NHS National Services Scotland

The National Drug-Related Deaths Database (Scotland) Report

Analysis of Deaths occurring in 2015 and 2016

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Executive Summary

The National Drug-Related Deaths Database (NDRDD) was established to collect detailed information regarding the nature and circumstances of people who had a Drug-Related Death (DRD) in Scotland. This is the seventh report and covers the calendar years 2015 and 2016 with trend data from 2009. This report analyses subsets of DRDs in Scotland on which National Statistics have already been published by National Records of Scotland (NRS) [1,2]. The NDRDD reports [3-8] analyse these deaths in further detail to help provide insights into the lives of those who died and highlight potential areas for intervention.

The commentary mainly focuses on deaths in 2016, along with important findings from 2015 and discussion of trends since 2009. **Section 3** focuses on unintentional and undetermined deaths (i.e. non-suicides) involving controlled substances that occurred in Scotland. These were largely a subset of the DRDs reported by NRS. **Section 4** reports on deaths from suicide involving controlled drugs (also a subset of the DRDs reported by NRS). Information on methods and definitions is included in **Section 2** and in the appendices.

Main points:

Demographic Profile

- In 2016, most DRDs continued to be among men (71%), although the percentage of female deaths increased from 2009 (21%) to 2016 (29%).
- The mean age of people who had a DRD increased from 34.9 years in 2009 to 41.0 years in 2016, reflecting the known ageing profile of people with problematic drug use.
- Just over half (52%) of the individuals who died lived in the 20% most deprived neighbourhoods in Scotland (Deprivation quintile 1).
- Most people who had a DRD lived in their own home (79%). Fifty-eight percent lived alone all of the time. The percentage of people in these categories increased over the time series (2009 to 2016).
- In 2016, 464 children lost a parent or parental figure as a result of DRD.

Substance Use History

- Most DRDs (88%) were among people previously known to use drugs. Three quarters of those known to have used drugs had used them for 10 or more years and 63% were known to have injected drugs.
- In 2016, over one third of people who had a DRD (37%) were prescribed an Opioid Substitution Therapy (OST) drug (mainly methadone) at the time of death. The percentage of people prescribed an OST at the time of death increased since 2009.
- In 2016 and across the time series combined, the percentage of females who had a DRD and were previously known to use drugs was lower than the percentage of males. Across the time series combined, among those known to use drugs, females were more likely than males to inject drugs. Females were also consistently more likely than males to be prescribed an OST at the time of death (44% compared to 34% in 2016).
- In 2016, over half of the people who had a DRD (54%) had previously experienced a non-fatal overdose.

- In 2016, around one third of people who died (32%) experienced alcohol-related problems in the six months prior to death. The percentage experiencing alcohol-related problems in the six months prior to death decreased over the time series (2009: 43%).

Medical and Psychiatric History and Significant Life Events

- In 2016, 70% of people who had a DRD had a medical condition recorded in the six months before death. Reported recent medical ill health among DRDs has increased since 2009 (46%).
- Medical multiple morbidity was associated with age and high-risk, long-term drug use.
- Approximately two-thirds of people who died (65%) had a recent psychiatric condition recorded in the six months prior to death. The percentage of DRDs with recent psychiatric ill health has increased since 2009 (40%).
- Depression and anxiety were the psychiatric conditions most commonly recorded in the six months prior to death. The percentage of DRDs with depression and/or anxiety increased over time (2009 to 2016).
- Sixty-two percent of individuals had experienced a significant event in the six months before death (most commonly, ill health or a recent diagnosis (medical or psychiatric)).
- Eighteen percent of people who had a DRD had experienced domestic violence prior to death. Sexual abuse at some point prior to death was recorded in 16% of DRDs.

Contact with Services

- In 2016, 77% of individuals (85% of those whose death was opioid-related) were in contact with a service with the potential to address their problem drug use or deliver harm reduction interventions in the six months before death.

Circumstances of Death

- In 2016, around two-thirds of people consumed the drugs in (67%) and died in (62%) their own home. The percentage of people in each of these categories increased since 2009.
- Over half of DRDs (56%) occurred when others were present at the scene of the overdose. The percentage of deaths where others were present at the scene of overdose (and potentially able to intervene) was lower where individuals lived alone all of the time (34%) or were aged 35 or over (52%), than in relevant comparison groups.
- Where known, take-home naloxone (THN) supply has increased over time (26% of 2016 DRDs). Among people who had previously been supplied with THN, availability at the scene of death was low (30%).

Toxicology Data

- In 2016, almost all (97%) DRDs occurred after the consumption of multiple substances.
- Heroin/morphine (61%), alcohol (49%) and anti-depressants (47%) were the most common substances found at post mortem in 2016 – all have increased in prevalence since 2011.
- Opioids (methadone, heroin, morphine or buprenorphine) were implicated in over three quarters (77%) of DRDs.

- In 2016, gabapentin and pregabalin were implicated in 15% and 8% of deaths respectively. Implication of these drugs has increased over time (2011: 1% and 0% respectively), potentially due to their use to enhance the effects of opioids.
- Diazepam presence at post mortem decreased sharply in 2016 (46%), while presence of etizolam (a benzodiazepine-type Novel Psychoactive Substance (NPS)) increased sharply (33%). Etizolam was twice as likely as diazepam to be implicated in deaths where it was found present (80% vs. 40%).
- NPS-related deaths increased sharply in 2016 due to the number of deaths involving benzodiazepine-type NPS (etizolam and diclazepam). Only four deaths involved the use of stimulant-type NPS (e.g. mephedrone).

Prescribing

- Among opioid-related deaths, the percentage of individuals prescribed an OST at the time of death increased from 22% in 2009 to 46% in 2016.
- The percentage of individuals prescribed OST (62%) who had heroin/morphine present at death was the highest recorded and was similar to the percentage observed among individuals not on OST (61%).
- Most individuals who were prescribed methadone and had it implicated in their death had been prescribed the drug for one or more years (82%), received it under supervision (81%) and were prescribed a dose within the recommended therapeutic range (68%).
- Prescribing of gabapentin or pregabalin within 90 days of death increased from 4% of people who had a DRD in 2009 to 21% in 2016.
- Recent prescribing of strong opioid painkillers was very rare. Oxycodone or fentanyl were only prescribed to eight people who had a DRD in 2016.

Conclusion

National Records of Scotland's National Statistics on DRDs show that, in each year since 2014, numbers of both drug-related and opioid-related deaths were at their highest recorded levels in Scotland. Scotland's DRD rate is estimated to be the highest in Europe and recent research has further emphasised the high population prevalence of problem drug use and the impact of DRDs in Scotland in terms of premature mortality. Further, the trajectory of Scotland's DRD rate suggests that deaths will continue to increase in the future.

The explanation for these high and increasing numbers of DRDs is complex. NDRDD data highlights some important themes that have remained unchanged in recent years:

- Scotland has an ageing cohort of people with a drug problem who have multiple complex health and social care needs. Many people who had a DRD shared similar characteristics: they were male, aged over 35, socially deprived, lived alone and had a history of injecting opioid use and non-fatal overdose.
- Opioids were implicated in 77% of deaths and an increasing percentage of those who died from opioid-related death were prescribed an Opioid Substitution Treatment (OST) at the time of death (46% in 2016). There was evidence that some individuals had recently left treatment and may therefore have been at increased risk of opioid overdose.
- Most of those who died whilst on OST had been prescribed a recommended therapeutic OST dose within a supervised prescribing regimen for one year or more. People on OST

were often prescribed other psychoactive medications such as benzodiazepines and anti-depressants.

This report on 2015 and 2016 DRDs also highlights some new findings and emerging trends:

- The number of people in specialist drug treatment at the time of death continued to increase. High levels of heroin/morphine presence among individuals on OST demonstrated the extent of non-compliance with specialist drug treatment using methadone or buprenorphine.
- Specific drugs consumed alongside opioids to enhance their effects may substantially increase the risk of overdose. Further research on the effects of the following substances in such circumstances would be beneficial:
  - Etizolam and diclazepam (both benzodiazepine-type NPS, reported to be widely sold as 'fake Valium (diazepam)') presence and implication in death increased substantially in 2016.
  - Gabapentin and pregabalin prescribing, presence at post mortem and implication in death increased over the time series (2009 to 2016). These drugs may reduce user's opioid tolerance and (at high doses) are associated with respiratory depression.
- Take-home naloxone (THN) provision has increased among the wider population at risk of opioid overdose and among people who had a DRD. However, existing THN provision has not prevented substantial increases in opioid-related deaths in Scotland. The reasons for this (e.g. solitary drug use, THN availability) need to be more clearly understood.
- Most DRDs (71% in 2016) were among men. However, comparing the annual average for 2012-2016 with that for 2002-2006, female DRDs have increased at a higher rate relative to male DRDs (169% compared to 60%). Women who had a DRD had differing levels of exposure than men to factors considered to increase (e.g. injecting drug use) or reduce (e.g. others present at the scene of death) the risk of DRD. Further investigation of female-specific risk factors would be beneficial.

The NDRDD will report updated findings on 2017 and 2018 deaths in 2020.

1: Introduction

The National Drug-Related Deaths Database (NDRDD) was established to collect detailed information regarding the nature and circumstances of those who died a Drug-Related Death (DRD) in Scotland. This is the seventh report and covers the calendar years 2015 and 2016 with trend data from 2009. This report analyses subsets of DRDs in Scotland on which National Statistics have already been published by National Records of Scotland (NRS) [1,2].

The NDRDD reports [3-8] analyse these deaths in greater detail with the aim of providing further insights into the lives of those who died and highlight potential areas for intervention. The data described in this report are collected by the local Data Collection Co-ordinators in each NHS Board area. The authors would like to thank Data Collection Co-ordinators for their hard work and dedication, without which this report could not be produced.

While attempts have been made to ensure the terminology used is as clear as possible, the nature of this report means that the use of technical/statistical terms is unavoidable. For further explanation of these words or phrases, please refer to the **Glossary**.

1.1: Defining 'Drug-Related Deaths'

There are various definitions of what constitutes a DRD. Both the NDRDD and NRS reports use the 'baseline' definition for the UK Drugs Strategy (described in **Annex A** of the NRS report on 2016 deaths [2] and on the **NDRDD section** of the ISD website). The NRS obtains details of all deaths registered in Scotland and identifies DRDs based on a supplementary questionnaire (an ME4 form) that is completed by the forensic pathologist.

Prior to the report for calendar year 2012 [3-5], the NDRDD definition did not include deaths by suicide (defined as 'intentional self-poisoning'), which are included in the 'baseline' definition for the UK Drugs Strategy. To maintain consistency with previous publications, the main body of this report (**Section 3**) focuses on unintentional and undetermined deaths and assault by drugs, while intentional self-poisonings (deaths by suicide) are described separately in **Section 4**.

1.2: NRS Report on Drug-Related Deaths 2016

In its most recent publication [2], NRS reported that 867 DRDs were registered in Scotland in 2016. This figure was 23% higher than the number registered in 2015 (706) and more than double the number registered in 2006 (421). At the time of publication, both the 2015 and 2016 figures were the highest number of DRDs recorded by NRS. Part of this increase is attributable to changes in the recording of pathology data and the classification of drugs (explained in the NRS publication). Nevertheless, the 3-year and 5-year moving averages show that, despite year-to-year fluctuation (for example, in 2008 and 2013), there is a clear long-term upward trend in DRDs. The NRS report is available **here**.

1.3: Report Outline

This report describes the **nature of DRDs in Scotland in 2015 and 2016 and the health and social circumstances of individuals who have died**. It contains:

- an account of the data collection and analysis of the NDRDD cohorts (**Section 2**);
- a full description of results from the 2016 NDRDD cohort of non-intentional deaths (including linked hospital admission and prescribing data), important findings from the 2015 cohort, discussion of trends since 2009 and key messages (**Section 3**);
- a section describing: deaths by suicide involving controlled substances, including key messages (**Section 4**); and,
- Conclusion (**Section 5**).

2: Methods

Drug-Related Deaths (DRDs) in Scotland are recorded and examined by Critical Incident Monitoring Groups who collaborate with the police and Procurator Fiscal to identify cases in their NHS Board area. On completion of the post mortem examination, the Critical Incident Monitoring Group and local Data Collection Co-ordinator decide if the case matches the inclusion criteria for the National Drug-Related Deaths Database (NDRDD). If these criteria are met, a record is submitted to ISD.

The proforma used for NDRDD data collection was designed to collect a wide range of data on individuals' health and social circumstances and the circumstances of their death. Information is collected from a range of sources including the Scottish Prison Service, Scottish Ambulance Service, drug treatment services, GPs and hospitals. Information is recorded using a secure online database administered by ISD. Data are then extracted, anonymised and analysed descriptively using SPSS.

As a result of ongoing quality improvements, this report includes figures which differ from previous reports [3-8]. Specifically:

- Following a data validation exercise, four cases were excluded from the 2009 cohort (reducing the total 2009 cohort to 428) and nine cases were excluded from the 2012 cohort (reducing the total 2012 cohort to 522).
- Due to late data submission, two additional deaths are reported for 2014 (increasing the total 2014 cohort to 624).

Information from ISD's general acute inpatient and day case admissions (SMR01) and psychiatric inpatient admissions (SMR04) datasets were linked to the NDRDD dataset. These analyses provide indicators of hospital stays (numbers of stays, time between hospital discharge and death – see Section **3.4.3**) and a description of multi-morbidity (see Sections **3.3.1** and **3.3.2**).

In addition, data from ISD's Prescribing Information System was linked to the NDRDD dataset, providing further detail about community prescribing[1]. These data are reported in Sections **3.2.3** (substitute prescribing) and **3.7.3** (other prescriptions). In respect of both linkages, all relevant permissions for use and reporting of data were obtained in accordance with ISD's Information Governance processes.

Further information on methods is available in **Appendix 1**.

2.1: The National Drug-Related Deaths Database Cohort

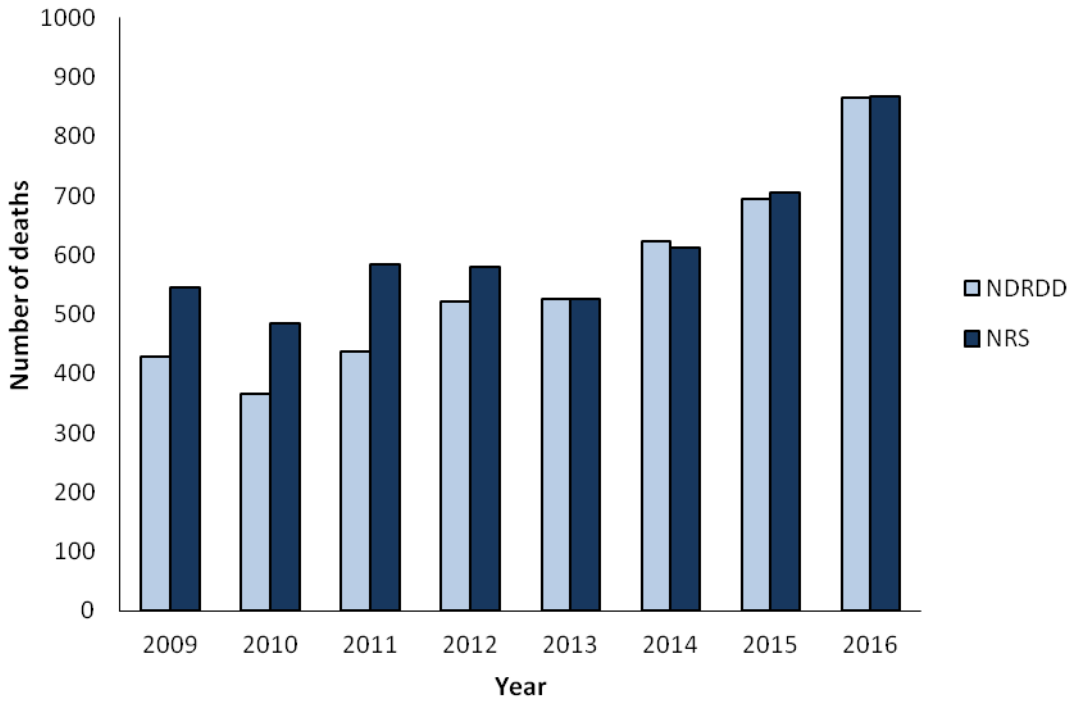
In 2016, a total of 919 records were submitted to ISD for the NDRDD. Of these, 54 (5.9%) did not meet the criteria for inclusion - the reasons for excluding these cases are detailed in **Appendix 2**. The percentage of cases excluded was the same as for 2015 (5.9%).

Using the National Records of Scotland (NRS) definition, a total of 865 records were identified as eligible for inclusion in the NDRDD cohort. This was a 24% increase compared to the number of cases in 2015 (695), similar to the increase in DRDs recorded by NRS

[1] These data are available from 2009 onwards, when patient identifiable Community Health Index numbers were first included in Prescribing Information System.

(23%). The figure for 2016 reported from the NDRDD was lower than the figure reported by NRS (867). Figure 1 shows the relative size of the two datasets over time. Increases in the size of the NDRDD cohort can partly be explained by the inclusion of deaths by suicide since 2012. However, other factors such as completion rates and the different reporting periods used by NRS and NDRDD also influence cohort sizes. These issues are described in detail in **Appendix 2**, which also includes data tables relevant to the following discussion.

Figure 1: Number of Drug-Related Deaths in NRS and NDRDD Cohorts (2009-2016)



In 2016, after matching to NRS data, there were eight records for which no NDRDD return was submitted to ISD (seven in 2015). In 2016, the percentage of missing records was 0.9%, similar to 2015 (1.0%)[2] and lower than for previous cohorts (2012: 7.2%, 2013: 10.5%, 2014: 1.7%).

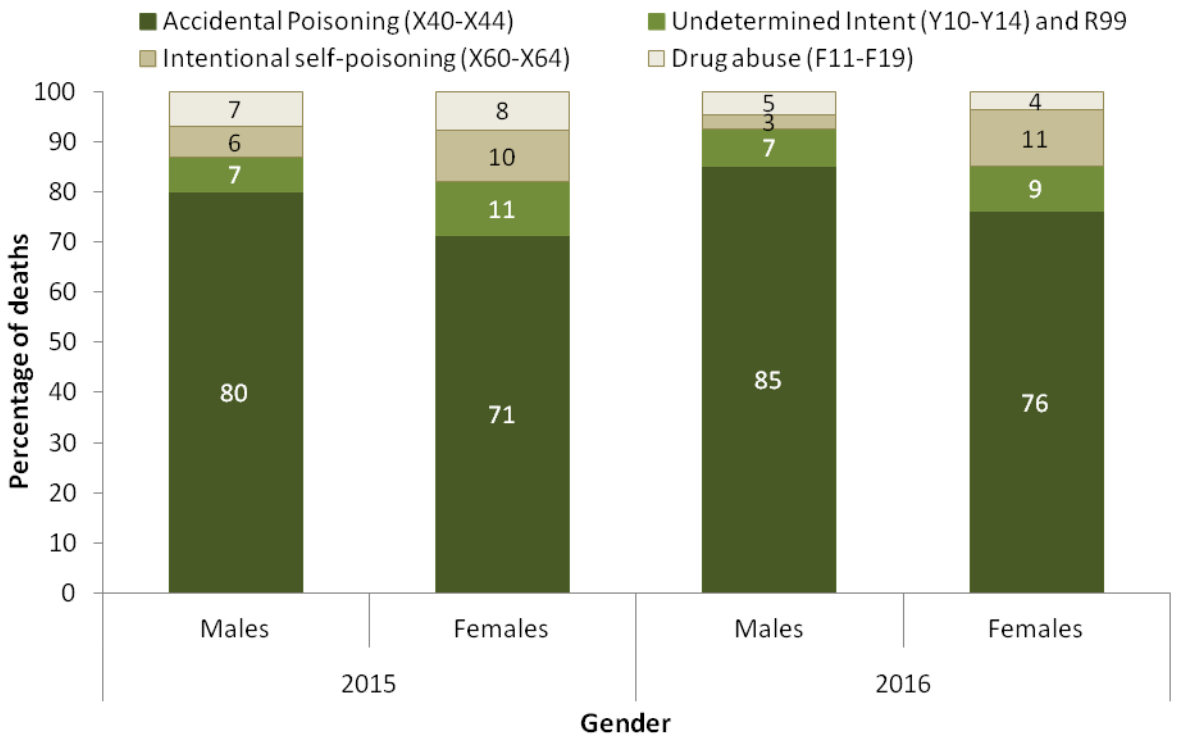
In 2016, of the 865 records which were eligible for inclusion in the NDRDD cohort, 47 (5.4%) cases were classed as deaths by suicide ('intentional self-poisoning' in Figure 2: reported in further detail in **Section 4**)[3]. Therefore, a total of 818 records were eligible for inclusion in the main NDRDD cohort in 2016 (hereafter referred to as 'the NDRDD cohort' or as 'non-intentional deaths').

[2] 2016: 8 (missing eligible cases) / 873 (865 eligible NRS cases + 8 missing eligible cases) = 0.9%. 2015: 7 (missing eligible cases) / 702 (695 eligible NRS cases + 7 missing eligible cases) = 1%.
[3] To bring the NDRDD cohort more in line with the volume of cases reported by NRS, deaths categorised as 'intentional self-poisoning' were included in NDRDD for the first time in 2012, but are excluded from the main NDRDD cohort in order to ensure that it remains consistent in scope, and therefore comparable, over time.

In 2015, of the 695 records which were eligible for inclusion in the NDRDD cohort, 52 (7.5%) cases were classed as deaths by suicide. Therefore, a total of 643 records were eligible for inclusion in the main NDRDD cohort in 2015.

Figure 2 shows the percentage of causes of death (as classified by International Classification of Diseases Version 10 (ICD10) diagnosis coding scheme [9]) by sex. As in previous years, deaths by suicide ('intentional self-poisoning') accounted for a higher percentage of deaths among females than males in both 2015 (10% compared to 6%) and 2016 (11% compared to 3%).

Figure 2: Cause of Drug-Related Death by Sex (NDRDD, 2015 & 2016)



2.2: Statistical Testing and Presentation of Findings

While 2015 and 2016 findings are described throughout, direct inter-group or inter-year comparisons described as 'higher' or 'lower' (or similar) in the commentary are generally restricted to those where a statistically significant difference ($p<0.05$) was identified. Details of the statistical tests used can be found in **Appendix A1.4**.

Throughout this report, the number of cases where information was known is only reported when completion was lower than 90% or where analysis relates to a specific group (e.g. females). For the main cohort, where not stated, denominator figures are available in the **data tables**.

3: Results and Commentary

This section presents the findings from the 818 non-intentional Drug-Related Deaths (DRDs) in the 2016 National Drug-Related Deaths Database (NDRDD) cohort, important findings from the 2015 cohort (643 non-intentional DRDs) and discussion of trends since 2009. Results are organised into the following thematic subsections, each concluding with a description of Key Findings.

- **Demographic Profile**: Examines the demographic and social characteristics of the NDRDD cohort.
- **Substance Use History**: Describes the extent and duration of substance use, associated treatments and known risk factors among the NDRDD cohort.
- **Medical and Psychiatric History and Significant Life Events**: Documents recent medical and psychiatric conditions (and associated hospital admissions) and experience of significant life events including domestic or sexual abuse.
- **Contact with Services**: A description of recent contact with services to provide insights into issues faced by individuals in the period immediately before death and the potential for harm reduction interventions.
- **Circumstances of Death**: A description of the circumstances of deaths, providing insights into contributing factors and potential interventions.
- **Toxicology Data**: Information about the drugs *present* in the body at post mortem and those thought by pathologists to have been *implicated* in death, including a short section on 'Novel' Psychoactive Substances (NPS).
- **Prescribing**: A description of deaths among individuals receiving Opioid Substitution Therapies and the prescription of other drugs among the NDRDD cohort.

The **data tables** include findings from the seven previous yearly cohorts from 2009, allowing comparisons to be made.

The main points found at the end of each subsection have been summarised in the **Key Messages** section and in the **Conclusion**.

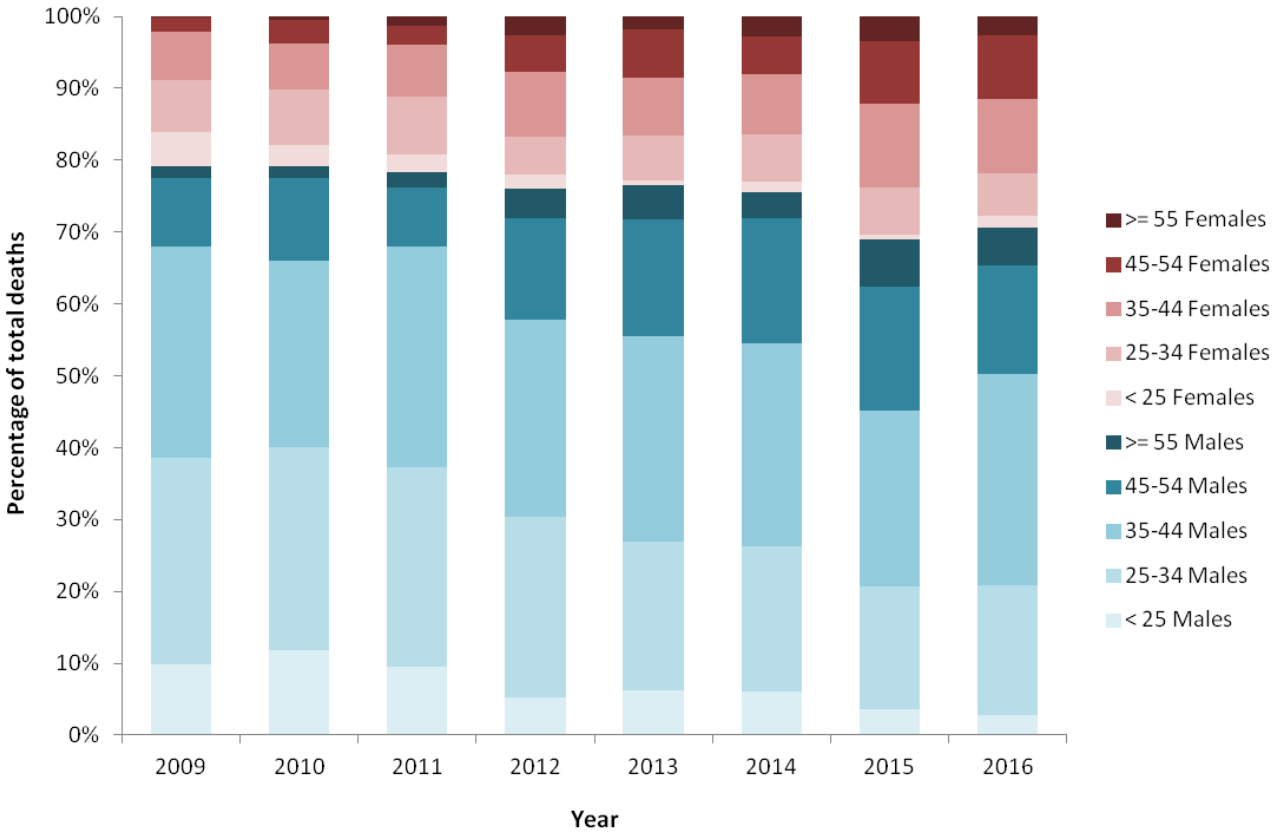
3.1: Demographic Profile

3.1.1: Age and Sex

In 2016, around seven in ten drug-related deaths (DRDs) were among males (578, 71%). Over the time series, the percentage of DRDs among females increased from 21% in 2009 to 29% in 2016.

The age profile of DRDs was similar across both sexes, with the highest percentage of DRDs in 2016 among individuals aged 35-44 (325, 40%) (Table 1 and Figure 3).

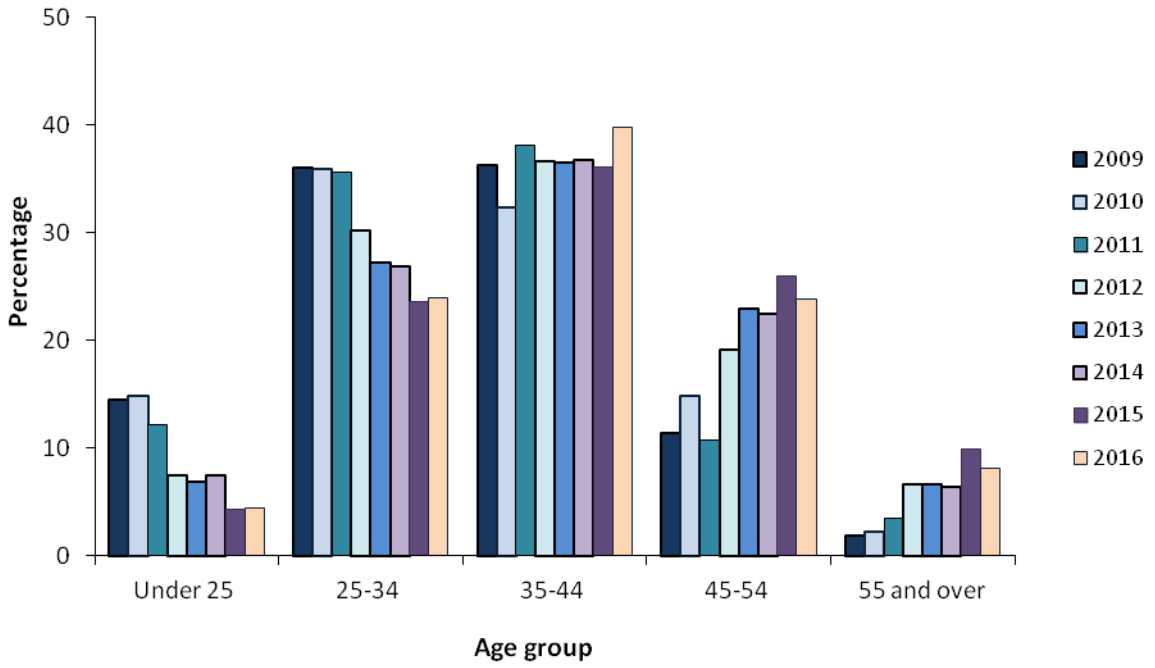
Figure 3: Percentage of Drug-Related Deaths by Age Group and Sex (NDRDD: 2009-2016)



The ageing profile of people with problematic drug use [10-13] was clearly evident in the NDRDD cohort:

- The mean age of people who had a DRD increased from 34.9 years in 2009 to 41.0 years in 2016.
- The percentage of DRDs among those aged 35 and over increased from 50% (212) in 2009 to 72% (586) in 2016. In particular, the percentage of DRDs among those aged 45 and over more than doubled from 13% (57) in 2009 to 32% (261) in 2016 (Figure 4).

Figure 4: Percentage of Drug-Related Deaths by Age Group (NDRDD: 2009-2016)



3.1.2: Deprivation

The Scottish Index of Multiple Deprivation classifies postcode areas in Scotland on the basis of deprivation. In 2016, just over half of people who had a DRD (423, 52%) lived in the most deprived neighbourhoods (Deprivation quintile 1) in Scotland, while only 25 individuals (3%) lived in the least deprived areas (Deprivation quintile 5). The deprivation profile has changed very little since 2009 (Deprivation quintile 1: 222, 52%) - DRD prevalence continues to be highest in the most deprived communities (Table 2).

3.1.3: Living Arrangements

In 2016, almost four out of five people who had a DRD (631, 79%) were reported to be living in their own home prior to death while 5% (37) lived in a hostel, were of no fixed abode or sleeping rough prior[4] to death (Table 3)[5]. The percentage of people living in their own home prior to death increased from 61% (259) in 2009, while the percentage living in the most precarious circumstances (hostel/no fixed abode/sleeping rough) decreased from 11% (45) in 2009.

Sixty-three percent (499) of the 2016 cohort lived on their own at least part of the time while 58% (458) lived on their own all of the time. Eighteen per cent of individuals (144) lived with their spouse/partner while 12% (93) lived with relatives (Table 4). The percentage living on their own all of the time increased from 41% (172) in 2009.

[4] Recognised to be among the most vulnerable in terms of a range of risks including DRD [14].
[5] Individuals could have been reported as living in more than one place, therefore totals may exceed 100%.

Across the time series, a higher percentage of people who had a DRD and were aged 35 and over lived in their own home or lived alone only (76% and 55% respectively) compared with younger individuals (57% and 41% respectively) (data not shown in tables).

Across the time series, a higher percentage of females who had a DRD (31%) were living with a partner/spouse compared to males (16%) (data not shown in tables).

3.1.4: Parenthood and Living with Children

In 2016, 37% (280) of people who had a DRD were a parent or parental figure to a child or children aged under 16 (similar to most previous years). The total number of children who lost a parent/parental figure due to a DRD in 2016 was 464 (Table 5).

Sixty-two individuals (8%) were living with a child when they died. Of the 464 children who lost a parent/parental figure due to a DRD, 103 (22%) were living with them at the time of death (Table 6).

In 2016, 163 DRDs occurred among people who injected drugs who were a parent or parental figure to a child[6]. Of these, 20 (12%) were living with their children at the time of death. A total of 28 children lived with a parent or parental figure who injected drugs prior to their death (data not shown in tables).

3.1.5: Summary

- In 2016, most DRDs continued to be among men (71%), although the percentage of female deaths increased from 2009 (21%) to 2016 (29%).
- The mean age of people who had a DRD increased from 34.9 years in 2009 to 41.0 years in 2016, reflecting the known ageing profile of people with problematic drug use.
- Just over half (52%) of the individuals who died lived in the 20% most deprived neighbourhoods in Scotland (Deprivation quintile 1).
- Most people who had a DRD lived in their own home (79%). Fifty-eight percent lived alone all of the time. The percentage of people in these categories increased over the time series (2009 to 2016).
- In 2016, 464 children lost a parent or parental figure as a result of a DRD.

[6] Children living with parents known to inject drugs were recognised to have a potentially high risk of Blood Borne Virus infection in ‘Getting our Priorities Right’ by the Scottish Government [15].

3.2: Substance Use History

3.2.1: Drug Use and Injecting Status Prior to Death

In the 2016 cohort, 88% (721) of people who had a DRD were known to have used drugs prior to death (Table 7). This figure was broadly consistent with previous years. In 2016 and across the time series combined, the percentage of female DRDs who were known to use drugs prior to death was lower than for males (2016: 81% compared to 91%, 2009-2016: 82% compared to 89% - Table 7).

Among those known to use drugs prior to death, three quarters of individuals (499, 75%) were known to have used drugs for ten years or more. A key change in the DRD cohort over time has been the increasing percentage of individuals who were known to have used drugs for 20 years or more (from 14% (53) in 2009 to 43% (286) in 2016). Increasing long-term drug use among the NDRDD cohort is associated with the increasing average age of people who had a DRD.

In 2016, 63% (454) of people who had a DRD and were known to use drugs prior to death were also known to inject (Table 8)[7]. Although no clear trend was evident across the time series, injecting prevalence ranged from approximately 60% to 70% of each cohort. Among those known to inject drugs, the percentage who injected drugs for 20 years or more increased from 13% (22) in 2009 to 33% (133) in 2016.

In 2016 and across the entire time period combined, recorded injecting was higher among those aged 35 and over (69%) than younger individuals (56%) (Table 8). Although there was considerable variation between yearly cohorts, recorded injecting was higher among females than males across the entire time period combined (67% compared to 63% - Table 8).

3.2.2: Drug Detoxification

In 2016, only 55 people who had a DRD (7%) were known to have undertaken a drug detoxification in the year prior to death. The percentage undertaking a drug detoxification in the year prior to death has decreased since 2009 (51, 14%). In 2016, nine individuals (16% of those who had a drug detoxification in the year prior to death) died within one month of this treatment (Table 9).

3.2.3: Substitute Prescribing

Using data from ISD's Prescribing Information System, 42% of the 2016 NDRDD cohort (346) had been prescribed an Opioid Substitution Therapy (OST) drug at some time since 2009[8]. Of these individuals, 93% (323) had been prescribed methadone. In 2015, the comparable figures were 37% (237) who had been prescribed an OST, of which 95% (226) had been prescribed methadone (data not shown in tables).

[7] This includes those injecting intravenously, intramuscularly ('muscle popping'), or subcutaneously.
[8] Due to issues with capturing Community Health Index numbers from hospital prescriptions [16-17], there is a risk that the figures presented may underestimate OST prescribing since 2009. Inter-year comparisons were not included in this report due to the restricted look back period available for analysis.

In 2016, 37% of individuals (301) were prescribed an OST drug at the time of death. Of these, 92% (276) were prescribed methadone, with the remainder receiving buprenorphine and naloxone (18) or buprenorphine (7) (Table 10). The percentage of the cohort prescribed an OST drug at the time of death increased over the time series (2009: 21%).

In 2016, the percentage of female DRDs who were prescribed an OST at the time of death was 44% (106), compared to 34% (195) among males. In each year, the percentage of females prescribed an OST at the time of death was higher than for males. For both sexes, the percentage prescribed an OST at the time of death increased across the time series (2009: 33% for females and 18% for males) (Table 10).

In 2016, the percentage of individuals aged 35 or over prescribed an OST at the time of death (248, 42%) was higher than among younger individuals (53, 23%). OST prescribing was observed in a higher percentage of individuals aged 35 or over in all years between 2009 and 2016 except 2014, and across the entire time series combined (Table 10).

For information on the dosage, supervision and efficacy of OST prescribing, see **Section 3.7.1**.

3.2.4: Previous Overdoses

In 2016, over half of people who had a DRD had previously experienced a non-fatal overdose (440, 54%); a similar percentage to previous years. Among those who had previously overdosed, 70 (16%) were known to have overdosed at least five times prior to their death (Table 11). In 2016, where known, the mean number of previous overdoses among DRDs was 2.8 (yearly averages over the time series ranged from 2.7 to 3.6) - data not shown in tables.

In 2016, of those who had experienced a previous overdose, 24% (105) had overdosed within six months of death (15% (67) had overdosed in the three months prior to death) (Table 12).

3.2.5: Alcohol-Related Problems[9]

Around one third (259, 32%) of people who had a DRD in 2016 had received treatment, been in contact with alcohol services, or had medical or psychiatric notes recorded about alcohol-related problems in the six months prior to death. The percentage of individuals with recent alcohol-related problems has decreased over the time series (2009: 43%) (Table 13).

In 2016 and across the entire time series combined, the percentage of female DRDs with recent alcohol-related problems recorded was lower than among males. In 2016, 24% of

[9] Decreases in the percentage of people who had a DRD with 'problem alcohol use' recorded as a recent medical condition (from 37% in 2009 to 6% in 2014) and the inconsistency between these findings, alcohol statistics [18] and clinical experience, led to the formulation (since 2013) of an alternative alcohol category, incorporating a broader range of NDRDD data items. Individuals are categorised as having recent alcohol-related problems if any of the following were recorded in the six months prior to death: Alcohol–related medical condition; Alcohol–related psychiatric condition; problem alcohol use noted in mental health history; contact with alcohol services; and, treatment for alcohol dependence. As the scope of this category extends beyond medical conditions, it is not reported in **Section 3.3.1**.

females (57) and 35% of males (202) had alcohol problems recorded in the six months prior to death (data not shown in tables).

3.2.6: Summary

- Most DRDs (88%) were among people previously known to use drugs. Three quarters of those known to have used drugs had used them for 10 or more years and 63% were known to have injected drugs.
- In 2016 and across the time series combined, the percentage of females known to use drugs was lower than the percentage of males. Across the time series combined, among those known to use drugs, females were more likely than males to inject drugs.
- In 2016, over one third of people who had a DRD (37%) were prescribed an OST drug (mainly methadone) at the time of death. The percentage of people who died who were prescribed an OST at the time of death increased since 2009. Females were consistently more likely than males to be prescribed an OST at the time of death (44% compared to 34% in 2016).
- In 2016, over half of the people who had a DRD (54%) had previously experienced a non-fatal overdose.
- In 2016, around one third of people who died (32%) experienced alcohol-related problems in the six months prior to death. The percentage experiencing alcohol-related problems in the six months prior to death decreased over the time series (2009: 43%).

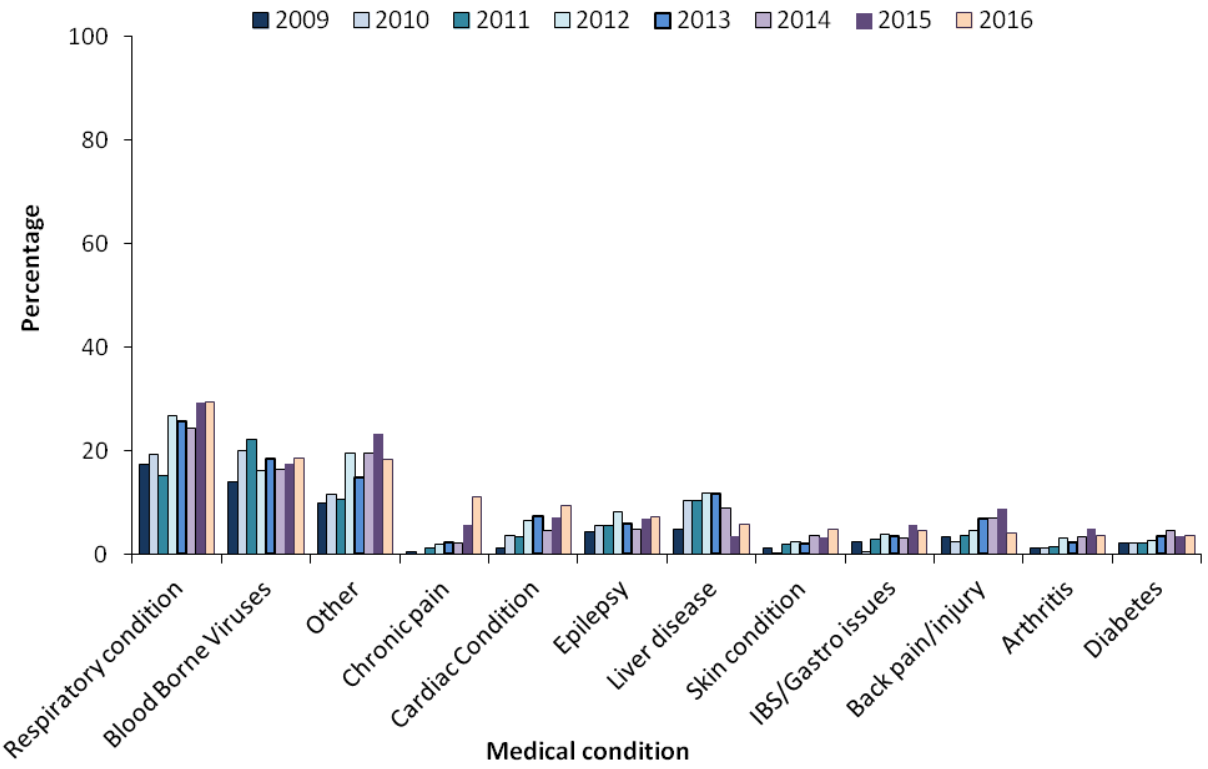
3.3: Medical and Psychiatric History and Significant Life Events[10,11]

3.3.1: Medical History

Recent Medical Conditions

One or more medical condition were recorded in the six months prior to death (hereafter referred to as 'recent') for 573 people in the 2016 NDRDD cohort (70%) (Table 14 & Figure 5). The percentage with a medical condition recently recorded increased over time (2009: 46%).

Figure 5: Medical Conditions Recorded in the Six Months Prior to Death (NDRDD: 2009-2016)[1]



1. Annual category percentages relating to small numbers of cases have been removed from these charts.

[10] Information from medical records (e.g. GP notes) and other data sources is recorded by NDRDD Data Collection Co-ordinators. Accuracy of these data is dependent upon the comprehensiveness of source information. Conditions or events are recorded as occurring within a specific time period if noted as such in records (therefore, lifetime occurrence of a condition may not be recorded as 'recent', potentially leading to underestimation). Likewise, some conditions may not be recorded in medical/psychiatric notes (they may be unknown to the individual, undiagnosed, or not reported). The figures in this section may also be influenced by the lack of definitional rigour associated with some diagnoses, subjective differences in assignment of psychiatric diagnoses and the interpretation of those who record information for the NDRDD.

[11] Individuals may have more than one medical or psychiatric condition recorded. For psychiatric conditions, bipolar disorder and schizophrenia are mutually exclusive diagnoses at any one time although individuals may have both in their lifetime, with revision over time. 'Drug addiction' and 'problem alcohol use' were removed from recorded conditions. Medical conditions wrongly recorded in the 'psychiatric conditions' variables (and vice versa) were transferred to the appropriate variables.

In 2016, 29% (241) of people who had a DRD were recorded as having a recent respiratory condition, 18% (151) had a Blood Borne Virus[12] (BBV) (i.e. hepatitis B, hepatitis C or HIV), 18% (150) an 'other' medical condition'[13] and 11% (90) suffered from chronic pain (Table 14).

Recording of respiratory disease and cardiac illness as medical conditions in the six months prior to death increased across the time series from 17% (74) in 2009 to 29% (241) in 2016 and from 1% (5) in 2009 to 9% (77) in 2016 respectively (Table 14). Across the time series, both types of condition were more prevalent among individuals aged 35 and over (Respiratory: 29%, Cardiac: 8%) than among the under 35s (Respiratory: 16%, Cardiac: 3%). Females (37%) were also more likely than males (20%) to have a recent respiratory condition recorded (data not show in tables). Changes in the age and sex composition of the NDRDD cohort (increasing average age, increasing percentage of females) are likely to explain increasing prevalence of respiratory and cardiac conditions over time.

There was no discernible trend over time in the prevalence of recent BBV recording, however it was strongly associated with injecting drug use[14]. In each year and over the time series combined, recent BBV conditions were more likely to be recorded for people who injected drugs (2009-2016: 31%) than for other DRDs (2009-2016: 3%). Recent BBV recording was also more prevalent among females (20% compared to 17% of males) and individuals aged 35 and over (22% compared to 11% among individuals aged under 35) - these differences are likely to be due to higher injecting prevalence among females and older individuals who had a DRD (data not shown in tables).

The prevalence of chronic pain showed a proportionally greater increase over time than for other conditions (e.g. respiratory). In years 2009 (<1%) to 2014 (2%), few recent chronic pain cases were observed among people who had a DRD. However, the percentage in 2015 with recent chronic pain (37, 6%) was higher than in any previous year, as was the percentage observed in 2016 (90, 11%) (Table 14). Across the time series, recent chronic pain was more often recorded for females (6%) than for males (3%) and for individuals aged 35 and over (5%) than for younger people (2%) (data not shown in tables). However, the sharp increases in chronic pain recording observed in 2015 and 2016 are unlikely to be function of changes in the demographic composition of the NDRDD cohort over time.

The prevalence of a subset of six medical conditions[15] identified in the NDRDD dataset and in hospital admission records (using the International Classification of Diseases Version 10 (ICD10) diagnosis coding scheme [9]) was used to examine multiple morbidity. On average, people who had a DRD in 2016 had 0.75 (of six) medical conditions recorded in the six

[12] While they are grouped together in Figure 5, the specific BBV infections are listed separately in Table 16.
[13] The category 'Other medical conditions' includes the following diagnoses: Eating Disorder; Learning Disability; Migraine; Pancreatitis (not alcohol-related); and cases recorded as 'Other medical condition' (e.g. fracture, cancers).
[14] This is consistent with 2016 BBV data published by Health Protection Scotland, stating that hepatitis C was the most prevalent BBV in Scotland and 90% of infected individuals had acquired the virus because of injecting drug use [19].
[15] The six key medical conditions examined were respiratory disease, liver disease, epilepsy, cardiac problems, stomach problems and Blood Borne Viruses (Hepatitis B, Hepatits C, HIV).

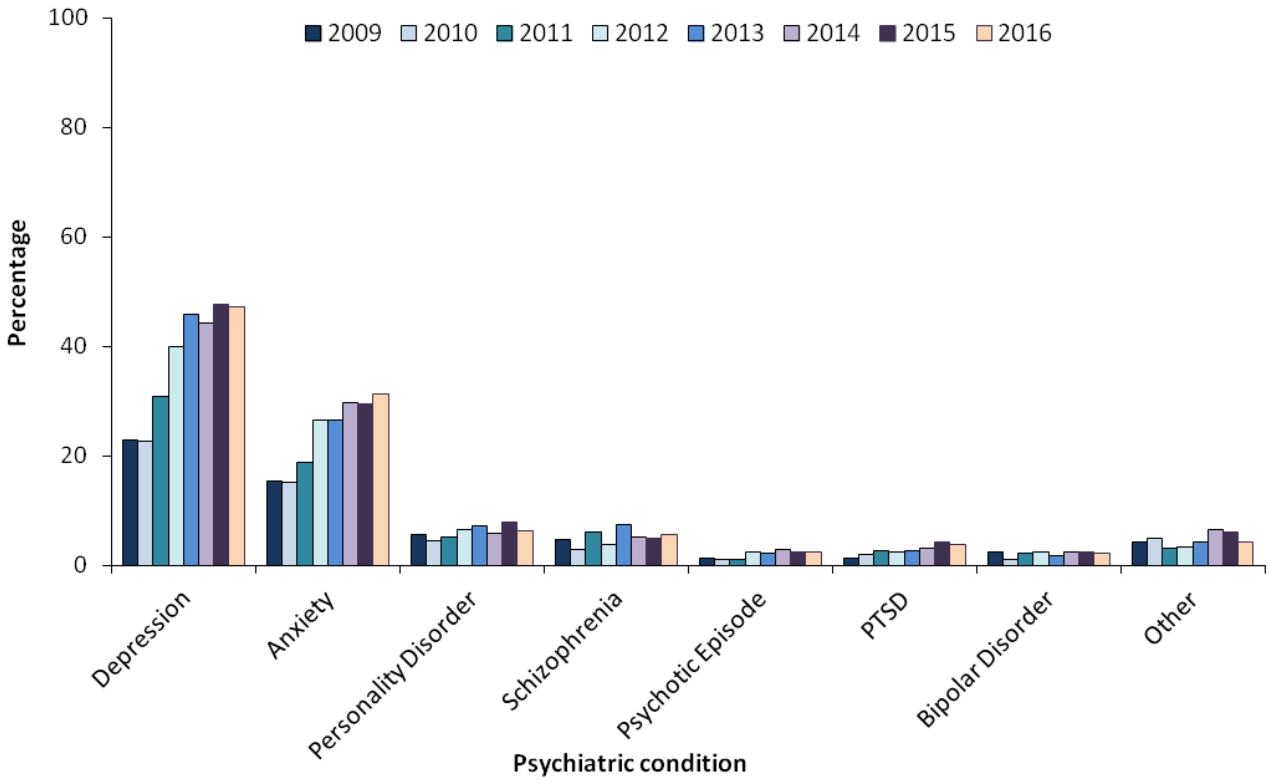
months prior to death (Table 15). In 2016, the average number of recent medical conditions was higher than in 2009 (0.44), indicating increasing recent co-morbidity over the time series. In 2016, females had a higher average number of recent conditions recorded (0.94) than males (0.67) and individuals aged 35 and over had a higher average number of recent conditions (0.88) than those under 35 (0.41). People who Injected Drugs for ten years or more (PWID10+) (1.10) had a higher average number of conditions than other groups of people who had a DRD, when categorised by their known drug use (individuals Not Known as a Person who Used Drugs (NK-PWUD): 0.62, People who Used Drugs, but were not known to inject (PWUD): 0.49, People who Injected Drugs for less than ten years (PWID<10): 0.63).

In 2016, in the ten years before death, people who had a DRD were admitted to a general acute hospital in relation to an average of 0.78 of the defined medical conditions examined. In 2016, the average number of medical conditions associated with hospital admission was higher than in 2009 (0.50). While there was no significant difference by sex in 2016, individuals aged 35 and over had a higher average (0.86) than those under 35 (0.56) and while PWID10+ had a higher average (0.89) than PWUD (0.69) and PWID<10 (0.70), there was no significant difference with the NK-PWUD group (0.80).

3.3.2: Psychiatric History

Recent Psychiatric Conditions

Figure 6: Psychiatric Conditions Recorded in the Six Months Prior to Death (NDRDD: 2009-2016)[1]



In 2016, 530 people who had a DRD (65%) had a specific psychiatric condition recorded in the six months prior to death (Table 16). This percentage has steadily increased over the time series (2009: 40%). In 2016, 47% (387) were recorded as recently suffering from depression, 31% (255) from anxiety, 6% (52) from personality disorders and 6% (46) from schizophrenia. The prevalence of recent psychiatric conditions over time is shown in Figure 6.

Recording of depression and anxiety as recent psychiatric conditions increased across the time series from 23% (98) in 2009 to 47% (387) in 2016 and from 15% (66) in 2009 to 31% (255) in 2016 respectively (Table 16). Across the time series, both conditions were more prevalent among females (Depression: 55%, Anxiety: 35%) than males (Depression: 34%, Anxiety: 22%) and among individuals aged 35 and over (Depression: 43%, Anxiety: 26%) than those aged under 35 (Depression: 34%, Anxiety: 24%) (data not shown in tables). Therefore, increases in the recording of recent depression and anxiety among all individuals who had a DRD may be partly attributable to changes in the demography of the NDRDD cohort.

The prevalence of a subset of seven psychiatric conditions[16] identified in the NDRDD dataset and in hospital admission records (using ICD10) was used to examine multiple psychiatric morbidity. On average, people who had a DRD in 2016 had 0.99 (of seven) psychiatric conditions recorded in the past six months (Table 17). The average number of recent psychiatric conditions was higher than in 2009 (0.53). In 2016, females had a higher average number of recent psychiatric conditions recorded (1.25) than males (0.88). There were no statistically significant differences in the mean number of psychiatric conditions recorded by age group or by known drug use status.

Admission to a psychiatric hospital in the ten years prior to death was less common than recent recording of a psychiatric diagnosis. Individuals in the 2016 cohort had psychiatric inpatient stays in relation to an average of 0.17 of the seven conditions examined (Table 17). There was no significant change in the prevalence of psychiatric admissions associated with these conditions over time (2009: 0.19). Across the time series combined, females who had a DRD (0.22) had been admitted to hospital in relation to a higher number of psychiatric conditions than males (0.15), as had individuals aged 35 and over (0.19) compared to under 35s (0.13) (in 2016, neither difference was significant). There were no differences between groups on the basis of drug use status.

3.3.3: Recent Significant Events

In 2016, 504 individuals (62%) were recorded as experiencing a significant event in the six months prior to death (Table 18)[17]. Twenty-five percent (206) were recorded as suffering ill health or a recent diagnosis (medical or psychiatric), 11% (86) experienced the breakdown of a significant relationship and 9% experienced either a bereavement (76) or relapse (75) in the past six months. Validating findings in relation to morbidity, the percentage reporting

[16] The seven psychiatric conditions examined were depression, anxiety, personality disorder, schizophrenia, psychotic episode, post traumatic stress disorder and bipolar disorder.
[17] Individuals may have had more than one significant event recorded.

recent ill health/diagnosis increased over time (2009: 18%). Over the time series, increasing trends were also observed in recent bereavement (2009: 7%).

3.3.4: Domestic and Sexual Abuse

In 2016, 151 (18%) individuals who had a DRD (81% of whom were female) were reported to have been a victim of domestic violence at some point prior to death (Table 19). Sexual abuse at some point prior to death was reported for 128 (16%) people who had a DRD (of whom 66% were female) in 2016 (Table 20). Although there are likely to be issues associated with the recording of these indicators, a trend of increasing prevalence of sexual abuse since 2009 (9%) was observed.

3.3.5: Summary

- In 2016, 70% of people who had a DRD had a medical condition recorded in the six months before death. Reported recent medical ill health among DRDs has increased since 2009 (46%).
- Respiratory illness (29%), blood borne viruses (18%) and chronic pain (11%) were the recent conditions most commonly recorded.
- Respiratory and cardiac conditions were more common among people aged 35 and over at the time of death and the prevalence of these conditions increased over time, in line with increases in average age. The sharp increases in chronic pain reporting in 2015 and 2016 are unlikely to be fully explained by demographic changes in the NDRDD cohorts over time.
- Medical multiple morbidity was associated with age and high-risk, long-term drug use.
- Approximately two-thirds of people who died (65%) had a recent psychiatric condition recorded in the six months prior to death. The percentage of DRDs with recent psychiatric ill health has increased since 2009 (40%).
- Depression and anxiety were the most common psychiatric conditions recorded in the six months prior to death. Both conditions were more common among females and older individuals and increased over the time series (2009 to 2016).
- Sixty-two percent of individuals had experienced a significant event in the six months before death (most commonly, ill health or a recent diagnosis (medical or psychiatric)).
- Eighteen percent of people who had a DRD had experienced domestic violence prior to death. Sexual abuse at some point prior to death was recorded in 16% of DRDs.

3.4: Contact with Services[18]

3.4.1: Drug Treatment Services

In the 2016 cohort, three quarters of people who had a DRD (613, 75%) had been in contact with a drug treatment service at some point in their lives. Over half of these (447, 55%) were in contact with drug treatment services in the six months prior to death (Table 21). Both the percentage of individuals in contact with drug treatment services at some point (2009: 61%) and in contact within the previous six months (2009: 33%) increased over the time series.

In 2016 and across the time series combined, the percentage of individuals aged 35 or over who had been in contact with a drug treatment service in the six months prior to death (2016: 344, 59%; 2009-2016: 1,364, 51%) was higher than among those aged under 35 (2016: 103, 44%; 2009-2016: 627, 40%). Similar significant differences were observed between age groups in relation to contact with drug treatment services at any time prior to death (Table 21).

Over the time series combined, the percentage of females in contact with a drug treatment service in the six months prior to death was higher (2009-2016: 1,426, 53%) than for males (2009-2016: 565, 45%) (data not shown in tables). In 2015 and 2016, the differences by sex in the percentage ‘ever’ or ‘recently’ in contact were not significant.

In 2016, 37% of people who had a DRD (303) attended an addiction service and 12% (96) had seen their GP for the purpose of drug treatment (Table 22). The percentage of individuals who had recently attended an addiction service increased over the time series (2009: 27%), while the percentage consulting their GP was significantly lower in 2015 (14%) and 2016 (12%) than in any previous year (2009 to 2014).

In 2016, 42% (343) of people who had a DRD were being treated for their problematic drug use at the time of death – this percentage increased over the time series (2009: 32%). In 2016 and across the time series combined, people aged 35 and over (2016: 268, 46%; 2009-2016: 1,095, 42%) were more likely than younger individuals (2016: 75, 32%; 2009-2016: 455, 29%) to have been in contact with a drug treatment service at the time of death. Females (2016: 114, 48%; 2009-2016: 481, 46%) were more likely than males (2016: 229, 40%; 2009-2016: 1,069, 34%) to be in contact with a drug treatment service at the time of death (Table 23).

In 2016, in cases where the date of last contact with drug treatment services was recorded, one third (110, 33%) of individuals who were being treated for their problematic drug use had been seen within one week of death and 84% (280) within one month of death (data not shown in tables).

3.4.2: Non-Drug Treatment Services

Among the 2016 cohort, 78% (637) had been in contact with services for reasons other than management of a drug misuse problem at some point in their lives (an increasing trend since

[18] Although the NDRDD collects information on contact within different time periods, this section emphasises contact within six months of death in order to illustrate which services might have had an impact in terms of preventing DRD.

2012 (66%), when these data were first available). Recording of recent (within six months) contact (372, 46%) was similar to most previous years (ranging from 42% to 48%, excluding 2014). Twenty-three percent (190) had recently seen mental health services and 14% (112) had been in contact with social work (Table 24). Despite a decrease from 2014 (27%), the percentage of the cohort in recent contact with mental health services has increased since 2009 (19%).

Among people who had been discharged from a psychiatric hospital in the six months prior to death, 63% (22/35) had also been in contact with mental health services in the six months prior to death. This was higher than the percentage in recent contact with mental health services in those not recently discharged from a psychiatric hospital (168/783, 21%) (data not shown in tables).

3.4.3: Hospital Stays[19]

General Acute Hospital Stays

In 2016, 86% (700) of people who had a DRD had been discharged from a general acute hospital in the ten years before death and 30% (247, 30%) had been discharged within six months of death (Table 26). The percentage of individuals with 'long-term' or 'recent' hospital discharges was stable over time.

Across the time series combined, there were clear differences in admission to general acute hospitals. Females (87%), individuals aged 35 and over (85%) and People who Injected Drugs for 10 years or more (PWID10+: 89%) were all more likely to have had a general acute hospital stay in the past ten years than their respective comparison groups: (males (82%); younger individuals (80%); other drug use groups (individuals Not Known as a Person who Used Drugs (NK-PWUD): 79%, People who Used Drugs (but were not known to inject) (PWUD): 80%, People who Injected Drugs for less than 10 years (PWID<10): 84%)). Similarly, recent general acute stays were more common among females (32%), individuals aged 35 and over (30%) and PWID10+ (33%) than among males (27%), younger individuals (25%) and two of the other drug use groups (PWUD: 24%, PWID<10: 28%)) (data not shown in tables).

Among individuals hospitalised in the ten years before death, the median number of inpatient stays increased from six in 2009 to eight in 2016 (the highest number (9) was observed in 2015). Across the time series combined, a higher median number of stays was observed among females (9) than males (7), individuals aged 35 and over (9) compared with those under 35 (6) and among individuals categorised as PWID10+ (9) compared with other drug use groups (NK-PWUD: 7, PWUD: 6, PWID<10: 7) (data not shown in tables).

[19] NDRDD data was linked to ISD's acute (SMR01) and psychiatric (SMR04) hospital inpatient databases in order to examine the number and nature of medical and psychiatric admissions and time before death. Admissions to Scottish NHS hospitals in the ten years before death were included. Information on the time between last hospital discharge (general acute or psychiatric) and death is shown in Table 25. Information on the number and percentage of opioid-related deaths occurring within four or 12 weeks of hospital discharge (based on NRS's National Statistics) is provided in ISD's National Naloxone Monitoring Report [20].

Psychiatric Hospital Stays

Twenty-five percent (203) of people who had a DRD in 2016 had been discharged from a psychiatric hospital within ten years, with 4% (35) having been discharged in the six months before death. The percentage of individuals with a 'long-term' or 'recent' psychiatric hospital discharge was similar across the time series (Table 27).

Across the time series, females (30%), individuals aged 35 and over (29%) and PWID10+ (31%) were each more likely to have had a psychiatric hospital inpatient stay in the past ten years than their respective comparison groups (males (25%); younger individuals (22%); other drug use groups (NK-PWUD: 16%, PWUD: 26%)) (data not shown in tables). There were no differences between groups in relation to the prevalence of psychiatric stays in the six months prior to death.

Among individuals hospitalised in the ten years before death, the median number of psychiatric hospital stays observed in the 2016 NDRDD cohort was two (there was no clear trend over time). Across the time series combined, a higher median number of psychiatric stays were observed among females (3) than males (2) and among individuals aged 35 and over (3) compared to those aged under 35 (2) (data not shown in tables).

3.4.4: Criminal Justice System

Police Custody

Continuing issues accessing police custody records meant that contact data were missing for 22% (140) of the 2015 cohort and 9% (72) of the 2016 cohort. Where known, 33% (164) of people who had a DRD in 2015 and 28% (206) people who had a DRD in 2016 had been in police custody in the six months prior to death (Table 28).

In 2016, 40 DRDs (5%) occurred within four weeks of a release from police custody. The equivalent number for 2015 was 38 (6%). Further detailed information on the time between police custody and death is shown in Table 29.

Prison Custody

Where known[20], slightly over half of the 2016 cohort (399, 53%) had ever been in prison and 12% (87) had spent time in prison in the six months prior to death (Table 30). There was no clear trend in experience of being in prison custody at any time. However, there was a decrease in experience of a prison custody release within six months of death (2009: 20%). Further information on the time between prison custody and death is shown in Table 31. Information on the number and percentage of opioid-related deaths occurring within four or 12 weeks of release from prison custody (based on NRS's National Statistics) is also provided in ISD's National Naloxone Monitoring Report [20].

Over the entire time series, differences between groups were evident in relation to experience of prison custody. Experience of prison at any time prior to DRD was more common among males than females (57% compared to 31%) and among PWID10+ (67%) than among groups with less severe/prolonged drug use (NK-PWUD: 16%, PWUD: 42%,

[20] Prison custody data were missing in over 10% of records in 2013 (49, 10%) and 2014 (67, 12%). However, data on time since last prison custody episode were available for over 90% of decedents in 2015 and 2016.

PWID<10: 60%) (there was no difference by age). Experience of recent prison custody was also higher among males (17% compared to 7% of females), among individuals aged under 35 (21% compared to 10% of individuals aged 35 and over) and highest among People who Injected Drugs for less than 10 years (PWID<10: 21%, compared to NK-PWUD: 3%%, PWUD: 11%, PWID10+: 15%) (data not shown in tables).

3.4.5: Contact with Services Providing Specialist Drug Interventions

While drug treatment episodes and hospital admissions may directly address individuals' substance use, specialist interventions are also provided in prison and police custody. These non-drug treatment services also provide opportunities to detect/address problem drug use, promote overdose awareness and deliver harm reduction interventions (e.g. providing Take Home Naloxone).

In 2016, 77% (632) of people who had a DRD had been in drug treatment, in prison or police custody or discharged from hospital in the six months prior to their death. The percentage of individuals in contact with these services in the six months prior to death increased over the time series (2009: 71%, 2010: 67%, 2011: 71%, 2012: 74%, 2013: 69%, 2014: 70%, 2015: 74%) (Table 32).

In 2016, 85% (524/618) of individuals who had an opioid-related death were in contact with these services in the six months prior to death. This percentage increased over the time series (2009: 72%) (Table 32).

3.4.6: Summary

- Over half of people who had a DRD (55%) were in recent (within six months) contact with drug treatment services; recent drug treatment service contact increased over time.
- The percentage of people who had a DRD who had seen their GP regarding their drug misuse in the past six months was significantly lower in 2015 (14%) and 2016 (12%) than in any previous NDRDD yearly cohort.
- Forty-six percent of individuals who died (46%) were in recent contact with non-drug treatment services (e.g. social work, housing). Mental health service contact among DRDs increased over time.
- Thirty percent of people who had a DRD had been discharged from a general acute hospital in the six months prior to death.
- In 2016, where known, 28% of people who had a DRD had been in police custody in the six months prior to death.
- In 2016, where known, 12% of people who had a DRD had been in prison in the six months prior to death.
- In 2016, 77% of individuals (85% of those whose death was opioid-related) were in contact with a service with the potential to address their problem drug use or deliver harm reduction interventions in the six months before death.

3.5: Circumstances of Death

3.5.1: Time and Location[21]

Information on the distribution of Drug-Related Deaths (DRDs) by day and month is available in Tables 33 and 34. Across the time series combined, the highest percentage of deaths occurred on a Sunday (16%) and in May (10%). However, differences were not significant - neither the day of death nor the month of death were unequally distributed.

In 2016, the NHS Boards where the highest number of DRDs occurred were Greater Glasgow & Clyde (238), Lothian (112) and Lanarkshire (107) (Table 35).

Based on the normal place of residence of people who had a DRD, the NHS Boards with the highest crude mortality rates in 2016 were Ayrshire & Arran (23 deaths per 100,000 population), Greater Glasgow & Clyde (21) and Lanarkshire (16) (Table 36)[22].

3.5.2: Place of Drug Use and Place of Death

Where known, 67% (527) of people who had a DRD consumed the drugs present at death in their own home, while 24% (191) consumed them in another person's home (Table 37). The percentage of individuals who consumed drugs at home increased across the time series (2009: 54%).

Where known, 62% of people who had a DRD (502) died in their own home and 21% (168) died in another person's home. One tenth of individuals (79) died in hospital (Table 38). The percentage of people who died in their own home has increased over time (2009: 51%).

3.5.3: Scene of Overdose

Where known, another person was present at the scene of the fatal overdose in 56% (439) of DRDs in 2016. The percentage of DRDs where another person was present decreased over the time series (2009: 64%). Presence of another person in the same room was recorded in 206 (26%) DRDs, broadly similar to previous years (Table 40).

Across the time series, presence of another person at the scene of fatal overdose was much lower among people who lived alone all of the time (34%) than among those who did not (75%). Similarly, fatal overdoses were less likely to be witnessed where the person was living in their own home (49%) than where they were not (67%) (data not shown in tables). As discussed in Section **3.1.3**, living in one's own home and living alone all of the time were related to age (higher among individuals aged 35 and over than among younger individuals). Age was also related to the percentage of fatal overdoses which were witnessed by another person (52% among individuals aged 35 and over, 66% among individuals aged under 35) (Table 39). Within the population of people who use drugs, ageing appears to be associated with an increase in the number of people for whom there is a reduced probability of effective intervention in the event of a drug poisoning or overdose.

[21] NRS examines the geographical distribution of DRDs and provides rates per head of population and rates per estimated number of 'problem drug users' in their National Statistics [1,2]. However, as the main NDRDD cohort is restricted to non-intentional deaths and is based upon calendar year rather than the year in which death was registered, similar analyses are also included in this report.
[22] Due to small numbers of DRDs, figures for island NHS Boards should be interpreted with caution.

Also with reference to Section 3.1.3, women were more likely to be living with a partner/spouse (31%) compared to men (16%). Females also had a higher percentage of fatal overdoses witnessed by another person (64%) than males (55%) (Table 39). Across the time series combined, it was more likely for another person to be present at the scene of a fatal overdose for females who were living with a partner/spouse (83%) than for females who were not (51%) (data not shown in tables).

In 2016, an ambulance attended the scene of 85% (695) of DRDs; a similar percentage to previous years (the lowest percentage was recorded in 2015 (494, 77%)). Among the 123 (15%) cases where an ambulance did not attend, there were 33 deaths (4%) when an ambulance was not required as the person was beyond medical intervention (Table 41).

Where known, an attempt was made to resuscitate the individual in 44% (353) of cases (Table 42). In 63% (222) of these cases, resuscitation was attempted by ambulance staff (Table 43)[23].

3.5.4: Naloxone Availability and Use[24]

Naloxone is an opioid antagonist which is used to reverse the effects of an overdose with drugs such as heroin [20]. In 2016, opioids (methadone, heroin/morphine or buprenorphine) were implicated in 618 of the 792 DRDs with known toxicology (78%). Whether there was a 'Take-Home' Naloxone (THN) kit available was known in 67% (414) of opioid deaths. THN was reported to be available at the scene of overdose in 34 of these deaths (8%) and was administered on 22 occasions (65% of cases where available) (Table 44).

Previous THN supply was known in 89% (724) cases in the 2016 cohort. Where known, 26% (189) of the 2016 cohort had been supplied with THN before death. THN supply before death increased over time among the cohort (2012: 3%, 2013: 8%, 2014: 15%, 2015: 20%). Among these cases, where known[25], naloxone was available at the scene of overdose in 30% (17) of DRDs (2012: 40%, 2013: 31%, 2014: 38%, 2015: 41%) (Table 45) and, where available, was used in 64% (9) of deaths (2012: 100%, 2013: 25%, 2014: 69%, 2015: 45%)[26]. Apart from one death in 2015, in all cases where naloxone was available but not used, no other persons were present at the scene of overdose or they were not in the same room (data not shown in tables).

[23] Multiple people (in differing roles) may have attempted to resuscitate the same individual.
[24] In 2010, questions were added to the NDRDD form to collect data on the availability of 'take-home' naloxone. However, an examination of 2010 and 2011 NDRDD data suggested that these questions were not solely measuring 'take-home' naloxone (as had been intended) but administration by a range of people including relatives, paramedics and hospital staff. The naloxone questions in the 2012 proforma were refined to specify administration of 'take home' naloxone provided directly to individuals at risk of an opioid overdose. Due to this change, naloxone availability and use from 2012 is not comparable to previous years.
[25] Naloxone availability at the scene of overdose was poorly recorded among those supplied with THN (known in only 30% (56/189) of 2016 cases.
[26] Naloxone availability at DRDs in a home environment (own home, other's home, hostel, B&B/temporary accommodation) was 31% (14/45) in cases where availability was known.

3.5.5: Summary

- In 2016, the NHS Boards with the highest crude mortality rates for DRDs were Ayrshire & Arran (23 deaths per 100,000 population), Greater Glasgow & Clyde (21) and Lanarkshire (16).
- In 2016, around two-thirds of people consumed the drugs in (67%) and died in (62%) their own home. The percentage of people in each of these categories increased since 2009.
- Over half of DRDs (56%) occurred when others were present at the scene of the overdose. The percentage of deaths where others were present at the scene of overdose (and potentially able to intervene) was lower where individuals lived alone all of the time (34%) or were aged 35 or over (52%), than in relevant comparison groups.
- Where known, take-home naloxone (THN) supply has increased over time (26% of 2016 DRDs). Among people who had previously been supplied with THN, availability at the scene of death was low (30%).

3.6: Toxicology Data

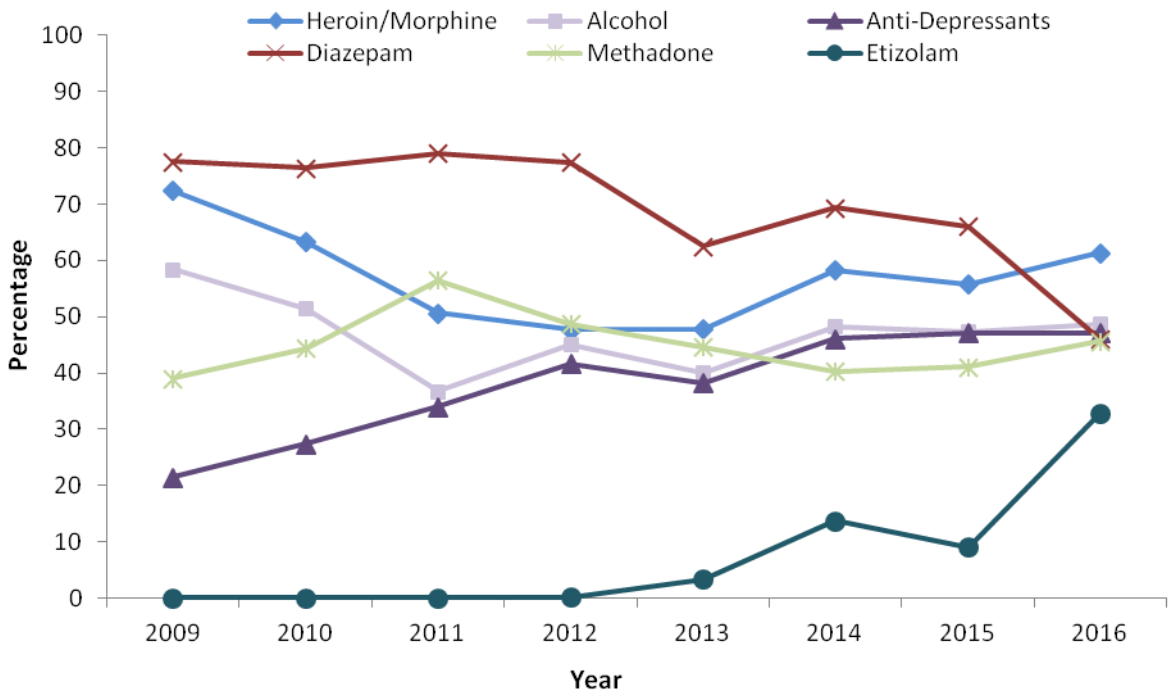
Information on the *presence* of a drug at post mortem is collected as part of the NDRDD dataset. Since 2011, ISD has also received pathology information from National Records of Scotland (NRS) about whether substances were (i) *implicated* in the death and (ii) *not implicated* in the death.

The determination as to whether substances were implicated in, or potentially contributed to, death is complex and lies with the pathologist who will consider toxicology data in combination with pathological and circumstantial evidence before coming to a conclusion. The relationship between presence and implication is not straightforward. Some drugs are more potent than others and there is significant risk to life even at so-called 'therapeutic' levels, particularly when ingested with other drugs or alcohol. Conversely, other drugs are considered to pose less risk to life, even when an excess of the drug is ingested. See **Appendix 1** for further information about these data.

3.6.1: Drugs Present at Time of Death

NDRDD toxicology results showing the drugs *present* in the body at the time of death (but not necessarily contributing to the death) indicated that the vast majority of DRDs (796, 97%) had multiple drugs present at the time of death. This was similar to previous cohorts (2009: 97%, 2010: 98%, 2011: 97%, 2012: 96%, 2013: 92%, 2014: 96, 2015: 97% - Table 46).

Figure 7: Most Common Drugs Present at Post Mortem (NDRDD: 2009-2016)



- In 2016, heroin/morphine was the drug most commonly found at post mortem (502, 61%). The percentage of DRDs with heroin/morphine present at post mortem was higher than in any cohort since 2010 (63%). Following a decrease from 2009 to 2012, a trend of

increasing heroin/morphine presence has been in evidence since 2012 (48%) (Table 46 and Figure 7).

- Alcohol was the second most common drug found at post mortem in 2016 - present in almost half of DRDs (398, 49%). Following a decrease from 2009 to 2011, a trend of increasing alcohol presence has been evident since 2011 (37%).
- Anti-depressants were present in 385 (47%) DRDs in 2016. The percentage with anti-depressants present increased over the time series (2009: 21%).
- Between 2009 and 2015, diazepam was the drug most commonly found present at post mortem in each NDRDD year cohort. In 2016, diazepam prevalence decreased significantly to 46% (376) and it was the fourth most common drug found at post mortem. This reduction was part of a general decreasing trend over the time series (2009: 78%). However, the 2016 percentage was also significantly lower than in any other year.
- In 2016, methadone was present in 46% of DRDs (373). Methadone presence at post mortem continues to be lower than in 2011 (56%), when it was present among more DRDs than heroin/morphine.
- In 2016, etizolam presence at post mortem increased sharply to 33% (269) of people who had a DRD. No deaths with etizolam present were recorded until 2012 and the 2016 percentage was significantly higher than in any previous year. Growth in the illicit market for benzodiazepine-type 'Novel' Psychoactive Substances (hereafter called 'benzo-type NPS') such as etizolam is highly likely to be associated with the reduction in diazepam use in recent NDRDD cohorts.
- The next most common drugs found present at post mortem were codeine[27] (262, 32%), cannabis (247, 30%), gabapentin (197, 24%) and 'Other drugs' (176, 22%).
- The percentage of DRDs with codeine, cannabis, gabapentin, 'other drugs', cocaine or pregabalin present all increased over the time series. In 2009, these drugs were present at post mortem among 20%, 12%, 0%, 13%, 14% and 0% of individuals respectively.
- In 2016, several emerging drugs were increasingly evident in post mortem toxicology data. Diclazepam (132, 16%) (a benzo-type NPS) and alprazolam (31, 4%) (a benzodiazepine also known by the brand name 'Xanax') were present at post mortem among significantly more DRDs than in any other year cohort.
- There was no evidence that strong opioids such as oxycodone (14, 2%) and fentanyl (7, 1%) had increased in prevalence over the time series or in 2016 compared to other years.

Drug presence by sex

Drugs present at post mortem by sex are shown in Table 47. In 2016, for females, anti-depressants (155, 65%) were the substances most commonly found at post mortem, followed by heroin/morphine (128, 53%) and methadone (123, 51%). For males, heroin/morphine (374, 65%), alcohol (294, 51%) and diazepam (273, 47%) were the substances most commonly found present at post mortem.

In 2016, anti-depressants (65%), methadone (51%), gabapentin (31%), pregabalin (23%) and zopiclone (10%) presence were all higher among females than males (40%, 43%, 21%, 16%

[27] It is important to note that codeine may be present in post mortem toxicology as a result of acetylcodeine being a naturally occurring impurity in illicit heroin rather than because of use as a prescribed or 'over the counter' medication.

and 3% respectively). Conversely, heroin/morphine (65%), alcohol (51%), cannabis (33%) or cocaine (20%) were all more likely to be found present at post mortem among males than among females (53%, 43%, 23% and 14% respectively).

Drug presence by age

Drugs present at post mortem by age are shown in Table 48. In individuals aged under 35, heroin/morphine (146, 63%), alcohol (116, 50%) and diazepam (96. 41%) were the substances most commonly found at post mortem. In people aged 35 and over, heroin/morphine (356, 61%), methadone (295, 50%) and anti-depressants (294, 50%) were the substances most commonly found present at post mortem.

In 2016, methadone (50%), anti-depressants (50%) and gabapentin (26%) presence were all higher among people aged 35 and over than among younger individuals (34%, 39% and 19% respectively). Cannabis was the only substance recorded among a significantly higher percentage of people aged under 35 (36%) than among older individuals (28%).

3.6.2: Combinations of Drugs Present at Time of Death

In 2016, opioids (heroin/morphine, methadone or buprenorphine) and benzodiazepines (e.g. diazepam, etizolam, diclazepam) was the most common combination of drugs found at post mortem (563, 69%) (Table 49). The main combinations within this group were heroin and benzodiazepines (419, 51%), followed by methadone and benzodiazepines (328, 40%). Benzodiazepines and alcohol were present in 36% of DRDs (295). The combination of heroin and gabapentin or pregabalin became more prevalent over the time series, increasing from 0% (0) in 2009 to 23% (191) of DRDs in 2016.

Certain drugs are known to prolong the heart's QT interval[28], potentially leading to a life threatening ventricular arrhythmia called 'torsades de pointes'. Drugs known to be associated with QT prolongation should not be co-prescribed. A small percentage of the cohort had a combination of drugs known to prolong the QT interval (methadone and anti-psychotics or citalopram) present at post mortem (2016: 65, 8%). There was no overall trend in the percentage of deaths where this combination of drugs was found present (2009: 7%, 2010: 7%, 2011: 10%, 2012: 2%, 2013: 7%, 2014: 8%, 2015: 8%).

In 2016, examining combinations of drugs present by sex, combinations involving heroin/morphine were more likely to be observed among males than females (e.g. heroin/morphine and alcohol (Males: 195, 34%; Females: 58, 24%). Conversely, the combination of methadone and benzodiazepines was more prevalent among females than males (Males: 213, 37%; Females: 115, 48%), as was the combination of anti-depressants and dihydrocodeine (Males: 44, 8%; Females: 35, 15%) (data not shown in tables).

By age group, drug combinations involving methadone were more likely to be observed among people aged 35 and over at the time of death than among younger individuals, potentially reflecting the higher percentage of older individuals in treatment (data not shown in tables).

[28] The time between the start of the Q wave and the end of the T wave in the heart's electrical cycle, representing depolarization and repolarization of the ventricles.

- Methadone and benzodiazepines (under 35: 73, 31%; 35 & over: 255, 44%)
- Methadone and heroin/morphine (under 35: 51, 22%; 35 & over: 169, 29%)
- Methadone and alcohol (under 35: 32, 14%; 35 & over: 118, 20%)

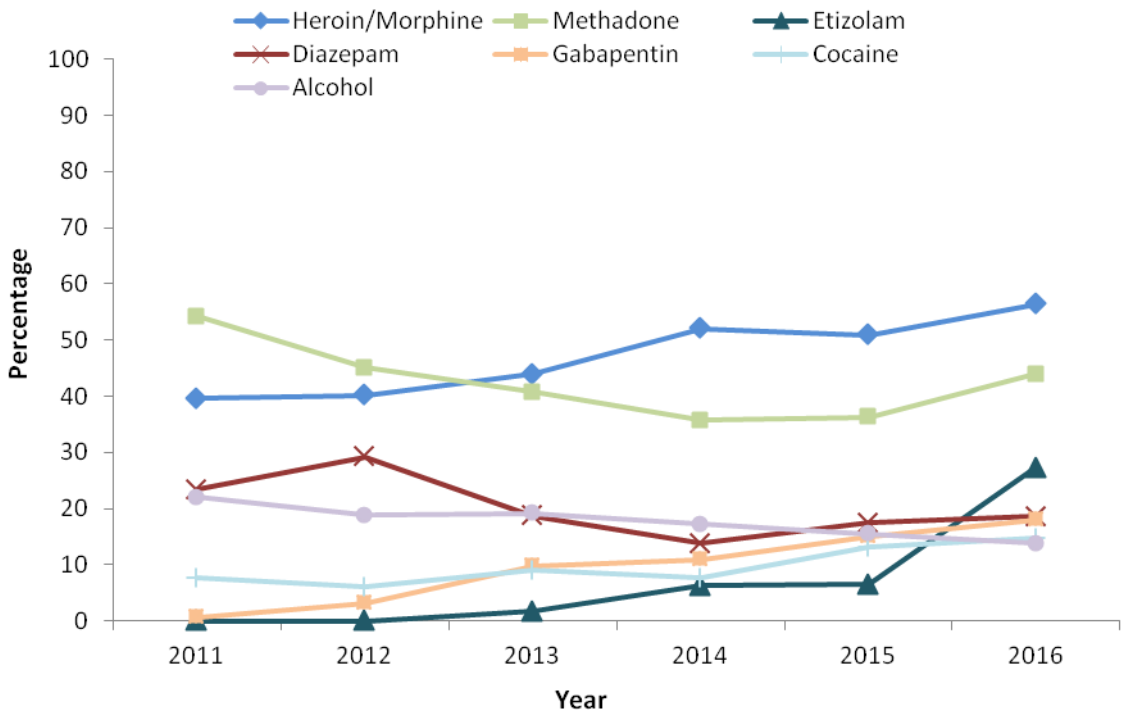
3.6.3: Drugs Implicated in Death

Additional information on drugs implicated in, or potentially contributing to, death has been supplied by NRS since 2011 and was available for 630 (98%) NDRDD non-intentional deaths in 2015 and for 802 (98%) deaths in 2016. Among these cases, multiple drugs were implicated in 71% (449) of 2015 NDRDD deaths and 82% (658) of 2016 NDRDD deaths. While the 2015 percentage was consistent with previous years, multiple drug implication was significantly higher in 2016 than in any other year from 2011 onwards (Table 50).

In 2016, opioids (methadone, heroin, morphine or buprenorphine) were *implicated* in 618 DRDs with NRS toxicology information. This was the highest number of opioid implicated deaths recorded. In percentage terms, opioids were implicated in 77% of DRDs with NRS toxicology information in 2016 - the highest percentage since 2011 (359, 83%) and significantly higher than the equivalent percentage in 2015 (455, 72%) (Table 50).

In 2016, heroin/morphine was the drug most frequently implicated in deaths (447, 56%), followed by methadone (348, 43%), etizolam (216, 27%), diazepam (147, 18%), gabapentin (143, 18%) and cocaine (117, 15%) (Table 50 and Figure 8).

Figure 8: Most Common Drugs Implicated in Death (NDRDD/NRS: 2011-2016)



The main changes in drug implication over the time series have been:

- The gradual increase in heroin/morphine implication since 2011 (40%).
- Sudden increases in benzo-type NPS implication in 2016. Etizolam implication was slowly increasing across the time series, reaching 7% of DRDs (with implication data) in 2015, before sharply increasing to 27% in 2016. Among a smaller number of DRDs, an even sharper increase in diclazepam implication was observed between 2015 (1%) and 2016 (9%).
- The gradual increases in gabapentin and pregabalin implication since 2011 (1% and 0% respectively). Gabapentin and pregabalin (implicated in 8% of deaths in 2016) are prescription drugs used to treat epilepsy and chronic pain. However, there is a significant illicit market for these controlled drugs, which are known to 'potentiate' or enhance the effects of opioids. In 2016, gabapentin or pregabalin were implicated in 197 deaths (25% of cases with implication data). Opioids (heroin/morphine, methadone or buprenorphine) were implicated in 85% (168) of these gabapentin or pregabalin deaths (data not shown in tables).
- Recent increases in the percentage of DRDs where cocaine was implicated. Implication was fairly static up to 2014, ranging between 6% and 9% of deaths, then increased to 13% in 2015 and 15% in 2016.
- The decrease in alcohol implication in drug-related deaths over the time series from 22% in 2011 to 14% in 2016.

Drug implication by sex

Drugs implicated in death by sex are shown in Table 51. In 2016, for males, heroin/morphine (330, 59%) was most commonly implicated in death, followed by methadone (229, 41%) and etizolam (140, 25%). For females, methadone (119, 50%), heroin/morphine (117, 49%) and etizolam (76, 32%) were most commonly implicated in DRDs.

In 2016, methadone (50%), etizolam (32%), gabapentin (23%), anti-depressants (16%), dihydocodeine (16%), codeine (7%) and zopiclone (4%) implication were all higher among female rather than male DRDs (41%, 25%, 15%, 8%, 10%, 3% and 1% respectively). Heroin/morphine (59%), cocaine (16%) and ecstasy (5%) implication were each more prevalent among male rather than female DRDs (49%, 10% and 1% respectively).

Drug implication by age

Drugs implicated in death by age are shown in Table 52. In 2016, heroin/morphine, methadone and etizolam were the substances most commonly implicated in death among both age groups (individuals aged under 35 years and individuals aged 35 years and over).

In 2016, methadone (47%) and anti-depressants (12%) were implicated in a higher percentage of deaths among individuals aged 35 years and over than among younger persons (34% and 6% respectively). Conversely, etizolam (32%) and ecstasy (8%) were implicated in a higher percentage of deaths among people aged under 35 years than among older (aged 35 and over) individuals (25% and 2% respectively).

Relative drug implication[29]

Despite only featuring in a small number of cases in 2016, ecstasy (28)[30] and oxycodone (14) were implicated in 100% of DRDs where they were present at post mortem (Table 53). Among drugs more commonly seen in DRDs, methadone was implicated in 95% (348/365) of DRDs where present, followed by heroin/morphine (92%: 447/487). Where found present at post mortem, etizolam was implicated in 80% (216/269) of deaths and diclazepam in 56% (73/131) of deaths.

In contrast, although diazepam, alcohol and anti-depressants were among the drugs most commonly found at post mortem, they were implicated in less than half of deaths where present (diazepam: 40% (147/367): alcohol; 28% (109/391); anti-depressants: 22% (84/379)).

3.6.4: 'Novel' Psychoactive Substances[31]

Since publication of the previous NDRDD report in 2016, the Psychoactive Substances Act [21] came into force across the United Kingdom, prohibiting (since 26 May 2016) the production, sale and supply of psychoactive[32] substances (other than those specifically exempted by the Act). This legislation was a direct response to increasing diversity within global drug markets over the last decade[33] and challenges in restricting the availability of 'Novel' Psychoactive Substances (NPS) via the Misuse of Drugs Act 1971 [23,24].

Recent NRS [1,2] and NDRDD [6-8] reports have included sections on NPS.

- In 2015, NRS counted 112 DRDs (including deaths by suicide) where NPS were either present or implicated in death, six of which were excluded from the overall DRD total (these were outwith the NRS definition, mainly due to uncontrolled NPS being the only substance present).
- In 2016, NRS counted 346 DRDs where NPS were either present or implicated in death, of which seven were not included in the overall total of DRDs.[34]

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[29] In order to calculate drugs implicated as a percentage of drugs present, the 16 cases with no NRS data were removed, resulting in toxicology data for drugs present and drugs implicated being available for 802 individuals in 2016. In 2015, 13 cases were removed, leaving 643 for analysis.

[30] In one 2016 death, no toxicology data was submitted to NDRDD but NRS implication data indicated that ecstasy was implicated in death. Therefore, ecstasy was found present in 27 deaths and implicated in 28 cases.

[31] The term 'NPS' has been used in NDRDD reports in preference to 'Legal Highs' because the latter term failed to recognise a) changes in the controls applied to relevant substances and b) the differential effects of those substances. However, it should be noted that in this report 'NPS' is coterminous with 'Legal Highs', 'synthetic substances' and other terms applied to this group of substances.

[32] Defined by the Act [21] as anything which 'by stimulating or depressing the person's central nervous system ... affects the person's mental functioning or emotional state'.

[33] By the end of 2016, the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) had been notified of 628 NPS via its EU Early Warning System, including 164 substances reported in 2015 and 2016 [22].

[34] It is important to note that, in both 2015 and 2016, the NPS-related deaths reported by NRS were largely a subset of the DRDs on which National Statistics were published [1,2]. Details of the NPS definition and inclusion criteria used by NRS are available in **Annex A** of the NRS report on 2016 deaths and on the **NDRDD pages** of the ISD website.

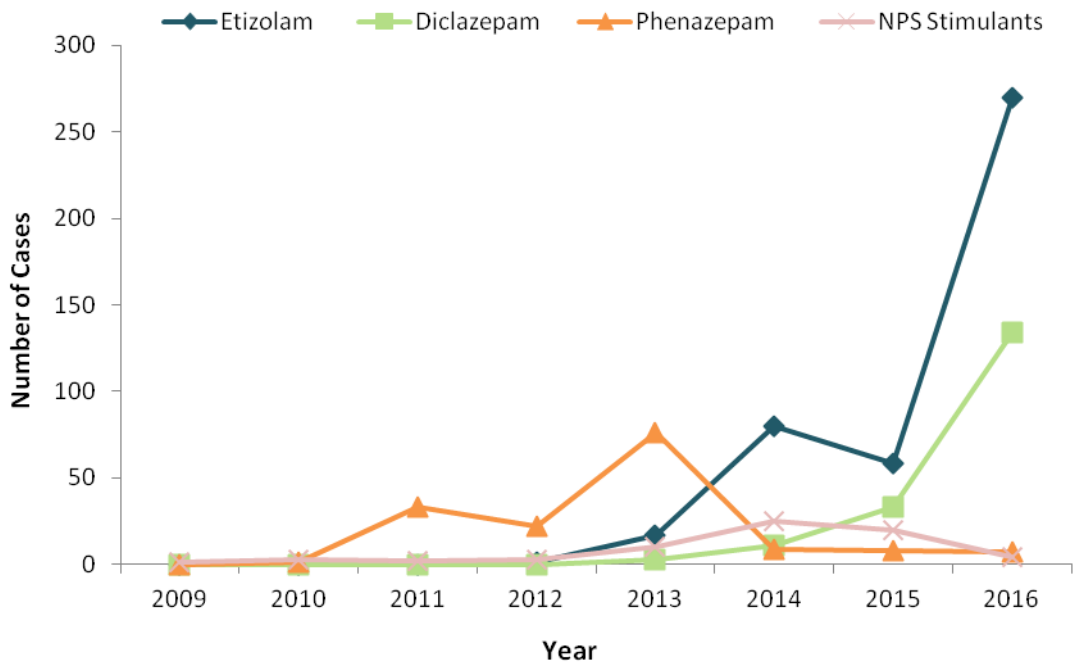
As the NDRDD cohort is based on the NRS definition, cases where only uncontrolled NPS were involved are also excluded from this analysis. 'NPS-related' deaths includes cases where NPS were present or implicated. NDRDD NPS-related death figures are based on year of death rather than year of registration (used by NRS) and are a subset of the non-intentional deaths analysed in this report.

The number of NPS-related DRDs in 2016 was 363 (44%). This was significantly higher than the number and percentage of deaths in the preceding three years (2013: 109, 22%; 2014: 112, 19%; 2015: 103, 16%) (Table 54).

All NPS-related DRDs in 2015 and 2016 involved consumption of multiple substances. The percentage of NPS-related deaths with benzo-type NPS drugs recorded within toxicology increased from 81% (83) in 2015 to 98% (355) in 2016, while the percentage featuring stimulant-type NPS fell from 18% (19) in 2015 to 1% (4) in 2016. Three deaths in 2015 (3%) and four in 2016 (1%) were related to use of cannabinoid-type NPS (Table 54). In 2016, three deaths were related to other types of NPS.

Deaths related to etizolam (a benzo-type NPS) increased sharply from 58 in 2015 (56% of NPS-related deaths or 9% of all DRDs) to 270 in 2016 (74% of NPS-related deaths or 33% of all DRDs) (Figure 9). Etizolam was first identified within DRD toxicology in 2012 and has been found in a total of 426 DRDs (63% of which occurred in 2016). The number of diclazepam-related cases also increased significantly in 2016 (since first appearing in 2013 there have been a total of 181 cases, 134 (74%) of which occurred in 2016). Since 2013, less than ten phenazepam-related DRDs have occurred annually (of a total of 156 cases, 76 (49%) occurred in 2013) (data not shown in tables).

Figure 9: NPS Recorded Within DRD Toxicology (NDRDD: 2009-2016)



Due to small numbers, stimulant-type NPS have been grouped together in Figure 9.

- In 2015, 20 DRDs involved stimulant-type NPS. Of these deaths, eight (40%) were related to the use of synthetic cathinones (e.g. mephedrone, mexedrone), seven (35%) to methiopropamine and five (25%) to ethylphenidate.
- In 2016, only four DRDs involved stimulant-type NPS. Of these, two deaths (50%) involved synthetic cathinones and two (50%) involved ethylphenidate.

Examining all NPS-related deaths in 2016, the specific drugs most commonly present alongside NPS in toxicology were heroin (232, 64%), methadone (194, 53%), anti-depressants (172, 47%), alcohol (158, 44%) and cannabis (127, 35%) (Table 54). Diazepam presence (127, 35%) decreased in 2016 (from 2011 and 2014, between half and two thirds of NPS DRDs had diazepam present).

Additional information on drugs implicated in, or potentially contributing to, death was available for 362 (99.7%) NPS-related deaths in 2016[35]. There was direct NPS implication in 76% (275) of NPS-related DRDs, higher than in any previous year (2011: 49%, 2012: 66%, 2013: 49%, 2014: 49%, 2015: 65%) – data not shown in tables. Overall, NPS were implicated in 34% (275/802) of 2016 DRDs with relevant information – higher than in any other year (2011: 4%, 2012: 5%, 2013: 11%, 2014: 10%, 2015: 10%) (data not shown in tables).

3.6.5: Summary

- In 2016, almost all (97%) DRDs occurred after the consumption of multiple substances.
- Heroin/morphine (61%), alcohol (49%) and anti-depressants (47%) were the most common substances found at post mortem in 2016 – all have increased in prevalence since 2011 (see Figure 7).
- Heroin/morphine (56%), methadone (43%) and etizolam (27%) were the substances most commonly implicated in deaths in 2016. The percentage of deaths where heroin/morphine or etizolam were implicated increased over time (see Figure 8).
- Opioids (methadone, heroin, morphine or buprenorphine) were implicated in over three quarters (77%) of DRDs.
- Gabapentin and pregabalin implication increased over time, potentially due to their use to enhance the effects of opioids. In 2016, gabapentin or pregabalin were implicated in 197 deaths, 85% (168) of which were also related to the use of opioids.
- Diazepam presence at post mortem decreased sharply in 2016 (46%), while presence of etizolam (a benzo-type NPS) increased sharply (33%). Etizolam was twice as likely as diazepam to be implicated in deaths where it was found present (80% vs. 40%).
- NPS-related deaths increased sharply in 2016 due to the number of deaths involving benzo-type NPS (etizolam and diclazepam). Only four deaths involved the use of stimulant-type NPS (e.g. mephedrone).

[35] For a further three deaths, a finding of multi drug toxicity was recorded, with no specific substances identified as potentially contributed to death.

3.7: Prescribing

People who use drugs have higher rates of morbidity and mortality than the rest of the population. As a result, rates of prescribing for medical and psychiatric conditions are likely to be higher than in the general population. The prescribing burden for this group is additionally increased by Opioid Substitution Therapy (OST) prescribing – the dominant form of treatment for opioid dependence.

In the toxicology findings (**Section 3.6**), prescribed drugs (e.g. methadone, buprenorphine, diazepam, gabapentin, pregabalin, anti-depressants) were often present and/or implicated in deaths. Use of illicit substances alongside prescribed medications can increase drug toxicity and the risk of adverse health-related outcomes (particularly for individuals prescribed OST, where higher risks of overdose and blood borne virus infection have been documented [25]).

This section describes the extent of prescribing among people who had a DRD and includes comparisons with the presence of prescribed drugs at post mortem, highlighting potential issues associated with compliance and/or diversion of prescribed drugs. Deaths among individuals prescribed OST are described in detail, to determine the extent of concomitant prescribing and/or illicit drug use.

3.7.1: OST prescribing

Fifty-three percent of DRDs in the NDRDD occurred when people had not been in recent contact with specialist drug treatment services (2,223/4,224). Further, among individuals whose death was opioid-related[36], both the percentage in contact with drug treatment services at the time of death (2009: 33%, 2016: 52%) (data not shown in tables) and the percentage prescribed an OST at the time of death (2009: 22%, 2016: 46%) (Table 10) increased over the time series.

As discussed in Sections **3.2.3** and **3.4.1**, OST prescription and drug treatment contact at the time of death were both more common among females and people aged 35 or over. Therefore, demographic changes over time may partly explain the increasing number of deaths 'in treatment'. However, these increases may also lead to questions about treatment interventions and whether they can protect against adverse health outcomes. Aspects of treatment such as OST dosing and adherence are explored here, along with the potential impact of non-compliance with treatment.

OST dosage and supervision

In 2016, 64% (188) of those receiving methadone or buprenorphine (with or without naloxone) were prescribed a normal daily therapeutic dose (methadone: 60-120mg, buprenorphine: 12-16mg) as recommended by the 'Orange Guidelines' [25]. One-third (98, 33%) were prescribed a lower than recommended dose and 3% (9) were prescribed a higher than recommended dose (Table 55). While the percentage prescribed a normal daily

[36] Since 2011, NRS has supplied data on drugs implicated in death. Opioid-related deaths are those where heroin, morphine, methadone or buprenorphine were implicated, or potentially contributed to death. For years before 2011, presence of those drugs in the body at post mortem is used as a proxy indicator.

therapeutic OST dose has fluctuated over the time series, it has not been lower than 50% of relevant cases in any year.

In 2016, the mean methadone dose was 69.7mg daily in 2016 – this was consistent with the average range over the time series (between 69mg and 75mg). In 2016, the mean buprenorphine dose was 9.8mg daily – the mean buprenorphine dose varied considerably over the time series due to the low number of cases observed each year (Table 55).

Mean daily methadone dosages were analysed by sex and age group. No significant difference was found in the average daily methadone dose prescribed to males (2009-2016: 69.5ml, 2016: 68.8ml) and females (2009-2016: 72.4ml, 2016: 71.1ml) across the entire time series combined, nor in 2016. Likewise, the average daily methadone dose of individuals under 35 (2009-2016: 68.2ml, 2016: 68.3ml) was not significantly different (across the time series or in 2016) than that observed among individuals aged 35 and over (2009-2016: 71.3ml, 2016: 69.9ml) (data not shown in tables).

Since 2010, approximately three quarters of OST prescriptions among people who had a DRD have been supervised[37]. In 2016, 78% (227) of OST prescriptions were supervised (Table 56).

Eighty two per cent (229) of people who had a DRD in 2016 and were prescribed OST had received their medication for one year or more and 22% (61) had received it for over ten years. The percentage of individuals prescribed an OST drug for less than one year decreased over the time series (2009: 22, 29%, 2016: 50, 18%) (Table 57).

OST adherence and effectiveness

In 2016, 99% (272) of those receiving methadone had methadone present in their body at post mortem compared to 19% (101/542) of those not prescribed methadone. While it is not possible to ascertain if people had consumed illicit methadone in addition to their prescribed methadone, presence among prescribees was higher in 2016 than in any other year. Methadone presence among non-prescribees is likely to vary according to the availability of illicit opiates. Therefore while 45% of non-prescribees had methadone present at post mortem in 2011 (during the heroin drought [26-29]) a decreasing trend has been in evidence since (2012: 33%, 2013: 25%, 2014: 22%, 2015: 17%) (Table 58).

In 2016, buprenorphine presence was recorded at post mortem in 72% (18/25) of individuals prescribed this drug at the time of death and in 4% (35/793) of non-prescribees. Over the entire time series (2009-2016), 56% of prescribees and 3% of non-prescribees had buprenorphine present at post mortem (data not shown in tables). Because of the small number of individuals prescribed this relatively new OST treatment, there was considerable variation between years in the percentage with the drug present at post mortem. However, both in 2016 (72%) and across the time series (56%), the percentage of buprenorphine prescribees with buprenorphine present at post mortem was significantly lower than the equivalent percentages among methadone prescribees (99% & 95% respectively).

[37] 'Supervision' may cover a wide range of scenarios from daily (7 day) supervised consumption to supervised consumption once per week on the day of collection only. Recording of OST supervision in NDRDD is based on the last dose dispensed prior to death.

In 2016, among people who had a DRD and were in receipt of an OST, 62% (186) had heroin/morphine present at post mortem, compared to 61% (316) of individuals not prescribed an OST. In 2016, the percentage of OST prescribees with heroin/morphine present was the highest recorded and statistically higher than in any other year cohort except 2009 (55%). Although the difference was not statistically significant, 2016 was the first year in which heroin/morphine presence was higher among OST prescribees than non-prescribees (Table 58).

In 2016, heroin/morphine was present at post mortem in a higher percentage of individuals who were prescribed buprenorphine at the time of death (22/25, 88%) than among individuals prescribed methadone at the time of death (164, 59%). Similarly, heroin/morphine presence was higher among buprenorphine prescribes across the time series (buprenorphine: 72/88, 82%; methadone: 544/1,138, 48%) (data not shown in tables).

3.7.2: Methadone-Related Deaths

While it is not possible to ascertain if people had consumed additional methadone 'on top' of the amount they were prescribed, methadone-implicated deaths among individuals prescribed methadone provide a potential basis for examining the extent to which dosing regimens may have potentially contributed to death or whether DRDs occurred in spite of safe prescribing practices.

In 2016, almost three quarters of individuals for whom methadone was implicated in death (258/348, 74%) were in receipt of a methadone prescription prior to death (Table 59). These individuals were generally on long-term, supervised prescribing regimens within recommended dose guidelines:

- 81% (202) received their prescription on a supervised basis (Table 60);
- 82% (199) had been prescribed methadone for one year or more (Table 61); and,
- 68% (173) were prescribed a normal daily therapeutic dose (60-120mg) [25]. Twenty-nine percent (75) were prescribed less than the recommended dose but it is not possible to determine if these individuals were in the process of having their dose increased to a recommended therapeutic dose (Table 62).

In methadone-implicated deaths among people prescribed methadone, there have only been two cases since 2011 where no other drugs were present at post mortem. All 258 cases observed in 2016 had other drugs present at post mortem, the most common being heroin/morphine (154, 60%), anti-depressants (151, 59%) and diazepam (132, 51%). The percentage of methadone-implicated deaths with heroin/morphine present was higher than in any other year (2011: 36%, 2012: 36%, 2013: 30%, 2014: 48%, 2015: 48%), while the percentage with diazepam present was lower than in any other year (2011: 85%, 2012: 86%, 2013: 73%, 2014: 83%, 2015: 75%) (data not shown in tables).

Since 2011, there have been 98 (12%) deaths among methadone prescribees where methadone was the only substance implicated in death. The percentage of methadone-implicated deaths attributed solely to methadone has decreased over time since 2011 (19%). In 2016, methadone was the sole substance implicated in 2% (7) of methadone-implicated deaths. Of the remaining 251 methadone-implicated deaths, heroin/morphine was implicated

in 57% (142), etizolam in 43% (107) and gabapentin in 28% (71). The percentage of methadone-implicated deaths with heroin/morphine or gabapentin implicated in death increased over the time series (2011: 31% and 1% respectively). An increasing trend in cocaine implication was evident between 2011 (8%) and 2016 (14%). In 2016, the percentage with etizolam present was higher than in any other year (2011: 0%, 2012: 0%, 2013: 3%, 2014: 12%, 2015: 15%, 2016: 43%) (data not shown in tables).

3.7.3: Presence of Other Prescribed Medications[38]

Most deaths among individuals prescribed OST appear not to have been linked to poor prescribing practice but instead involved consumption of other substances. Drugs such as heroin, cocaine and etizolam are not currently prescribed in the UK. However, other substances implicated in death (e.g. diazepam, gabapentin) may have been legitimately prescribed. Using data from ISD's Prescribing Information System (PIS), it is possible to identify recent (within 90 days of death) dispensing activity in relation to specific prescription drugs[39]. Comparing this information with drugs present in the body at post mortem provides some information on whether individuals had taken prescribed medication and the extent to which drugs may have been diverted to the illicit market.

Anti-depressants

In 2016, anti-depressant prescribing was observed in the three months prior to death in 40% of DRDs (328). Although there was an overall increasing trend from 2009 (27%) onwards, recent anti-depressant prescribing appears to have peaked in 2013 (44%) (Table 63 and Figure 9).

Around three-quarters (238/328, 73%) of those recently prescribed anti-depressants had them present at post mortem (Table 64). Anti-depressants were also found at post mortem in 30% (147/490) of individuals not recently prescribed them. Anti-depressant presence at post mortem increased over the time series among both groups (2009: 56% and 8% respectively).

In 2016, recent anti-depressant prescribing was observed among 50% (150) of those prescribed an OST (methadone or buprenorphine (with or without naloxone)) at the time of death and 34% (178) of those who were not. The percentages for both groups fluctuated over time with no overall trend evident. Over the entire time series combined, recent anti-depressant prescriptions were more common among those prescribed OST (46%) than those not prescribed OST (34%) (data not shown in tables).

The type of anti-depressants prescribed to people who had a DRD has changed over time (Table 65 and Figure 10). In 2016, among individuals prescribed an anti-depressant in the 90

[38] It should be noted that, in some cases, exact dispensing dates are not provided in the Prescribing Information System, which instead defaults to the last day of the month, when the prescription was paid. Therefore, although some cases are included in which it appears that the drug was dispensed after death, this provides a fairly robust estimation of individuals prescribed specific drugs. Although CHI completeness (described in footnote 8 above) is more problematic in relation to OST drugs, information on other types of prescriptions may also be influenced by this issue.

[39] Previous reports categorised 'recent' prescriptions as those within 30 days of death, however, this has been changed to 90 days following advice from prescribing colleagues on the use of dates from the PIS system.

days before death, mirtazapine (145, 44%) was the most commonly prescribed drug, followed by sertraline (49, 15%), amitriptyline (33, 10%) and fluoxetine (31, 9%). The increasing trend in recent mirtazapine prescribing continued, rising from 18% in 2009. Sertraline prescribing increased over the time series from 2% of DRDs in 2009. There was a decreasing trend in citalopram prescribing from 33% in 2009 to 6% in 2016. For other anti-depressant drugs there was no clear trend over time. It should be noted that the amitriptyline trend may include instances where the drug was prescribed for chronic pain relief (it was not possible to exclude these cases).

The reduction in citalopram prescribing is likely to be associated with warnings regarding co-prescribing of drugs known to prolong the QT interval [30-32]. In 2016, citalopram had recently been prescribed to 26 (3%) people who had a DRD. Among these individuals, methadone and citalopram (both of which are known to prolong the QT interval) were recently co-prescribed in four (0.5%) cases. Of nine deaths where both drugs were found present at post mortem, recent co-prescribing had occurred in two (22%) cases. Over the time series, a total of 45 (1%) people who had a DRD were prescribed both methadone and citalopram within 90 days of death. In 111 instances of co-presence, 25 (23%) people had recently been co-prescribed these drugs (data not shown in tables).

Figure 10: Prescriptions within 90 days of Death (NDRDD/PIS: 2009-2016)

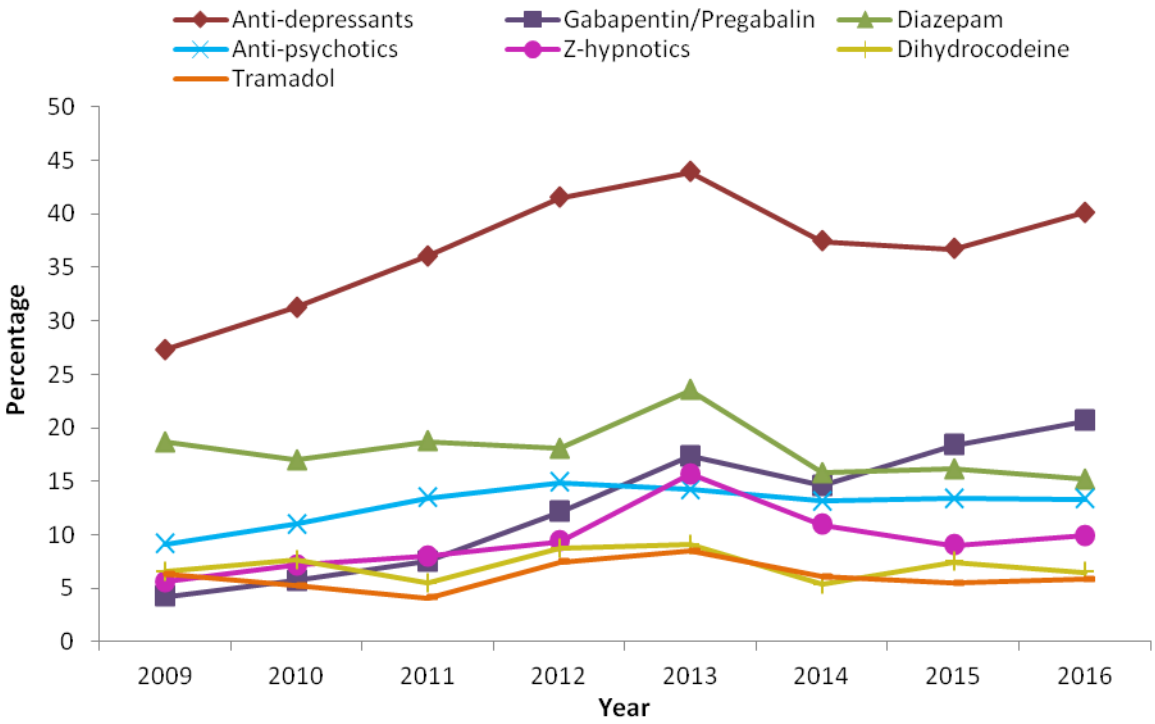
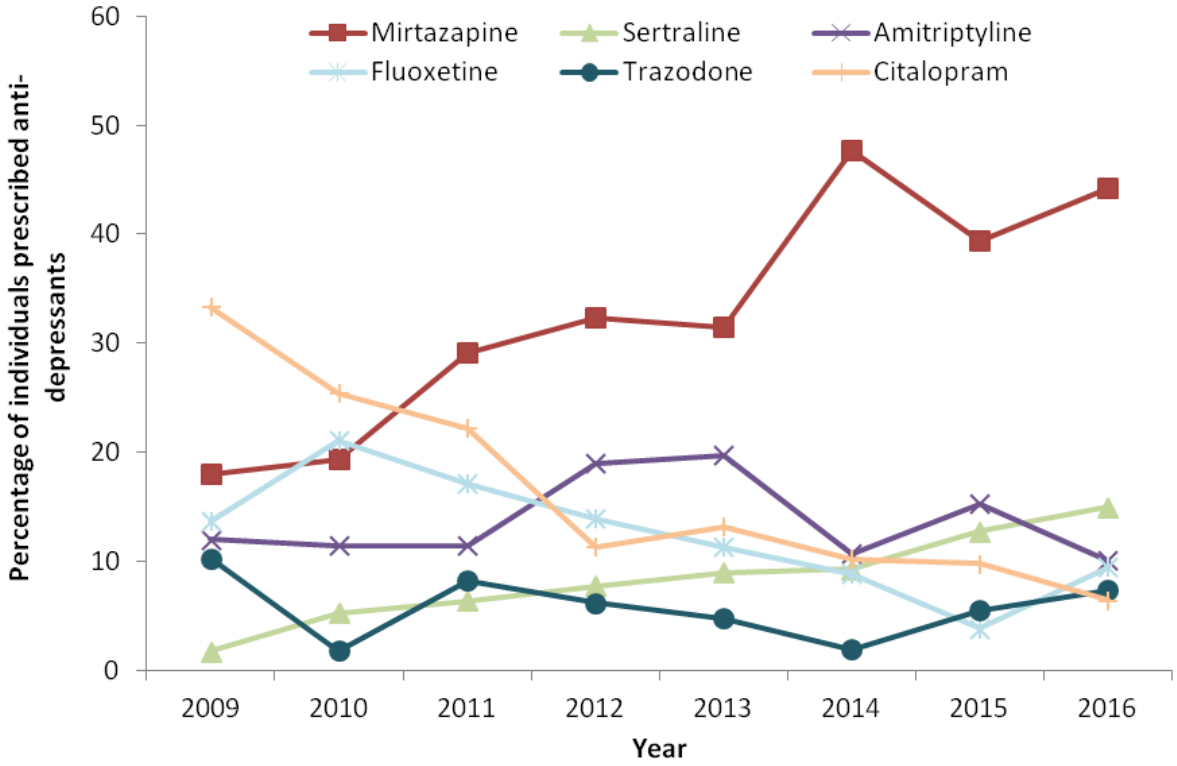


Figure 11: Anti-Depressant Most Recently Prescribed by Year (NDRDD/PIS: 2009-2016)



Gabapentinoids

Gabapentin and pregabalin are prescribed medications for epilepsy and chronic pain, but at high doses these drugs have been reported to enhance or 'potentiate' the subjective effects of opioids [33]. Recent (within three months) prescribing of these drugs (collectively referred to as gabapentinoids) was observed in 21% (169) of DRDs in 2016 (2015: 118, 18%). The percentage of individuals recently prescribed gabapentinoids increased over time (from 4% in 2009).

In cases where gabapentinoids had recently been prescribed, presence of these drugs at post mortem was 82% (139/169) in 2016. Where not prescribed, these drugs were found in 27% of DRDs (176/649). In 2016, among individuals recently prescribed these drugs, gabapentin or pregabalin were implicated in 72 deaths (43% of recently prescribed cases). Opioids (heroin/morphine, methadone or buprenorphine) were also implicated in 61 (85%) of these deaths (data not shown in tables).

In 2016, prescribing of gabapentinoids in the three months prior to death was observed among 25% (52/301) of those prescribed an OST (methadone or buprenorphine (with or without naloxone)) at the time of death and 18% (66/517) of those who were not. Both percentages increased over time from 2009 (OST: 10%, non-OST: 3%). Over the time series combined, gabapentinoid prescriptions were more common among those prescribed OST (21%) than those not prescribed OST (11%) (data not shown in tables).

Diazepam

In 2016, diazepam was prescribed in the 90 days prior to death to 15% (124) of the NDRDD cohort. Despite the high percentage (24%) of recent prescriptions observed among people

who had a DRD in 2013, there was a decreasing trend across the time series from 2009 (19%).

In 2016, diazepam was found present at post mortem in 79% (98/124) of individuals to whom diazepam was recently prescribed. Presence among those not recently prescribed diazepam was significantly lower than in any other year; 40% (278/694) of relevant individuals compared to between 56% and 75% in previous cohorts.

Recent diazepam prescribing was observed among 20% (59/301) of those prescribed an OST at the time of death and 13% (65/517) of individuals who were not. Recent diazepam prescribing decreased over the time series among individuals prescribed OST (2009: 28%), while there was no clear trend among the non-OST group. Over the time series, those prescribed OST were more likely to be prescribed diazepam (23%) than those who were not (15%) (data not shown in tables).

Anti-psychotics

Anti-psychotics such as quetiapine are primarily used to manage psychosis (including delusions, hallucinations, paranoia or disordered thought) in schizophrenia and bipolar disorder. Prescribing of anti-psychotics in the three months prior to death was observed in 13% (109) of DRDs in 2016. The percentage of individuals recently prescribed anti-psychotics has been approximately the same since 2011 (between 13 and 15 per cent).

In 2016, where anti-psychotics had recently been prescribed, presence at post mortem was 50% (54/109). Where not prescribed, they were found in 8% of DRDs (54/703).

Rather than examining co-prescribing of anti-psychotics with all OSTs, focusing on co-prescribing of methadone and anti-psychotics is more worthwhile, as both are specifically associated with risk of QT interval prolongation [31, 32]. In 2016, 47 (6%) individuals had recently been co-prescribed methadone and anti-psychotics. Of the 60 people who had a DRD and who had anti-psychotics and methadone present at post mortem, 24 (40%) had recently been co-prescribed these drugs. Over the time series combined, a total of 195 (5%) individuals were prescribed this combination of drugs within 90 days of death and, of the 216 people with methadone and anti-psychotics present at post mortem, 83 (38%) had recently been prescribed these drugs (data not shown in tables).

Collectively, 6% (50) of people who had a DRD in 2016 had been prescribed methadone and either citalopram or an anti-psychotic drug within 90 days of death (a total of 227 (5%) over the time series). Comparing prescription of these drugs with presence at post mortem, in 2016, 23 of the 65 individuals (35%) with this drug combination found at post mortem were prescribed these drugs within 90 days of death (3% of 2016 DRDs and 100 DRDs (2%) over the time series combined) (data not shown in tables).

Z-hypnotics

Z-hypnotic drugs (principally zopiclone and zolpidem) are used to treat insomnia (a common condition among people who use drugs) and have similar effects (and side-effects) to benzodiazepines. In 2016, z-hypnotics were prescribed within 90 days of death to 10% (81) of the NDRDD cohort. Statistically, there was an increasing trend in z-hypnotic prescription

across the time series from 2009 (6%) though this may be associated with the high percentage of prescribees observed in 2013 (16%).

In 2016, z-hypnotics were found present at post mortem in 30% (24/81) of DRDs where the person was recently prescribed these drugs. Presence of z-hypnotics at post mortem among prescribees increased over the time series (2009: 8%). Presence of z-hypnotics among those not recently prescribed these drugs was 3%.

In 2016, recent z-hypnotic prescribing was observed among 9% (16/301) of those prescribed an OST at the time of death and 10% (42/517) of those who were not. Over time, both groups had similar levels of prescribing with no clear patterns of change (data not shown in tables).

Weak opioid analgesics

Dihydrocodeine prescribing in the 90 days prior to death was relatively infrequent (53, 6% of DRDs in 2016) and was fairly static between year cohorts. Where recently prescribed, dihydrocodeine was found at post mortem in 79% (42/53) of deaths and where not prescribed, in 15% (113/765) of deaths – both percentages were fairly consistent over the time series. It is not appropriate to analyse dihydrocodeine prescription by OST group, as dihydrocodeine is often prescribed in order to manage withdrawal symptoms during opioid detoxification.

Recent tramadol prescribing was evident for a small percentage of people who had a DRD in 2016 (48, 6%) and varied little over the time series (2009-2016). Tramadol was found present in 54% of recently prescribed individuals (26/48) in 2016. Tramadol presence among those not recently prescribed was 6% (44/770) and has been relatively consistent over time. There were no differences in recent tramadol prescribing on the basis of OST prescription (2016: 5% (14/301) for OST prescribees, 6% (34/517) for non-OST prescribees) (data not shown in tables).

Strong opioid analgesics

Reflecting recent concerns about deaths related to the prescribing and/or misuse of high-strength opioid painkillers, recent oxycodone [34] and fentanyl [35,36] prescribing was examined.

In 2016, seven people who had a DRD (1%) were prescribed oxycodone (including the extended-release formulation oxycontin) in the 90 days before death. Recent oxycodone prescription was rare, with only 31 cases observed across the time series (0.7% of 4,224 DRDs). In 2016, oxycodone was present in 57% of cases where it had been prescribed. There were a further 10 deaths where oxycodone was found present among non-prescribees (1%). Across the time series, there were no cases where recent oxycodone prescription was made alongside an OST treatment (data not shown in tables).

Fentanyl prescribing among people who had a DRD was extremely rare. Over the time series, a total of 17 individuals (0.7% of 4,224 DRDs) had recently been prescribed fentanyl. In 2016, fentanyl was found present at post mortem in seven individuals (most of whom had not recently been prescribed the drug). Across the time series, there was only one death where fentanyl and an OST treatment were recently co-prescribed (data not shown in tables).

3.7.4: Summary

- Among opioid-related deaths, the percentage of individuals prescribed an OST at the time of death increased from 22% in 2009 to 46% in 2016.
- Most OST prescribing at the time of death was well established (one year or more - 82%), via supervised consumption (78%) and within recommended therapeutic dose guidelines (64%).
- In 2016, 99% of individuals prescribed methadone had methadone present in their body at post mortem. This was higher than the percentage of individuals prescribed buprenorphine who had buprenorphine present in their body at post mortem (72%).
- The percentage of individuals prescribed OST (62%) who had heroin/morphine present at death was the highest recorded and was similar to the percentage observed among individuals not on OST (61%).
- In 2016, heroin/morphine was present at post mortem in a higher percentage of individuals who were prescribed buprenorphine at the time of death (22/25, 88%) than among individuals prescribed methadone at the time of death (164, 59%).
- Most individuals who were prescribed methadone and had it implicated in their death had been prescribed the drug for one or more years (82%), received it under supervision (81%) and were prescribed a dose within the recommended therapeutic range (68%). In the vast majority of these cases, multiple drugs were implicated in death.
- Recent anti-depressant prescribing increased over time and was observed among 40% of the 2016 cohort. Forty-six percent of those prescribed an OST were also prescribed anti-depressants.
- Prescribing of gabapentin or pregabalin within 90 days of death increased from 4% of individuals in 2009 to 21% in 2016. Over the time series combined, gabapentin or pregabalin prescriptions were more common among those prescribed OST (21%) than those not prescribed OST (11%).
- Co-prescribing of methadone with either citalopram (an anti-depressant) or anti-psychotics (associated with a life threatening ventricular arrhythmia called torsades de pointes) occurred prior to death in 50 (6%) cases. Co-presence at death was evident in 65 cases in 2016, 23 (35%) of which were preceded by recent co-prescribing.
- Recent prescribing of strong opioid painkillers was very rare. Oxycodone or fentanyl were only prescribed to eight people who had a drug-related death in 2016.

3.8: Key Messages

The National Drug-Related Deaths Database (NDRDD) has reported on Drug-Related Deaths (DRDs) since 2009 [3-8] in order to gain a better understanding of Scotland's high rate of drug-related mortality. This is the seventh report from the NDRDD and this section describes the characteristics and circumstances surrounding the non-intentional deaths of 643 individuals in 2015 and 818 in 2016.

Consistent increases in DRDs have been observed in all UK countries since 2013 [37]. In 2015, it was estimated that more drug overdose deaths occurred in the UK than in any other European country, although adjustments for overall population size meant that DRD rates in Estonia, Sweden, Norway and Ireland were higher than in the UK [38]. However, based on the most recent comparison using the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) 'drug-induced death' definition [40], Scotland's 2015 DRD rate was more than double that of any other UK country (Table 1) [37] and, when compared separately with other countries, was the highest in Europe.

Table 1: EMCDDA Drug-induced death[1] rates by UK country (2015)

Country	Rate per 100,000 population
Scotland	11.9
Northern Ireland	5.6
Wales	5.4
England	4.0
United Kingdom	4.7

1. See Footnote 39.

Comparisons with non-EU countries are less straightforward. In 2016, high DRD rates were observed in the United States (19.8 per 100,000 population) [40] and in British Columbia, Canada (20.9) [41]. Both recently declared public health emergencies (British Columbia: 2016; USA: 2017) following unprecedented increases in opioid-related deaths as a result of addiction to pharmaceutical opioids and/or widespread adulteration of illicit drug supplies with strong synthetic opioids (i.e. fentanyl) [42]. Scotland's 2016 DRD rate (16.0 per 100,000 population) [2] was lower than in the USA or British Columbia. However, Scotland's DRD rate is increasing and its proximity to these high rates is noteworthy.

'Drug-induced deaths'[39] in seven northern European countries (including Scotland) with high or increasing DRD rates were analysed in a recent EMCDDA report [39]. In the countries examined, such deaths were predominantly related to opioids and, it was argued, should be compared to the numbers of people using these substances, rather than to general population estimates. While differences in the mechanisms for identifying and recording deaths made comparisons challenging, by this measure Scotland's DRD rate was not

[40] 'Drug-induced deaths' is a term used by the EMCDDA which is broadly similar to other DRD definitions: '...people who die directly due to use of illegal substances, although these often occur in combination with other substances such as alcohol or psychoactive medicines. These deaths occur generally shortly after the consumption of the substance. They are also known as overdoses or poisonings' [39, p. 7].

significantly higher than other countries. One of the key issues underlying high DRD rates in Scotland was that the number of people using opioids was estimated to be around twice as high (17.4 per 1,000 adults) as the comparator country with the next highest number (Sweden: 9.1).

Taking into account the number of people using drugs and the number of deaths, 'Burden of Disease'[41] studies quantify the relative impact of different causes of preventable death. In 2016, 'Drug use disorders' accounted for the eighteen highest number of 'Years of Life Lost' among the entire UK population and the tenth highest in Scotland. However, for 15-49 year olds in the UK and Scotland 'Drug use disorders' accounted for the second highest number of 'Years of Life Lost' in both areas, (2nd highest among males and 3rd highest among females) [43]. In the 2015 Scottish Burden of Disease study [44] (which uses different age groupings), 'Drug use disorders' accounted for the highest number of 'Years of Life Lost' among 15-34 year old males (7,017 years) and 15-34 year old females (2,467 years), the third highest (10,759 years) among 35-64 year old males and the sixth highest (10,759 years) among 35-64 year old females.

The Ageing Cohort of People with a Drug Problem

DRDs occurred most often among males living in the most deprived communities in Scotland[42]. The mean age of individuals who had a DRD increased over time from 34.9 in 2009 to 41.0 in 2016. Similar increases in age at death have also occurred in other UK countries [37]. In Scotland, this corresponds with changes in the population of people with a drug problem – the most recent available estimates (2012/13) indicate that more than half of people with a drug problem were aged 35 and over and, among the population of 35-64 year olds, the percentage of people with a drug problem increased from 0.9% of population in 2006, to 1.4% in 2012/13 [13].

Since the last NDRDD report, further evidence about the 'ageing cohort' of people with a drug problem [10-12, 46-48] has been published. A 2017 report by the Scottish Drugs Forum (SDF) [12], projected an increase in the population of older people with a drug problem (35 years and over) to 2017/18 before numbers stabilised. However, even after overall numbers of older people with a drug problem have stabilised, it was projected that the number of individuals aged 45 and over within that group would continue to increase until at least 2027/28. Parkinson et al's [49] age-period cohort analysis found an increased risk of DRD for individuals born between 1960 and 1980, especially for males living in the most deprived areas. They argue that this cohort effect is consistent with the hypothesis that exposure to the changing social, economic and political contexts of the 1980s created a delayed negative health impact.

[41] 'Burden of Disease' studies measure the extent to which specific diseases reduce the health and life expectancy of a population by quantifying the difference between the ideal of living to old age in good health and the situation where healthy life is shortened by illness, injury, disability and early death. Using this methodology, estimates of 'Years of Life Lost' and 'Years Lived with Disability' are combined to form a composite measure of the population health impact of specific diseases.
[42] These findings reflect the most recent drug prevalence estimates [13] and the widely recognised and documented association between deprivation and health inequalities [45].

Individuals known to be engaged in persistent, high-risk opioid use have dominated all NDRDD cohorts. However, numbers of DRDs have increased as the cohort of people who started using drugs (mainly opioids) in the 1980s and 1990s have aged. Over a prolonged period of time, drug use (particularly opioid use) creates underlying health vulnerabilities [50]. Analysis for the SDF report found high rates of hospital admission, medical and psychiatric conditions and prescribing among people with a drug problem, particularly for older individuals. Among DRDs, increasing medical and psychiatric morbidity/co-morbidity (respiratory conditions, depression, anxiety) and experience of hospital admission [51] were also associated with age.

The SDF report [12] also included a qualitative component based on interviews with people with lived experience of problematic drug use. This highlighted dissatisfaction (and consequently, higher risk of non-engagement) with drug treatment services due to perceived lack of fit with needs. It was felt that non-engagement with services contributed to loneliness and isolation. Poor physical and mental health and continued drug use by isolated individuals who often live alone in their own homes[43], creates circumstances where there is a high risk of overdose and limited opportunity for intervention. The complex health and social care needs of older people with a drug problem are likely to result in simultaneous increases in demand for services, increased risk of death due to co-morbidities and increased exposure to periods of elevated overdose risk when using drugs alone, in their own homes.

The age (and other associated factors) of individuals requiring drug treatment should be routinely factored into local service planning and should be a consideration when assessing risk of DRD. Facilities which provide a safe environment for drug consumption may be particularly valuable for this group. There is clear international evidence that such facilities prevent overdose deaths [54].

Female DRDs

Increases in the number of female DRDs have been apparent in recent DRD statistics from National Records of Scotland [1, 2]. Comparing the annual average for 2012-2016 with that for 2002-2006, female DRDs have increased at a higher rate relative to men (169% compared to 60% [2]). The NDRDD report on 2014 deaths [8] included a section on female DRDs and, reflecting continuing concerns regarding this issue, this report also incorporates a wider range of routine analyses by sex.

The percentage of female DRDs increased from 21% in 2009 to 29% in 2016. Females who died were more likely than males to have experienced domestic violence or sexual abuse and were more likely than males to be living with a partner or spouse. Females were also more likely than males to have had a respiratory condition, blood borne virus, chronic pain, depression and anxiety recorded in the six months prior to death. Experience and frequency of general acute and psychiatric hospital admission was also higher among females than males.

[43] Among DRDs both indicators were higher than in the Scottish population [52] and are acknowledged risk factors for DRD [53].

Females who had a DRD were less likely than males to have had alcohol-related problems. Where the individual was previously known to use drugs, females were more likely than males to inject drugs intravenously. A higher percentage of females were prescribed Opioid Substitution Therapy (OST) at the time of death than in males. However, there was no significant difference by sex in prescribed methadone doses.

Female DRDs were more likely to be witnessed than male DRDs, particularly when living with a partner/spouse. In 2016, the substances most commonly found at post mortem among female DRDs were anti-depressants, heroin/morphine and methadone. Anti-depressants, methadone, gabapentin, pregabalin and zopiclone presence were each higher among females than males. Methadone, etizolam, gabapentin, anti-depressants, dihydocodeine, codeine and zopiclone were each implicated in a higher percentage of female DRDs than male DRDs.

From NDRDD data, women appear to have had higher levels of exposure than men to some factors which are generally deemed 'protective' against DRD (e.g. living with a partner/spouse, on OST, others present at the scene of death). However, they also had higher levels of exposure to some DRD risk factors than men (e.g. medical and psychiatric co-morbidity, injecting drug use) [55]. Taking into account the findings of studies about females with a drug problem, there is a possibility that drug use within relationships and partner-administered injection [56, 57] may play a role in elevating overdose risk and preventing effective naloxone administration for women. Eighty percent of needles/syringes distributed from injecting equipment provision services in Scotland are provided to men [58] and the extent to which partners/spouses also use drugs and administer injections to partners may merit further investigation (this is not currently part of the NDRDD data collection). Some factors considered generally 'protective' against DRD (based on examinations of DRD cohorts dominated by men) may not be as 'protective' for women. Gender-sensitive services delivering female-specific harm reduction/overdose awareness messages taking account of these issues and targeted training of partners/families to administer THN may potentially be beneficial.

The role of drug treatment services

Individuals who died from DRD had complex and multi-faceted needs and were often accessing a range of services prior to death. Many had recently been in contact with non-drug treatment services. Recent contact with treatment services and OST prescription were both higher among older people who had a DRD, so this is likely to be associated with the ageing cohort.

Deaths out of treatment

The difference between the percentage of people in contact with drug treatment services in the six months prior to death (55%) and in contact at the time of death (42%) suggests that there may be problems maintaining contact with some individuals or retaining them in treatment. Active engagement with, and retention in, drug treatment and on OST is protective against mortality [59]. Therefore, maximising the numbers of people with a drug problem accessing treatment services (for example, by tailoring services to the needs of specific

subgroups [60] such as older people with a drug problem [12], outreach from primary care, substance misuse liaison from secondary care) would be beneficial.

There is less scope to address overdose risks that may arise from voluntary disengagement from, and/or non-compliance with, treatment [61]. NDRDD does not include details of the circumstances in which individuals disengaged from services and data from the Drug and Alcohol Treatment Waiting Times database and Scottish Drug Misuse Database [62] are not sufficiently complete to provide robust data on this issue. Minimising avoidable discharges from drug treatment services (e.g. for disciplinary reasons or non-compliance) may be beneficial in reducing risk of DRD [63].

Deaths in treatment

An increasing percentage of opioid-related deaths occurred among individuals actively engaged in treatment and/or prescribed OST at the time of death. DRDs among people on OST were examined in detail in this report. As with NDRDD reports since 2011 [5], there was also a detailed examination of methadone-implicated deaths.

Methadone remains the main OST drug used in Scotland [16, 64]. It is recognised as an effective treatment for opioid dependence [65] which is safer than heroin [66] although the risk of DRD among individuals prescribed methadone increases with age [67, 68]. Despite a continuing decrease in the absolute numbers of methadone prescriptions (from 15.9 defined daily doses per 1,000 population per day in 2010/11, to 12.3 in 2016/17[44] [16]), the increasing number of methadone-implicated deaths and the increasing percentage of DRDs where the individual was in drug treatment/on OST means that it continues to be relevant to this report.

Among all individuals on OST (**Section 3.7.1**) and individuals for whom methadone was implicated in death (**Section 3.7.2**), OST prescription was generally characterised by longer-term (one year or more) supervised prescription within recommended therapeutic dose ranges [25]. It is not known whether individuals were 'topping up' OST prescriptions with additional methadone. However, from post mortem toxicology information, it was clear that the prescribed OST (often methadone) was very rarely the sole drug consumed before death or implicated in death.

DRDs while in specialist drug treatment have increased over the time series. For the first time in 2016, heroin/morphine presence was proportionally higher among those prescribed an OST (62%) than among individuals without an OST prescription (61%). In methadone-implicated deaths, the other substances most frequently implicated (aside from methadone) were heroin/morphine, etizolam and gabapentin (among this group, implication of each of these drugs also increased over the time series). Antidepressants, diazepam and gabapentinoids were each more frequently prescribed to those receiving OST than those who were not (potentially further elevating DRD risk [33]). While OST and non-OST prescribing may have been a factor in these deaths, many involved the use of multiple illicit substances.

[44] Figures showing the estimated number of individuals prescribed methadone are published annually by ISD [17].

There was clear evidence of responsible prescribing but, in line with the Orange Guidelines [25], a patient's treatment needs must be balanced against the potential for prescribed medication to cause additional harms and for illicit diversion. There is a need to understand reasons for non-compliance with treatment and to ensure that measures are in place to minimise this. Alongside routine discussions about ongoing illicit drug use, testing for illicit drugs during specialist drug treatment can facilitate discussions about reasons for non-compliance [25]. There is also substantial evidence that, among individuals for whom OST has not prevented relapse during previous treatment episodes, Heroin Assisted Treatment [25, 69, 70] is effective at reducing illicit opioid use.

Take-Home Naloxone

It is important that services (both drug-related and non drug-related) work together to promote retention in treatment, continuity of care and awareness of overdose risk. If potentially harmful patterns of drug use can be identified during any type of service contact there is an opportunity to reduce the number of DRDs by undertaking targeted harm reduction measures or referring to services which can do so.

It is well evidenced that the period immediately following release from prison is a time of heightened DRD risk [60, 71, 72]. Periods of imprisonment can result in reduced drug tolerance (due to abstinence or changes in the quantity or quality of illicit drugs), increasing the risk of overdose for individuals who return to drug use after their release. Likewise, discharge from hospital is also regarded as a risk factor for opioid-related death (due to a reduction of opioid tolerance or withdrawal during an inpatient stay [73]). In 2016, for 77% of DRDs and 85% of opioid-related deaths, the individual had been in drug treatment, in prison or police custody or discharged from hospital in the six months prior to their death. Both percentages increased over the time series.

Naloxone is an opioid antagonist which is used to reverse the effects of an overdose. The National Naloxone Programme [20, 74] supplies Take-Home Naloxone (THN) kits from prisons and community outlets to opioid users at risk of overdose. THN kits are also available from GPs and other prescribers via community prescription. Despite the overall increase in opioid-related deaths, there has been a reduction in the number and percentage of these deaths following prison release since the start of the National Naloxone Programme. However, there has been no reduction in the number and percentage of deaths following hospital discharge [20]. It is not known how many opioid overdoses have been reversed and how many lives saved by THN in Scotland, but it is likely that the substantial increases in opioid-related deaths would have been larger had this intervention not been available.

In Scotland, over 37,000 THN kits have been supplied since the start of the National Naloxone Programme [20]. Among individuals who died from DRD, THN supply also increased over time. There are two identifiable factors which may have prevented effective intervention in these cases:

1. The percentage of DRDs where others were present at the scene of death (and therefore able to intervene) has decreased over time. Presence of others at the scene of death was strongly related to living alone all of the time and to living in your own home, both of which were more common among older people who had a DRD. Therefore, as the population of

people with a drug problem has aged, the number of people for whom there is a reduced probability of effective intervention in the event of a drug poisoning or overdose has increased.

2. Where THN had been supplied, availability at the scene of death was low (where known, 30% of cases where supplied). In cases where THN is not available at the scene of overdose, risk of death increases due to the delays in administering potentially life-saving interventions. Due to the observed outcome (death), there is a possibility that THN availability data from DRDs may be considered unrepresentative (i.e. that a higher percentage of living opioid users carried THN). However, it appears that poor THN availability may be a wider issue, with the percentage of individuals attending injecting equipment provision services in Scotland who carried THN also known to be low (6% in 2015/16) [48, 75].

THN supply in Scotland is increasing [20]. However, efforts to further increase THN supply would be beneficial. Enhancing opioid overdose awareness and promoting THN carriage among the general public may help to prevent overdose deaths (as in British Columbia, Canada [76]). The lack of a reduction in the numbers of deaths in the period of elevated overdose risk following hospital discharge also highlights the need for distribution of THN from acute settings (for example, via substance misuse liaison nurses).

Regardless of the number of THN kits distributed, delivery of this potentially life-saving intervention is clearly dependent on opportunity and availability. In NDRDD data it was observed that other persons were present at more than half of overdoses (providing an opportunity for intervention) and in many cases resuscitation was attempted. Facilities for the safe consumption of drugs may help to reduce DRDs [54] by reducing instances of solitary drug use and by facilitating the provision of harm reduction advice and effective intervention in the event of overdose. There is also a need to understand if harm reduction messages (e.g. carrying THN) are not being consistently adhered to. Clear harm reduction advice is given to opioid users when naloxone is supplied in order to minimise the risks of overdose. However, those messages may need to be re-emphasised across a variety of settings and obstacles to their successful implementation (for example, perceived fear of arrest/prosecution for carrying THN [77]) addressed, in order to produce the types of behavioural change that will help to reduce numbers of deaths.

High-risk poly drug use

In Scotland, almost all DRDs occurred after the consumption of multiple drugs. Opioids (heroin/morphine, methadone or burprenorphine) were implicated in over three quarters of DRDs in 2016. In most cases where these drugs (which suppress respiratory function) were considered to have potentially contributed to death, they were consumed alongside other substances. The percentage of DRDs with heroin/morphine implicated has steadily increased since 2011[45], while the percentage with methadone implicated decreased from 2011 to 2015 (a slight increase was observed in 2016). The use of other drugs regarded by users as enhancing the effect of opioids is widespread and may further increase the risk of overdose

[45] These trends support the conclusion that, following the end of the heroin drought in 2010 and 2011 (which may prompted more individuals to enter treatment in order to access OST), heroin quality/availability increased [26-29].

and death. However, the extent and quality of evidence about the effects and of these substances and the risks associated with them (particularly at high, supra-therapeutic doses) varies considerably.

Benzodiazepines

In Scotland, there is a history of problematic use of opioids and benzodiazepines stretching back to the 1980s, when temazepam was reportedly injected alongside buprenorphine [78]. The continuation of this pattern of use is the main reason why the Scottish definition of 'problem drug use' [13] is based on these substances. Benzodiazepines are often prescribed to reduce anxiety at low doses, but at higher doses may affect speech, reflexes and induce sleep. Research on benzodiazepines has tended to focus on the efficacy of normal, therapeutic doses in addressing specific medical or psychiatric conditions. The effect of high, supra-therapeutic benzodiazepine doses (highlighted by Johnson et al [79]) in terms of respiratory depression[46] (the main physiological cause of death among DRDs) remains largely unknown. As a result, evaluation of their implication in DRDs is complex, leading to variations in pathology practice. In the context of multiple drug consumption it is likely that both impaired judgement and competition for metabolic pathways may elevate risk of DRD [79]. Among DRDs, the most common drug combination found present at death was opioids and benzodiazepines.

Diazepam presence has decreased significantly since 2012, while the presence of various benzodiazepine-type 'Novel' Psychoactive Substances (benzo-type NPS) has increased. Deaths associated with phenazepam increased until 2013. After phenazepam became a controlled substance in June 2012, etizolam (a widely available, uncontrolled substance at the time) emerged as the main benzo-type NPS. In 2016, deaths involving diclazepam also started to increase. Compared to diazepam (40% implication where present), etizolam (80% implication) and diclazepam (56% implication) have contributed to death in a higher percentage of DRDs where present.

There continue to be significant gaps in knowledge about the interactions between new benzo-type NPS and other co-present substances and the physical/psychological effects of high, supra-therapeutic benzodiazepine doses [79]. New benzo-type NPS may be more dangerous in combination with opioids than diazepam. Gram for gram, etizolam [80] and diclazepam [81] are each ten times more potent than diazepam [82] and users' unfamiliarity with dosing may have contributed toward some deaths [83]. Etizolam has greater bioavailability[47] (93%) and a shorter biological half life[48] (6 hours) [80] than diazepam (76% and 20-100 hours respectively) [82] (for diclazepam, only biological half life was known: ~42 hours [81]). Therefore, compared to diazepam, a greater percentage of etizolam is absorbed

[46] Hypoventilation (also known as respiratory depression) is a medical emergency that occurs when ventilation/breathing is inadequate to perform needed gas exchange in the lungs. This causes an increased concentration of carbon dioxide and lower's the blood's pH value (respiratory acidosis). If untreated, the increased concentration of carbon dioxide, will lead to oxygen insufficiency (hypoxia) resulting in death.

[47] The percentage of a drug or other substance which enters the circulation when introduced into the body and so is able to have an active effect.

[48] The time required for the activity of a substance taken into the body to lose one half of its initial effectiveness.

by the body and the effects experienced by the user wear off more quickly, potentially encouraging more frequent re-dosing. There is a possibility that users may unwittingly be consuming excessive doses because these drugs have been made to resemble 'diazepam' by illicit drug manufacturers, or described as such by dealers. Alternatively, given the lack of established evidence about these drugs, high rates of implication may be partly explained by an inability to 'rule out' implication in death. Further research is required in order to determine why etizolam and diclazepam are implicated in a greater percentage of deaths than diazepam.

Etizolam and diclazepam both became controlled substances in May 2017, almost one year after the implementation of the Psychoactive Substances Act (April 2016) [21]. As they are not licensed for prescription in the UK, their continued use depends on the availability of supplies. As there are no signs that benzodiazepine use in Scotland is diminishing, the likely result of effective enforcement against these drugs will be transition to an alternative benzo-type NPS or to licit benzodiazepines (e.g. alprazolam/Xanax) diverted from overseas markets [38, 84].

Gabapentinoids

A further emerging concern is the increasing prevalence of gabapentinoids (mainly gabapentin and pregabalin) in DRDs. Emerging in the 1990s as treatments for epilepsy, they are licensed for use in treating chronic pain, nerve pain and anxiety (pregabalin only). Their illicit use alongside opioids has increased over time as subjective high-dose effects, reported as sedative, euphoric and dissociative/psychedelic [85], have become more widely known. Users' report that they reinforced the subjective effects of opioids, but also made 'blackouts' more likely [86].

Schifano [85] reports a considerable UK-wide increase in prescriptions for these drugs in the past five years (potentially reflecting the variety of licensed uses) and wide availability on illicit markets. The increase in gabapentinoid prescribing and presence among DRDs reflects these changes. In 2016, gabapentin or pregabalin were implicated in 197 deaths (25% of cases with implication data). Opioids (heroin/morphine, methadone or buprenorphine) were implicated in 85% (168) of these deaths. Similar increases have been reported in England & Wales where, in 2015, gabapentinoids were implicated in 137 DRDs, of which opioids were also implicated in 79% of cases [33].

Gabapentinoid use among people with a drug problem is problematic for the following reasons:

- Management of chronic pain is a significant concern affecting a wide range of patient groups, but the sudden, significant increase in 'chronic pain' being cited as a recent medical condition observed in NDRDD data is unlikely to be fully explained by demographic changes in the cohorts over time. It is possible that some of these reported conditions may reflect drug-seeking behaviour.
- In 2016, of the 169 individuals who had a DRD and who had recently been prescribed these drugs, gabapentinoids were implicated in 73 (43%) deaths. Of these 73 DRDs, opioids were also implicated in 61 (85%) deaths. Prescribing must continue to take account of the potential for medication to cause additional harms and for illicit diversion [25].

- Evidence is emerging about the potential for gabapentinoids to lower users' tolerance to opioids, making overdose more likely. Lyndon et al [33] reported that, at low doses, pregabalin reduced tolerance to opioids and at high doses (doses 3-20 times in excess of the recommended therapeutic limit were reported by users) induced respiratory depression by itself. While this study was based on mice, the reported effects were consistent with users' reports of gabapentinoid use reinforcing the effects of opioids and increasing risk of overdose. High doses make these effects more likely to occur, elevating users' risk of overdose and death.

Anti-depressants

Though not specifically recognised as enhancing the effects of opioids, anti-depressants are often used alongside opioids and may create additional risks. In line with general increases in anti-depressant prescribing in Scotland [86], anti-depressant presence at post mortem and recent anti-depressant prescribing among drug-related deaths both increased across the time series. These changes may be linked to the increasing percentage of DRDs where depression was recorded as a recent psychiatric condition. However, the increase in the presence of anti-depressants at post mortem among people who had a DRD but were not prescribed them suggests that illicit use of these substances may be increasing or that their use may be a potential risk factor for DRD.

While there has been an increase in prescribing of anti-depressants, there has been a change in the drugs used. Reductions in the prescribing of amitriptyline may be explained by a move away from tricyclic anti-depressants to safer alternatives such as mirtazapine [87]. The reduction in citalopram prescribing is a reflection of guidance on its prolongation of the QT interval [30]. Evidence of QT prolongation also caused by methadone indicates that citalopram should not be used among people who use drugs due to the potential for further cardiac toxicity [31, 32]. Mirtazapine is recognised as safer and to have specific benefits (e.g. increasing hunger, promoting sleep) for people with a drug problem [87]. As with benzodiazepines [79], there is little known about the effects of anti-depressants when consumed in large (in excess of recommended therapeutic range) quantities or in the context of multiple substance use.

Novel Psychoactive Substances

There was a large increase in the number of NPS-related deaths in 2016, mainly because of the high number of deaths involving etizolam (a benzo-type NPS). Previous analyses of NDRDD data focusing on NPS-related deaths [6-8, 88] described the apparent contrast between benzo-type and Stimulant-type NPS deaths, concluding that individuals whose death involved benzo-type NPS shared many characteristics with opioid-related deaths while Stimulant-type cases were attributed to recreational use by younger people. As there were so few non benzo-type NPS deaths in 2016, this type of analysis was not feasible.

The increases in NPS involvement in deaths among people with a drug problem continues to be a cause for concern. In 2016, 87% (299) of NPS-related deaths were opioid-related (higher than in any previous year (2011: 73%, 2012: 57%, 2013: 73%, 2014: 74%, 2015: 76%) – data not shown in tables. If toxicology data from deaths is indicative of 'normal' patterns of drug consumption, NPS drugs (particularly benzodiazepines) have now become part of the 'normal' range of substances routinely used by people with a drug problem.

However, as discussed earlier, one of the greatest issues is that the toxicological data and evidence base is not sufficiently developed to provide an accurate indication of effects, or implication in deaths [79, 82, 89].

While overall numbers of DRDs have increased, the apparent reduction in accidental deaths among individuals not previously known to use drugs is a positive outcome, which may be associated with changes in law enforcement [21]. The range of Stimulant-type NPS associated with DRDs and variations in their involvement from year to year presented considerable difficulties in terms of legal and treatment responses. In spite of the decrease in associated deaths, the non-fatal harms associated with these drugs are considerable[49] and continued surveillance of new stimulant-type NPS is required.

Synthetic cannabinoids have been directly implicated in only two deaths in Scotland (both in 2016) and associated harms appear to be predominantly non-fatal (their use may be a factor in increasing rates of cannabinoid-related general acute and psychiatric hospital stays [DRHS]). However, these drugs have a short history of use and identification in toxicological tests is challenging due to their high potency/low concentration in blood and rapid metabolism [93]. In spite of the apparent absence of fatalities associated with their use, further research would be beneficial in order to fully assess associated health risks.

Legislative changes first reduced the licit availability of NPS in the UK by banning specific substances [92, 94] and then stopped the legal sale of NPS from 'head shops'[50] and online vendors via the Psychoactive Substances Act 2016 [21, 95]. However, the increasing diversification of traditional drug markets [24, 38], increasing sales of psychoactive substances via the 'dark web'[51] [96-98], the increasing potency of controlled substances (notably, heroin, cocaine and ecstasy) [38, 99] and restrictions on other substances (e.g. minimum unit pricing for alcohol) will continue to influence the availability and cost of psychoactive substances and the harms associated with their use. Continued surveillance of new and emerging substances and effective information sharing between stakeholders as part of the new Centre for Excellence in New Psychoactive Substances (NPS) Research [100] will influence Scotland's future response to NPS.

Data Analysis

Many of the key messages above include comments on service provision. Some also highlight areas of concern (new or old) where there is a lack of robust evidence (e.g. unplanned discharges). Innovation is required in order to continue to deliver insightful analysis. In recent years, data linkage has been key to the development of the NDRDD, adding further value to this rich dataset and facilitating the identification of trends in prescribing and hospital admission. In order to continue enhancing our intelligence about this important public health issue, further statistical analysis of this database would be beneficial.

[49] Ethylphenidate (a short-acting stimulant NPS) use in the Lothians was associated with an increase in frequency of injecting, unsafe injecting practices and bacterial infections [90-92]).
[50] A head shop is a retail outlet specializing in paraphernalia used for consumption of cannabis and tobacco and items related to cannabis culture and related countercultures.
[51] The term 'dark web' relates to World Wide Web content that exists on darknets, overlay networks that use the Internet but require specific software, configurations or authorization to access.

In particular, data linkage which emphasises DRD as a single health outcome for the wider population of people with drug problems is important. This would enhance understanding of DRDs in the wider context of morbidity and premature mortality among this group of individuals and would help to evaluate DRD ‘risks’ and describe how they impact on specific subsets of individuals.

4: Deaths by Suicide in the 2015 and 2016 NDRDD Cohorts

4.1: Introduction

Known risk factors for death by suicide in the general population are wide ranging and can include: depression, previous suicide attempts, incidents of self-harm, other mental health problems, unemployment, alcohol and/or substance abuse, tragic life events, violence and sexual abuse [101-103]. Research (and this report) has shown that people with problematic drug use, particularly in the Scottish context, exhibit such risks [6-8, 71, 104-106]. In addition, studies of individuals in drug and alcohol treatment have shown previous suicide attempts and current suicidal thoughts are common [107]. The risk of death by suicide is greater when several risk factors occur concurrently.

The Scottish Suicide Information Database (ScotSID) is led by ISD Scotland and provides comprehensive data on all deaths by suicide. The 2017 ScotSID report, based on 2009-2015 data, highlighted the strong link between death by suicide and deprivation and, for a minority (11%), participation in specialist drug treatment prior to death [108]. This Section provides further detail on deaths by suicide using controlled drugs (referred to below as 'intentional' deaths or DRDs), contrasting these deaths with findings from the 'non-intentional' deaths[52] described in **Section 3**. Data for this section are not shown in the tables that accompany the report.

4.2: Results and Commentary

National Drug-Related Deaths Database (NDRDD) forms are submitted to ISD in respect of deaths by suicide which involved consumption of controlled drugs. In 2016, 47 intentional self-poisoning deaths were reported to NDRDD (52 in 2015). It is important to note that these deaths are largely a subset of the 867 DRDs and 728 probable deaths by suicide registered in 2016 on which National Records of Scotland (NRS) published National Statistics [2,109].

Taking into account the different time periods for case inclusion and delays in determining cause of death, the NDRDD could potentially have received forms for 840 deaths occurring in and registered in 2016 (48 of which were 'intentional' self-poisonings). Of these, a total of 832 NDRDD forms were returned (seven of the eight potential NDRDD forms not completed were non-intentional deaths). Therefore, for the intentional death cohort in 2016, one of a potential 48 NDRDD forms was not completed (2%) compared to seven (1%) of a potential 792 NDRDD forms for non-intentional deaths. The percentages not received were the same as in 2015, when 2% of eligible intentional death forms and 1% of non-intentional death forms were not submitted.

4.2.1: Demographic Profile

Age and Sex

In 2016, the mean age of intentional DRDs (47.8 years) was higher than the mean age of non-intentional DRDs (40.5 years).

[52] 'Non-intentional' deaths includes accidental poisonings, those of 'undetermined intent' and deaths where the cause was described as 'drug abuse'.

As in previous years, there was a higher percentage of males (578, 71%) than females (240, 29%) among non-intentional DRDs. In 2016, among intentional DRDs, women (30, 64%) outnumbered men (17, 34%) for the first time. As described in **Section 2.1**, intentional DRDs accounted for a higher percentage of all DRDs among females (30/270, 11%) than males (17/595, 3%). This was similar to previous NDRDD year cohorts.

Living Arrangements and Relationships

In 2016, living arrangements among people who had an intentional DRD were similar to those among non-intentional DRDs. Where known, 80% (36/45) of intentional DRDs lived in their own home at the time of death compared to 79% (631/801) of non-intentional DRDs. The percentage of people living with parents at the time of death was similar among intentional (5/41, 12%) and non-intentional DRDs (81/792, 10%).

Differences in relationships at the time of death were observed between intentional and non-intentional DRDs. A higher percentage of people whose death was intentional (29/36, 81%) were childless at the time of death compared with non-intentional DRDs (485/765, 63%). In terms of marital status, a lower percentage of people from the intentional DRD group were single at the time of death (13/39, 33%) than in the non-intentional DRD group (446/776, 57%).

Employment Status

Where known, 54% (20/37) people whose death was intentional were categorised as ‘unemployed’ - lower than the 77% (591/767) recorded among non-intentional DRDs. The percentage of intentional DRDs where the person was categorised as ‘long-term sick/disabled’ (11/37, 30%) was not significantly higher than among non-intentional DRDs (178/767, 23%).

4.2.2: Substance Use History

Drug Use and Injecting Status Prior to Death

In 2016, known drug use in the intentional DRD cohort (12/47, 26%) was lower than among non-intentional DRDs (721/818, 88%).

Similar to the non-intentional DRDs, the majority of the 12 intentional DRDs who were known to have used drugs prior to death were male (7, 58%). Fifty-seven percent of individuals for whom duration of drug use was known (4/7) had used drugs for 20 years or more. Among the 12 intentional DRDs who were known to have used drugs prior to death, 17% (2) were known to have injected drugs; this was lower than the equivalent percentage in the non-intentional DRD cohort (63%).

Previous Overdoses

In 2016, 47% (22/47) of people in the intentional DRD cohort had previously experienced at least one overdose, compared with 54% (440/818) of people in the non-intentional DRD cohort.

4.2.3: Medical and Psychiatric History and Significant Life Events

Recent Medical History

Among people whose death was intentional (32/47, 68%) and non-intentional (573/818, 70%), similar percentages experienced a medical condition in the six months prior to death. A higher percentage of people in the non-intentional DRD cohort had hepatitis C recorded in the six months prior to death (144/818, 18%) than in the intentional DRD cohort (2/47, 4%).

Recent Psychiatric History

In the six months prior to death, 33 of the 47 (70%) individuals whose death was intentional were recorded as experiencing a psychiatric condition; the percentage of people experiencing such conditions in the non-intentional DRD cohort was 65% (530/818). The prevalence of most psychiatric conditions was similar in both cohorts.

Recent Significant Events

Sixty-eight percent (32/47) of individuals whose death was intentional had experienced at least one adverse event in the six months prior to death, the most common being recent ill health (18, 38%) and the breakdown of a significant relationship (6, 13%). There were no significant differences in the percentage of the non-intentional DRD cohort recently experiencing these types of events (62%, 25% and 11% respectively).

Previous Suicide Attempts

In 2016, a higher percentage of individuals (47% of known cases) in the intentional DRD cohort had made a previous suicide attempt compared with those in the non-intentional DRD cohort (24%).

4.2.4: Circumstances of Death

Place of Death

Similar percentages of people whose death was intentional and non-intentional were pronounced dead in their own home (28/42, 67% compared to 502/809, 62%).

Persons Present at Scene of Overdose

Where known, people whose death was intentional were more likely to be on their own at the time of death (26/38, 68%) than people in the non-intentional DRD cohort (341/780, 44%). For the remaining intentional DRDs when at least one individual was present at the location, 33% (4/12) of deaths occurred when another person was in the same room. This compares to 47% (206/434) of the non-intentional DRD cohort.

4.2.5: Toxicology Data

Drugs Present at Time of Death

Among individuals whose death was intentional, the drugs most commonly found present at post mortem were: anti-depressants (31/47, 66%), alcohol (22/47, 47%), dihydrocodeine (17/47, 36%), paracetamol (14/47, 30%), diazepam and anti-psychotics (both 13/47, 28%), tramadol (12/47, 26%) and heroin (11/47, 23%).

Certain drugs were found present at post mortem in a lower percentage of intentional DRDs compared with non-intentional DRDs; diazepam (28% and 46% respectively),

heroin/morphine (23% and 61%), cannabis (11% and 30%), etizolam (6% and 33%) and methadone (4% and 46%).

Other drugs were found present in a higher percentage of intentional DRDs compared with non-intentional DRDs; anti-depressants (66% and 47% respectively), dihydrocodeine (36% and 19%), paracetamol (30% and 16%), anti-psychotics (28% and 13%) and tramadol (26% and 9%).

Drugs Implicated in Death

Among individuals whose death was intentional, the drugs most frequently implicated in death were: anti-depressants (20/47, 43%), dihydrocodeine (17/47, 36%), tramadol (11/47, 23%), codeine (8/47, 17%), heroin/morphine, paracetamol and anti-psychotics (each 6/47, 13%) and alcohol, gabapentin and zopiclone (5/47, 11%).

Different patterns of drug implication were observed between intentional and non-intentional deaths. Alcohol was implicated in 11% of intentional DRDs; similar to the non-intentional DRD cohort (13%). A lower percentage of intentional DRDs had heroin/morphine (13%), etizolam (4%), diazepam (4%) or methadone (2%) implicated in death than in the non-intentional DRD cohort (55%, 26%, 18% and 43% respectively). In contrast, certain drugs were implicated in a higher percentage of intentional DRDs than in the non-intentional cohort; anti-depressants (43% and 10% respectively), dihydrocodeine (36% and 12%) and tramadol (23% and 6%).

4.2.6: Summary

- On average, people who had an intentional DRD were older (47.8 years) than those who had a non-intentional DRD (40.5 years).
- Intentional deaths accounted for a higher percentage of DRDs among females (11%) than males (3%) in 2016.
- Known drug use was lower among the intentional DRD cohort (26%) than the non-intentional DRD cohort (88%).
- A higher percentage of individuals (47% of known cases) in the intentional DRD cohort had made a previous suicide attempt compared with those in the non-intentional DRD cohort (24%).
- A lower percentage of intentional DRDs had heroin/morphine (13%), diazepam (4%), etizolam (4%) or methadone (2%) implicated in death compared with the non-intentional DRD cohort (55%, 26%, 18% and 43% respectively).
- A higher percentage of intentional DRDs had anti-depressants (43%), dihydrocodeine (36%) and tramadol (23%) implicated in death compared with the non-intentional DRD cohort (10%, 12% and 6% respectively).

4.3: Key Messages

Many of the issues widely acknowledged as affecting people with a drug problem are also recognised causes of suicide [12, 71, 101-107]. The key risk factors for death from suicide (depression, previous non-fatal suicide attempts, incidents of self-harm, other mental health problems, unemployment, alcohol and/or substance abuse, and tragic life events) were

clearly evident among individuals in both the intentional and non-intentional DRD cohorts. However, the descriptive comparisons of individuals in the intentional and non-intentional DRD cohorts indicated that there were differences between the two groups in several key areas.

Although controlled drugs were involved in both types of death, the key difference between the two groups was related to their cause of death. For individuals whose death was non-intentional, deaths were largely accidental events arising from regular, problematic drug use. However, a lower percentage of individuals whose death was intentional were known to have previously used drugs. This important distinction underlies many of the other differences observed between the two groups.

The demographics of the two cohorts also differed in a variety of respects. On average, individuals whose death was intentional were older than individuals in the non-intentional DRD cohort. A higher percentage of female DRDs recorded by NDRDD were classified as intentional deaths compared with males. Among intentional DRDs, a higher percentage of individuals were childless at the time of death and a lower percentage of individuals were categorised as ‘unemployed’ than in the non-intentional DRD cohort.

Toxicology data also highlighted important differences between the intentional and non-intentional DRD groups. Among intentional DRDs, a smaller percentage had diazepam, heroin/morphine, cannabis, etizolam or methadone present in the body at post mortem, while a higher percentage had anti-depressants, dihydrocodeine and paracetamol present. Drugs implicated in death largely mirrored these patterns; a higher percentage of intentional DRDs had anti-depressants, dihydrocodeine or tramadol implicated in death than in the non-intentional DRD cohort.

5: Conclusion

Data from the National Drug-Related Death Database (NDRDD) provides detailed information on Drug-Related Deaths (DRDs) in Scotland, describing the nature and circumstances of those who died and highlighting potential areas for intervention.

As discussed earlier, National Records of Scotland's National Statistics on DRDs show that, in each year since 2014, numbers of both drug-related and opioid-related deaths were at their highest recorded levels in Scotland. Scotland's DRD rate is estimated to be the highest in Europe and recent research has further emphasised the high population prevalence of problem drug use [39] and the impact of DRDs in Scotland in terms of premature mortality [44]. Further, the trajectory of Scotland's DRD rate suggests that deaths will continue to increase in the future.

The explanation for these high and increasing numbers of DRDs is complex. NDRDD data highlights some important themes that have remained unchanged in recent years:

- Scotland has an ageing cohort of people with a drug problem who have multiple complex health and social care needs. Many people who had a DRD shared similar characteristics: they were male, aged over 35, socially deprived, lived alone and had a history of injecting opioid use and non-fatal overdose.
- Opioids were implicated in 77% of deaths and an increasing percentage of those who died from opioid-related death were prescribed an Opioid Substitution Treatment (OST) at the time of death (46% in 2016). There was evidence that some individuals had recently left treatment and may therefore have been at increased risk of opioid overdose [59].
- Most of those who died whilst on OST had been prescribed a recommended therapeutic OST dose within a supervised prescribing regimen for one year or more. People on OST were often prescribed other psychoactive medications such as benzodiazepines and anti-depressants.

This report on 2015 and 2016 DRDs also highlights some new findings and emerging trends:

- The number of people in specialist drug treatment at the time of death continued to increase. High levels of heroin/morphine presence among individuals on OST demonstrated the extent of non-compliance with specialist drug treatment using methadone or buprenorphine.
- Specific drugs consumed alongside opioids to enhance their effects may substantially increase the risk of overdose. Further research on the effects of the following substances in such circumstances would be beneficial:
    - Etizolam and diclazepam (both benzodiazepine-type 'Novel' Psychoactive Substances, reported to be widely sold as 'fake Valium (diazepam)' [83]) presence and implication in death increased substantially in 2016.
    - Gabapentin and pregabalin prescribing, presence at post mortem and implication in death increased over the time series (2009 to 2016). These drugs may reduce user's opioid tolerance and (at high doses) are associated with respiratory depression [33].
- Take-home naloxone (THN) provision has increased among the wider population at risk of opioid overdose and among people who had a DRD. However, existing THN provision has not prevented substantial increases in opioid-related deaths in Scotland. The reasons for this (e.g. solitary drug use, THN availability) need to be more clearly understood.

- Most DRDs (71% in 2016) were among men. However, comparing the annual average for 2012-2016 with that for 2002-2006, female DRDs have increased at a higher rate relative to male DRDs (169% compared to 60% [2]). Women who had a DRD had differing levels of exposure than men to factors considered to increase (e.g. injecting drug use) or reduce (e.g. others present at the scene of death) the risk of DRD. Further investigation of female-specific risk factors would be beneficial.

The NDRDD will report updated findings on 2017 and 2018 deaths in 2020.

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Glossary

Benzodiazepine-type NPS:	These drugs are part of the wider benzodiazepine class of drugs which induce sedation by reducing irritability or excitement. At low doses, they reduce anxiety and produce a peaceful effect. Higher doses may result in slurred speech, staggering gait, poor judgement, and slow, uncertain reflexes. Higher doses may also be used as a hypnotic to induce sleep. In the event of an overdose or if combined with another sedative (including opioids), many of these drugs can cause unconsciousness and even death. Benzodiazepine-type NPS (such as etizolam and diclazepam) produce similar effects to prescribed benzodiazepines (such as diazepam and alprazolam). Benzodiazepine-type NPS are, by definition, not licensed for medical use or legally controlled at the point they become available in a specific country's illicit drug market. Individual benzodiazepine-type NPS may not be licensed for use in specific countries because they have proven to be less efficacious in treatment or because they are regarded as unsafe due to other characteristics such as potency, bioavailability or biological half-life.
Cannabinoid-type NPS:	These drugs mimic cannabis, but they bear no relation to the cannabis plant except that the chemicals which are blended into the base plant matter act on the brain in a similar way to cannabis. They are traded under names such as Clockwork Orange, Black Mamba, Spice and Exodus Damnation. The effects of these are similar to cannabis intoxication: relaxation, altered consciousness, disinhibition, a state of being energised and euphoria.
Concomitant:	Concurrent
DRD:	Drug-Related Death
EMCDDA:	European Monitoring Centre for Drugs and Drug Addiction
ICD:	International Classification of Diseases
ISD:	Information Services Division
NDRDD:	National Drug-Related Deaths Database
NK-PWUD:	Individuals Not Known as a Person who Used Drugs
NPS:	Novel Psychoactive Substances. Drugs which affect the central nervous system and which are not licensed for medical use or legally controlled at the point they become available an illicit drug market.
NRS:	National Records of Scotland

OST:	Opioid Substitution Therapy
QT interval	The time between the start of the Q wave and the end of the T wave in the heart's electrical cycle, representing depolarization and repolarization of the ventricles. Certain drugs are known to prolong the heart's QT interval, potentially leading to a life threatening ventricular arrhythmia called 'torsades de pointes'.
PWID<10:	People who Injected Drugs for less than 10 years
PWID10+:	People who Injected Drugs for 10 years or more
PWUD:	People who Used Drugs (but were not known to inject)
Regimen:	A prescribed course of medical treatment, diet, or exercise for the promotion or restoration of health.
SIMD:	Scottish Index of Multiple Deprivation
Stimulant-type NPS:	These drugs mimic substances such as amphetamines, cocaine, or ecstasy and include BZP, mephedrone, MPDV, NRG-1, Benzo Fury, MDAI, ethylphenidate etc. People who take these drugs can feel energised, physically active, fast-thinking, very chatty and euphoric.

List of Tables

File name	File and size
NDRDD (Scotland) Report 2015 2016 Data Tables	Excel 470 Kb

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Further Information

Other ISD publications on drug and alcohol misuse can be found at the **drug and alcohol topic pages** on the ISD website.

The Scottish Public Health Observatory (ScotPHO) provides information on various aspects of drug misuse in Scotland: **ScotPHO drug misuse section**.

If you would like further information relating to drug misuse, please contact the Health & Social Care – Drug & Alcohol Team at **nss.isdsubstancemisuse@nhs.net**.

The next update of this publication will be in Spring 2020.

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Appendices

Appendix 1 – Methods

A1.1: Data Collection Development

A1.1.1: National Drug-Related Death Database Governance

The National Forum on Drug-Related Deaths (NFDRD) Research and Data Monitoring Subgroup (formerly known as the Data Collection Subgroup) established the National Drug-Related Death Database (NDRDD), oversaw the process of data collection and steered the delivery of this report until 2015.

In 2016, oversight of the NDRDD was transferred to the new Partnership for Action on Drugs in Scotland (PADS) Harms Subgroup. Whilst the NDRDD is led by ISD, both oversight groups have been comprised of individuals from a range of organisations and professional backgrounds. Further details on **PADS** are available at the Scottish Government website.

A1.1.2: The National Drug-Related Death Database Data Collection Form

The proforma used for NDRDD data collection was developed by the NFDRD Data Collection Subgroup. It was designed to collect data on a wide range of details concerning the individuals' social circumstances and health prior to death. These variables include socio-demographic information, drug use history, medical history, circumstances surrounding the death, details of substitute prescriptions and drugs detected in the person's body through toxicological and pathological examination. In addition, data are collected regarding the individual's contact with services (e.g. health, social care and criminal justice) prior to death. Although the dataset has been reviewed each year since its inception, the core data items collected remain unchanged.

A1.2: Data Collection Process

A1.2.1: Case Identification

In the event of an unexpected death, the police complete a Sudden Death Report which is passed to the Procurator Fiscal. The Procurator Fiscal then calls for a full pathological and toxicological post mortem examination to be conducted to determine the cause of death. On completion of the post mortem examination, the Local Critical Incident Monitoring Group and local Data Collection Co-ordinator decide if the case matches the inclusion criteria for the NDRDD (i.e. if it is a Drug-Related Death (DRD) as per the NDRDD definition). If these criteria are met, a case record is submitted to ISD.

A1.2.2: Local Area Drug-Related Death Surveillance

DRDs in Scotland are recorded and examined by Local Critical Incident Monitoring Groups who often collaborate with the police and Procurator Fiscal to identify such cases in their local area. Each area has a Data Collection Co-ordinator who works closely with the Local Critical Incident Monitoring Group and other key partners to collate the information on each DRD.

A1.2.3: Data Sources and Data Collection

In addition to the Sudden Death Report completed by the police and the pathology report, information surrounding the circumstances of death and information on the person who died is collected from a wide range of sources. These sources include the Scottish Prison Service and Scottish Ambulance Service as well as notes from drug treatment services, GPs, psychiatrists, hospitals and pharmacies. For most NDRDD data items, the main information sources were identical for all NHS Boards in Scotland. However for some items there was variance in their recording depending on local practice (e.g. for Greater Glasgow & Clyde, data on naloxone provision prior to death is requested from ISD, rather than from the NHS Board naloxone lead).

A1.2.4: Information Support, Data Entry and Data Transfer

Prior to the collection of data on 2014 deaths, ISD implemented a secure online database enabling direct entry of DRD information by Data Collection Co-ordinators. Information was recorded and validated using the secure online Oracle database administered by ISD. These data were then anonymised and added to the composite NDRDD dataset.

A1.2.5: Incorporation of 'Drugs Implicated' Data from National Records of Scotland

The NDRDD dataset provides information about the drugs *present* in the body at post mortem. National Record of Scotland (NRS) provides additional information about whether substances were (i) *implicated* in the death and (ii) *not* implicated in the death. Pathologists provide NRS with additional information about most DRDs. However, when information is not received, NRS assumes all drugs mentioned on the death certificate were implicated in the death.

Presence of a drug in the body at post mortem does not necessarily mean that the drug contributed to death and interpretation of post mortem toxicology is complex. The determination as to whether a drug has caused or contributed to death lies with the pathologist who will consider toxicological findings in combination with pathological and circumstantial evidence before coming to a conclusion.

This report incorporates this information, which was supplied to ISD by NRS with the relevant permissions and subsequently matched to the NDRDD dataset. The supplementary NRS information allows for a more meaningful analysis of the circumstances of individual drug deaths, taking into account the substances that have contributed towards deaths.

A1.3: Data Quality Assurance

Within the electronic spreadsheet and Oracle database, data were automatically checked at the point of data entry and subsequently cross-matched with records obtained from the NRS Vital Events database which contains the records of all those who die in Scotland. ICD-10 diagnosis codes were then extracted and compared with the relevant codes within the NDRDD. This quality assurance process makes it possible to thoroughly investigate any differences between the NDRDD and NRS data. Details regarding the outcomes of this matching process can be found in **Appendix A2**.

A1.4: Statistical Testing

Data were analysed descriptively using SPSS.

Comparisons of proportions where samples were expected to be similar in nature (e.g. single year NDRDD cohorts) were tested using a T-test. A chi-square test was used where groups were thought to be different in nature (e.g. males and females). Where comparisons involved small numbers of cases (e.g. inter-year comparison of Stimulant-type 'Novel' Psychoactive Substance (NPS) deaths), Fisher's exact test was used. While the T-test was used where individual years appeared to be outliers (e.g. higher percentage in 2016 than in other cohorts), a chi-square test for trend was used where there was evidence of linear change over time.

Differences in means were tested using an Independent Samples T-test. Medians were tested using Mood's Median Test.

A1.5: Data Confidentiality and Information Governance

The data collected for the NDRDD are not directly covered by the Data Protection Act 2018, which relates only to living individuals. However, NHSScotland maintains a duty of confidence to protect data relating to deceased individuals after their death. Person-identifying details regarding each individual are entered into the NDRDD as this information is necessary for linkage to other datasets. All measures are taken to protect the confidentiality of these data and the NDRDD project adheres to the seven Caldicott Guardian Principles.

Appendix 2 – Construction of the 2015 and 2016 National Drug-Related Deaths Database Cohorts[53]

A2.1: Drug-Related Deaths for 2015 and 2016 Reported by Different Agencies

The National Drug-Related Deaths Database (NDRDD) reports on a subset of 865 of the DRDs in Scotland in 2016 (695 in 2015) and is therefore not a National Statistics output for Scotland but a descriptive account of a cohort of deaths where further information was available. The National Statistics output for the number of DRDs registered annually in Scotland is published by National Records of Scotland (NRS) in its annual DRD report [1]. The number of DRDs registered in 2016 and reported by NRS was 867 (706 in 2015).

Year	NDRDD	NRS
2015	695	706
2016	865	867

A2.2: Matching National Drug-Related Death Database Records to National Records of Scotland Death Records

As in previous NDRDD reports [2-4], data were quality assured by matching records in this database to those held by NRS. NRS review the death certificates for all deaths registered in a given calendar year before determining whether or not they were drug-related. Each year, some deaths are also reviewed jointly by NRS and senior clinicians at ISD. The 2016 NRS figure of 867 (706 in 2015) was therefore derived from this comprehensive process.

A total of 919 records were returned to ISD for inclusion in the NDRDD for 2016 and these were matched to death database held by ISD which includes the 867 DRDs registered in Scotland in 2016 (740 including 706 DRDs in 2015). Fifty-four (out of 919) of the NDRDD records did not meet the NDRDD definition of a DRD (44 out of 740 in 2015). Therefore the final 2016 NDRDD cohort (analysed for this report) contained 865 records (695 in 2015[54]). The reasons for the removal of records are shown below.

	Number of cases excluded	
	2015	2016
Deaths coded to something unrelated to the use of a controlled substance e.g. chronic ischaemic heart disease (ICD10 code I25), other chronic obstructive pulmonary disease (J44)	36	49
Unable to identify whether the death was drug-related due to missing data	8	5
Duplicates	1	0
Total	**45**	**54**

[53] Police Scotland figures (and associated comparisons) are not included in this year's report. After the creation of Police Scotland, a new Police Scotland DRD Database was implemented in order to facilitate consistent national recording and to provide a mechanism for the early indication of trends reported by local policing divisions. Police Scotland share intelligence from this database with local drug trend monitoring groups and with national partner agencies via the Partnership for Action on Drugs in Scotland and NPS Centre for Excellence advisory structures.

[54] The final 2015 cohort comprised of 695 instead of 696 records (740-44=696). One record was a duplicate of a valid drug-related death case and it was removed from the cohort.

A2.3: Explanation of the Difference between the 2015 and 2016 National Drug-Related Deaths Database and National Records of Scotland Figures

Differences in 2015

The reasons why the NDRDD figure of 695 was lower than the NRS figure of 706 are shown in the table below. The main difference in the case inclusion criteria used by NRS and NDRDD is that NDRDD uses the date of death to allocate deaths to a particular year whereas NRS use the date the death was registered. However, as all deaths in Scotland must be registered within eight days, this only affects deaths occurring at the end of each calendar year.

Therefore, 27 cases where death occurred in 2014 but was registered in 2015 were included in NRS's 2015 DRD figures but were not included in the 2015 NDRDD cohort (these were counted as 2014 deaths by NDRDD).

Thirteen deaths which occurred in 2015 (and are included in this NDRDD report) but were registered in 2016 are not included in the 2015 NRS figure. These deaths were included in the NRS 2016 cohort.

	Number	Total
The number of DRDs reported by NRS for 2015.	706	
Less the NRS deaths that occurred in 2014 but were registered in 2015 i.e. not included in the 2015 NDRDD figure.	-27	679
Less the NRS deaths that were included in the 2015 NRS figure but for which a NDRDD record was not returned to ISD.	-7	672
Add the NDRDD deaths that occurred in 2015 but were registered in 2016 i.e. not included in the 2015 NRS figure.	+13	685
Add the NDRDD deaths that were not included in the 2015 NRS figure but for which a NDRDD record was returned to ISD, and the death met the NDRDD definition of a DRD.	+10	695
Cases in NDRDD cohort to be analysed.	695	

Of the seven deaths NRS counted as DRDs for which ISD did not receive any NDRDD data, two (28.6%) occurred in NHS Tayside and NHS Lanarkshire and one (14.3%) occurred in NHS Lothian, NHS Ayrshire & Arran and NHS Western Isles.

Differences in 2016

The reasons why the NDRDD figure of 865 was lower than the NRS figure of 867 are shown in the table below. As explained above, the main difference was due to allocation to the NDRDD cohort by year of death and to the NRS cohort by year of registration of death.

Therefore, 27 cases where death occurred in 2015 but was registered in 2016 were included in NRS's 2016 DRD figures but were not included in the 2016 NDRDD cohort (these were counted as 2015 deaths by NDRDD).

Fifteen deaths which occurred in 2016 (and are included in this NDRDD report) but were registered in 2017 are not included in the 2016 NRS figure. These deaths will be included in the NRS 2017 cohort.

	Number	Total
The number of DRDs reported by NRS for 2016.	867	
Less the NRS deaths that occurred in 2015 but were registered in 2016 i.e. not included in the 2016 NDRDD figure.	-27	840
Less the NRS deaths that were included in the 2016 NRS figure but for which a NDRDD record was not returned to ISD.	-8	832
Add the NDRDD deaths that occurred in 2016 but were registered in 2017 i.e. not included in the 2016 NRS figure.	+15	847
Add the NDRDD deaths that were not included in the 2016 NRS figure but for which a NDRDD record was returned to ISD, and the death met the NDRDD definition of a DRD.	+18	865
Cases in NDRDD cohort to be analysed.	865	

Of the eight deaths NRS counted as DRDs for which ISD did not receive any NDRDD data, two (25.0%) occurred in NHS Greater Glasgow and Clyde and in NHS Lanarkshire and one (12.5%) occurred in NHS Grampian, NHS Tayside, NHS Lothian and NHS Ayrshire & Arran.

A2.4: Reasons why National Records of Scotland DRDs were not Captured by the National Drug-Related Death Database Data Collection

1. The pathologist (or the Local Critical Incident Monitoring Group informed by the pathologist) decided that the death was a suicide whereas NRS had counted the death as an 'event of undetermined intent' because NRS had not been told that the death was believed to be a suicide by the date on which NRS 'froze' its statistical data records for that year (N.B. a death certificate will not state whether a death was a suicide. NRS relies on Procurators Fiscal to inform it whether a traumatic or suspicious death was believed to be the result of an accident, assault, or intentional self-harm). In this scenario a NDRDD record was not completed and returned to ISD for the death, but the death was probably counted by NRS as an 'event of undetermined intent' DRD, or possibly an 'accidental' DRD.
2. The pathologist (or the Local Critical Monitoring Group) decided that the Cause of Death was 'unascertained' and that the death should therefore not be classed as a DRD whereas the information that NRS received had indicated that the death was a DRD.
3. The NRS decided that the death was a DRD because an illicit drug was present in the toxicology, but the pathologist (or the Local Critical Incident Monitoring Group) considered that:

    i) either the level of the illicit drug was so small that the death could not be considered as being a DRD, or

    ii) the only illicit drug(s) listed in the toxicology were being prescribed to the deceased at the time of death and therefore these drugs should not be considered as being illicit

    NRS is not informed about the levels of drugs found, or whether the drugs had been prescribed to the deceased. In any case, the 'UK Drug Strategy' DRD definition (which NRS applies) does not exclude deaths because there was a low level of drug found or

because they had been prescribed to the deceased (see Paragraph A2.2 in **Annex A** of the NRS report on 2016 deaths).

4. Where the pathologist's Cause of Death consisted of several elements, only one of which was related to illicit drug intoxication, and where the pathologist (or the Local Critical Incident Monitoring Group) decided that the non-illicit drug element was the main cause of death whereas the NRS decided that the death was in fact drug-related (it should be noted that in the majority of cases where the Cause of Death consists of several elements the NRS reach the same conclusion as the pathologist as to what the single main Cause of Death is).
5. The Data Collection Co-ordinator was not informed about a DRD. For example, when there is no evidence at the time of death to suggest a potential DRD, the Police Sudden Death report would not show the death as being a suspected DRD. Occasionally, via post-mortem and toxicology testing, the Procurator Fiscal will later find that such a death was a DRD. In some areas the Procurator Fiscal may not inform the police and the Local Critical Incident Monitoring Group about such a DRD and consequently ISD will not be sent a NDRDD record. The NRS will normally know about these DRDs as they receive toxicology and cause of death information directly from the pathologist. Note that this scenario will not arise in areas where the pathologist has direct links with the Local Critical Incident Monitoring Group and the Data Collection Co-ordinator.
6. There is an ongoing criminal investigation surrounding a DRD and the Procurator Fiscal has not given permission for certain information relating to a death to be released to the Data Collection Co-ordinator and the Co-ordinator has consequently been unable to complete a NDRDD record for the death. However, the NRS may have enough available information to define the death as a DRD.
7. For the NDRDD, the place where someone dies determines what area the death is assigned to. However, NRS's figures for DRDs in Scotland are normally registered by the geographical area of the usual place of residence of the deceased. If the place of residence is outside Scotland, then the location of death within Scotland is assigned. In the case of someone who had recently moved residence within Scotland, NRS is likely to count the death by the former area of residence (provided that he/she had been resident there for at least 12 months). This could lead to small discrepancies in the number of DRDs that NRS and NDRDD assign to a particular area of Scotland.

Appendix 3 – Publication Metadata

Metadata Indicator	Description
Publication title	The National Drug-Related Deaths Database (Scotland) Report: Analysis of Deaths occurring in 2015 and 2016
Description	A detailed examination of a subset of the Drug-Related Deaths that occurred in Scotland in 2015 and 2016 (including trend data from 2009 where available).
Theme	Health and Social Care
Topic	Drug-related mortality
Format	PDF with Excel **tables**
Data source(s)	Data from the National Drug-Related Deaths Database (NDRDD) held by ISD. Data are collected at a local level by data co-ordinators. For each record they access a variety of sources including drug treatment services, GPs, prisons, police etc. Data from the National Records of Scotland (NRS) for drug-related deaths in 2015 and 2016. This was supplied to ISD by the NRS for this report.
Date that data are acquired	Data for this report were submitted to ISD in October 2016 and were then quality assured. Note: data are gathered locally soon after each death and are collated before being sent to ISD by the agreed deadline. NRS data were also submitted to ISD in October 2016.
Release date	12 June 2018
Frequency	Biennial
Timeframe of data and timeliness	All drug-related deaths that occurred in calendar years 2015 and 2016 are considered relevant.
Continuity of data	This is the seventh NDRDD report. In 2012 the definition of 'drug-related death' used by NDRDD was expanded to include deaths by suicide involving controlled drugs (or 'intentional' deaths or DRDs). However, these intentional DRDs are reported separately in **Section 4** of the report, to ensure the continued comparability of findings from the main cohort of non-intentional deaths. Other definitions have remained consistent over time.
Revisions statement	No planned revisions
Revisions relevant to this publication	As a result of ongoing quality improvements, figures may be revised over time. The numbers of deaths reported in 2009, 2012 and 2014 are different from those in previous reports for the following reasons: • Following a data validation exercise, four cases were excluded from the 2009 cohort (reducing the total 2009 cohort to 428) and nine cases were excluded from the 2012 cohort (reducing the total 2012 cohort to 522). • Due to late data submission, two additional deaths are reported for 2014 (increasing the total 2014 cohort to 624).
Concepts and definitions	Detailed information of the deaths relevant to this report is shown in **Annex A** of the NRS report on 2016 deaths and on the **NDRDD section** of the ISD website.
Relevance and key uses of the statistics	Planning; epidemiology; research; provision of services and access to services; improved understanding of topic area.
Accuracy	All records are validated when entered into the ISD database. Any issues identified within the record are highlighted to the data provider

	and corrected before analysis begins.
Completeness	Detailed breakdowns of completeness are available in the **data tables**.
Comparability	The data captured can be used for year-on-year comparisons.
Accessibility	It is the policy of ISD Scotland to make its web sites and products accessible according to **published guidelines**.
Coherence and clarity	The report is available as a PDF file with tables clearly linked for ease of use.
Value type and unit of measurement	Counts, numbers and percentages.
Disclosure	The **ISD protocol on Statistical Disclosure Protocol** was followed.
Official Statistics designation	Official Statistics
UK Statistics Authority Assessment	N/A
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Help email	**x.gounari@nhs.net**
Date form completed	11 May 2018

Appendix 4 – Early access details

Pre-Release Access

Under terms of the "Pre-Release Access to Official Statistics (Scotland) Order 2008", ISD is obliged to publish information on those receiving Pre-Release Access ("Pre-Release Access" refers to statistics in their final form prior to publication). The standard maximum Pre-Release Access is five working days. Shown below are details of those receiving standard Pre-Release Access.

Standard Pre-Release Access:

Scottish Government Health Department

NHS Board Chief Executives

NHS Board Communication leads

Early Access for Management Information

These statistics will also have been made available to those who needed access to 'management information', ie as part of the delivery of health and care:

Early Access for Quality Assurance

These statistics will also have been made available to those who needed access to help quality assure the publication:

Selected members of Partnership for Action on Drugs in Scotland Harms Subgroup:

Dr Carole Hunter, Lead Pharmacist, NHS Greater Glasgow & Clyde Addiction Services

Dr Andrew McAuley, Senior Epidemiologist, Health Protection Scotland & Senior Research Fellow, School of Health & Life Sciences, Glasgow Caledonian University

Dr Claire McIntosh, Consultant Addiction Psychiatrist & Clinical Director, NHS Forth Valley Substance Misuse Services

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Dr Roy Robertson, General Practitioner, Muirhouse Medical Practice & Professor of Addiction Medicine, Centre for Population Health Sciences, University of Edinburgh

Appendix 5 – ISD and Official Statistics

About ISD

Scotland has some of the best health service data in the world combining high quality, consistency, national coverage and the ability to link data to allow patient based analysis and follow up.

Information Services Division (ISD) is a business operating unit of NHS National Services Scotland and has been in existence for over 40 years. We are an essential support service to NHSScotland and the Scottish Government and others, responsive to the needs of NHSScotland as the delivery of health and social care evolves.

Purpose: To deliver effective national and specialist intelligence services to improve the health and wellbeing of people in Scotland.

Mission: Better Information, Better Decisions, Better Health

Vision: To be a valued partner in improving health and wellbeing in Scotland by providing a world class intelligence service.

Official Statistics

Information Services Division (ISD) is the principal and authoritative source of statistics on health and care services in Scotland. ISD is designated by legislation as a producer of 'Official Statistics'. Our official statistics publications are produced to a high professional standard and comply with the Code of Practice for Official Statistics. The Code of Practice is produced and monitored by the UK Statistics Authority which is independent of Government. Under the Code of Practice, the format, content and timing of statistics publications are the responsibility of professional staff working within ISD.

ISD's statistical publications are currently classified as one of the following:

- National Statistics (ie assessed by the UK Statistics Authority as complying with the Code of Practice)
- National Statistics (ie legacy, still to be assessed by the UK Statistics Authority)
- Official Statistics (ie still to be assessed by the UK Statistics Authority)
- other (not Official Statistics)

Further information on ISD's statistics, including compliance with the Code of Practice for Official Statistics, and on the UK Statistics Authority, is available on the ISD website.