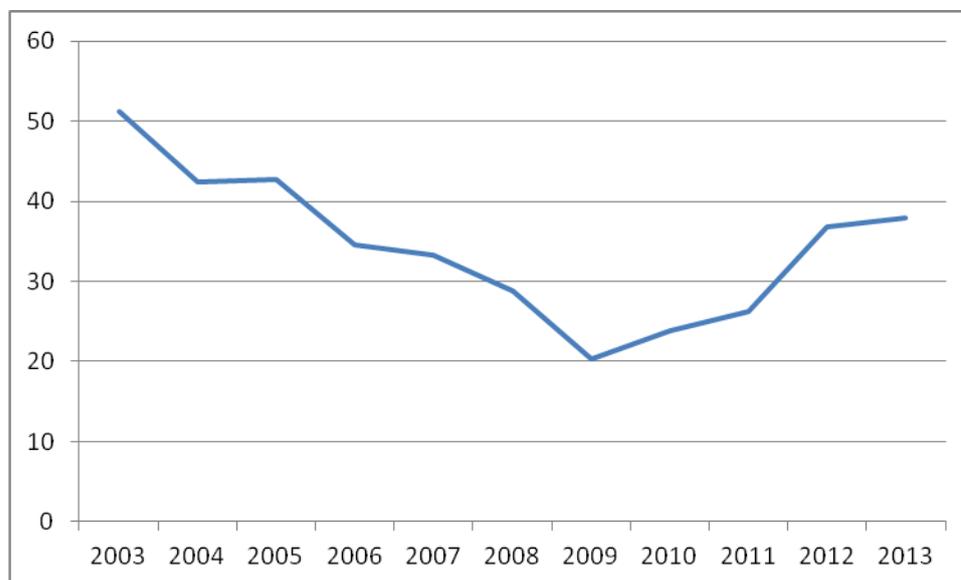
Chapter 3: Cocaine Purity and Adulterants (Cutting Agents)

Forensic Intelligence

31. Forensic intelligence in respect of drug seizures is coordinated within an initiative named ENDORSE, within the work of the National Crime Agency (NCA). This initiative supports law enforcement agencies investigating the national and international drugs supply and informs the government drug strategy. ENDORSE coordinates intelligence from all major UK forensic science providers to report on the purity levels and adulteration of heroin, cocaine and amphetamine, which is shared with a wide range of national and international partners. It also leads to tactical reporting that identifies forensic links between different seizures, which is issued to UK police forces and other law enforcement agencies (National Crime Agency <http://www.nationalcrimeagency.gov.uk/crime-threats/drugs/forensic-intelligence>).

Purity of Cocaine Powder

Figure 5: Trend in street-level mean percentage purity of cocaine powder seized by police forces in England and Wales (2003–2013)



Source: Burton, R., Thomson, F., Visintin, C., and Wright C. (2014) United Kingdom drug situation: Annual report to the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA)

32. Figure 5 shows the trend in average percentage street-level purity of cocaine powder seized by police forces in England and Wales, indicative of the purity of cocaine powder available to consumers. It demonstrates that during the period to 2008/09, when the prevalence of

use was increasing, reciprocally the purity of cocaine powder available at street level fell, such that during 2009 the average (mean) purity reached a low point of just 20%, compared to over 50% during 2003. However, Table 1 shows that the purity-adjusted price increased, almost twofold, over the same period. The purity of street-level seizures has risen since 2009, with a corresponding fall in the purity-adjusted price. It is important to note that the mean purity reported here disguises considerable variation: there is evidence of a two-tier market for cocaine powder, in which many seizures are of very low purity (see below).

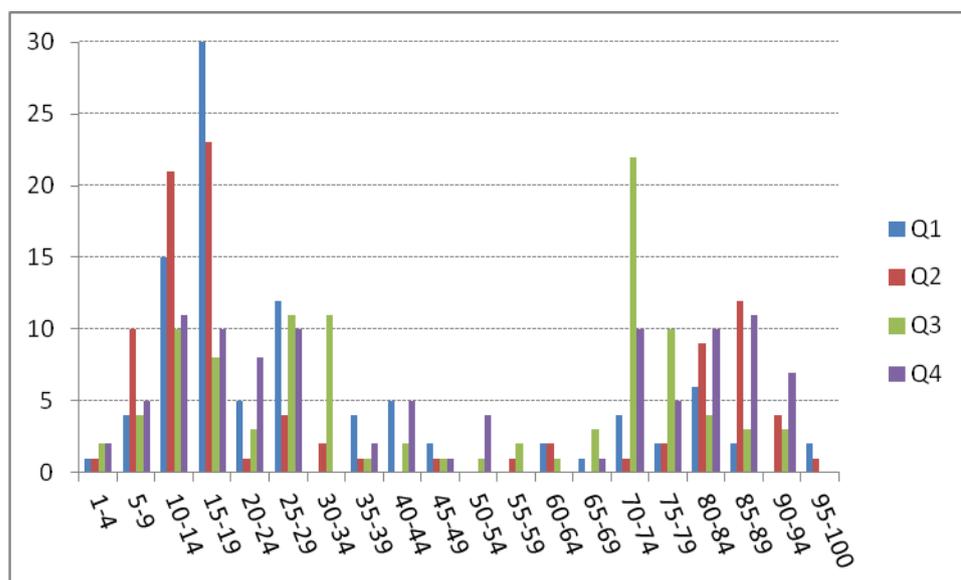
Table 1: Trends in the purity-adjusted price (per gram) of cocaine powder in the United Kingdom, 2003 to 2012: indexed to 2003

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Purity-adjusted price	£55	£62	£59	£73	£71	£71	£101	£86	£78	£56	£54

Source: Burton, R., Thomson, F., Visintin, C., and Wright C. (2014) United Kingdom drug situation: Annual report to the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA)

33. The Home Affairs Committee inquiry into the cocaine trade noted the emergence of a two-tier market, whereby the majority of street-level seizures in 2008/09 were of 10% purity or less, but with some containing as little as 5%, with lower-quality cocaine having become available to a new market of consumers previously unable to afford the drug (Home Affairs Committee, 2010). As noted above, this is highly likely to be a consequence of and a contributory factor to the observed increase in the prevalence of use and the changed demographic profile of users. As shown in Figure 6, the existence of a two-tier market is supported by more recent analysis of cocaine powder seized within the ‘middle market’, which found that the purity level for most seizures was either at or above 70% or below 30%, with levels around 15–20% being the most common and as many as one in ten being lower than 10% purity (NCA, 2014 – see Figure 6).

Figure 6: Quarterly purity profile of 1oz packages in cocaine hydrochloride seizures in 2013



Source: National Crime Agency (2014) ENDORSE Annual Report: Drug Purities and Adulterants Detected in England and Wales Seizures in 2013

Adulterants (“Cutting Agents”)

34. Most drugs are “cut” by adding adulterants to increase their weight. This increases profit margins for those involved in the supply chain. Purity levels decrease, successively, in cocaine powder seized at importation, wholesale and then distribution level, indicating that adulteration occurs throughout the supply chain (NCA, 2014). Recent seizures of cocaine powder at importation and wholesale level have been found to contain between just 1% and 94% cocaine (NCA, 2014). Recent user-level seizures, which are typically of lower purity than at importation or wholesale level, have detected the presence of over 50 different types of adulterant (NCA, 2014).

35. Generally, adulterants can be divided into two different groups: i) inert bulking agents, and ii) active pharmaceutical ingredients. The latter often enables greater dilution without users perceiving any obvious reduction in quality at the point of purchase, because they mimic the effects of cocaine (e.g. benzocaine). Many of the cutting agents found in cocaine samples are also used to increase the bulk of other illicit drugs such as heroin, amphetamines and ecstasy (NCA, 2014).

36. Any white powder can be used to bulk cocaine. These include the pharmaceutically inert substances boric acid, lactose, mannitol and creatine. Inert bulking agents are generally of low toxicity in themselves. However, as users may not modify the quantities that they use between batches, variation in the amount of these bulking agents, which results in variation

in the cocaine content, may result in users consuming more cocaine than they intend, with a consequent increase in the risk of acute toxicity.

Common Pharmaceutically Active Cutting Agents and their Associated Risks

37. Active cutting agents are important because of the potential medical harms associated with their use, which can be serious, as in the case of levamisole-induced agranulocytosis and skin necrosis (Larocque and Hoffman, 2012; Kachiu *et al.*, 2012). Seized samples frequently contain a mixture of more than one cutting agent (NCA, 2014).
38. Levamisole is the most common active cutting agent detected in recent (2012–2013) UK samples. This component is added prior to importation: at importation level, 67% of recent adulterated seizures were found to contain this substance (NCA, 2014). Levamisole is pharmaceutically active as an anthelmintic agent, used in veterinary medicine to deworm sheep (Coles *et al.*, 1975). Levamisole was also used to treat human worm infestations, but it was withdrawn from the U.S. and Canadian markets in 1999 and 2003, respectively, due to the risk of serious side effects and the availability of more effective replacement medications. At first sight, it would seem a bizarre substance to use as a cutting agent for cocaine. However, recent research suggests that by metabolism in part to aminorex (an amphetamine-like psychostimulant – Hadler, 1970) levamisole may enhance and prolong the stimulant effects of cocaine (Hofmaier *et al.*, 2014). The effects of levamisole are ascribed to inhibition of monoamine oxidase, catechol-O-methyl transferase: these effects seem here to be relevant to the potentiation of cocaine actions (Shah *et al.*, 1986).
39. There are over 200 reports in the medical literature of significant levamisole-related complications in cocaine users (Larocque and Hoffman, 2012). The most serious side effect of levamisole is agranulocytosis, a severe depletion of white blood cells that leaves patients vulnerable to infection (Canadian Pharmacists Association, 2009).
40. Another common active cutting agent is benzocaine, found in around half of samples.
41. Benzocaine is a local anaesthetic with a number of legitimate medical and dental uses. When snorted, it causes a tingling sensation in the nose, akin to that produced by cocaine, and it thus allows greater bulking of cocaine powder without users perceiving any obvious reduction in quality (Benzocaine Review, US National Library of Medicine).
42. Caffeine is also a common adulterant of street cocaine samples. At high doses, caffeine can be associated with significant toxicity, e.g. electrolyte disturbances such as hypokalaemia (low potassium) and stimulant effects (aggression, agitation) that can potentiate and exacerbate acute cocaine toxicity (Cole *et al.*, 2010).
43. Examples of other pharmaceutically active cutting agents detected in UK samples include: phenacetin, diltiazem, procaine, lignocaine, and paracetamol. Phenacetin is an analgesic that has been removed from therapeutic use in the UK owing to its carcinogenic and kidney-damaging properties. It is most commonly found as an adulterant in crack cocaine, but it is

also present in some cocaine powder samples. Diltiazem, a calcium channel blocker used to treat high blood pressure and angina is another common adulterant. It is reported to reduce cocaine craving in rats (Boston University, 2008) and could potentially enhance and prolong the effects of cocaine.

44. To date, there is little evidence that cocaine powder is being cut with Novel Psychoactive Substances, but there may be the potential for this to change and the situation should be monitored, as noted in Recommendation 2, below.

Disruption of the Supply of Cutting Agents

45. A considerable “grey market” has developed in which cutting agents such as benzocaine are legally purchased and sold on to those dealing in the illegal market of cocaine and other Class A drugs. Law enforcement agencies in the UK are aware of this trade and the way in which it underpins the cocaine trade. Until recently, there were few successful prosecutions of dealers in the grey market, although recently three men who imported a total of four tons of benzocaine into the UK were jailed for a total of more than 20 years (Crown Prosecution Service, 2012).

46. The Serious Crime Act 2015 came into effect in March 2015. This allows the seizure and forfeiture of cutting agents and gives extensive new powers in this regard at a civil (lower) level of proof. These provisions provide the power to seize and detain any substance that is suspected of being intended to be used as a drug cutting agent and will not be limited to a specific listed chemical. This may be helpful in disrupting the supply chain for cocaine powder.

47. The ACMD welcomes moves to disrupt the supply of cutting agents. It is hoped that disrupted availability of conventional cutting agents will result in a shift towards the use of less harmful inert substances. However, there is the potential for suppliers to seek new and potentially more dangerous substances to use for this purpose. This could increase the risk of harm to users.

48. Recommendation 2:

The ACMD recommends that the National Crime Agency should continue its ENDORSE initiative. This is a key and significant source of information about drug seizures and includes intelligence regarding cutting agents. This will allow the ACMD, Home Office and Department of Health to monitor emerging trends related to cocaine powder.

Action: National Crime Agency

Summary

49. The purity of the cocaine powder available in the UK market is highly variable. There is evidence of a two-tier market, with most of the cocaine powder that is available to consumers being of very low purity. The availability of low-purity, cheaper, cocaine powder is very likely to have been associated with the increase in the prevalence of use and the changed demographic profile of users. A variety of inert and pharmaceutically active cutting agents are found in cocaine powder seized in the UK. Many of the active cutting agents can cause serious medical harm. New legislation, designed to disrupt the illicit drug market, allows the seizure and forfeiture of cutting agents; it will be important to monitor the effects of this legislation on the market in cutting agents.

Chapter 4: Harms Associated with Cocaine Powder

50. Much of the available literature does not distinguish the harms associated with use of cocaine powder from those associated with use of crack cocaine and, in the main, refers to harms caused by heavy dependent use, usually of crack cocaine. It can also refer to use by the injecting route, which is rare.
51. As described in Chapter 2, a substantial number of people use cocaine powder. Significant, severe acute harms can arise even from occasional or infrequent use. For example, even a single episode of intranasal cocaine powder use has been observed to lead to severe and life-threatening cardiac effects (Robaei *et al.*, 2010). Moreover, any use of cocaine may put an individual at risk of dependence. Dependent, regular, and/or sustained use elevates the risk of users experiencing chronic harms.

Cocaine Pharmacology and Pharmacokinetics

52. Cocaine acts by blocking the reuptake of the three monoamine neurotransmitters, norepinephrine, dopamine, and serotonin, at the synaptic junction. As a result, there is an accumulation of neurotransmitters causing continuous stimulation that leads to the pleasurable effects reported by cocaine users. It is particularly potent in inhibiting the dopamine transporter (DAT) which is important in mediating the psychostimulant effects of the drug. These effects include: euphoria, associated with the excess presence of dopamine; feelings of confidence, which may be associated with the excess presence of serotonin; and feelings of energy, which are possibly associated with the excess presence of norepinephrine. The neural system most affected by cocaine is called the ventral tegmental area (VTA), which is central to positive reinforcement aspects of addiction (National Institute on Drug Abuse, 1999; United States Congress: Office of Technology Assessment, 1993).
53. Cocaine usually makes the user feel euphoric, energetic, talkative, and mentally alert, especially to the sensations of sight, sound, and touch. It can also temporarily decrease the need for food and sleep. Some users report that the drug helps them perform simple physical and intellectual tasks more quickly, although others experience the opposite effect (United States Congress: Office of Technology Assessment, 1993; National Institute on Drug Abuse, 1999).
54. The duration of cocaine's euphoric effects depends upon the route of administration. Cocaine's effects appear almost immediately after injecting a single dose and disappear within 5 to 10 minutes. The high from snorting is also of rapid onset (1–3 min) but it may last 15 to 30 minutes (Cone, 1995).

55. The amount of cocaine absorbed in the nasal mucosa (bioavailability) is only around 60%, whereas the bioavailability of injected cocaine is 100% (National Institute on Drug Abuse, 1999; Jones, 1999; Cone, 1995).

Risk of Dependence

56. Use of cocaine powder confers a risk of becoming dependent. However, the available literature does not distinguish the specific risk of dependence associated with cocaine powder from that associated with crack cocaine. Florez-Salamanca *et al.* (2013) found that half of the cases of dependence in a cohort of 815 cocaine users occurred within 1.42 years of onset of use and that 15.6% proceeded to dependence at some point. In another study of 2,259 cocaine users Lopez-Quintero *et al.* (2011) found that 20.9% of cocaine users made the transition to dependence, and half of these cases occurred within four years of onset of use. O'Brian and Anthony (2005) in a sample of 1,080 individuals who had used cocaine in the last 24 months found that 5% to 6% had become dependent. The latter study found that the progression to dependence was associated with using crack and with injecting.

57. Injection of cocaine and smoking crack cocaine appear to be associated with a greater risk of dependence because they are linked with more rapid systemic absorption associated with more immediate and more intense, but short-lasting, effects compared to intranasal use. Due to the short duration of effects and the great sensation of reward, crack cocaine patterns of use tend to be heavier in terms of both frequency and quantity (De Olivera *et al.*, 2009). The risk of dependence among users of crack cocaine has been estimated to be two to three times greater than among cocaine powder users (Chen and Anthony, 2004).

58. There is currently heightened research interest in identifying the possible genetic basis of the risk of cocaine dependence. For example, Fernandez-Castillo *et al.* (2013) examined 37 genes associated with monoaminergic transmission and concluded that cocaine dependence was associated with serotonergic transmission. Gelemter *et al.* (2013) in a genome-wide study, identified single nucleotide polymorphisms (SNPs) associated with cocaine dependence.

59. It is clear from CSEW data that only a small minority of individuals use cocaine powder in the regular, frequent, persistent pattern that is likely to be indicative of dependent use (Chapter 2). Furthermore, notwithstanding that level of demand does not necessarily equate to level of need, the relatively small number of individuals who seek treatment for problems associated with use of cocaine powder (Chapter 5) is consistent with a relatively low current prevalence of dependent use of cocaine powder.

60. The increased use of cocaine powder within the general population creates the potential for an increase in problems of dependence. While the available indicators (frequent use, as observed by population surveys, and treatment presentations) are imperfect measures of the level of dependence in the population, these nonetheless should be monitored closely.

This will require that detailed information from surveys on frequency of use is routinely made available to the relevant organisations.

61. Recommendation 3:

Public Health England, the Home Office and Devolved Administrations to continue monitoring the outputs of the population surveys and treatment presentations for any emerging indications of an increase in the prevalence of cocaine powder dependence.

Action: Public Health England, Home Office and Devolved Administrations

Acute Physical Harms

62. Acute harms are those caused by the immediate effects of cocaine and can affect any user: they can occur in first-time users as well as chronic, dependent users. Acute cocaine toxicity can result in severe and potentially life-threatening clinical features.

63. Cocaine is a stimulant that results in psychomotor and cardiovascular stimulant effects. Common clinical features seen in acute cocaine toxicity include agitation, psychosis, convulsions, tachycardia (a fast heart rate), hypertension (a high blood pressure) and chest pain. Less common severe manifestations of acute cocaine toxicity include stroke, hyperpyrexia (a high body temperature: this is a life-threatening emergency) and arrhythmias (abnormal heart rhythm which can cause cardiac arrest).

64. An important feature of acute cocaine toxicity is chest pain (angina) related to acute coronary syndrome. This is due to constriction (spasm) of the coronary arteries supplying the heart that results in angina and potentially acute coronary syndrome/myocardial infarction (a 'heart attack'). The risk of these effects is greatest in the first hour after cocaine use, but there is an increased risk for several hours after use. As noted below, it is likely that there is under-recognition of cocaine-associated chest pain: it is important that clinicians managing patients with chest pain consider cocaine as the cause because the management of cocaine-associated chest pain differs from the management of non-drug-related chest pain (Marzuk *et al.*, 1998; Hoffman, 2010; Lange and Hillis, 2001; McCord, 2008).

65. During 2010, in the UK, there were 1,986 in-patient discharges related to poisoning by cocaine (from a total of 30,618 discharges relating to illicit drug poisoning) and 3,502 in-patient discharges related to mental and behavioural drug-related disorders associated with cocaine (Mena *et al.*, 2013). However, as noted below, hospital statistics are likely to significantly under-record drug-related morbidity.

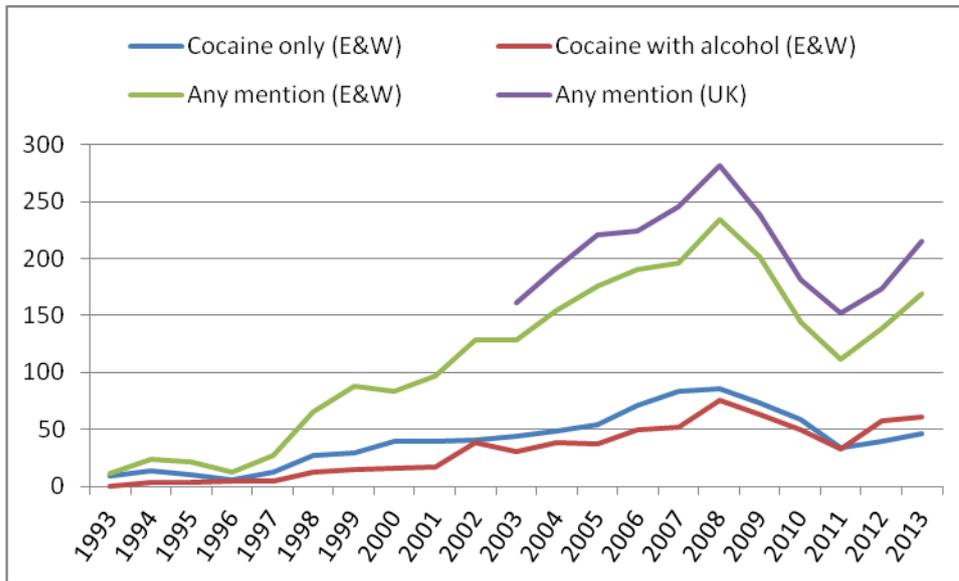
66. There are limited data available on the epidemiology of acute cocaine toxicity in the UK. Studies have shown that clinicians' recording of cocaine use in patients presenting with chest pain is poor and that there is likely to be significant under-recording of cocaine and other drug-related hospital admissions in the UK setting (Shah *et al.*, 2011; Wood *et al.*, 2011). Whilst Bishop *et al.* (2010) observed that patient notes recorded cocaine use in only

2% of patients presenting with chest pain to a London Emergency Department, urine screening at two London Emergency Departments indicated that 7% of patients presenting with chest pain, and 23% of those aged 18 to 30 years, tested positive for cocaine (Maric *et al.*, 2010). Furthermore, laboratory studies do not distinguish between cocaine powder and crack cocaine; thus there are problems in estimating the prevalence of chest pain related to cocaine powder.

Cocaine-related Mortality

67. Recording of drug-related deaths does not distinguish between powder and crack cocaine. We are therefore unable to report specifically on cocaine powder deaths and the figures below, describing cocaine-related mortality, include both powder and crack cocaine and should be considered in the context of an estimated 743,000 (range 667,000–820,000) past-year cocaine powder users in England and Wales during 2013/14 (Home Office, 2014).
68. It should be noted that deaths associated with cocaine use may be associated, particularly, with acute cardiovascular or cerebrovascular causes. Death due to such causes may not, necessarily, prompt toxicological testing for illicit drug metabolites, particularly in the older age groups and, thus, may not be recorded as cocaine-related. Also, the mention of a drug on a death certificate does not, necessarily, indicate that the drug was the cause of death.
69. Cocaine is involved in a relatively small proportion of the total number of drug-related deaths: 169 of 2,995 deaths registered in England and Wales during 2013 (Office for National Statistics, 2014) and 65 of 526 deaths registered in Scotland during 2013 (National Records of Scotland, 2014). It is notable that more than one-third of the 169 deaths involving cocaine registered in England and Wales also involved alcohol. As noted above, mention that a drug is involved in a death does not necessarily mean that it is the cause of the death.
70. During 2008, equivalent to the period when the CSEW indicates the peak population rates for cocaine powder use, the Office for National Statistics (ONS) recorded the registration of 86 drug-related deaths in England and Wales where any type of cocaine was the only drug mentioned, 75 where it was mentioned alongside alcohol, and 235 where it was mentioned at all (ONS, 2014).

Figure 7: Number of drug-related deaths where cocaine (any type) was mentioned (England and Wales); was mentioned without other drugs (England and Wales); with alcohol (England and Wales); or was mentioned at all (UK); deaths registered between 1993–2013



Sources:

Office for National Statistics (2014) Deaths Related to Drug Poisoning, England and Wales – 2013 (<http://www.ons.gov.uk/ons/publications/re-reference-tables.html?edition=tcm%3A77-375474>) accessed on 10/11/2014;

Burton, R., Thomson, F., Visintin, C., and Wright C. (2014) United Kingdom drug situation: Annual report to the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) – Table 6.3 p103

71. Figure 7 shows trends in the number of drug-related deaths (in England and Wales and in the UK) where cocaine was mentioned on the death certificate. The number of drug-related deaths mentioning cocaine increased between 1993 and 2008 and declined thereafter, with some signs of an increase after 2011 (ONS, 2014; Burton *et al.*, 2014). The magnitude of the increase (between 2000 and 2008) appears to have been greater than the magnitude of the increase in the prevalence of past-year cocaine use, as indicated by the CSEW. Notwithstanding that mortality data do not distinguish between crack and cocaine powder and that they relate to the year of registration rather than the year of death (the median delay between death and registration of death was approximately six months). The latter may, tentatively, indicate an increase in mortality risk associated with cocaine use over that period, albeit from a low baseline.

Chronic Physical Harms

72. These are harms which continue after cocaine use has ceased; again, much of the literature does not distinguish between the effects of crack and cocaine powder. They are all dose related and likely to be associated with frequent or/and heavy use of cocaine.
73. Chronic cocaine use is associated with cardiomyopathy (dilation of the heart resulting in heart failure). It is likely that this is caused by repeated episodes of cocaine-related myocardial ischaemia, but there is the potential that cocaine has additional direct myocardial toxicity (Lange and Hillis, 2001). Animal and *in vitro* studies suggest that chronic cocaine use is associated with an increased risk of coronary atherosclerosis, although data in cocaine users to substantiate this are not available (Lange and Hillis, 2001; Langner *et al.*, 1988; Kolodgie *et al.*, 1999; Wood *et al.*, 2009).
74. Snorting cocaine can cause necrosis of the nasal mucosa and septum (Patel *et al.*, 2000). Common adulterants found in cocaine include lidocaine, benzocaine, phenacetin, levamisole and paracetamol, which have harms in themselves (see above). An additional study suggests that snorting cocaine powder can exacerbate asthma (Levine *et al.*, 2005).

Sexually Transmitted Disease Transmission

75. There is a strong connection between the use of cocaine and risky sexual behaviour (Cheryl *et al.*, 2007). Cocaine users are more likely to have unprotected sex and also partake in sexual behaviour that may lead to increased anal or vaginal bleeding which increases the risk of infection (Schmidt *et al.*, 2011).

Cocaine and HIV Progression

76. Research suggests that cocaine may directly affect the progression of HIV by causing immune alterations in T cells (CD4), suppressor/cytotoxic T cells (CD8), and natural killer cells (Xu *et al.*, 1999; Cook *et al.*, 2008).
77. Cocaine use also enhances the replication of HIV *in vitro* (Cabral, 2006). Cells from chronic cocaine users more readily support HIV replication and development of AIDS-defining infections than cells from non-users, suggesting a direct role for cocaine in the progression of HIV to AIDS (Baldwin *et al.*, 1998). The poor adherence to antiretroviral therapy by chronic cocaine users may also be a factor in the progression of HIV (Cook *et al.*, 2008).

Cocaine and Pregnancy

78. A number of studies have shown that cocaine use during pregnancy can be associated with a number of complications: the quantity, frequency and type of cocaine used are likely to be key factors with respect to the likelihood of these occurring. Also, it can be difficult to determine causality in some of these studies as chronic users may be malnourished and have other reasons for poor pregnancy outcomes, such as alcohol use or cigarette smoking (Gouin *et al.*, 2011). Again, the literature seldom distinguishes between cocaine powder and crack cocaine.

79. In the USA, a meta-analysis of 31 studies showed that cocaine use during pregnancy was significantly associated with preterm birth, and low birth weight (Gouin *et al.*, 2011). It has also been associated with spontaneous abortion, placental abruption and congenital abnormalities. Neonatal issues include poor feeding, lethargy and seizures (Keegan *et al.*, 2010).

Psychiatric and Psychological Harms

80. Cocaine use is associated with a number of acute neurobehavioural and neuropsychiatric complications. Common, acute neurobehavioural effects include anxiety, irritability, restlessness, agitation and insomnia. Again, the literature often does not distinguish between the harms that may arise from use of cocaine powder and those that may arise from the use of crack cocaine.

81. Agitated delirium can be associated with cocaine use. It is a very rare event and is not necessarily related to the dose ingested. Clinically, it is characterised by severe agitation, delirium and psychosis, together with hyperpyrexia (Ruttenberg *et al.*, 1999). The majority of the research literature consists of case reports, overwhelmingly in crack cocaine users. However, one study using a local death registry between 1979 and 1990 found that 31% of fatal agitated delirium cases were attributed to intranasal use of cocaine powder rather than smoked or injected crack (Ruttenberg *et al.*, 1999). Management can be a challenge because individuals with agitated delirium are often extremely agitated and can be hostile (Plush *et al.*, 2015). Physical restraint can be associated with respiratory arrest and sudden death (Stratton *et al.*, 2001).

82. Depression is common in both community and clinic samples of crack users. There is little data on the prevalence of depression in intranasal powder cocaine users. The direction of causality is unclear, as cocaine causes a 'crash' in mood following a binge, while users report use of cocaine to self-medicate low mood. While a recent longitudinal study found that depression adversely affected prognosis in cocaine dependence (Samet *et al.*, 2013), a previous meta-analysis found no significant effect of depression on treatment contact or subsequent cocaine use (Conner *et al.*, 2008; Hall, 1996).

83. Cocaine abuse is associated with psychotic symptoms in a significant proportion of users seeking treatment: rates between 43% and 88% are described (Vergara-Moragues *et al.*,

2014). These effects can be difficult to manage and pose significant challenges for pre-hospital emergency services (the police and ambulance services) and to clinicians in Emergency Departments. Psychiatric diagnostic classification systems distinguish between transient psychotic experiences secondary to acute cocaine intoxication and longer-lasting psychosis; the former is more common. Transient delusions and hallucinations were experienced by a majority (84%) of participants in a Spanish study of intranasal cocaine users (Vergara-Moragues *et al.*, 2014). The majority of participants in the latter study were dependent and/or very frequent users; variation in sample composition with respect to patterns of use may contribute to the wide range of estimates observed in the literature. Visual hallucinations are characteristic and may be helpful diagnostically. Transient psychotic symptoms were associated with more frequent cocaine use and a comorbid lifetime diagnosis of alcohol dependence. Other studies (reviewed in Roncero *et al.*, 2014) found associations between the amount of cocaine used, age of first use, and comorbid cannabis abuse (Kalayasiri *et al.*, 2010; Roncero *et al.*, 2013). More persistent psychotic disorders in association with cocaine use are associated with earlier age of onset, increased frequency of imprisonment, and comorbid cannabis, hallucinogen and alcohol abuse (Roncero *et al.*, 2014, as above).

84. Acute intranasal cocaine ingestion has been associated with an improvement in psychomotor speed (reviewed in Spronk *et al.*, 2013). The same comprehensive review described deficits in attention, memory and executive function in both recreational users and dependent users with a history of chronic cocaine use, including powder cocaine use.

85. A number of studies have shown that chronic cocaine use affects dopaminergic systems in the prefrontal cortex. Increasing lifetime cocaine dose, greater consumption during the previous 30 days and an increased frequency of use are all associated with poorer cognitive performance. In a meta-analysis of 15 studies comparing cocaine users to healthy controls, effect sizes were large for attention, moderate to large for memory, and small for language and sensory-perceptual functioning (Sokhadze *et al.*, 2008). With regard to executive functioning, findings were mixed and appeared to be test dependent. There is some suggestion that cognitive impairment is progressive with continued use but that a decrease in use arrests progression, and may show signs of improvement in some domains, such as working memory, over time (Vonmoos *et al.*, 2014)

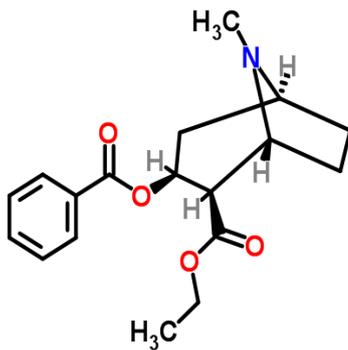
Cocaine and Alcohol

86. We have noted, in Chapter 2, that cocaine powder is very frequently used in combination with alcohol (Graham *et al.*, 2013). Cocaine consistently antagonises the learning deficits, psychomotor performance deficits and driving deficits induced by alcohol. The combination of alcohol and cocaine tends to have greater-than-additive effects on heart rate, concomitant with up to 30% increased blood cocaine levels. More importantly, it is suggested that the combination of cocaine and alcohol can potentiate the tendency towards violent thoughts and threats, which may lead to an increase of violent behaviours. Cocaine antagonises the effects of alcohol resulting in users feeling less inebriated and able

to drink more alcohol without collapsing (Chermack and Blow, 2002; Pennings *et al.*, Leccese and Wolff, 2002).

87. Cocaine is metabolised in part to cocaethylene (Figure 8) when alcohol and cocaine are used at the same time (Farre *et al.*, 1993; Harris *et al.*, 2003). Although cocaethylene is cardiotoxic (Perez-Reyes and Jeffcoat, 1989) its role in the cardiac effects of the combined use of alcohol and cocaine is unclear. On the basis of the currently available scientific literature, it appears that the combined use of alcohol and cocaine may result in some increase in the risk of cardiovascular toxicity, but the results of studies are conflicting (Pirwitz *et al.*, 1985), and any increase in risk is thought to be due to alcohol decreasing the metabolism of cocaine and, therefore, increasing free (parent) cocaine concentrations with only a minimal (if any) contribution to an increased risk from the formation of cocaethylene (Farre *et al.*, 1997; Henning *et al.*, 1996; Perez –Reyes & Jeffcoat, 1992).

Figure 8: Cocaethylene



88. We have noted concern regarding cocaethylene and combined use of alcohol and cocaine. The evidence does not indicate that cocaethylene in itself is more cardiotoxic. However, as noted above, the use of cocaine does seem to enable an individual to continue binge drinking alcohol to very high levels whilst not appearing intoxicated, which itself conveys additional risks of harm.

Drug Driving

89. There is some evidence that cocaine is commonly a contributory factor in drug-driving cases. (Burch *et al.*, 2012) examined Forensic Science Service data on blood concentrations of alcohol and drugs for alleged drug-driving cases from February 2010 until March 2011 in England and Wales. Samples for all alleged drug-driving cases were screened for amphetamines/methylamphetamines, benzodiazepines, cocaine, opiates and cannabinoids. Cocaine and/or its metabolite benzoylecgonine were the most commonly quantified drug

(92 cases). The authors note that drug concentrations may be complicated by a number of factors including: drug-drug interactions; delays between sampling and analysis; and a variation in the time between arrest and blood sampling. The Drug Driving (Specified Limits) (England and Wales) Regulations 2014 set a limit of 10 micrograms of cocaine per litre of blood, above which it is an offence to drive a motor vehicle.

Potential Social Harms

90. There is a variety of potential social and societal harms linked to cocaine use. Most of these will relate to individuals who use heavily or are dependent and are related to levels of consumption. Many of these may more typically be related to crack than to cocaine powder use. These harms might include the accumulation of debt, relationship breakdown, loss of employment, and engagement with criminal networks and violence. There is also the potential for users to acquire a criminal record. All of these have the potential to impact on the wider family and community of cocaine users.

91. Information provided by the Metropolitan Police Service indicates that cocaine features as a significant element in criminality connected with organised crime groups (OCGs). In most cases, such OCGs are multi-commodity, of which powder cocaine may feature alongside crack, other drugs or acquisitive crime. Because of the very nature of the trade, it is difficult to get full and accurate data and much of the known information is sensitive. However, in London, from approximately 1,200 organised crime groups, around 300 are 'linked' with cocaine, the majority with powder cocaine. Amongst this group of 300, some 60 are involved in the importation of cocaine powder. In a number of cases, organised cocaine dealing is linked to street gangs and to serious violent crime. The national picture is not dissimilar but numbers of OCGs, nationally, are not available for publication.

Personal Experiences of Cocaine Powder Dependence

92. In preparing this review, we have benefitted from hearing about personal experience of cocaine powder dependence. This suggests that, for some: dependence may develop very quickly; may consist of 'binges' rather than prolonged, sustained use; may engender feelings of deep regret and self-loathing about behaviour whilst intoxicated, particularly with respect to risky sexual behaviour; may endanger their employment and relationships; may lead to criminal involvement to fund continued use; and may leave users feeling "paranoid" and unwilling to acknowledge their drug problem. It is not possible for us to determine whether these experiences are representative, but it is evident that cocaine powder use can be extremely damaging and can have severe destructive consequences.

Harms to Producer and Transit Nations

93. It is important to recognise that the international trade in cocaine and other drugs has political, social, environmental, and economic consequences that reach far beyond the effects on individual users. The United Nations Office on Drugs and Crime (UNODC) suggests that *“The global illicit [opiate and] cocaine markets represent two of the biggest transnational drugs and crime threats of our time”* and the UN Security Council (2009) has highlighted the contribution that drug trafficking makes to political instability in producer and transit countries. Appendix 2 describes key features of the international trade in cocaine.
94. The production of cocaine creates various harms to the environment in the Andean region (Álvarez, 2007; Dourojeanni, 1992). These include deforestation and soil erosion, as rainforest is cleared to make way for coca crops. Turning coca leaves into cocaine involves the use of damaging effluents, including kerosene, hydrochloric acid, sulphuric acid and ammonia, which are poured into the river systems of Colombia, Bolivia and Peru. This is a significant contributor to environmental contamination (Dourojeanni, 1992).
95. These harms are aggravated by internal conflicts and by the pursuit of growers and crops, the illegality of processing and the aerial fumigation of coca plantations. Paramilitary groups have taxed and coerced some farmers into coca production (Felbab-Brown, 2010). Pursuit of growers and eradication of their crops encourages them, in the absence of market opportunities for other products, to push ever further into the rainforest (Rincón-Ruiz and Kallis, 2013). The illegality of processing blocks manufacturers from safe disposal of effluents (Keefer and Loayza, 2010). The aerial fumigation of coca plantations adds to deforestation of surrounding rainforest and creates harms to local populations, including increased dermatological conditions and miscarriages (Camacho and Mejia, 2013).

Summary

96. Much of the available literature does not distinguish the harms associated with use of cocaine powder from those associated with use of crack cocaine.
97. Acute harms from cocaine can affect any user. Even first-time users can experience severe and potentially life-threatening clinical consequences. Chest pain is an important clinical feature of severe toxicity and, as noted above, the management of cocaine-associated chest pain differs from the management of non-drug-related chest pain: we recommend (in Chapter 6) that staff working in acute services should be equipped to recognise problems that may be related to illicit drug use.
98. Use of cocaine powder confers a risk of becoming dependent. Survey data (CSEW) suggest that a small minority of individuals use cocaine powder in the regular, frequent, persistent pattern that is likely to be indicative of dependent use.

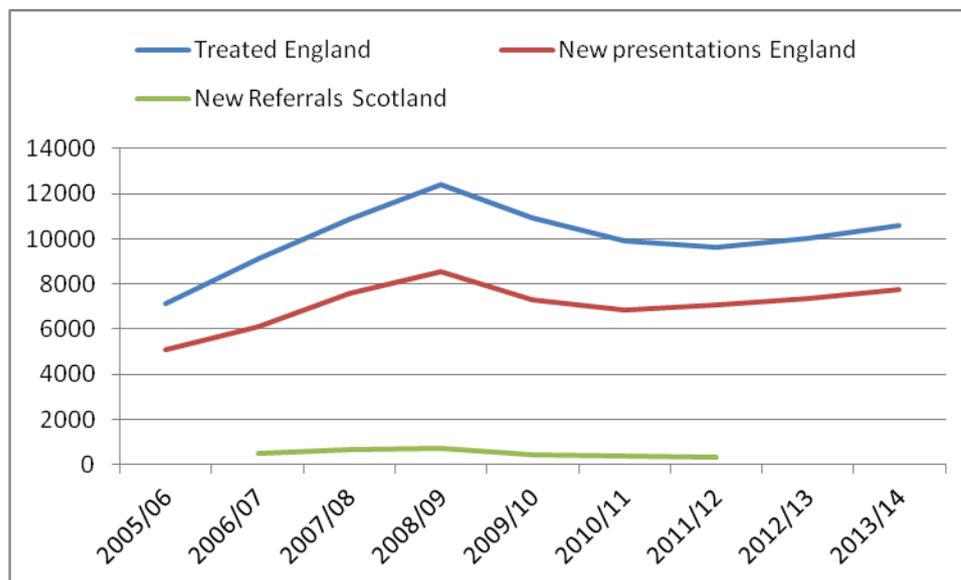
99. Chronic physical harms are associated with heavy dependent use and include cardiomyopathy and coronary atherosclerosis as well as necrosis of the nasal septum associated with snorting.
100. Cocaine use is associated with high-risk sexual behaviour and with HIV progression *in vitro*. Cocaine use during pregnancy can be associated with a number of complications. Anxiety, irritability, restlessness and insomnia are commonly associated with cocaine use. Cocaine can also be associated with agitated delirium and longer-term psychosis and depression. It may also be associated with cognitive deficits.
101. Cocaine powder is very frequently used in combination with alcohol. The evidence does not indicate that its metabolite when used with alcohol, cocaethylene, is in itself more cardiotoxic. However, the use of cocaine does seem to enable an individual to continue binge drinking alcohol to very high levels which, itself, conveys additional risks of harm.
102. The international trade in cocaine and other drugs has political, social, environmental, and economic consequences that reach far beyond the effects on individual users.

Chapter 5: Treatment for Cocaine Powder Users

Level of Demand for Treatment for Problems Associated with Cocaine Powder Use

103. Treatment trends for cocaine powder use in England and Scotland (Figure 9) reflect the trends in prevalence indicated by the CSEW. Published treatment data in respect of cocaine powder, alone, could not be located for Wales or Northern Ireland.

Figure 9: Trends in the total number of cocaine powder users treated during the year (England); the number of adults presenting for treatment during the year (England); and the number of new referrals (Scotland) who used cocaine powder as their primary drug, 2005/06 to 2013/14



Sources: Public Health England (2014) "Adult Drug Statistics from the National Drug Treatment Monitoring System (NDTMS) 1 April 2013 to 31 March 2014"

Scottish Drugs Misuse Database (SDMD) NHS Health Board Overview of Initial Assessments for Specialist Drug Treatment 2012/13 Data Tables

104. It is evident that a relatively small proportion of cocaine powder users access structured, public sector, addiction treatment services. In England, just over 10,500 adult primary cocaine powder users received a structured treatment intervention during 2013/14 (Public Health England, 2014), with an additional 245 persons aged under 18 years, from an estimated past-year user population of 743,000 (range 667,000–820,000 – Home Office, 2014) in England and Wales. These represent 5% of the individuals receiving structured treatment for drug problems. In comparison, 160,000 opiate and/or crack users received treatment, from an estimated user population (2011/12 estimate) in the range between 291,000 and 302,000 (Hay *et al.*, 2014). The number of individuals who access private or non-structured addiction treatment is not known.

105. Three-quarters of the 4,132 clients in the English treatment system who received a treatment outcome review during 2012/13 and who used cocaine powder as their primary drug were classified as abstinent or improved (Public Health England, 2014). However, this represents follow-up of only 39% of the clients treated during the year.

106. The available evidence does not support definitive conclusions about levels of treatment need and treatment accessibility. Qualitative research (e.g. Radcliffe and Stevens, 2008) has highlighted that the policy focus of drug treatment on “*high harm*” drug users may, of itself, be stigmatising and that treatment services may be inaccessible to some, for example those in employment. Thus, it is possible that people who have problems associated with their cocaine powder use may be reluctant to seek help from services which they might perceive as being opiate focussed. Provision of treatment for this group may require scaling up the provision of drug services in mainstream health settings, at times and places that are convenient to users, rather than daytime-only services at specialised drug agencies. Nonetheless, it has been noted (above) that a very small proportion of those who use cocaine powder do so on the frequent, persistent basis that may signify problematic patterns of use for which addiction treatment may be indicated. The number of people who seek treatment, above, is of an equivalent order of magnitude to the number who might be expected to have dependence problems based on CSEW findings regarding frequency of use. Nevertheless, it is important to ensure that addiction treatment services have the capacity and expertise to address the needs of cocaine powder users and that treatment services should be accessible to this group.

107. **Recommendation 4:**

a) Local Authority based public health commissioners (and the equivalent in Devolved Administrations) of drug treatment services to ensure that local services for the treatment of cocaine powder are sufficient to meet local needs and should ensure that these services are properly accessible to the cocaine powder user group.

b) Drug treatment service providers to ensure that their workforce is competent to deliver cocaine powder treatment/interventions.

Action: Local Authority public health commissioners of drug treatment services (and the equivalent in Devolved Administrations) and drug treatment service providers

Approaches to Cocaine Powder Treatment: Overview

108. The cocaine treatment literature discussed below has the following characteristics:

- i. It always distinguishes the treatment of cocaine from amphetamines (EMCDDA, 2014; Lingford-Hughes, 2012; NIDA, 2010; Baker, 2004; Johansson, 2003; Effective Interventions Unit, 2002);

- ii. It does not distinguish the treatment of cocaine powder from crack cocaine. The author was unable to trace dedicated cocaine powder treatment articles with one exception (NTA, 2010);⁴
- iii. The cocaine treatment goals fall into three categories: managing withdrawal; maintaining abstinence; substitute prescribing (Lingford-Hughes, 2012);
- iv. The most frequently used outcome measures are: reduction of cocaine use; treatment retention; reduction of cocaine craving (Johansson, 2003; EMCDDA, 2014);
- v. The literature quoted consists mostly of reviews of primary research, taking the form of systematic reviews that are based on meta-analyses (Johansson, 2003; EMCDDA, 2014) but not always (Baker, 2010); whilst a number are narrative reviews offered as guidelines (Effective Intervention Unit, 2002; Lingford-Hughes, 2012) or consensus reports (NIDA, 2010).

109. In the following, treatment for cocaine abuse and dependence is discussed in two sections: pharmacological and psychosocial interventions (Johansson, 2003).

Pharmacological Interventions

110. Numerous diverse pharmacological agents have been studied for a potential role in the treatment of cocaine dependence. Those agents reflect aspects of the neurochemistry of cocaine targeting amongst others the systems of dopamine, serotonin, glutamate, GABA, calcium channels, and opioids (Preti, 2007). The same agents classified according to their clinical effects belong to various classes including: psychostimulants, dopamine agonists, antidepressants, anticonvulsants, antipsychotics (EMCDDA, 2014).

111. Across the world and in the last 15 years there is a consensus, amongst scientists, that the existing evidence provides weak, if any, support to the use of pharmacological treatment for cocaine abuse and dependence (EMCDDA, 2014; Reed *et al.*, 2014; Lingford-Hughes, 2012; NIDA, 2010; Baker, 2004; Effective Interventions Unit, 2002). More specifically:

- i. There is no evidence of effectiveness of pharmacotherapy in managing cocaine withdrawal (Baker, 2004; Lingford-Hughes, 2012);
- ii. The use of dopamine agonists, anti-depressants and anticonvulsants is not recommended (Lingford-Hughes, 2012; Reed *et al.*, 2014);
- iii. There is no clear evidence supporting substitute prescribing of dexamphetamine, but definitive studies are warranted (Lingford-Hughes, 2012; Reed *et al.*, 2014).

⁴ On the 7.12.2014, searching for <Cocaine and Powder and (Treat* or Pharmacotherap*)> in the <Title> of entries in all resources included in Ovid Online search database (that includes Medline, Embase, AMED) gave two results, only one of which distinguished the treatment of cocaine powder users from crack cocaine users (NTA, 2010). By comparison on the same day <Cocaine and Treat*> led to 1,697 results; <Cocaine and Pharmacotherap*> led to 102 results.

112. The richness of the data accumulated whilst researching the effect of pharmacological intervention has highlighted areas of potential future research:

- i. First of all, a meta-analysis of six relevant Cochrane Database reviews (EMCDDA, 2014) that, all but one, were also incorporated into Lingford-Hughes (2012), highlighted findings worth exploring further. Those included the significant reduction of cocaine craving with antipsychotics; and the association of disulfiram to cocaine treatment retention. Although not currently recommended, the position of disulfiram in cocaine treatment needs to be re-examined in the light of further evidence (Lingford-Hughes, 2012);
- ii. Second, the realisation that the addictive power of cocaine appears to go far beyond the ensuing low tolerance and limited withdrawal syndrome, covering strong desires for re-use (Prete, 2007), led to the focus on the potential role of anti-craving agents in the treatment of cocaine use. Currently the focus of research is on the following anti-craving agents: disulfiram, modafinil, topiramate, baclofen (Reed *et al.*, 2014). However, it is still early days in translating research findings into recommendations for clinical practice.

113. Finally, no discussion of the pharmacological treatments for cocaine would be complete without discussing the 'cocaine vaccine'. The vaccine couples cocaine with a protein to stimulate the body to produce antibodies to cocaine. However, the anti-cocaine vaccination effect (antibody concentration) can be overcome with sufficiently high enough cocaine consumption. Thus, Orson *et al.* (2014) advocated enhancing the efficacy of the vaccination with enzyme mediated enhanced degradation of cocaine; the use of such a combination in clinical trials belongs to the future.

Psychosocial Interventions

114. Psychosocial interventions (such as CBT and Contingency Management) have proven effectiveness in the treatment of cocaine users and are recommended as the Standard of Care (EMCDDA, 2014, Lingford-Hughes, 2012).

115. An earlier meta-analysis (Fridell, 2003) grouped the numerous very heterogeneous psychosocial interventions into: supportive (such as: non-manual-based counselling, relaxation, acupuncture); re-educative (such as: CBT interventions, manual-based counselling, 12-step approach, cue exposure, contingency management, social skills training, community reinforcement approach); re-constructive (such as: family therapy, interpersonal psychotherapy). The meta-analysis showed that:

- i. Re-educative interventions reduce cocaine use;
- ii. Re-constructive interventions increase treatment retention.

116. Three further systematic reviews resulted in findings consistent with Fridell (2003), showing specifically that:

- i. CBT interventions reduce cocaine use and increase treatment retention (Knapp, 2007);
- ii. Contingency Management improves treatment retention (Vocci, 2009);
- iii. Acupuncture use in cocaine dependence is not supported by evidence (Mills *et al.*, 2005).

117. Recent guidelines (NICE, 2007) have specifically mentioned two psychosocial interventions for cocaine users:

- i. Self-help groups based on 12-step principles (such as Cocaine Anonymous);
- ii. Contingency Management (for example, for cocaine-free urine testing).

118. Within the United Kingdom, two sets of clinical guidelines have recommended the use of brief interventions in the general treatment of drug misusers, particularly for those who have limited contact with the services (NICE, 2007; Department of Health (England) and the Devolved Administrations, 2007). It should be noted that the screening/assessment component of brief interventions, whereby recipients' attention is focussed on their drug use, may be a key, and possibly sufficient, factor that induces positive effects on behaviour (Marsden *et al.*, 2006; Humeniuk *et al.*, 2012).

Conclusion and Summary

119. The available evidence does not support definitive conclusions about levels of treatment need and treatment accessibility for cocaine powder users. Nevertheless, it is important to ensure that addiction treatment services have the capacity and expertise to address the needs of cocaine powder users and that treatment services should be accessible to this group.

120. The future development of cocaine vaccines and anti-craving agents might reverse the balance of efficacy that has so far swung away from the pharmacological interventions towards the psychosocial ones. Currently though, cocaine-specific systematic reviews support only the use of psychosocial interventions – in particular CBT Interventions and Contingency Management; whilst there is a substantial recognition amongst experts that 12-step interventions are helpful. In the community, treatment should be care-planned and involve key-working and mutual aid. Residential rehabilitation may be required for those with severe substance dependence involving cocaine who cannot achieve recovery outcomes in community settings.

121. Screening/assessment and Brief Intervention should be offered to those in limited contact with drug services.

Chapter 6: Over-arching Issues

122. This chapter explores themes for which we consider that the overall response to cocaine powder sits best within existing, generic frameworks for addressing substance misuse, albeit that there may be some specific opportunities for action with respect to cocaine powder.

Strategy and Policy

123. The 2010 UK Drug Strategy, 'Reducing demand, restricting supply, building recovery: supporting people to live a drug-free life' sets out the Government's cross-cutting approach to tackling drugs and addressing alcohol dependence. The Scottish Drugs Strategy, 'Road to Recovery' was published in May 2008. The Northern Ireland drug and alcohol strategy, 'New Strategic Direction for Alcohol and Drugs (NSD)', was published in 2006. Its second phase runs from 2011–2016. Wales' combined, ten-year, alcohol and drug strategy, 'Working Together to Reduce Harm – The Substance Misuse Strategy for Wales' runs from 2008 to 2018. All of these strategies set out cross-cutting approaches to tackling illicit drug misuse and, with the exception of the Scottish strategy, also give consideration to the role of alcohol.

124. We have noted evidence that cocaine powder is commonly used jointly with alcohol. It is desirable that policy responses to cocaine powder recognise its close association with alcohol use and the risks that this entails.

125. In respect of cocaine, the UK Strategy specifically refers to the relevance and importance of "cutting agents" to the drugs trade as organised criminals expand the use of these agents to maintain profits. New enforcement powers have been introduced in respect of cutting agents, as noted in Chapter 3: it is important that the effects of this legislation on the trade in cutting agents are monitored closely.

126. The strategies assert the importance of working with international partners to reduce supply. The UK Strategy comments specifically on tackling cocaine production and distribution from Latin America, via the Caribbean and Africa, and tackling cutting agents from China and India. It pledges to make more effective use of the Government's overseas capabilities, including diplomatic and military assets, to strengthen co-operation with international partners to disrupt traffickers at source and/or in transit countries. This commitment is reflected in the Government's Serious and Organised Crime Strategy launched in 2013 (HM Government, 2013a) and action in this area was reported in the 2013 Drug Strategy Annual Review (HM Government, 2013b). The Scottish strategy pledges to build partnerships with UK law enforcement organisations such as the National Crime Agency and Her Majesty's Revenue and Customs (HMRC), to maximise opportunities to influence work at UK and international levels.

127. In respect of treatment and recovery, the Scottish Drugs Strategy recognises the need to ensure that services cover the full range of drug use problems encountered locally, not just opiate dependency. In some cases, this may involve redesign of existing services, use of new technologies and the up-skilling of employees to address changing patterns of drug use. It notes specifically that current services may not be equipped to deal with the rise in cocaine and poly-drug use.

Early Intervention

128. Given the relatively widespread use of cocaine powder, as demonstrated by findings from the CSEW and other sources, as described above, and the potential for some users to develop acute or chronic problems associated with its use, it is important that such opportunities for early intervention, as may exist, are acted upon.

129. There is evidence for the benefits of screening/assessment and brief interventions for alcohol problems in primary care settings and there are promising indications that these may also be effective in other settings, including the criminal justice system (Graham *et al.*, 2013), and in respect of other forms of substance use (Edwards *et al.*, 2003). The National Institute for Health and Care Excellence identifies brief interventions for substance misusers as a key priority (NICE, 2007). National Offender Management Service (NOMS) guidance (NOMS, 2005) highlights the provision of brief alcohol interventions, delivered by staff with the necessary Drugs and Alcohol National Occupational Standards (DANOS) competences.

130. Drug users' contact with generic services such as primary care, acute services, young people's services, and criminal justice agencies may provide opportunities for brief intervention, designed to reduce the likelihood of an escalation in drug use, or for onward referral for those for whom more substantial intervention is indicated. We recognise that this may be a challenging area, given users' potential reluctance to acknowledge their use and the constraints on staff time in, for example, emergency care settings.

131. Although the precise components of brief intervention that contribute to changes in behaviour are unclear, we note that the process of screening and self-assessment, which focuses recipients' attention on their substance use, is a key and possibly sufficient factor to induce behaviour change among substance users (Marsden *et al.*, 2006; Humeniuk *et al.*, 2012). However, it is beyond the remit of this report to make more specific proposals regarding the appropriate content of such interventions.

132. Recommendation 5:

Public Health England and the Devolved Administrations to seek further expert advice from suitable health professionals and academics regarding the development of assessment and brief intervention models for cocaine powder and other substances, for use in generic settings.

Action: Public Health England, Devolved Administrations

133. The need for early intervention for substance users is generic, but there may be settings (see below) that offer particular opportunities for identification, and early intervention, specifically in respect of cocaine powder use. Potential examples are criminal justice (police, Offender Management Service) and emergency medicine settings.
134. In many areas of England and Wales, persons arrested by the police for specific types of offence are subject to salivary testing for drug metabolites, including cocaine powder, although these tests do not distinguish between crack and cocaine powder. Arrestees may also be tested at police discretion. Those arrestees who test positive may be referred for more detailed assessment and onward referral for treatment, where this is indicated. There is evidence that cocaine powder is often used in combination with alcohol (Home Office, 2012); that cocaine powder use is more common among those who frequently visit nightclubs and pubs (Home Office, 2014); that cocaine use may be more likely among those reporting heavy episodic drinking (Lightowlers and Sumnall, 2013); and that combined use of cocaine with alcohol confers an additive risk in respect of violent offending (Lightowlers and Sumnall, 2013). There is also, less robust, evidence that a proportion of night-time violent offences that are committed under the influence of alcohol may also involve use of cocaine (Daley, 2009). An arrest for violent offending does not, automatically, prompt administration of a drug test. Without intending to suggest inferences regarding the propensity for most cocaine powder users to be involved in violent crime, or to draw conclusions regarding the proportion of drinkers who also use cocaine, there may be opportunities to capitalise on the existing drug testing programme via discretionary drug testing of violent offenders, an approach that has been used previously in Greater Manchester and Merseyside (Daley, 2009). A positive salivary test followed by suitable assessment may provide opportunities for identification of and, where indicated, brief intervention with those cocaine powder users who also are violent offenders.
135. Acute services have the potential to be an important intervention point for cocaine powder users. The extent of cocaine-related Emergency Department attendance may be under-recognised by clinicians; a recent UK study at two London Emergency Departments found that 23% of attendees aged 18 to 30 years experiencing chest pain tested positive for cocaine (Maric *et al.*, 2010). Notwithstanding the difficulties inherent in screening and intervening within this setting, chest pain presentations to Emergency Departments by younger adults may provide an opportunity for identification of and brief intervention with cocaine powder users. Moreover, we have noted (Chapter 4) that it is important that clinicians managing patients with chest pain consider cocaine as the cause because the management of cocaine-associated chest pain differs from the management of non-drug-related chest pain.
136. Primary and acute health services, and criminal justice services, should be better equipped to identify problems that may be related to illicit drug use, including cocaine powder use (and cutting agents), to ensure early identification and appropriate intervention including referral for treatment where indicated.

137. **Recommendation 6:**

The Department of Health, NHS England, the Ministry of Justice and Devolved Administrations to ensure that key staff working in primary and acute health services, and criminal justice services, be better equipped to identify problems that may be related to illicit drug use; including cocaine powder (and cutting agents), to ensure early identification and appropriate intervention including referral for treatment, where indicated.

Action: Department of Health, NHS England, Ministry of Justice and Devolved Administrations

Prevention and Education

138. The ACMD recognises the complexity inherent in delivering preventative interventions, a subject which is addressed in detail in a previous ACMD briefing paper: *Prevention of drug and alcohol dependence*. Overall there is a paucity of evidence as to whether education and prevention are an effective means to reduce rates of drug use in the population.

139. Preventing cocaine powder use and related harm, as with other substance use, is extremely challenging, with a limited evidence base to guide practice. Responses to date have broadly focused on education within schools and government information and awareness-raising campaigns.

140. Cocaine education in schools is, primarily, undertaken in the broader context of substance use education, including alcohol, and is set within the remit of personal, social, and health education. It aims to develop the capacity of an individual to be equipped to make informed choices and enhance their life outcomes.

141. Information and awareness campaigns have, largely, been focussed on young people and have been delivered separately in England (<http://www.talktofrank.com/>), Scotland (<http://knowthescore.info/>) and Wales (<http://www.dan247.org.uk/>) using a variety of delivery methods, including: information and helplines; national media; TV; radio; cinema advertisements; and billboards. These aim to educate and enhance knowledge rather than to change behaviour, per se.

142. A previous ACMD briefing paper: *Prevention of drug and alcohol dependence* considers the question of drug prevention. The ACMD supports the UK Government and Devolved Administrations' broad social and life skills approach to drug education and prevention that includes information on specific substances.

143. **Recommendation 7:**

In line with the ACMD's Prevention briefing, the ACMD recommends that Public Health England, Local Authorities and schools ensure the issues surrounding cocaine powder are embedded within education initiatives about generic substance use prevention.

The ACMD does not consider that it would be appropriate, or helpful, for mass education initiatives that specifically highlight cocaine powder.

Action: Public Health England, Local Authorities and schools

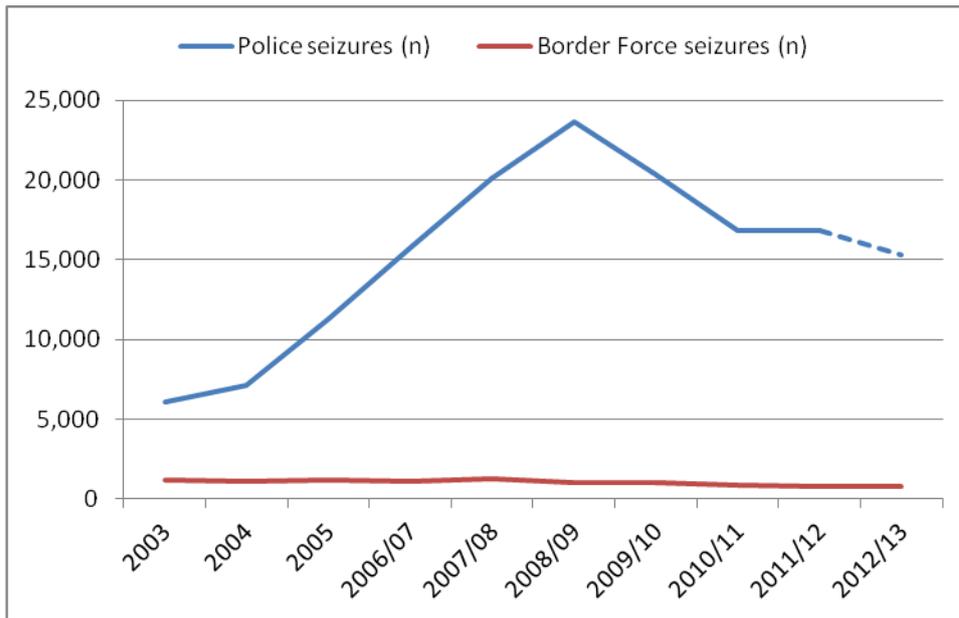
144. It may, however, be appropriate to consider whether there are opportunities to convey advice and information specific to cocaine powder in those settings, pubs and nightclubs, commonly associated with its use. Such initiatives should be approached with caution and would require expert input to avoid potential unintended consequences. For example, it would be counter-productive for non-users to gain the impression that use of cocaine powder is the norm among their peers in these settings.

145. In respect of cocaine powder, we commend existing resources, such as 'Talk to FRANK' (England) and 'Know The Score' (Scotland), which include accurate, factual information about cocaine powder, its effects, and the associated risks, including information regarding its use in association with alcohol and information regarding potentially high levels of cutting agents and the potential effects of these.

Enforcement and Criminal Justice Issues

146. It is evident that cocaine powder continues to account for a substantial level of criminal justice activity in the UK, particularly in respect of policing of the Misuse of Drugs Act. There were 18,593 seizures of cocaine powder in the UK during 2012/13 (Burton *et al.*, 2014), representing only a very slight decrease from the 19,788 seizures during the previous year (Davies and Murray, 2013). An estimated 25 to 30 tonnes of cocaine are imported annually into the UK (National Crime Agency, <http://www.nationalcrimeagency.gov.uk/crime-threats/drugs>). We have noted, above (paragraph 91), cocaine's strong association with organised crime groups.

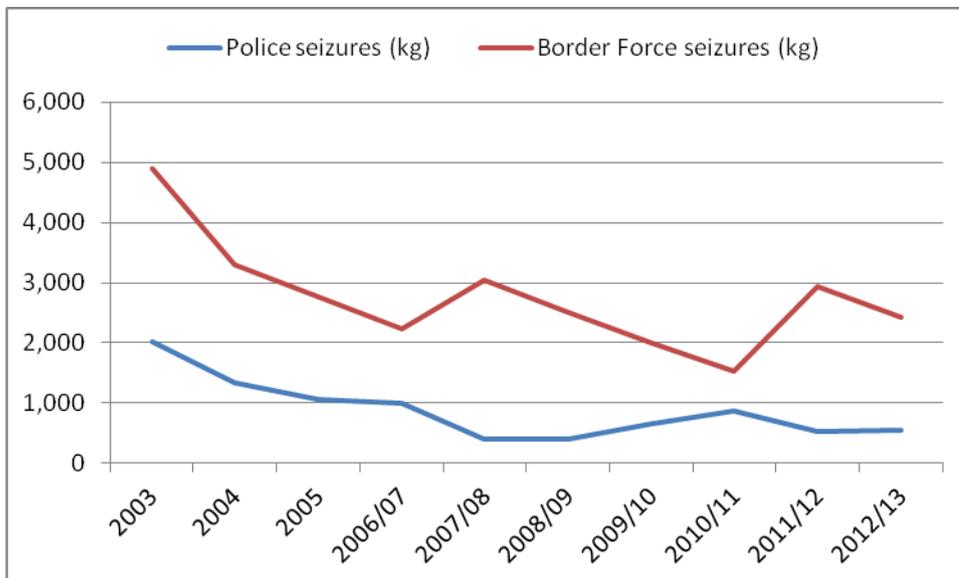
Figure 10: Number of cocaine powder seizures by year, England and Wales, 2003 to 2012/13



Source: Seizures of drugs in England and Wales, 2012/13 Home Office Statistical Bulletin

Figures for 2012/13 exclude Hants and Surrey.

Figure 11: Quantity of cocaine powder seized by year, England and Wales, 2003 to 2012/13



Source: Seizures of drugs in England and Wales, 2012/13 Home Office Statistical Bulletin

147. Figures 10 and 11 show trends over the past decade in the number and quantity of cocaine seizures. There was a substantial increase in the number of police seizures of cocaine powder between 2003 and 2008/09. The majority of seizures (63% of the total 16,075 seizures made during 2012/13) are of quantities of less than one gram (Coleman, 2013).

148. The bulk, in quantity, of cocaine seizures are made at the point of entry to the UK, by the Border Force. The quantity of cocaine powder seized has fluctuated year on year but trends in the quantity of controlled drugs seized by the Border Force can be affected by a small number of very large seizures. During 2012/13, there were three tonnes of cocaine seized, 80% of this by the Border Force (Coleman, 2013).

149. Drug trafficking falls within the remit of the National Crime Agency, which works in the UK and internationally with producer and transit countries, to disrupt and prevent organised crime. Over half of the organised crime groups operating against the UK are considered to be involved in drug-related crime (HM Government, 2013a).

150. In addition to activity in respect of the Misuse of Drugs Act, local police forces also deal with the consequences of cocaine powder use, including potential public nuisance and its relationship to organised crime. As noted above, much cocaine powder consumption in the UK is in combination with alcohol and may impact on the night-time economies of cities and towns across the UK. As we have also noted, contact with the police may provide opportunities for intervention with some groups of arrestees.

151. **Recommendation 8:**

Law enforcement agencies to ensure that their officers are aware of the signs and potential consequences of cocaine powder use, in particular, in terms of the potential for aggression and the elevated risk of cardiovascular problems during arrest and custody supervision and care.

Action: Law enforcement agencies

Appendix 1: The History of Cocaine Use

Cocaine has always been positioned differently in the history of drug use. It has had more of a non-medical underworld image. Its medical use as an anaesthetic never quite overrode its popular image through use in coca wines and other preparations. Its association with less powerful professional interests meant that its position was easier to undermine. Ideas about 'disease' and 'addiction' were always more weakly established for cocaine.

Coca chewing dates back many centuries. Coca leaves mixed with other substances were used in the Andes for both sacred and secular purposes. Unlike tobacco, another plant drug of the Americas, coca's use as a plant product did not translate quickly into Europe. It was known in Europe through travellers' tales. Descriptions were enthusiastic about the sustaining properties of the leaf. Abraham Cowley, an English physician and poet, celebrated the virtues of coca in his *Book of Plants* (1662):

'Endowed with leaves of wondrous nourishment, whose juice sucked in, and lo the stomach taken long hunger and long labour can sustain. From which our faint and weary bodies find more succour, more they cheer the dropping mind, than can your Bacchus and your Ceres joined.'

The work of Dr Paolo Mantegazza, an Italian physician who had practised in Peru, brought coca into European medicine from the 1850s. It was about this time too that the isolation of cocaine as an alkaloid took place, in 1860, through the work of Albert Niemann of Gottingen.

There was enthusiasm in the 1870s for the use of coca in many types of medical and non-medical conditions. The pages of the *British Medical Journal* were full of its use as a stimulant and a tonic for a variety of conditions. The veteran toxicologist Sir Robert Christison wrote of how he had used coca in the Highlands of Scotland in 'walking trials' of 15 miles or more.

The powers of the alkaloid as a local anaesthetic subsequently won the drug medical acceptability. The early work of Sigmund Freud, and that of his friend and research colleague Carl Koller in Vienna, was significant. Freud's use of cocaine was influenced by American reports of its utility as a cure for morphine addiction – a common way of introducing a new 'wonder drug'. In his paper 'On Coca' (*Über Coca*) published in 1884 he produced the first major positive survey of the drug's therapeutic uses. More important for the medical use of the drug was the rediscovery of its anaesthetic properties by Carl Koller. Its use in eye surgery was a major advance and medical enthusiasm was unlimited in the 1880s.

The drug also had wide popular use. Angelo Mariani, the Parisian chemist and entrepreneur, sold coca extract as *Vin Mariani*, also *Pate Mariani*, *Pastilles Mariani* and *The Mariani*. In 1888, Messrs Ambrecht, Nelson and Co in London had several varieties of coca wine, including sweet malaga, (used by ladies and children), a burgundy coca wine for gouty cases and also coca sherry and coca port. There were imitations such as Coca Cola in the United States.

But a reaction set in, as is often the case with such enthusiasms for new drugs. Coca wines and other products fell foul of the turn-of-the century campaigns against patent medicines and their contents. The dangers of treating one addiction (morphine) with a drug that produced another (cocaine) began to be recognised. But addiction and cocaine was always a controversial matter and this underpinned the later more restrictive reaction to the drug. Those who used cocaine habitually seemed to be more non-medical types, using for pleasure, than the 'morphinists' and so the medical response was harsher. The steadily increasing disapproval of the detective Sherlock Holmes' cocaine use demonstrated in the novels of Sir Conan Doyle through the eyes of his friend, Dr Watson, is one indication of the changing attitudes of the medical profession to cocaine in the late 19th century.

Even before the First World War, cocaine use was becoming a matter of increased concern. In the US this was connected with perceived use by ethnic minorities. Black cocaine use was seen as a spur to violence against Whites in the American South and embodied the racial fears of the time. A cocaine-using underworld developed in the US even before the formal drug controls of 1914. Race was not important as a motive force for cocaine restriction in the UK or internationally, and there were other sources of fear. Government departments, the Colonial and India Offices, wanted to reduce the growth of smuggling morphine and cocaine in the Far East, a stance also subsequently supported by the US Government. There were industrial interests in play. Merck of Darmstadt had pioneered the production of crude cocaine initially in the Andes, to save the loss of potency of the leaves in transit. Production in Java in the Dutch East Indies became increasingly important in the early 20th century, producing coca rich in cocaine. Other pharmaceutical companies came into the German market. In discussions around the Hague Convention of 1912, Germany refused, in part to protect her domestic cocaine industry, to adhere to a convention which might be only partially applied and therefore detrimental to pharmaceutical industry interests. At a stroke, international drug control became an all-or-nothing affair, a potential global system of control.

The hope of course had been that nothing much would happen, that the proviso would prove impossible to implement. But the war changed all that. The leakage of drugs through smuggling became a more serious matter. And on the UK home front, the use of cocaine in the army, by Canadian soldiers billeted in Folkestone, and also by soldiers on leave in the West End of London, seemed to be assuming serious proportions and could not be controlled by existing pharmacy legislation. An Army Council order in 1916 preceded more general UK control, applied primarily to cocaine alongside smoking opium. The protests of dentists and the findings of a committee of investigation, which concluded there was little widespread recreational use, were hastily brushed aside. Dentists were a less powerful professional group within medicine and their views more easily discounted by the mainstream medical profession.

Cocaine was thus the 'lead drug' for the more general international control system which was put in place as part of the post-war peace settlement. The war had brought a control system which only the Americans wanted; cocaine was the initial motive force. The price of cocaine plummeted owing to an expansion in supply. In the 1920s it continued and developed a career as a party and recreational drug. It featured in the Billie Carleton and Freda Kempton cases just after the war and in the early 1920s. Cocaine was the recreational drug of the period. But

prosecutions fell in the inter-war years. There were 58 in 1921 but only two by 1927. By the 1930s, the cocaine 'epidemic' was at an end.

In the post-WW2 years, as a widening subculture developed in the UK, cocaine took its place alongside heroin and morphine as a drug of recreational use. It was prescribed to addicts by the small number of practitioners who operated in this area. The second report of the Interdepartmental Committee on Drug Addiction published in 1965 (the Brain Committee) found that numbers taking cocaine had risen from 30 in 1959 to 211 in 1964 and that virtually all the cocaine users were also addicted to heroin. The heyday of prescribing for addicts ended in 1968 when general medical practitioners were replaced by specially licensed doctors working in the new hospital-based drug dependence clinics. In the first few months, clinic doctors made an effort to reduce or eliminate the prescribing of cocaine. Cocaine was not seen as a drug of dependence, in line with its long-standing 'non-medical' image. Heroin prescribing was also radically reduced in favour of methadone.

Cocaine largely dropped out of drug policy discussions in the 1970s and its use was replaced by alternative drugs such as the amphetamines. In the 1980s there were warnings from the US about an impending wave of cocaine use and the arrival of crack cocaine. In 1986, when these warnings were made, cocaine was not yet a street drug in London. The advent of HIV/AIDS and its implications for drug policy diverted attention away from cocaine powder and crack cocaine, while policy refocused on harm reduction.

Appendix 2: Cocaine Trade

The trafficking, distribution and use of Class A drugs causes significant harm to the United Kingdom and to producer and transit countries. It threatens security, subverts the economy, damages communities and harms individuals. The Parliamentary Home Affairs Select Committee report “The Cocaine Trade” (2010) provides a comprehensive review.

The Production and Routing of Cocaine to the UK

The UK needs to import 25–30 metric tonnes of cocaine annually to meet the demand for its cocaine powder and crack markets. A tonne of cocaine at import could, potentially, once adulterated, equate to between 7 and 14 million street deals of cocaine at £20 to £40 per deal.⁵

Colombia, Peru and Bolivia are the main source countries for cocaine. Recently published UN and US cocaine production estimates suggest global production has reduced, from a range of 875–1,000 tonnes in 2005 to a range of 700–850 tonnes in 2008/09. The ranges for cocaine production are wide, but both US and UN figures show estimates for Colombian production falling from a high level while Peru’s and Bolivia’s production is rising.

In 2009/10 it was estimated that 65–70% of the UK’s identified cocaine supply was produced in Colombia, or in the border areas of neighbouring Venezuela and Ecuador. Peru and Bolivia accounted for the vast majority of the remaining 30–35% of cocaine imported into the UK. It is now believed that the amount entering the UK from Colombia is decreasing; whilst that from Peru and Bolivia is increasing.⁶

Colombian criminal groups continue to dominate the cocaine trade within South America. This trade continues to support terrorist and paramilitary groups in Colombia such as the FARC, whose commanders control key cocaine production and trafficking zones that ultimately impact on the UK and mainland Europe.⁷

West Africa is a significant transit region for cocaine destined for the European and UK markets. The Caribbean continues to be an important transit route for cocaine destined for Europe and the UK. Much of the cocaine from this region is trafficked by air courier, although yachts and maritime container traffic are also used.⁸

Large concealments within maritime containers, utilising container seaports, remain the principal method for cocaine departing South American source countries for Europe. Although

⁵ Source National Crime Agency (NCA).

⁶ Source United Kingdom Threat Assessment (UKTA) (NCA).

⁷ Source NCA.

⁸ Source NCA.

some shipments arrive direct in the UK, most are further distributed from European port hubs by feeder vessels or arrive in the UK through traditional points of entry.

The Iberian Peninsula, particularly Spain, remains the primary entry point for cocaine arriving in Europe, both in terms of the number and the volume of cocaine seizures. The majority of cocaine destined for the European market is judged to have crossed the Atlantic by sea in quantities up to multi-tonne loads, primarily in maritime containers from Latin America, but also concealed in general cargo, yachts and fishing vessels.⁹

⁹ Source NCA.

Appendix 3: Contributions to this review

Advisory Council on the Misuse of Drugs members:

Tim Millar (Chair of Cocaine Working Group)
Les Iversen (ACMD Chair and Member of Cocaine Working Group)
Kostas Agath (Cocaine Working Group)
Emily Finch (Cocaine Working Group)
David Liddell
Annette Dale-Perera
Nigel Kirby
Paul Dargan
Roger Brimblecombe
Sarah Graham
Alex Stevens
Simon Bray
Fabrizio Schifano
Harry Sumnall
Steve Pleasance

Special thanks to:

Dima Abdulrahim
Dr Virginia Berridge (London School of Hygiene and Tropical Diseases)
Howard Roberts
Josie Smith
Lawrence Gibbons
Luke Mitcheson
Aidan Gray
Charlotte Davies
Nicola Kalk
Vikki Reynolds (National Crime Agency)
Anna Richardson (Home Office)
Karen Rofe (Home Office)
Craig Wright (Focal Point)
Jenny Bradley (CSEW)

Secretariat

Jo Wallace
Zahi Sulaiman
Caroline Wheeler
Mohammed Ali
Mike Taylor

Appendix 4: Members of the Advisory Council on the Misuse of Drugs

Professor Les Iversen (Chair)	Neuropharmacologist and Visiting Professor of Pharmacology, Oxford University
Dr Kostas Agath	Consultant Psychiatrist (addictions), Central and North West London NHS Foundation Trust and Medical Director of Addaction
Gillian Arr-Jones	Pharmacist and expert reviewer and pharmacist consultant in health and social care
Fiona Bauermeister	Assistant Chief Officer, London Community Rehabilitation Company
Simon Bray	Commander (Security), Metropolitan Police
Dr Roger Brimblecombe	Pharmacologist
Annette Dale-Perera	Independent management consultant specialising in addiction, health and criminal justice
Dr Paul Dargan	Consultant Physician, Clinical Toxicologist and Clinical Director, Guys and St Thomas' NHS Foundation Trust, Reader in Toxicology, Kings College London
Dr Emily Finch	Consultant Psychiatrist, South London and Maudsley NHS Trust and Clinical Director of the Addictions Clinical Academic Group
Professor Simon Gibbons	Professor of Medicinal Phytochemistry and Head of the Pharmaceutical and Biological Chemistry Department, University College London School of Pharmacy.
Sarah Graham	Director, Sarah Graham Solutions
Professor Raymond Hill	Neuropharmacologist and Visiting Professor of Pharmacology, Imperial College London
Kyrie LI James	First Tier Tribunal, Immigration and Asylum Chambers
Nigel Kirby	Deputy Director, National Crime Agency
David Liddell	Director of the Scottish Drugs Forum
Professor Fiona Measham	Professor of Criminology, School of Applied Social Sciences, Durham University

Jo Melling	Head of Commissioning for Drugs and Alcohol, Public Health, Oxfordshire
Dr Tim Millar	Senior Research Fellow and Addiction Research Strategy Lead, University of Manchester
Richard Phillips	Independent Consultant in substance misuse
Rob Phipps	Former senior policy official (drugs and alcohol), Department of Health, Social Services and Public Safety in Northern Ireland
Dr Steve Pleasance	Analytical chemist and Head of Industry at the Royal Society of Chemistry
Dr Marcus Roberts	Chief Executive of DrugsScope
Professor Fabrizio Schifano	Consultant Psychiatrist (addictions), Crime Reduction Initiative, Hertfordshire Drug and Alcohol Recovery Services
Professor Alex Stevens	Professor of Criminal Justice and Deputy Head of the School of Social Policy, Sociology and Social Research, University of Kent
Professor Harry Sumnall	Professor in substance use, Liverpool John Moores University
Professor Ben Whalley	Professor of Neuropharmacology, School Director of Research, University of Reading.

References

- ACMD Briefing Paper: Prevention of Drug and Alcohol Dependence, 2015
(https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/406926/ACMD_R_C_Prevention_briefing_250215.pdf)
- Álvarez, M. (2007) *Environmental damage from illicit drug crops in Colombia*, in W. de Jong et al., *Extreme Conflicts and Tropical Forests*, Berlin: Springer
- Baker A., Lee N.K. and Jenner L. (Eds) (2004). *Models of Intervention and Care for Psychostimulant Users, 2nd Edition*, National Drug Strategy Monograph Series No 51. Canberra. Australian Government Department of Health and Ageing.
- Baker D.R., Barron L., Kasprzyk-Hordern B. (2014) *Illicit and pharmaceutical drug consumption estimated via wastewater analysis. Part A: chemical analysis and drug use estimates: Sci Total Environ.* 487:629-41
- Baldwin, G.C., Roth, M.D., Tashkin, D.P. (1998) *Acute and chronic effects of cocaine on the immune system and the possible link to AIDS.* Journal of Neuroimmunol 83:133–138.
- Benzocaine review - US Natl Library of Medicine:
[pubchem.ncbi.nlm.nih.gov/compound/benzocaine.section=Top]
- Bishop, C.R., Dargan, P.I., Greene, S.L., Garnham, F., Wood, D.M. (2010) *Emergency department presentations with suspected acute coronary syndrome –frequency of self-reported cocaine use.* European Journal of Emergency Medicine 17(3):164-6.
- Boston University (2008) *Common Heart Drug May Reduce Cocaine Cravings.* ScienceDaily. ScienceDaily, 28 February 2008. <www.sciencedaily.com/releases/2008/02/080227155016.htm>.
- Burch, H. J., Clarke, E. J., Hubbard, A. M. and Scott-Ham, M. (2012). *Concentrations of drugs determined in blood samples collected from suspected drugged drivers in England and Wales.* Journal of Forensic and Legal Medicine 20(4) 278-289
- Burton, R., Thomson, F., Visintin, C., and Wright C. (2014) *United Kingdom drug situation: Annual report to the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA)*
- Cabral, G.A. (2006) *Drugs of abuse, immune modulation, and AIDS.* Journal of Neuroimmune Pharmacol. 1:280–295.
- Camacho, A. and Mejia, D. (2013) *The health consequences of aerial spraying of illicit crops: the case of Colombia*, Paper presented to the Annual Conference of the International Society for the Study of Drug Policy, Bogotá
- Canadian Pharmacists Association. 2009. *Products Discontinued from the Market Since Publication of the 2000 CPS*
- Chen, C.Y., Anthony, J.C. (2004) *Epidemiological estimates of risk in the process of becoming dependent upon cocaine: cocaine hydrochloride powder versus crack cocaine.* Psychopharmacology (Berl).72:78-86.

- Chermack, S.T., and Blow, F.C. 2002. *Violence among individuals in substance abuse treatment: the role of alcohol and cocaine consumption*. Drug and Alcohol Dependence 66: 29–37
- Cheryl, D., Fryar, M.S.P.H. et al. (2007) *Drug Use and Sexual Behaviors Reported by Adults: United States, 1999–2002*. CDC Number 384.
- Cole, C., Jones, L., McVeigh, J., Kicman, A., Syed, Q., & Bellis, M. (2010) *A Guide to Adulterants, Bulking Agents and other Contaminants found in illicit drugs*, Liverpool John Moores University, Liverpool
- Coleman, K. (2013) *Seizures of drugs in England and Wales, 2012/13* Home Office Statistical Bulletin
- Coles, G.C., East, J.M., Jenkins, S.N. (1975), *The mechanism of action of the anthelmintic levamisole*. General Pharmacology: The Vascular System 6: 309–313
- Cone, E.J. (1995) *Pharmacokinetics and Pharmacodynamics of Cocaine*. J Anal Toxicol (1995) 19(6): 459-478 doi:10.1093/jat/19.6.459
- Conner, K.R., Pinquart, M., Holbrook, A.P. (2008) [Meta-analysis of depression and substance use and impairment among cocaine users. Drug Alcohol Dep. 98:13-23](#)
- Cook, J.A., Burke-Miller, J.K., et al. (2008) *Crack Cocaine, Disease Progression, and Mortality in a Multi-Center Cohort of HIV-1 Positive Women*. AIDS 22(11): 1355–1363
- Crown Prosecution Service, 2012, *Cutting agent suppliers jailed*. [http://www.cps.gov.uk/thames_chiltern/cps_thames_and_chiltern
- Daly M. (2009) *The hidden mixer* DRUGLINK March/April 2009
- Davies C. and Murray R. (Eds) (2013) *United Kingdom Drug Situation 2013 EDITION* UK Focal Point On Drugs Annual Report to the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA)
- De Oliveira, L.G., Barroso, L.P., Silveira, C.M., Van Der Meer Sanchez, Z., De Carvalho Ponce, J., Vaz, L.J. (2009) *Neuropsychological assessment of current and past crack cocaine users and misusers*. Substance Use and Misuse 44(13):1941-1957
- Department of Health (England) and the devolved administrations (2007). *Drug Misuse and Dependence: UK Guidelines on Clinical Management*. London: Department of Health (England), the Scottish Government, Welsh Assembly Government and Northern Ireland Executive
- Dourojeanni, M. (1992) *Environmental impact of coca cultivation and cocaine production in the Amazon region of Peru*. Bull Narc. 44(2):37-53.
- Effective Interventions Unit (2002). *Psychostimulant Research: a practical guide*. Scottish Executive. Available to download as a pdf at <http://www.scotland.gov.uk/Publications/2002/10/15524/11578>
- European Monitoring Centre for Drugs and Drug Addiction (2014) *European Drug Report 2014: Trends and developments* EMCDDA, Lisbon, May 2014
- European Monitoring Centre for Drugs and Drug Addiction (2014). *Perspective on Drugs Series. Treatment for cocaine dependence: reviewing current evidence* (webpages last update 27.05.2014). Available to download as a pdf version at: <http://www.emcdda.europa.eu/topics/pods/treatment-for-cocaine-dependence>

- Farre, M., de la Torre, R., Gonzalez, M.L., Teran, M.T., Roset, P.N., Menoyo, E., Cami, J. (1997) *Cocaine and alcohol interactions in Humans: Neuroendocrine effects and cocaethylene metabolism*. Journal of Pharmacology and Experimental Therapeutics 283:164-176
- Farre, M., Torre, R.D., Llorente, M., Lamas, X., Ugena, B., Segura, J., Cami, J. (1993) *Alcohol and cocaine interactions in humans*. Journal of Pharmacology and Experimental Therapeutics. 266:1364-1373.
- Felbab-Brown, V. (2010), *Shooting Up: Counter-Insurgency and the War on Drugs*, Washington DC: Brookings Institute
- Fernández-Castillo, N., Roncero, C., Grau-Lopez, L., Barral, C., Prat, G., Rodriguez-Cintas, L., Sánchez-Mora, C., Gratacòs, M., Ramos-Quiroga, J.A., Casas, M., Ribasés, M., Cormand, B. (2013) *Association study of 37 genes related to serotonin and dopamine neurotransmission and neurotrophic factors in cocaine dependence*. Genes Brain Behav. 12:39-46
- Flórez-Salamanca, L., Secades-Villa, R., Hasin, D.S., Cottler, L., Wang, S., Grant, B.F., Blanco, C. (2013) *Probability and predictors of transition from abuse to dependence on alcohol, cannabis, and cocaine: results from the National Epidemiologic Survey on Alcohol and Related Conditions*. Am J Drug Alcohol Abuse. 39:168-79
- Fridell, M., (2003). Psychosocial Treatment for Drug Dependence. In Berglund, M., Thelander, S., Jonsson, E., (Eds): *Treating Alcohol and Drug Abuse; An Evidence Based Review*, pp 325-413, Wiley-VCH GmbH & Co. KgaA
- Fuller, E., and Hawkins, V., (2014) *Smoking, drinking and drug use among young people in England in 2013* Health & Social Care Information Centre
- Gelernter, J., Sherva, R., Koesterer, R., Almasy, L., Zhao, H., Kranzler, H.R., Farrer, L. (2013) *Genome-wide association study of cocaine dependence and related traits: FAM53B identified as a risk gene*. Mol Psychiatry. Aug 20. doi: 10.1038/mp.2013.99. [Epub ahead of print]
- Gouin, K., Murphy, K., Shah, P.S. (2011) *Knowledge Synthesis group on Determinants of Low Birth Weight and Preterm Births. Effects of cocaine use during pregnancy on low birth weight and preterm birth: systematic review and meta-analyses*. American Journal of Obstetrics and Gynecology 204(4):340.e1-12
- Graham, L., Parkes, T., McAuley A., and Doi, L. (2013) *Alcohol problems in the criminal justice system: an opportunity for intervention* World Health Organisation
- Hadler AJ. 1970. *Further studies of aminorex, a new anorexigenic agent*. Curr Ther Res Clin Exp., 12:639-44
- Hall, W. (1996). *What have population surveys revealed about substance use disorders and their comorbidity with other mental disorders?* Drug and Alcohol Review 15, 157-170
- Harris, D.S., Everhart, E.T., Mendelson, J., Jones, R.T. (2003) *The Pharmacology of cocaethylene in humans following cocaine and ethanol administration*. Drug and Alcohol Dependence 72:169 -182
- Hay, G., Rael dos Santos, A., Worsley, J. (2014) *Estimates of the Prevalence of Opiate Use and/or Crack Cocaine Use, 2011/12: Sweep 8 Summary Report*. Public Health England

- Henning, R.J., Wilson, L.D. (1996) *Cocaine is as cardiotoxic as cocaine but is less toxic than cocaine plus ethanol*. Life Sciences. 59:615-27
- HM Government (2013a) *Serious and Organised Crime Strategy* The Stationery Office Limited, UK
- HM Government (2013b) *Drug Strategy Annual Review: Delivering within a New Landscape*
- Hoare, J and Moon, D (2010) *Drug Misuse Declared: Findings from the 2009/10 British Crime Survey England and Wales*. Home Office, London.
- Hoffman, R.S. (2010) *Treatment of patients with cocaine-induced arrhythmias: bringing the bench to the bedside*. British Journal of Clinical Pharmacology 69(5):448-57
- Hofmaier, T., Luf, A., Seddik, A. et al., 2014, *Aminorex, a metabolite of the cocaine adulterant levamisole, exerts amphetamine like actions at monoamine transporters*. Neurochemistry International, 73:32-41
- Hollander J.E., Todd K.H., Green G., Heilpern K.L., Karras D.J., Singer A.J., Brogan G.X., Funk J.P., Strahan J.B. (1995) *Chest pain associated with cocaine: an assessment of prevalence in suburban and urban emergency departments*. Annals of Emergency Medicine, 26, 671-676
- Hollander, J.E., Brooks, D.E., Valentine, S.M. (1998) *Assessment of cocaine use in patients with chest pain syndromes*. Archives of Internal Medicine 158(1):62-66
- Hollander, J.E., Hoffman, R.S., Gennis, P. et al. (1994) *Prospective multicenter evaluation of cocaine-associated chest pain*. Cocaine Associated Chest Pain (COCHPA) Study Group. Academic Emergency Medicine 1(4):330-9
- Home Affairs Committee (2010) - Seventh Report *The Cocaine Trade*
- Home Office (2012) *Drug Misuse Declared: Findings from the 2011/12 Crime Survey for England and Wales* Home Office, London.
- Home Office (2013) *Drug Misuse: Findings from the 2012/13 Crime Survey for England and Wales* Home Office, London.
- Home Office (2014) *Drug misuse: Findings from the 2013/14 Crime Survey for England and Wales* Home Office, London.
- Humeniuk, R., Ali, R., Babor, T., Souza-Formigoni, M., et al. (2012) *A randomized controlled trial of a brief intervention for illicit drugs linked to the Alcohol, Smoking and Substance Involvement Screening Test (ASSIST) in clients recruited from primary health-care settings in four countries*. Addiction 107(5) 957-966
- ISD Scotland (2011) *Scottish Schools Adolescent Lifestyle and Substance Use Survey (SALSUS) National Report Smoking, Drinking and Drug Use Among 13 And 15 Year Olds In Scotland In 2010*
- Johansson B.A., (2003) *Pharmacotherapy for Cocaine Dependence*. In Berglund, M., Thelander, S., Jonsson, E., (Eds): *Treating Alcohol and Drug Abuse; An Evidence Based Review*, pp 533-570, Wiley-VCH GmbH & Co. KGaA
- Jones, H.T. (1999). *Pharmacokinetics of Cocaine*
[http://archives.drugabuse.gov/pdf/monographs/monograph175/221-234_Jones.pdf]

Jones, H., Hickman, M., Kasprzyk-Hordern, B., Welton, N.J., Baker, D.R., and Ades A.E (2014) *Illicit and pharmaceutical drug consumption estimated via wastewater analysis. Part B: Placing back-calculations in a formal statistical framework*: Sci Total Environ. 487(100) 642–650

Lee, K.C., Ladizinski, B., and Federman, D.G., (2012) *Complications Associated With Use of Levamisole-Contaminated Cocaine: An Emerging Public Health Challenge* Mayo Clin Proc. 87: 581–58

Kalayasiri, R, Gelernter, J, Farrer, L. *et al.*, 2010, [Adolescent cannabis use increases risk for cocaine-induced paranoia](#). Drug and Alcohol Dependence, 107: 196-201

Kaye, S., Darke, S. (2004) *Non-fatal cocaine overdose among injecting and non-injecting cocaine users in Sydney, Australia*. Addiction 99:1315-22.

Keefer, P. & Loayza, N, (2010) *Innocent Bystanders: Developing Countries and the War on Drugs*, Basildon & Washington DC: Palgrave Macmillan & The World Bank

Keegan, J., Parva, M., Finnegan, M., Gerson, A., Belden, M. (2010) *Addiction in pregnancy*. Journal of Addictive Diseases 29(2):175-91

Knapp, W.P., Soares, B., Farrell, M., and Silva de Lima, S., (2007). *Psychosocial interventions for cocaine and psychostimulant amphetamine related disorders*. Cochrane Database of Systematic Reviews, Issue 3, available online and accessed on the 7.12.2014 at <http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD003023.pub2/pdf/standard>

Kolodgie, F.D., Wilson, P.S., Mergner, W.J., Virmani, R.(1999) *Cocaine-induced increase in the permeability function of human vascular endothelial cell monolayers*. Experimental and Molecular Pathology 66(2):109-22

Lange, R.A., Hillis, L.D. (2001) *Cardiovascular complications of cocaine use*. New England Journal of Medicine 345:351-358

Langner, R.O., Bement, C.L., Perry, L.E. (1988) *Arteriosclerotic toxicity of cocaine*. National Institute on Drug Abuse: Research Monograph 88: 325-36

Larocque, A., Hoffman, R.S. (2012) *Levamisole in cocaine: unexpected news from an old acquaintance*. Clin Toxicol (Phila)., 50:231-41

Levine, M., Iliescu M.E., Margellos-Anast, H., Estarziou, M., Ansell, D.A.(2005) *The effects of cocaine and heroin use on intubation rates and hospital utilization in patients with acute asthma exacerbations*. Chest. Oct; 128(4):1951-7

Lightowlers, C. & Sumnall, H. *A violent mix? The association between concurrent alcohol and cocaine use and violence amongst young people in England and Wales*. Drugs Education Prevention and Policy; DOI: 10.3109/09687637.2013.861799

Lingford-Hughes, A.R., Welch, S., Peters, L., Nutt, D.J., (2012). *BAP Updated Guidelines: Evidence-based guidelines for the pharmacological management of substance abuse, harmful use, addiction and comorbidity: recommendations from BAP*. Journal of Psychopharmacology, 26: 899-952. Online version accessible at http://www.bap.org.uk/pdfs/BAPaddictionEBG_2012.pdf

Lopez-Quintero, C¹, Pérez de los Cobos, J., Hasin, D.S., Okuda, M., Wang, S., Grant, B.F., Blanco, C., (2011) *Probability and predictors of transition from first use to dependence on nicotine, alcohol,*

cannabis, and cocaine: results of the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC). Drug Alcohol Depend. 2011 May 1; 115(1-2):120-30.

Maric, T., O'Connor, S., Pollock, N., Mirza, Z., Henry, J. (2010) *Prevalence of cocaine use among patients attending the emergency department with chest pain.* Emerg Med J. Jul; 27(7):548-50. doi: 10.1136/emj.2008.070581.

Marsden, J., Stillwell, G., Barlow, H., Boys, A., Taylor, C., Hunt, N., Farrell, M. (2006) *An evaluation of a brief motivational intervention among young ecstasy and cocaine users: no effect on substance and alcohol use outcomes* Addiction, 101(7) 1014-26

Marzuk, P.M., Tardiff, K., Leon, A.C., Hirsch, C.S., Portera, L., Iqbal, M.I., Nock, M.K., Hartwell, N. (1998) *Ambient temperature and mortality from unintentional cocaine overdose.* Journal of American Medical Association 279(22):1795-800.

McCord, J., Jneid, H., Hollander, J.E., de Lemos, J.A., Cercek, B., Hsue, P., Gibler, W.B., Ohman, E.M., Drew, B., Philippides, G., Newby, L.K. (2008) *American Heart Association Acute Cardiac Care Committee of the Council on Clinical Cardiology. Management of cocaine-associated chest pain and myocardial infarction: a scientific statement from the American Heart Association Acute Cardiac Care Committee of the Council on Clinical Cardiology.* Circulation. 117(14):1897-907.

Mena, G., Giraudon, J., Alvarez, E., Corkery, J.M., Matias, J. et al. (2013) *Cocaine-related health emergencies in Europe: a review of sources of information, trends and implications for service development.* Eur.Addiction Research, 19:74-81.

Mills, E.J., Wu, P., Gagnier, J., and Ebbert, J.O., (2005). *Efficacy of acupuncture for cocaine dependence: a systematic review & meta-analysis.* Harm Reduction Journal 2005, 2:4 Available online at <http://www.harmreductionjournal.com/content/pdf/1477-7517-2-4.pdf>

National Crime Agency (2014) ENDORSE Annual Report: Drug Purities and Adulterants Detected in England and Wales Seizures in 2013

National Institute on Drug Abuse (2010). *Research Report Series: Cocaine: What treatments are effective for cocaine abusers?* (Webpage updated Sep 2010); Accessed online on 6 Dec 2014 at <http://www.drugabuse.gov/publications/research-reports/cocaine/what-treatments-are-effective-cocaine-abusers>

National Records of Scotland (2014) *Drug-related deaths in Scotland in 2013* A National Statistics publication for Scotland

National Treatment Agency for Substance Misuse (2010). *Cocaine powder: how the treatment system is responding to a growing problem.* Available online at <http://www.nta.nhs.uk/uploads/ntapowdercocaine1march2010d.pdf>

NICE (2007). *Drug Misuse: Psychosocial Interventions (NICE Clinical Guideline 51).* Available online at <http://www.nice.org.uk/guidance/cg51/resources/guidance-drug-misuse-psychosocial-interventions-pdf>

National Offender Management Service (2005) *NOMS Alcohol Interventions Guidance including revised guidance on Managing the Alcohol Treatment Requirement (ATR) - Update of Annex B to Probation Circular 57/2005*

National Institute on Drug Abuse (1999) *NIDA Research Reports – Cocaine*

O'Brian, M., Anthony, J., (2005) *Risk of becoming cocaine dependant – epidemiological estimates for the US 2000-2001*. Neuropsychopharmacology. 30(8): 1588

Office for National Statistics (2014) Deaths Related to Drug Poisoning, England and Wales – 2013 (<http://www.ons.gov.uk/ons/publications/re-reference-tables.html?edition=tcm%3A77-375474>) accessed on 10/11/2014

Orson, F.M., Wang, R., Brimijoin, S., Kinsey, B.M., Singh, R.A.K., Ramakrishnan, M., Wang, H.Y., & Kosten, R.T., (2014). *The Future Potential for Cocaine Vaccines*. Expert Opin. Biol. Ther. 14(9): 1271-1283

Patel, R.¹, Shah, R., Baredes, S., Spillert, C.R., Lazaro, E.J. (2000) *Nasal toxicity of cocaine: a hypercoagulable effect?* J Natl Med Assoc. 2000 Jan; 92(1):39-41

Pennings, E.J.¹, Leccese, A.P., Wolff, F.A. (2002). *Effects of concurrent use of alcohol and cocaine*. Addiction. 97:773-83.

Perez- Reyes, M., Jeffcoat, A.R. (1992) *Ethanol/cocaine interaction: cocaine and cocaethylene plasma concentrations and their relationship to subjective and cardiovascular effects*. Life Sciences 51:553-563.

Pirwitz, M.J., Willard, J.E., Landau, C., Lange, R.A., Glamann, D.B., Kessler, D.J., Foerster, E.H., Todd, E., Hillis, L.D. (1995) *Influence of cocaine, ethanol, or their combination on epicardial coronary arterial dimensions in humans*. Archives of Internal Medicine 155:86-91.

Plush, T., Shakespeare, W., Jacobs, D., Ladi, L., Sethi, S., Gasperino, J. (2015) *Cocaine-Induced Agitated Delirium: A Case Report and Review* Journal of Intensive Care Medicine 30(1) 49-57

Preti, A., (2007). *New Developments in the Pharmacotherapy of Cocaine Abuse*. Addiction Biology, 12, 133-151.

Public Health England (2014) *Adult Drug Statistics from the National Drug Treatment Monitoring System (NDTMS) 1 April 2013 to 31 March 2014*

Radcliffe, Polly C. and Stevens, Alex (2008) *Are drug treatment services only for 'thieving junkie scumbags'?* *Drug users and the management of stigmatised identities*. Social Science and Medicine, 67 (7). pp. 1065-1073. ISSN 0277-9536

Reed K., Day, E., Keen, J., and Strang, J., (2014) *Pharmacological Treatments for Drug Misuse and Dependence*. *Expert Opinion on Pharmacotherapy*, 16(3): 1-4. Posted Online on 21.11.2014; and accessed on 6.12.2014 at <http://informahealthcare.com/doi/abs/10.1517/14656566.2015.98347>

Robaei, D., Grieve, S.M., Nelson, G.C., Bhindi, R., Figtree G.A (2010) *Cocaine-induced epicardial coronary artery thrombosis resulting in extensive myocardial injury assessed by cardiac magnetic resonance imaging* Eur Heart J. 2010 Oct;31(20):2446. doi: 10.1093/eurheartj/ehq229. Epub 2010 Jul 6.

Rincón-Ruiz, A. & Kallis, G. (2013), *'Caught in the middle, Colombia's war on drugs and its effects on forest and people'*, Geoforum, 46(May): 60-78

Robertson, R., (2014) *Scottish Crime and Justice Survey 2012/13: Drug Use* Scottish Centre for Crime and Justice Research, University of Glasgow

Roncero, C., Daigre, B. Gonzalvo, S., et al. (2013). [Risk factors for cocaine-induced psychosis in cocaine-dependent patients. Eur J.Psychiatry, 28: 141-146](#)

Roncero,C., Comín,M, Daigre, C (2014) [Clinical differences between cocaine-induced psychotic disorder and psychotic symptoms in cocaine-dependent patients](#) Psychiatry Research, 216: 398-403

Ruttenber, A.J., McAnally, H.B., Wetli, C.V. (1999) *Cocaine-associated rhabdomyolysis and excited delirium: different stages of the same syndrome.* American Journal of Forensic Medicine and Pathology 20(2):120-7.

Samet, S., Fenton, M.C., Nunes, E., et al. (2013) [Effects of independent and substance-induced major depressive disorder on remission and relapse of alcohol, cocaine and heroin dependence .Addiction, 108: 115–123](#)

Schmidt, A.J., Rockstroh, J.K., Vogel, M., An der Heiden, M., Baillot, A., Krznaric, I., Radun, D. (2011) *Trouble with bleeding: risk factors for acute hepatitis C among HIV-positive gay men from Germany – a case-control study.* Public Library of Science One 8;6(3):e17781.

Scottish Drugs Misuse Database (SDMD) *NHS Health Board Overview of Initial Assessments for Specialist Drug Treatment 2012/13 Data Tables*

Serious Crime Act 2015: <http://services.parliament.uk/bills/2014-15/seriouscrime.html>

Shah, A.D., Wood, D.M., Dargan, P.I. 2011 *Survey of ICD-10 coding of hospital admissions in the UK due to recreational drug toxicity.* Quarterly Journal Medicine 104(9) 779-84.

Shah, K.K., Gulati, O.D., Hemavathi, K.G. (1986) *Investigation of some effects of levamisole on dog blood pressure: Indian Journal of Physiology and Pharmacology 30(1) 55-62*

Sokhadze, E., Stewart, C., Hollifield, M., Tasman, A. (2008) *Event-Related Potential Study of Executive Dysfunctions in a Speeded Reaction Task in Cocaine Addiction.* J Neurother 12(4):185–20

Spronk, D.B., van Wel, J.H.P., Ramaekers, J.G., Verkes, J.G. (2013), *Characterizing the cognitive effects of cocaine: A comprehensive review.* Neuroscience Biobehavioral Reviews. 37:1838-1859

Stratton, S.J., Rogers, C., Brickett, K., Gruzinski, G. *Factors associated with sudden death of individuals requiring restraint for excited delirium.* Am J Emerg Med. 2001; 19(3):187-91.

Toner, S., and Freil, R., (2010) *Experience of Drug Misuse: Findings from the 2008/09 Northern Ireland Crime Survey* Northern Ireland Statistics and Research Agency, Research and Statistical Bulletin 1/2010

United Nations Office on Drugs and Crime (2010) *World Drug Report 2010* United Nations, New York

United Nations Security Council (2009)

<http://www.unodc.org/unodc/en/frontpage/2009/December/security-council-debates-devastating-impact-of-drug-trafficking.html>

United States Congress: Office of Technology Assessment (1993) *Biological Components of Substance Abuse and Addiction. Chapter 3: The Neuropharmacology of Drugs of Abuse* UNT Digital Library. <http://digital.library.unt.edu/ark:/67531/metadc40044/>. Accessed December 12, 2014.

Vanmoos, M., Hulka, L.M., Preller, K.H. *et al*, (2010) *Cognitive Impairment in Cocaine Users is Drug-Induced but Partially Reversible: Evidence from a Longitudinal Study* *Neuropsychopharmacology* 39, 2200-2210

Vergara-Moragues, V., Gómez, P.A., González-Saiz, F., Rodríguez-Fonseca, F. (2014) *Cocaine-induced psychotic symptoms in clinical setting*. *Psychiatry Research*, 217: 115-120

Vocci, F.J., and Montoya, I.D., (2009). *Psychological treatments for stimulant misuse comparing and contrasting those for amphetamine dependence and those for cocaine dependence*. *Current Opinion in Psychiatry*, 22(3): 263-68. Available online at <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2825894/pdf/nihms130361.pdf>

Wood, D.M., Conran, P., Dargan, P.I. (2011) *ICD-10 coding: poor identification of recreational drug presentations to a large emergency department*. *Emerg Med J*.2011; 28(5): 387-9

Wood, D.M., Dargan, P.I., Hoffman, R.S. (2009) *Management of cocaine-induced cardiac arrhythmias due to cardiac ion channel dysfunction*. *Clin Toxicol (Phila)*. 2009; 47(1): 14-23

Xu, W., Flick, T., Mitchel, J., Knowles, C., Ault, K. 1999 *Cocaine effects on immunocompetent cells: an observation of in vitro cocaine exposure*. *Int J Immunopharmacol*. 1999; 21: 463–472