



# Fentanils and synthetic cannabinoids: driving greater complexity into the drug situation

An update from the EU Early Warning System  
June 2018



EMBARGO — 7 JUNE  
11:30 Central European Time/CET  
(10:30 Western European Time/WET/Lisbon)



European Monitoring Centre  
for Drugs and Drug Addiction

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## Introduction

New psychoactive substances are a broad range of drugs that are not controlled by the 1961 and 1971 United Nations drug control conventions but may pose similar threats to public health. Many of them are traded as 'legal' replacements to established controlled drugs such as cannabis, heroin, cocaine and MDMA.

Over the last decade, there has been a large increase in these substances as globalisation and new technology have allowed production to shift from small-scale illicit laboratories in Europe to commercial chemical and pharmaceutical operations in China that are capable of making hundreds of different substances on an industrial scale. Once in Europe, they are sold openly in branded products advertised as 'legal highs', under the guise of being 'research chemicals', and as 'food supplements', in attempts to make these substances attractive to users. They are also sold on the illicit drug market, either under their own names or passed off as established controlled drugs to unsuspecting users. In parallel with the growth in the range of substances and products that are offered, the consumer base has also grown and includes recreational users, chronic and marginalised drug users, those who self-medicate, and people wanting to improve how they look or their performance at work or when studying. The growth in the market is also reflected in a large increase in the number of seizures reported by law enforcement as well as in poisonings.

For more than 20 years, a three-step legal framework of early warning, risk assessment and control measures has allowed Europe to rapidly identify and react to public health threats caused by new substances (Council of the European Union, 2005). The European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) is responsible for the first two steps in this system, namely operating the EU Early Warning System with Europol (the European Union agency for law enforcement cooperation) (see 'EU Early Warning System') and conducting risk assessments; while the European Commission, the Council of the European Union and the European Parliament are responsible for control measures.

This is the second update from the EU Early Warning System. In these publications, the EMCDDA aims to provide some insights into what is happening with new psychoactive substances in Europe, based on data from the agency's early warning and risk assessment activities. This issue covers the period from January 2016 until December 2017, with aggregated data on seizures reported by law enforcement limited to 2016 data. A focus of this publication is the new fentanils (which form the

## EU Early Warning System

The EU Early Warning System, operated by the EMCDDA and Europol, plays a central role in supporting national- and EU-level preparedness and responses to new psychoactive substances. In operation for the past 20 years, it comprises those two agencies, 30 national early warning systems across Europe, the European Medicines Agency and the European Commission. The national systems routinely report data, such as seizures of new psychoactive substances from police and customs as well as poisonings, to the EMCDDA. These data are then used both to identify emerging threats and as the basis of the EMCDDA's risk assessment activities. The EMCDDA transmits essential and urgent technical information as well as risk communications (such as public health alerts) to the Early Warning System network by email. It also operates an information system called the European Database on New Drugs (EDND). The system offers round-the-clock access to information on more than 670 new substances based on data reported by the network, identified by the EMCDDA through its additional monitoring systems, and reported by other partners.

Learn more: <http://www.emcdda.europa.eu/activities/action-on-new-drugs>

large majority of the new synthetic opioids that have been reported in Europe) and the synthetic cannabinoids. For the purpose of this report, the term 'seizures' means any encounters of new psychoactive substances by law enforcement, including seizures, samples recovered from crime scenes, and shipments detained for inspection.

Since the previous publication, in March 2015, there have been a number of major developments in Europe (EMCDDA, 2015). Some of these are encouraging. The number of new substances reported for the first time each year during 2016 and 2017 has fallen by around 40 % compared with 2015. Much of this is related to a decrease in the number of new synthetic cannabinoids and synthetic cathinones appearing each year. In part, this may reflect the results of sustained efforts to control new substances in Europe, including their open sale as 'legal highs' on the high street. Law enforcement operations in China leading to the closure of laboratories making these substances might be another reason.

Other developments are less encouraging. The analysis presented here suggests that the availability of many new substances remains relatively high and, in places, stronger links are developing with the established illicit drug market. It also appears that there is increasing interest from crime groups in making new substances, such as synthetic cathinones, in Europe. Another major challenge in the last few years has been the large number of highly potent new substances that have appeared on the market. These pose a high risk of life-threatening poisoning to users and are capable of causing explosive outbreaks that can overwhelm local healthcare systems. In some circumstances, law enforcement and laboratory personnel may be at risk of poisoning from occupational exposure. These substances are also easier to conceal and smuggle, with a few grams sufficient to make many thousands of doses for the drug market. Given the globalised nature of the market, these substances can pose a serious cross-border threat to health. Currently, two groups that particularly stand out in this respect are the new synthetic opioids (particularly the fentanils) and the synthetic cannabinoids.

During 2016-17 there was a large increase in the availability of new synthetic opioids in parts of Europe. While they appear to play a small role in the overall market, they are one of the fastest-growing groups monitored by the EMCDDA. These substances, most of which come from the highly potent fentanyl family, are of special concern to public health because they pose a high risk of life-threatening poisoning, as an overdose can quickly stop a person from breathing. This makes them especially dangerous to users, particularly as many will be unaware that they might be sold as heroin and other illicit opioids or even sold as falsified (fake) medicines. Here, we provide an overview of the current situation with new fentanils in Europe — which in 2016-17 were involved in more than 250 deaths — as well as reviewing the key findings of the risk assessments conducted by the EMCDDA on five of them during 2017.

While the number of new synthetic cannabinoids reported each year is falling, they continue to be the largest group of substances monitored by the EMCDDA. Seizures reported by law enforcement also indicate that they continue to be available across much of Europe. These substances are no longer just touted as 'legal' replacements to cannabis, but have developed a reputation as powerful and cheap intoxicants among vulnerable groups, such as the homeless and prisoners, who use them for their 'mind-numbing' effects. Over the last few years, there has been an increase in the number of deaths reported to the EMCDDA involving these substances. The reasons for the pronounced psychoactive effects and severe poisoning are

### Key methodological points

Seizures of new psychoactive substances in Europe that are reported by law enforcement agencies must be understood as minimum values, as data are drawn from case reports rather than monitoring systems. Reports are influenced by a range of factors such as increasing awareness of new substances, their changing legal status, law enforcement capacities and priorities, and the reporting practices of law enforcement agencies. For the purpose of this report, the term 'seizures' means any encounters of new psychoactive substances reported by law enforcement, including seizures, samples recovered from crime scenes, and shipments detained for inspection.

Some seizures contain more than one active ingredient, therefore more than one identification can be made from a single seizure.

There have been changes in the methodology used to analyse seizures of new psychoactive substances, some of which have occurred since previous report. This has led to the revision of a number of estimates from previous years; hence the figures presented here may differ from those in the previous report.

not particularly well understood, but the high potency of the substances and the unintentionally high doses that users are exposed to are important factors. Here we take a look at these factors in more detail, as well as reviewing the key findings of the risk assessments conducted by the EMCDDA on five of these cannabinoids during 2016 and 2017.

This report also highlights how the EMCDDA is responding to these challenges by helping strengthen preparedness and responses at national and EU levels. New EU legislation that was adopted in November 2017 will also significantly support this work. Finally, we reflect on the overall conclusion of this analysis, which suggests that, while sustained growth of the market may not be inevitable, new substances are driving greater complexity into the drug situation; we also ask what this may mean for Europe, and highlight the central role that early warning systems can play in responding to this complex public health problem.

## Overview of seizures, 2016-17

By the end of December 2017, the EMCDDA was monitoring more than 670 new substances that have appeared on Europe’s drug market over the past 20 years. This total includes 51 substances that were reported for the first time during 2017 (Figure 1), namely 13 opioids, 12 cathinones, 10 cannabinoids, 4 phenethylamines, 3 benzodiazepines, 2 tryptamines, 1 arylcyclohexylamine, 1 arylalkylamine, 1 piperidine/pyrrolidine and 4 substances that do not belong to these other groups. This was the second year in a row when the number of new substances reported for the first time has decreased, from a high of around 100 substances in 2014 and 2015 to around 50 to 60 substances per year (roughly one new substance every week). It also marked the first time when the new opioids were the single largest group of new substances to appear on the drug market in any one year — a position that has previously been dominated by the cannabinoids and cathinones. With 38 substances overall, 2017 saw the opioids become the fourth largest group of substances monitored, after synthetic cannabinoids (179 substances), cathinones (130) and phenethylamines (94) and not including the miscellaneous category ‘other substances’.

## Seizures reported by law enforcement during 2016

During 2016, more than 70 000 seizures of new substances, weighing 4.1 tonnes, were reported to the

Key figures	
↑	<b>670+</b> substances monitored overall
↓	<b>66</b> substances reported for the first time in 2016
≈	<b>70 769</b> seizures reported by law enforcement in 2016
↓	<b>4.1</b> tonnes seized by law enforcement in 2016
↓	<b>51</b> substances reported for the first time in 2017
↑	<b>38</b> new opioids monitored, of which <b>28</b> are highly potent fentanils
↑	<b>250</b> deaths linked to fentanils between 2016 and 2017

EMCDDA by law enforcement agencies from across Europe (Figure 2). While the number of seizures was similar to those reported in 2015, there was a drop of around 30 % in the quantities reported, mostly due to a dip in reports involving synthetic cannabinoids. Overall, seizures during 2016 were once again dominated by cannabinoids and cathinones, which, together, accounted for around 80 % of the total number and quantity of new substances reported during the year (Figure 2). Similarly to

FIGURE 1

**New psychoactive substances notified to the EU Early Warning System for the first time 2005-17: number per year (left) and total number per category (right)**

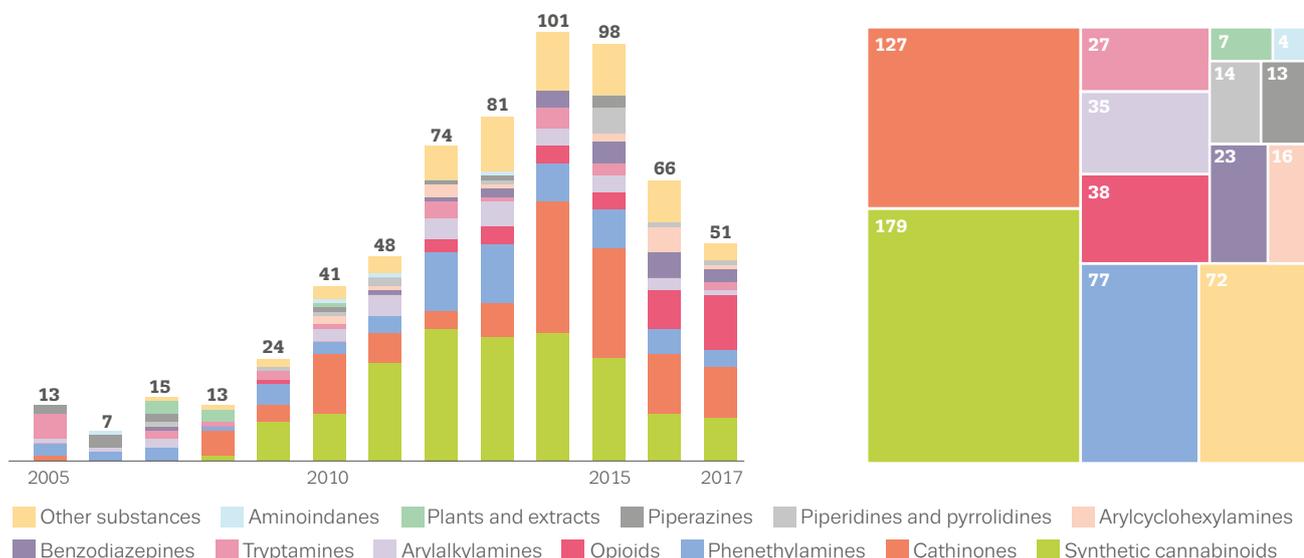
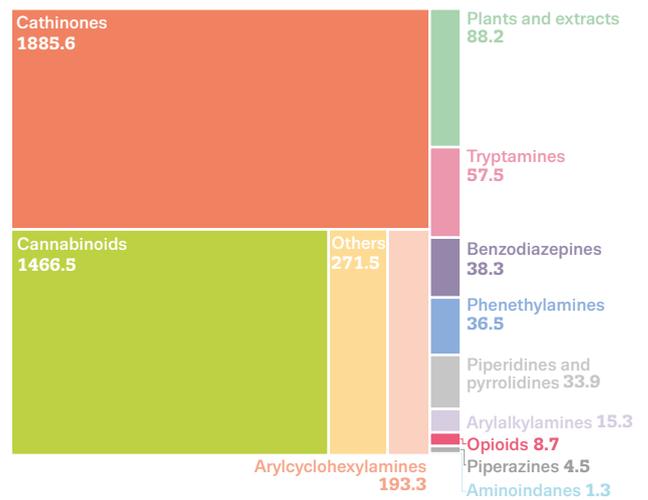
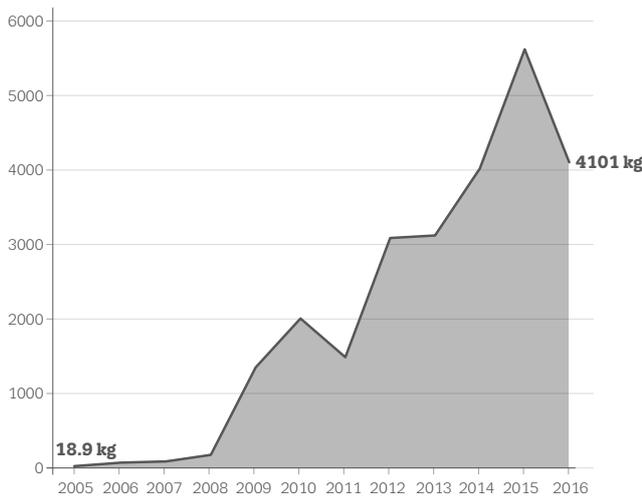
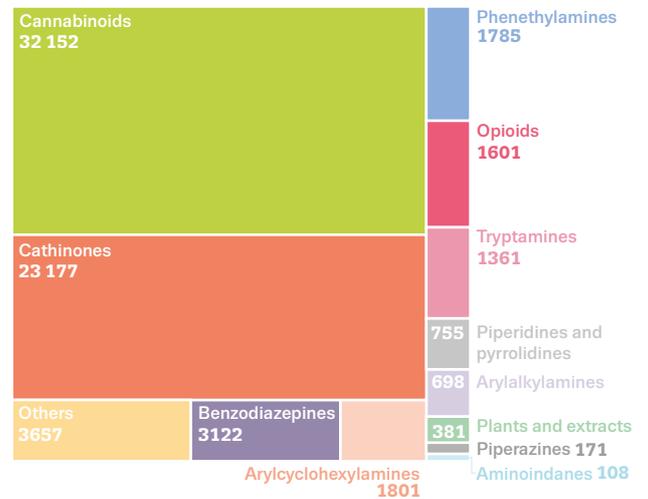
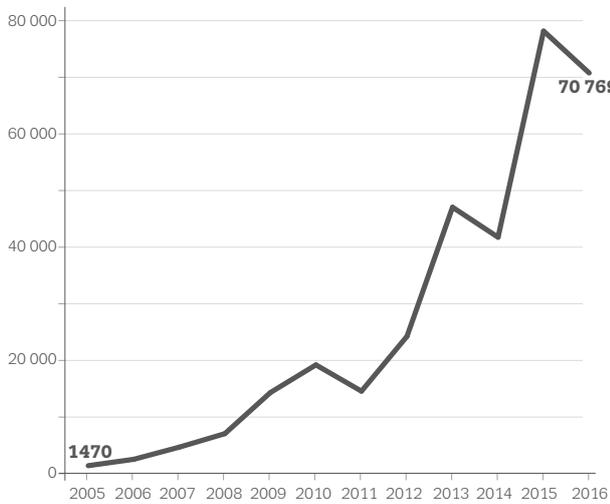


FIGURE 2

Number and quantity of seizures of new psychoactive substance reported to the EU Early Warning System: trends and distribution by category in 2016



Source: EU Early Warning System

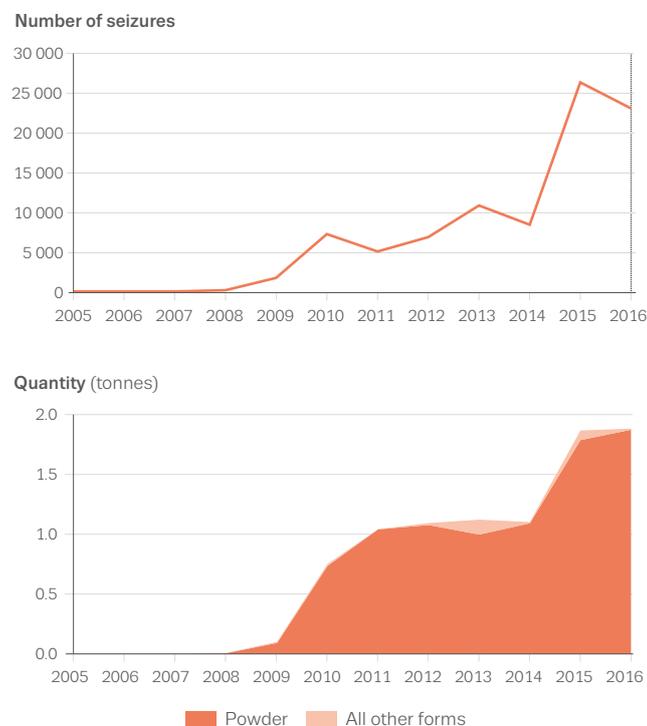
previous years, around half (approximately 360) of the new substances currently being monitored were detected in Europe during 2016. Among other problems, this increases the risk of them being sold either deliberately or accidentally as other drugs. Sometimes, such as when new fentanils are sold as heroin or as fake medicines, this can have fatal consequences.

The section below provides an overview of seizures reported for the synthetic cathinones, new benzodiazepines and some of the other groups of substances monitored by the EMCDDA. Data for the new opioids and synthetic cannabinoids are discussed in separate sections.

### Synthetic cathinones

Reflecting their use as legal replacements for cocaine, amphetamine and other controlled stimulants, there were more than 23 000 seizures of synthetic cathinones reported from across Europe in 2016 (Figure 3). These account for almost one-third of the total number of seizures of new substances over the year, and amounted to almost 1.9 tonnes, making synthetic cathinones the most commonly seized new psychoactive substances by quantity in 2016. The EMCDDA is currently monitoring 130 of these substances, including 14 that were reported for the first time in 2016 and 12 during 2017. Synthetic cathinones are generally found in powder form. The five

FIGURE 3

**Seizures of synthetic cathinones reported to the EU Early Warning System: trends in number of seizures and quantity detected, 2005-16**

most commonly seized cathinones in 2016 were alpha-PVP, 4-chloromethcathinone, 3-chloromethcathinone, 4-methyl-*N,N*-dimethylcathinone and 3-methylmethcathinone. The top five cathinones detected in powders were 4-chloromethcathinone (890 kg), 4-chloroethcathinone (247 kg), *N*-ethylhexedrone (186 kg), 3-methylmethcathinone (126 kg) and mexedrone (50 kg). In recent years, there have been indications of increasing interest in making synthetic cathinones in Europe, including seizures of precursors, equipment and illicit laboratories used to make mephedrone (which is now under international control), as well as 4-chloromethcathinone and 3-chloromethcathinone.

**New benzodiazepines**

Reflecting consumer demand, the market in new benzodiazepines appears to have grown over the past few years. The EMCDDA is currently monitoring 23 of these substances, including six that were reported for the first time in 2016 and three during 2017. While the overall number of seizures reported by law enforcement during 2016 decreased compared with 2015, the quantity reported increased. More than half a million tablets containing new benzodiazepines such as diclazepam, etizolam,

flubromazolam, flunitrazolam and fonazepam were reported during 2016 — which was about 70 % more than in 2015. Some of these new benzodiazepines were sold as tablets, capsules or powders under their own names. In other cases, they were used to make fake versions of commonly prescribed benzodiazepine medicines, such as diazepam and alprazolam, and sold directly on the illicit drug market.

**Other substances**

During 2016, there were increases in the quantities reported for some of the other groups of substances that are monitored by the EMCDDA, including arylcyclohexylamines, indolalkylamines, and piperidines and pyrrolidines.

**Synthetic opioids**

With a total of 38 different opioids reported, the number of synthetic opioids has grown rapidly in Europe since the first substance was reported in 2009. In fact, most of these substances have been reported for the first time during the past two years, with 9 reported in 2016 and 13 during 2017. Although they play a small overall role in Europe's drug market, many of the new opioids are highly potent substances that pose a risk of life-threatening poisoning because an overdose can cause respiratory depression (slowing down of breathing), which can lead to respiratory arrest (stopping breathing) and death. The public health importance of this risk is reflected in the fact that most deaths involving illicit opioid use are caused by respiratory depression (White and Irvine, 1999). Of particular concern are the new fentanils. These substances currently dominate this group, with a total of 28 reported since they first appeared in 2012.

Reflecting their small share of the market as well as their high potency, new opioids accounted for only around 2 % of the total number of seizures of new substances and about 0.2 % of the total quantity reported to the EU Early Warning System during 2016. New opioids are found mainly in powders but also in tablets and, since 2014, liquids. For the most part, seizures are dominated by fentanils. There were around 1 600 seizures of new opioids reported by law enforcement during 2016, of which 70 % were related to fentanils. These included 7.7 kg of powders (of which 60 % contained fentanils), approximately 23 000 tablets (of which 13 % contained fentanils) and 4.5 litres of liquids (of which fentanils accounted for 96 % of the total). Some of these liquids are from seizures made by police and customs of nasal sprays, which appear to be growing in popularity as a way of using these substances.

## Fentanils: background

During the 1960s, attempts to develop better and safer analgesic medicines led to the synthesis and testing of a series of new opioid narcotic analgesic drugs by the pharmaceutical company Janssen Pharmaceutica. Fentanyl was the first substance in this highly potent family to be synthesised and was followed by a series of related substances, which together are known as the fentanils (Janssen, 1982; Janssen and Van der Eycken, 1968). Since then, dozens more of these substances have been synthesised and tested by scientists. A small number — fentanyl, alfentanil, sufentanil and remifentanil — have become widely used in human medicine in anaesthesia and for pain management, while some are used in veterinary medicine in anaesthesia and for pain management, and, in the case of carfentanil and thiafentanil, to immobilise large animals. Some of the fentanils are also used to study how the body works, provide insights into disease and help develop new medicines (Ujváry et al., 2017).

Like other types of opioid analgesics, such as morphine and heroin, the fentanils produce their main effects by activating a receptor in the brain called the mu-opioid receptor (Cox, 2011; Pasternak and Pan, 2013; Ujváry et al., 2017). The effects include euphoria, relaxation, analgesia, sedation, slowing of the heart, hypothermia and respiratory depression (Cox, 2011; Dahan et al., 2001; Kieffer, 1999; Pattinson, 2008; Romberg et al., 2003). It is this last effect that poses the greatest danger to users, as, because of the high potency of these substances, small amounts can cause severe, life-threatening poisoning from respiratory depression. Left untreated, this can be fatal (Cox, 2011; Dahan et al., 2010; Pattinson, 2008; Somerville et al., 2017; White and Irvine, 1999). Fentanils also have an abuse liability and dependence potential. In recognition of their potential to cause these serious harms, 21 fentanils are controlled by the United Nations international drug control system <sup>(1)</sup>.

Timely administration of the antidote naloxone can rapidly reverse the severe respiratory depression caused by fentanils (Kim and Nelson, 2015). Of note is that recent experiences in the United States and Canada suggest that, compared with treating heroin overdoses, larger and

additional doses of naloxone have been required in some cases in order to reverse the respiratory depression (Faul et al., 2017; Klar et al., 2016; Somerville et al., 2017; Sutter et al., 2017). While this finding needs further study, it could be due to factors such as the high potency of the fentanils, the dose an individual is exposed to and the fact that the effects of these substances may last longer in the body than those of naloxone. Patients who have overdosed with fentanils may need longer periods of observation after initial treatment in case respiratory depression reoccurs.

Alongside their legitimate uses as medicines and in research, the fentanils also have a long history of illicit use as replacements for heroin and other controlled opioids. Between 1979 and 1988, more than 10 fentanils that had been made in illicit laboratories were detected on the drug market in the United States (Henderson, 1991). The first was alpha-methylfentanyl, followed by substances such as 3-methylfentanyl and 4-fluorofentanyl. Typically, they were sold as heroin or 'synthetic heroin'. Together, these substances were involved in more than 100 deaths, mostly in the state of California. Later, in the mid-2000s, illicitly manufactured fentanyl was sold as heroin or in mixtures with heroin, and was responsible for outbreaks of overdoses that involved hundreds of deaths in the eastern United States (Schumann et al., 2008). It appears that, with the exception of Estonia, where 3-methylfentanyl and fentanyl were responsible for an epidemic of fatal poisonings during this time, these substances caused limited problems elsewhere in Europe (Berens et al., 1996; de Boer et al., 2003; Fritschi and Klein, 1995; Kronstrand et al., 1997; Ojanperä et al., 2008; Poortman-van der Meer and Huizer, 1996).

Over the past few years, there has been a large increase in the availability of fentanils in the United States, Canada and Europe (Gladden et al., 2016; US CDC, 2015). This has been driven by the opioid epidemics in North America, interest in selling these substances in Europe and broader changes in the illicit drug market.

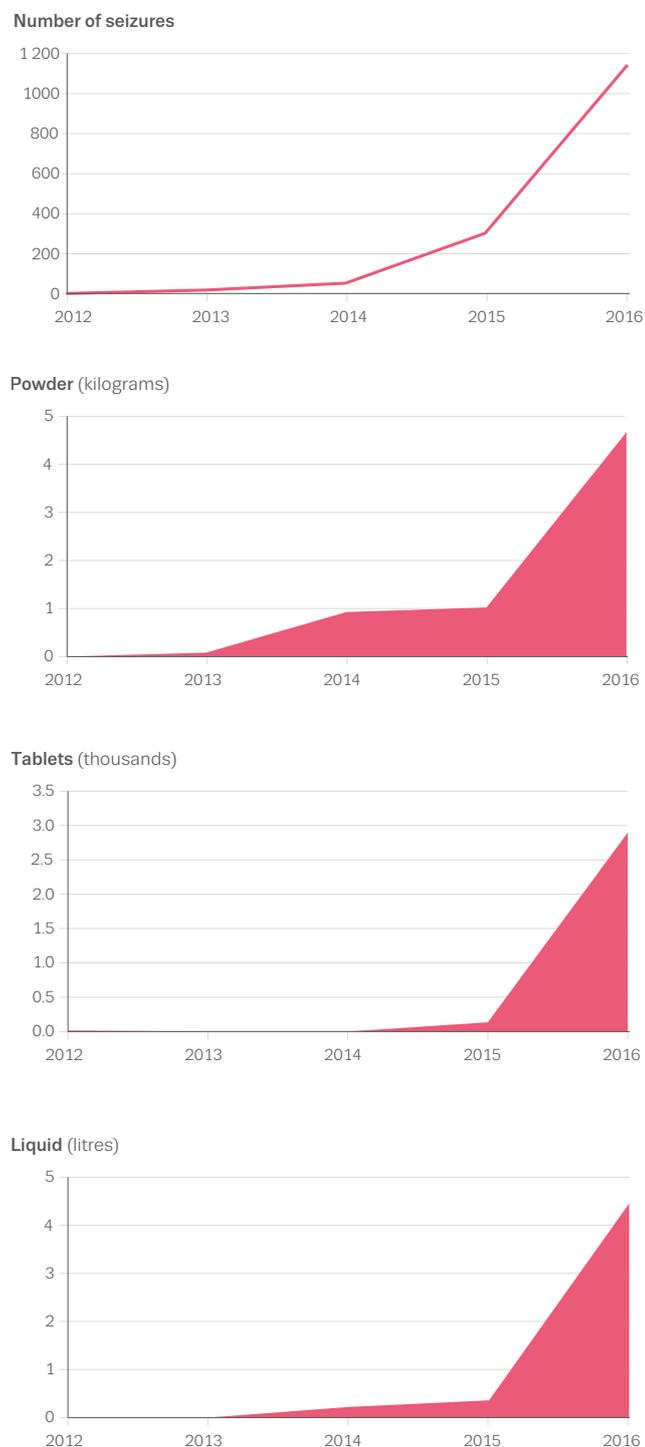
## Situation in Europe

Since 2012, a total of 28 new fentanils have been identified on Europe's drug market. This includes eight substances that were reported for the first time in 2016 and 10 during 2017. During this period, there has also been a large increase in seizures reported by customs at international borders and police at street-level (Figure 4) (see also 'Reducing the risk of occupational exposure to fentanils', page 11). While the picture differs widely across Europe, 23 countries have reported detections of

<sup>(1)</sup> A total of 21 fentanils are controlled under the United Nations Single Convention on Narcotic Drugs, 1961, as amended by the 1972 Protocol. These are 3-methylfentanyl, 3-methylthiofentanyl, acetyl-alpha-methylfentanyl, alpha-methylfentanyl, alpha-methylthiofentanyl, beta-hydroxy-3-methylfentanyl, beta-hydroxyfentanyl, para-fluorofentanyl, thiofentanyl, acetylfentanyl and carfentanil, which are controlled under Schedules I and IV; and alfentanil, fentanyl, sufentanil, remifentanil, butyrfentanyl, ocfentanil, furanylfentanyl, acryloylfentanyl, 4-fluoroisobutyrfentanyl and tetrahydrofuranylfental, controlled under Schedule I.

FIGURE 4

**Seizures of fentanils reported to the EU Early Warning System: trends in number of seizures and quantity detected, 2012-16**



one or more of these substances (Figure 5) <sup>(2)</sup>. Reports to the EMCDDA of fatal poisonings have also increased substantially from some countries (EMCDDA, 2016a; EMCDDA, 2017a,b,c,d,e,f,g; EMCDDA, 2018a,b).

It appears that most shipments of new fentanils coming into Europe originate from companies based in China. Production in illicit laboratories, including in Europe, has also been reported occasionally. Typically, production of fentanyl and other fentanils is relatively straightforward, which adds to the challenges in responding to these substances.

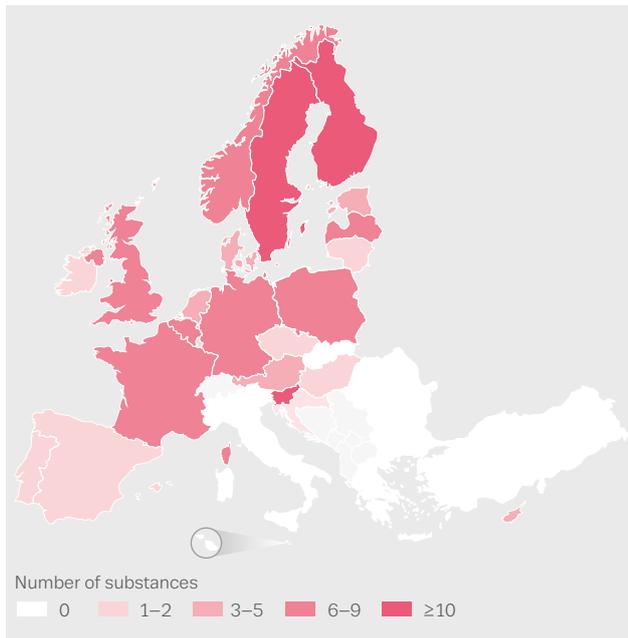
Like other new substances, one of the reasons behind the increase in these fentanils is that they are not controlled under the United Nations drug control conventions. This means that in many countries they can be manufactured and traded relatively freely and openly — a situation which has been exploited by entrepreneurs and crime groups using companies based in China to make the substances. The fentanils are typically shipped to Europe by express mail services and courier services. From here, they are then sold as ‘legal’ replacements for illicit opioids on the surface web and on the darknet. Unknown to users, they are also sold as heroin or mixed with heroin and other illicit opioids. Occasionally they have also been used to make fake medicines and, less commonly, sold as cocaine (see ‘Fentanils in fake medicines and cocaine’, page 12).

Fentanils have been found in a variety of physical and dosage forms in Europe. The most common form is powders, but they have also been detected in liquids and tablets. Depending on the circumstances, seizures of powders have ranged from milligram to kilogram quantities. They may be relatively pure, especially when seized coming into the European Union. They may also be mixed with one or more substances. In the latter case, these include commonly used cutting agents (such as mannitol, lactose and paracetamol), as well as heroin and other fentanils/opioids. To a much smaller degree, other drugs, such as cocaine and other stimulants, have also been detected in mixtures with fentanils in Europe. During 2016, more than 4.6 kg of powder containing fentanils was reported, while almost 4.5 litres of liquid and around 2 900 tablets were also reported. Less commonly, fentanils have also been found in blotters and plant material. In these cases, there may be no indication that they contain

<sup>(2)</sup> Austria, Belgium, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Ireland, Latvia, Lithuania, Luxembourg, the Netherlands, Poland, Portugal, Slovenia, Spain, Sweden, the United Kingdom and Norway have all reported one or more detections of new fentanils that have been formally notified as new psychoactive substances under the terms of Council Decision 2005/387/JHA.

FIGURE 5

Number of different fentanils detected by country reported to the EU Early Warning System, 2012-17



fentanils, which could pose a risk of poisoning to people who use them.

During 2016, the top five fentanils detected in powders reported by law enforcement were valeryl fentanyl (0.98 kg), ocfentanyl (0.70 kg), carfentanyl (0.57 kg), 4-fluoro-isobutyryl fentanyl (0.52 kg) and furanyl fentanyl (0.47 kg). The top five fentanils detected in liquids were acryloyl fentanyl (2.23 l), furanyl fentanyl (1.41 l), tetrahydrofuranyl fentanyl (0.50 l), 4-fluoro-isobutyryl fentanyl (0.21 l) and cyclopentyl fentanyl (0.06 l). The fentanils detected in tablets during 2016 were acryloyl fentanyl (1 451 tablets), 4-fluoro-isobutyryl fentanyl (1 155), acetyl fentanyl (150), cyclopentyl fentanyl (105) and furanyl fentanyl (45).

Fentanils are sold and used as 'legal' substitutes for illicit opioids and prescription opioid medicines; this may include for self-medication, such as treating pain and/or opioid withdrawal. In addition, they are also sold as or in mixtures with heroin and other illicit opioids. Information from law enforcement and death investigations in Europe have found that fentanils are used by vulnerable and marginalised opioid users, including those who inject heroin and other illicit opioids. In many cases, these individuals will not be aware that they are using them. This can place them at greater risk of life-threatening overdose. Other groups who may use fentanils include those who are experimenting with the substance (such as psychonauts).

### Reducing the risk of occupational exposure to fentanils

Given the increase in availability of fentanils in Europe, the issue has been raised that first responders, law enforcement and laboratory personnel may encounter them as part of their work. Law enforcement officers could encounter fentanils in a range of operational settings. These could include consignments in transit, for example vehicles (such as aircraft and courier vans), ports of entry (which may include courier and mail centres), illicit laboratories, storage/processing/distribution facilities (such as sites where vendors re-package into smaller quantities for onward sale), tableting and nasal spray/e-liquid production facilities, sites used to mix fentanils with heroin/illicit opioids, and at street level. Fentanils may also be encountered during the transport, processing, forensic investigation, storage and disposal of seized materials. As a result, there could be a potential risk to personnel from occupational exposure, which may need to be risk assessed. With appropriate measures — protocols and procedures, equipment and training — fentanils can be handled safely. For further information on this issue, including assessing and responding to such scenarios, agencies may wish to refer to 'Recommendations on selection and use of personal protective equipment and decontamination products for first responders against exposure hazards to synthetic opioids, including fentanyl and fentanyl analogues', published by the United States InterAgency Board for Equipment Standardization and Interoperability (2017), as well as 'Fentanyl safety recommendations for first responders', published by the White House National Security Council (2017).

While fentanils are often injected, their high potency and ease of use mean that nasal sprays containing diluted solutions have become an increasingly common way of using these substances in some parts of Europe in recent years. Unlabelled nasal sprays containing acryloyl fentanyl, offered for sale online, were detected in Sweden in 2016 (Figure 6). This substance was involved in 47 deaths in Europe during 2016. E-liquids containing fentanils that can be vaped using electronic cigarettes have also been reported. Compared with injecting, these make it easier for people to use fentanils while still giving them a similar

## Fentanils in fake medicines and cocaine

Recently, there has been a large increase in the number of seizures by police in the United States and Canada of fake medicines containing fentanils. These fakes are sold directly on the illicit drug market as commonly used opioid analgesics (pain killers) and benzodiazepines. At the same time, there has also been an increase in reports of fentanils being mixed with or sold as cocaine. As users are unaware of this, it can increase the risk of life-threatening overdose. A number of mass poisonings have been reported in North America due to this type of adulteration (Arens et al., 2016; Klar et al., 2016; Sutter et al., 2017; Tomassoni et al., 2017). Those at particularly high risk include users who may not have any tolerance to opioids, such as cocaine users. While similar reports have been comparatively rare so far in Europe, a number

of seizures have been reported since 2016. This includes recent seizures by police in Sweden of fake Xanax benzodiazepine tablets that contained cyclopropylfentanyl, a substance that was involved in more than 80 deaths in Europe during 2017.

Fake Xanax tablets



Copyright: Swedish Police.

FIGURE 6

**Unlabelled nasal sprays containing acryloylfentanyl that were sold online in Sweden in 2016**



Source: Image kindly provided by Prof Anders Helander, Department of Laboratory Medicine, Karolinska Institutet, Stockholm, Sweden. Copyright: Anders Helander.

psychoactive effect. Their use may also pose a high risk of accidental overdose. Nasal sprays and e-liquids could make using fentanils more attractive and socially acceptable, helping them spread more widely.

Since late 2015, the EMCDDA has conducted eight joint investigations with Europol on fentanils that have caused serious concern at European level. The two agencies investigated acetylfentanyl in 2015, acryloylfentanyl and furanylfentanyl in 2016, and 4-fluoroisobutyrylfentanyl (4F-iBF), tetrahydrofuranylfentanyl (THF-F), carfentanil (see 'Carfentanil in Europe', page 16), methoxyacetylfentanyl and cyclopropylfentanyl during 2017. Together, these substances have been involved in more than 250 deaths, many of which were attributed directly to these substances. Five of these substances were formally risk assessed by the EMCDDA during 2017 (Table 1), and methoxyacetylfentanyl and cyclopropylfentanyl were assessed early in 2018. So far, acryloylfentanyl and furanylfentanyl have been subject to control measures at EU level because of the risks they pose to Europe.

## Synthetic cannabinoids

### Background

Synthetic cannabinoids, also known as synthetic cannabinoid receptor agonists, are a group of drugs that mimic the effects of a substance found in cannabis called tetrahydrocannabinol (THC). THC is responsible for many

of the psychoactive effects of cannabis which give that feeling of being ‘stoned’ or ‘high’ (Gaoni and Mechoulam, 1964; Huestis et al., 2001; Pertwee, 2005a; Pertwee, 2014). These effects are caused by activating a receptor in the brain called the cannabinoid receptor type 1 (CB<sub>1</sub> receptor) (Huestis et al., 2001; Pertwee, 2014). The receptor is part of a signalling system in the body called the endocannabinoid system, which helps regulate, among other things, behaviour, mood, pain, appetite, sleep and the immune system (Pertwee, 2015).

Similar to the fentanils, the synthetic cannabinoids were originally developed by scientists to study the body, provide insights into disease and help develop new medicines (Pertwee, 2005b; Reggio, 2009). Around the mid-2000s, they began to appear in Europe in products

called ‘Spice’ that were sold as ‘legal’ replacements to cannabis. In these products, powders containing synthetic cannabinoids were mixed with plant material which could then be smoked as cigarettes (‘joints’) (Auwärter et al., 2009; EMCDDA, 2009; Jack, 2009). Since then, 179 cannabinoids have been identified on the drug market in hundreds of different products (Figure 7). The products are commonly referred to as ‘herbal smoking mixtures’, ‘Spice’, ‘K2’, ‘synthetic cannabis’ and ‘synthetic marijuana’. Most of the synthetic cannabinoid powders are made in China, with the final products made in Europe.

Because synthetic cannabinoids work in a similar way to THC, many of their effects are similar to those of cannabis (Auwärter et al., 2009). Most prominently, they are able to create the feeling of being ‘stoned’. This includes

TABLE 1

Key findings of the risk assessments of acryloylfentanyl, furanylfentanyl, 4-fluoroisobutyrylfentanyl (4F-iBF), tetrahydrofurfanylfentanyl (THF-F) and carfentanil conducted by the EMCDDA

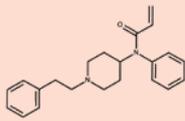
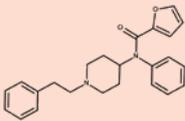
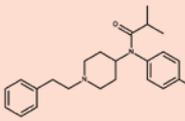
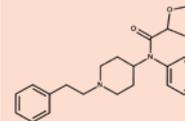
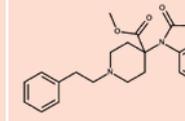
Common name	Acryloylfentanyl	Furanylfentanyl	4F-iBF	THF-F	Carfentanil
Chemical name	<i>N</i> -(1-Phenethylpiperidin-4-yl)- <i>N</i> -phenylacrylamide	<i>N</i> -Phenyl- <i>N</i> -[1-(2-phenylethyl)piperidin-4-yl]furan-2-carboxamide	<i>N</i> -(4-Fluorophenyl)- <i>N</i> -(1-phenethylpiperidin-4-yl)isobutyramide	<i>N</i> -Phenyl- <i>N</i> -[1-(2-phenylethyl)piperidin-4-yl]oxolane-2-carboxamide	Methyl 1-(2-phenylethyl)-4-[phenyl(propanoyl)amino]piperidine-4-carboxylate
Chemical structure					
Category	Synthetic opioid	Synthetic opioid	Synthetic opioid	Synthetic opioid	Synthetic opioid
Pharmacology	μ-opioid receptor agonist	μ-opioid receptor agonist	μ-opioid receptor agonist	μ-opioid receptor agonist	μ-opioid receptor agonist
Formal notification to the EU Early Warning System	7 July 2016	3 November 2015	26 August 2016	23 December 2016	12 February 2013
Number of deaths	47	23	20	14	61
Number of countries where associated deaths occurred	3	6	2	1	8
Number of seizures by law enforcement	162	143	24	53	801
Number of countries where it has been seized	5	14	4	1	7
Total quantity seized	113 g powder 1 495 ml liquid 896 tablets	1 036 g powder 6 g plant material 1 559 ml liquid 45 tablets	379 g powder 208 ml liquid 6 727 tablets	99 g powder 950 ml liquid	3.3 kg powder

FIGURE 7

Products containing CUMYL-PeGACLONE, a synthetic cannabinoid, seized in Germany in 2016



Source: Image kindly provided by Dr Jan Schäper, Bayerisches Landeskriminalamt, Munich, Germany. Copyright: Jan Schäper.

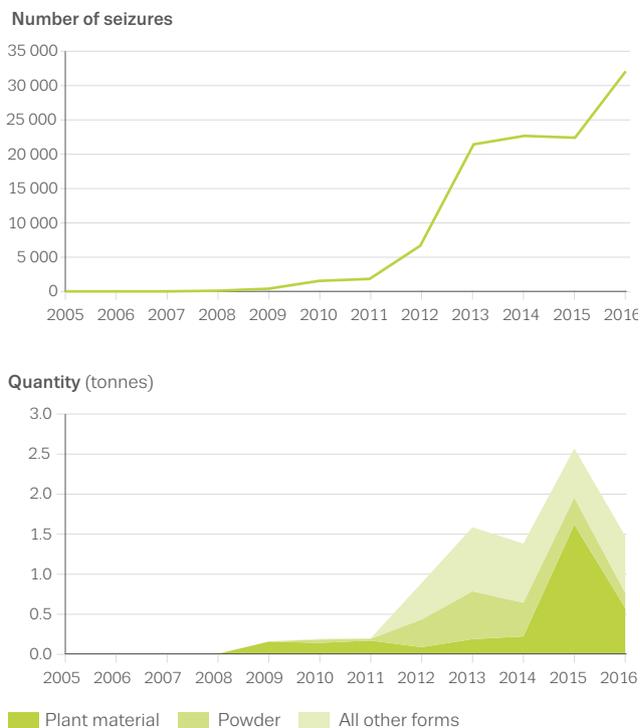
relaxation, euphoria, lethargy, depersonalisation, distorted perception of time, impaired motor performance, hallucinations, paranoia, confusion, fear, anxiety, dry mouth, bloodshot eyes, tachycardia (an abnormally fast heart rate), nausea and vomiting. In some cases, these effects appear to be much more pronounced and severe than those produced by cannabis (Ford et al., 2017; Zaurova et al., 2016).

## Situation in Europe

Synthetic cannabinoids are the largest group of substances that are monitored by the EU Early Warning System. In 2016-17, there was a marked decrease in the number of new cannabinoids reported for the first time. Despite this, the cannabinoids were the most frequently seized new psychoactive substances in 2016, with just over 32 000 reports (Figure 8). This is an increase of almost 10 000 on the previous year and accounts for nearly half the total number of seizures of new psychoactive substances reported in 2016. Almost 1.5 tonnes of the substances were reported during 2016. Of this, almost 40 % was in the form of plant material (smoking mixtures), with powders accounting for almost another 13 %. Seizures in Europe of synthetic cannabinoids in powder form together with other raw ingredients, and of processing facilities, demonstrate that smoking mixtures are made in Europe. When made into 'smoking mixtures', the amount of powder that was reported in 2016 could have been used to make many

FIGURE 8

Seizures of synthetic cannabinoids reported to the EU Early Warning System: trends in number of seizures and quantity seized, 2005-16



millions of doses. Of note is that there has been a marked drop in the amount of seizures reported by law enforcement of synthetic cannabinoids in powder form, from a high of almost 600 kg in 2013 to around 190 kg in 2016 (Figure 8). The reasons for this 70 % drop are unclear, but it might signal a decrease in the production of smoking mixtures in Europe in the past few years as laws have been tightened.

The five most commonly seized synthetic cannabinoids reported by law enforcement in 2016 were MDMB-CHMICA, AB-CHMINACA, UR-144, 5F-AKB48 and AMB-FUBINACA. The top five cannabinoids seized in plant material (smoking mixtures) were AB-FUBINACA (361 kg), 5F-AMB-PINACA (116 kg), AMB-FUBINACA (20 kg), 5F-MDMB-PINACA (15 kg) and AB-CHMINACA (13 kg), while the top five cannabinoids seized in powders were 5F-NAPICA (AM-6527 5-fluoropentyl derivative) (54 kg), CUMYL-4CN-BINACA (50 kg), AMB-FUBINACA (27 kg), 5F-MDMB-PINACA (15 kg) and AB-FUBINACA (7 kg).

Data reported to the EMCDDA through the EU Early Warning System as well as other sources suggest that severe and fatal poisoning is much more common with synthetic cannabinoids than with cannabis (EMCDDA, 2016c; EMCDDA, 2017h,i,j,k,l; Tait et al., 2016; Winstock

and Barratt, 2013; Zaurova et al., 2016). The reasons for the more pronounced psychoactive effects and severe and fatal poisoning seen with synthetic cannabinoids are not particularly well understood, but at least two factors are likely to be important: the high potency of the substances and the unintentionally high doses that users are exposed to.

Firstly, studies have found that many of the cannabinoids sold on the drug market are much more potent than THC (behaving as so-called ‘full agonists’). This means that even at very small doses they can activate the CB<sub>1</sub> receptor much more strongly than THC (Banister et al., 2016; Ford et al., 2017; Longworth et al., 2017a,b; Reggio, 2009; Tai and Fantegrossi, 2017). It is worth noting that little is known about the effects of synthetic cannabinoids on other signalling systems in the body, which may also explain some of the effects of these substances.

Secondly, the process for mixing the synthetic cannabinoids with the plant material to make smoking mixtures (which are the most common way of using these substances) can lead to dangerous amounts of the substances in the products. This is because producers have to guess the amount of cannabinoids to add, while the mixing process makes it difficult to dilute the cannabinoids sufficiently and distribute them consistently throughout the plant material. This can result both in products that contain toxic amounts of the substances in general, as well as in products where the cannabinoids are clumped together, forming highly concentrated pockets among the plant material (Figure 9) (Ernst et al., 2017; Frinulescu et al., 2017; Langer et al., 2014, 2016; Moosmann et al., 2015; Schäper, 2016). These issues are made worse because the products are smoked (or vaped), allowing the substances to be rapidly absorbed into the bloodstream and to reach the brain, where they cause many of their effects.

The combination of these two factors makes it difficult for users to control the dose that they are exposed to. This can lead them to unintentionally administer a toxic dose (see ‘Other risks related to synthetic cannabinoids and smoking mixtures’, page 18). Accounts from patients and people who witness poisonings suggest that in some cases a small number of puffs from a joint have been sufficient to cause severe and fatal poisoning.

These factors are also responsible for outbreaks of mass poisonings caused by smoking mixtures. These have ranged in size from a handful of victims to over 800 people, some of whom have died. Such outbreaks can also rapidly overwhelm the capacity of emergency responders and other parts of local healthcare systems (such as hospital

FIGURE 9

**Uneven distribution of cannabinoid in a herbal mixture seized by German police in 2014**



Note: This product contained MDMB-CHMICA, a synthetic cannabinoid that was linked to more than 28 deaths in Europe between 2014 and 2016. Large white lumps of MDMB-CHMICA can be seen at the bottom left of the image. Given the high potency of MDMB-CHMICA, such large amounts pose a risk of severe and even fatal poisoning to users.

Source: Originally published by Schäper (2016, p. 112).

Image kindly provided by Dr Jan Schäper, Bayerisches Landeskriminalamt, Munich, Germany. Copyright: Jan Schäper.

emergency departments). Many of the outbreaks that have been reported so far are from the United States, but they have also occurred in Russia and Europe (Adams et al., 2017; Kasper et al., 2015; Schwartz et al., 2015; Shevyrin et al., 2015; Springer et al., 2016; Trecki et al., 2015; Tyndall et al., 2015).

While the poisoning caused by synthetic cannabinoids can be similar to that caused by cannabis, severe effects are also commonly reported. These include serious cardiovascular toxicity (including sudden death), rapid loss of consciousness/coma, respiratory depression, seizures and convulsions, hyperemesis, delirium, agitation, psychosis, and aggressive and violent behaviour (Adams et al., 2017; Bäckberg et al., 2017; Hill et al., 2016; Kasper et al., 2015; Schwartz et al., 2015; Shevyrin et al., 2015; Springer et al., 2016; Trecki et al., 2015; Tyndall et al., 2015; Waugh et al., 2016).

In addition, the effects of poisoning — particularly loss of consciousness, respiratory depression and behavioural effects — may place users at additional risk. This includes choking on/inhaling vomit, drowning, falling, hypothermia as a result of falling unconscious outside in cold weather, and self-inflicted violence/injury (Tait et al., 2016; Yeter,

## Carfentanil in Europe

Carfentanil is one of the most potent fentanils developed by scientists (Janssen, 1982). It is used in research and, in some countries, as a veterinary medicine to immobilise large animals. The substance was first detected in Europe in December 2012 in a seizure made by police in Latvia. Until 2016, detections were limited to Latvia, Lithuania and Estonia. During 2017, there was a spike in reports of these substances from law enforcement as well from death investigations in parts of Europe. This led to a joint investigation by the EMCDDA and Europol in May 2017 and risk assessment later in the year. These found that during 2017 there had been a rapid increase in the availability of carfentanil in Europe. Overall, seizures were reported in seven countries. This increase was thought to be linked to supply by companies based in China, with sales of wholesale and consumer amounts on the surface web and the darknet helping the substance to spread.

Law enforcement agencies have reported more than 800 seizures of carfentanil to the EMCDDA since January 2013, with around 25 % of these seizures occurring in the first four months of 2017. Overall, in almost 50 % of these cases, carfentanil was detected in mixtures with heroin and/or another opioid. In at least three countries, carfentanil was in the heroin/illicit

opioid supply chain. In one case, more than 400 g of carfentanil was seized by police, which would probably have been sufficient to produce millions of doses for the drug market. Between November 2016 and April 2017, carfentanil was involved in at least 61 deaths in eight countries. In many cases, those who died were people who used heroin.

Carfentanil seized in Norway



Note: Foil packet containing a ziplock bag labelled 'C.50' that contained carfentanil as a white powder. It was bought on a darknet market and recovered from a scene of death in Norway in 2017. Image kindly provided by Norwegian National Criminal Investigation Service (Kripes). Copyright: Norwegian National Criminal Investigation Service (Kripes).

2017). The aggressive and violent behaviours reported with synthetic cannabinoids may also place others at risk of injury. Driving while under the influence of synthetic cannabinoids places users and others at risk of injury (Capron, 2016; Kaneko, 2017; Karinen et al., 2015; Musshoff et al., 2014).

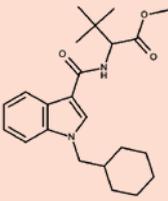
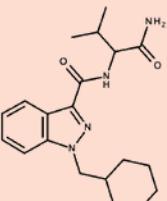
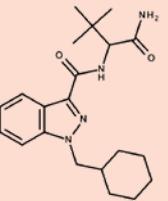
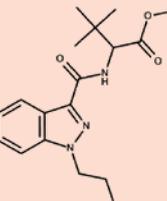
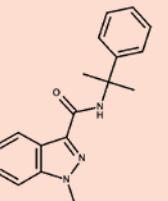
People who use synthetic cannabinoids include recreational users (including cannabis users), high-risk drug users and groups who experiment with the substances (such as psychonauts). This may also include individuals who are subject to drug testing (such as people in drug treatment, prisoners and drivers) because some drug tests/screens cannot detect some of the cannabinoids; this may be especially the case with those substances that are relatively new to the drug market. Of particular concern is that synthetic cannabinoids are increasingly used by vulnerable groups, such as the homeless and prisoners, in some areas. In at least some

cases, these users are specifically seeking out these substances because they have a reputation for causing profound intoxication at relatively low cost. Reports suggest that this has exacerbated existing health and social problems as well as creating new ones for these groups. For example, in prisons, alongside the adverse health effects, the market in synthetic cannabinoids has been linked to an increase in aggression, violence, bullying and debt. In some cases, this has caused a serious threat to the overall safety and security of the prison environment (Blackman and Bradley, 2017; HMIP, 2015; Ralphs et al., 2017; User Voice, 2016).

Since 2016, the EMCDDA has conducted five joint investigations with Europol on synthetic cannabinoids that have caused serious concern at European level. The two agencies investigated MDMB-CHMICA in 2016, and AB-CHMINACA, ADB-CHMINACA, 5F-MDMB-PINACA and CUMYL-4CN-BINACA during 2017. Together, these

TABLE 2

Key findings of the risk assessments of MDMB-CHMICA, AB-CHMINACA, ADB-CHMINACA, 5F-MDMB-PINACA and CUMYL-4CN-BINACA conducted by the EMCDDA

Common name	MDMB-CHMICA	AB-CHMINACA	ADB-CHMINACA	5F-MDMB-PINACA	CUMYL-4CN-BINACA
Chemical name	Methyl 2-[[1-(cyclohexylmethyl)-1 <i>H</i> -indole-3-carbonyl]amino]-3,3-dimethylbutanoate	<i>N</i> -(1-Amino-3-methyl-1-oxobutan-2-yl)-1-(cyclohexylmethyl)-1 <i>H</i> -indazole-3-carboxamide	<i>N</i> -(1-Amino-3,3-dimethyl-1-oxobutan-2-yl)-1-(cyclohexylmethyl)-1 <i>H</i> -indazole-3-carboxamide	Methyl 2-[[1-(5-fluoropentyl)-1 <i>H</i> -indazole-3-carbonyl]amino]-3,3-dimethylbutanoate	1-(4-Cyano-butyl)- <i>N</i> -(2-phenylpropan-2-yl)-1 <i>H</i> -indazole-3-carboxamide
Chemical structure					
Category	Synthetic cannabinoid	Synthetic cannabinoid	Synthetic cannabinoid	Synthetic cannabinoid	Synthetic cannabinoid
Pharmacology	Full agonist at the CB <sub>1</sub> receptor; agonist at the CB <sub>2</sub> receptor	Full agonist at the CB <sub>1</sub> receptor; partial agonist at the CB <sub>2</sub> receptor	Full agonist at the CB <sub>1</sub> receptor; agonist at the CB <sub>2</sub> receptor	Full agonist at the CB <sub>1</sub> and CB <sub>2</sub> receptors	Full agonist at the CB <sub>1</sub> and CB <sub>2</sub> receptors
Formal notification to the EU Early Warning System	12 September 2014	10 April 2014	24 September 2014	8 January 2015	4 March 2016
Number of deaths	29	31	13	28	11
Number of countries where associated deaths occurred	6	6	3	2	2
Number of seizures by law enforcement	>3 600	6 422	3 794	1 986	2 461
Number of countries where it has been seized	25	26	19	27	12
Total quantity seized	67 kg plant material 46 kg powder	190 kg plant material 44 kg powder 293 ml liquid 194 g blotters	139 kg plant material 10 kg powder 25.5 g blotters	100 kg plant material 13 kg powder 309 g and 94 ml liquid blotters	261 kg plant material 52 kg powder blotters

substances have been involved in more than 100 deaths, many of which were attributed directly to these substances. All five of these substances were formally risk assessed by the EMCDDA during either 2016 or 2017 (Table 2). So far, MDMB-CHMICA has been subject to

control measures at EU level because of the risks it poses to Europe.

## New challenges, new responses

### Strengthening early warning and response

The rapidly changing nature of the market in new substances, its growing links with the established illicit market and the large total number of substances that need to be monitored present challenges for early warning activities. In response to this, the EMCDDA has undertaken a rolling programme of work to strengthen early warning and response activities in order to better protect public health. This includes developing a range of interconnected systems as part of the EU Early Warning System — including a toxicovigilance system, signal management system, open source information monitoring system and risk communication system — that allows it to better identify, understand, prioritise and respond to public health threats. The foundation of the system continues to be the chemical identification of new substances in seizures made by law enforcement and in poisoning cases. In addition, the EMCDDA has also conducted an increasing number of risk assessments on substances causing particular concern to the European Union.

The toxicovigilance system allows the EMCDDA to identify, manage, understand and, through other components of the EU Early Warning System and risk assessment process, react to serious adverse events associated with new substances. Much of the initial work has focused on strengthening the detection, reporting and assessment of such events reported by the countries which are part of the EU Early Warning System, as well as those events identified by the EMCDDA from the scientific and medical literature and other open sources. The signal management system provides a framework for identifying, understanding and prioritising threats related to new substances.

It is clear from recent developments that the early identification and response to emerging threats can be strengthened by proactive data collection systems working alongside existing reporting systems. As a result, the EMCDDA is working to improve the ability of the EU Early Warning System to detect signals of public health relevance from open source information by developing a monitoring system that can provide new data on areas such as the online drug markets, epidemiology and reports of serious adverse events. The EMCDDA has also looked at ways to improve risk communication related to threats and other important signals identified through its early warning and risk assessment activities. This work is intended to support the work of the EU Early Warning System's network, including strengthening national preparedness.

### Other risks related to synthetic cannabinoids and smoking mixtures

Unknown to users, synthetic cannabinoids have also been sold as ecstasy/MDMA and other illicit drugs. In some cases, this has led to severe poisoning (Allibe et al., 2016; Brenneman et al., 2016; Pap, 2016).

Potent opioids have also been identified in smoking mixtures sold in Europe, which users will often be unaware of. These include O-desmethyltramadol, U-47,700 and furanylfentanyl (Coopman and Cordonnier, 2017; Dresen et al., 2010; EMCDDA, 2017c). Using these types of products could cause life-threatening poisoning. This risk will be especially high in people with no tolerance to opioids.

At EU level, the legal framework for responding to public health and social threats caused by new psychoactive substances, which dated from 2005, has been revised, with the aim of establishing a swifter, more effective system. The new legislation retains the three-step approach of early warning, risk assessment and control measures, while strengthening existing processes by streamlining and accelerating data collection and assessment procedures, and introducing shorter deadlines (European Parliament and Council, 2017a,b).

The EMCDDA has also further strengthened its cooperation with United Nations agencies. In particular, over the past few years the EMCDDA has provided data, analysis and expertise to the World Health Organization (WHO) and United Nations Office on Drugs and Crime (UNODC) in order to inform the global response to this issue and ultimately help protect public health. Reflecting current concerns, one focus of this work has been on new synthetic opioids, and particularly the fentanils.

## Discussion and conclusion

Over the last decade, there has been a large increase in new psychoactive substances in Europe. As a result, there have also been large increases in seizures reported by law enforcement as well as severe poisonings, deaths and other types of harms. As the range of substances and products has grown, groups of consumers have also diversified. There are also growing interactions between the market in new substances and illicit drugs, as new

substances are increasingly sold directly on the illicit drug market under their own names or passed off as illicit drugs to unsuspecting users. This includes feeding the illicit market when established drugs are in short supply.

A particular challenge here is the new opioids, especially the highly potent fentanils, which may enter the heroin/illicit opioid supply chain.

A number of positive developments have been reported in the past few years, such as a drop in the number of new substances identified for the first time in 2016 and 2017. As noted, in part, this may reflect the results of sustained efforts to control new substances in Europe, including their open sale as 'legal highs' on the high street, which will have a knock-on effect on the demand from retailers. While analysis of this issue is limited, it has been suggested that these approaches may have led producers and retailers in Europe to drop out of the market. Like most phenomena, part of the market is likely to have been driven by fads, with enthusiasm waning over time. It is possible that some individuals became involved in the market only because products were widely available and they saw an opportunity to make money quickly and easily. These suggestions are certainly worth further study in order to better understand the effects of regulation and how markets respond. Similarly, changes in the established illicit market can also have an impact on demand for some new substances. Has the recent rebound in the MDMA market in Europe affected demand for new cathinones and phenethylamines (EMCDDA, 2016b)?

Despite these gains, new challenges have also emerged. The recent large increase in new opioids detected in Europe — particularly the 28 fentanils since 2012 — is a major concern because of the severe risk of fatal poisoning that they pose. Adding to this problem are the two additional fentanils that have been reported as of February 2018.

More broadly, the general trend towards highly potent substances is worrying, not only because they pose a greater risk of severe poisoning, but also because they are easier to conceal and smuggle. A few grams are often sufficient to make many thousands of doses for the drug market, and can be easily concealed in a small package. This can make it harder for customs and border forces to detect and intercept them at borders. As the volume of express mail continues to increase, without new approaches, the detection of such packages may become increasingly difficult. Given the globalised nature of the market, these types of substances can present a serious cross-border threat to health. As highlighted in this report, the synthetic opioids and synthetic cannabinoids are two groups that already particularly stand out in this respect. While the explosive outbreaks reported in the United

States and Canada caused by these substances has been limited in Europe so far, there is little room for complacency. Recently, clusters and outbreaks of overdoses involving the fentanils have increased in some parts of Europe. However, little is certain in this complex market. Reflecting its globalised nature, it is unclear what the impact will be on the availability of fentanils in Europe as a result of the recent generic control measures introduced for this family of substances in the United States during February 2018 (United States Department of Justice, 2018).

While growth of the market at a similar pace to that seen since 2008 is not inevitable, the examples provided in this report highlight that the continued availability of new psychoactive substances is introducing greater complexity into the drug situation. They also serve to underline the importance of continued investment in strong early warning systems at both national and EU levels, as well as a more rapid risk assessment process at EU level in order to protect the health and security of people living in Europe. The new European Union legislative framework on new psychoactive substances will play a central role in helping achieve these aims.

## Acknowledgements

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## **About this report**

In this update from the EU Early Warning System, the EMCDDA aims to provide insights into what is happening with new psychoactive substances in Europe, based on data from the agency's early warning and risk-assessment activities. This report covers the period from January 2016 until December 2017.

## **About the EMCDDA**

The European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) is the central source and confirmed authority on drug-related issues in Europe. For over 20 years, it has been collecting, analysing and disseminating scientifically sound information on drugs and drug addiction and their consequences, providing its audiences with an evidence-based picture of the drug phenomenon at European level.

The EMCDDA's publications are a prime source of information for a wide range of audiences including: policymakers and their advisors; professionals and researchers working in the drugs field; and, more broadly, the media and general public. Based in Lisbon, the EMCDDA is one of the decentralised agencies of the European Union.

