Drug Related Deaths in NHS Lothian in 2018

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Multi-annual analysis of drug related deaths in NHS Lothian 2014 to 2018

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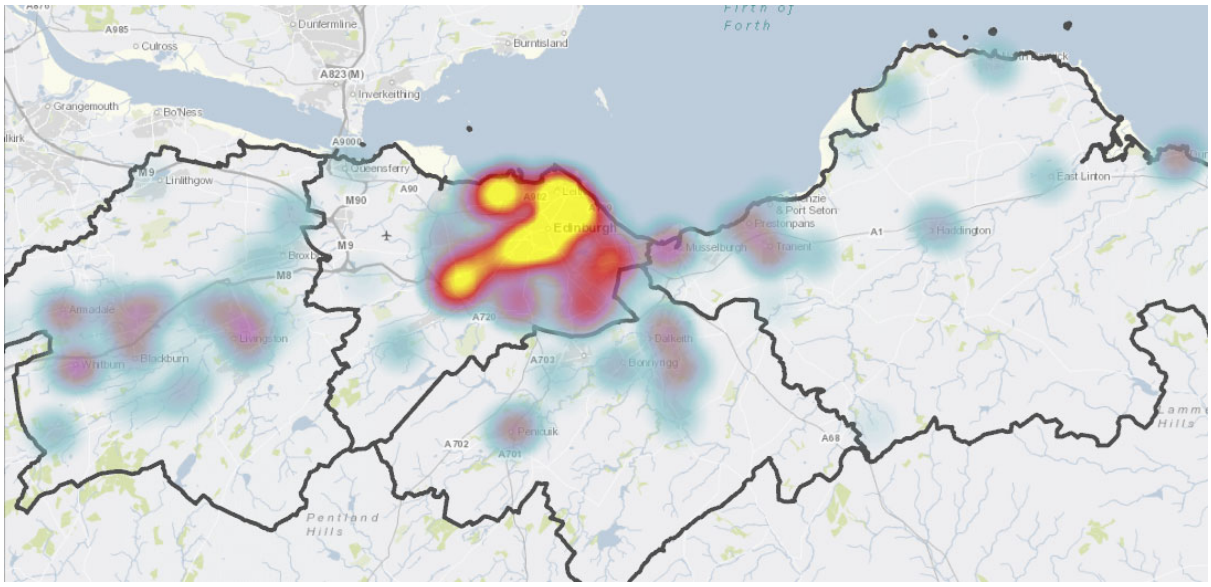

(Heat map of DRD cases in NHS Lothian from 2014 to 2018. Map produced by Dr M. Tranter)

Executive summary

1) The number of drug related deaths (DRDs) recorded by NHS Lothian in 2018 was 151. This compares with 161 in 2017. Whilst this represents a small decrease it should not be taken as indicating a trend.

2) Numbers of DRDs recorded in the City of Edinburgh by NHS Lothian have been steady for the past three years. Whilst this is better than many other areas in Scotland, it should be remembered that this is a plateau in avoidable premature deaths at a maximum level. The rate of drug-related deaths in Scotland is significantly higher than that of comparable countries.

3) In 2018, the median number of drugs implicated in death was 4 with an interquartile range of 3 to 6. Poly-drug use is the norm in DRDs and may be a significant factor in the ongoing high numbers of DRDs and of the longer term rise in numbers of DRDs.

4) The number of drugs implicated in death has doubled since 2014 and the drugs taken have changed markedly.

5) Whilst heroin use has declined in relative terms over recent years, opioids are still the most commonly implicated drug group. Opioids are found in the majority of people (90%) dying from DRDs in NHS Lothian. They usually occur along with at least one other drug group.

6) Benzodiazepines and gabapentinoids are also implicated in a majority of deaths (75% and 51% respectively) although not always in combination.

7) Of the benzodiazepines, diazepam is still the most frequently implicated but etizolam is emerging as a particular concern. This may be partly because of its entirely illicit nature leading to unknown and variable quality issues.

8) The median age at death in DRDs was 41 and has not changed over the period of 2014 to 2018. It is the same for men and women and has roughly the same interquartile range over that period (currently 34-50).

9) Engagement with specialist treatment services reduces the risk of death in people with a drug problem (PDP) significantly.

10) Whilst the majority of DRDs (71%) were not engaged with specialist services at the date of death, many had been up until around a year before then. Only around 50% had no engagement with services within the previous year and that includes a group of people who had no history of drug misuse i.e. who would not be classified as having a drug problem.

11) The data available regarding the characteristics of the at risk population, people with a drug problem, is inadequate for the purposes of risk assessment. Whilst there are some sources, none is adequate alone or in combination. If we do not properly

understand the people we are trying to help, we cannot do so effectively. This is a key area where more work is urgently required.

12) This report does not report on some frequently reported aspects such as levels of deprivation, past or present trauma and co-morbidities, physical or mental. These are well explored and accepted as important factors but unlikely to change in the near future. Their relevance is clear and should not be forgotten. But they need to be addressed in a wider context than DRDs or people with a drug problem which are only one aspect of their impact.

Recommendations

1) A major driver of the rise in DRD numbers seems to be poly-drug use by people with a drug problem (PDP). Numbers of drugs implicated in each DRD have increased rapidly in a short period. It seems to be a dangerous but widespread practice. The reasons why drug users are using more drugs together are not clearly understood. It is recommended that information and data be sought on this from existing sources. If it is not available, it should be sought directly and specifically from drug users as part of a high quality funded research and surveillance programme that would enable a rapid response to changing risks. There are existing mechanisms for gathering qualitative data from drug users and this should be undertaken in collaboration with third sector organisations such as the Scottish Drugs Forum (SDF).

2) Opioids are still the most commonly implicated drug in DRDs. This emphasises the importance of continued and expanded naloxone provision and training. This should be as wide as possible and include to drug users on discharge from hospital, prison or custody as well as to friends, relatives and others likely to witness overdoses such as hostel staff and 3rd sector staff.

3) The growing use of "street benzos" and their implication in DRDs (including non-prescribed diazepam) is of great concern. Etizolam in particular is emerging as a major problem. It is recommended that the opportunities, benefits and problems of prescribing diazepam more widely be analysed by an expert group.

4) Engagement with specialist services is protective. Currently only around 50% of the estimated population is engaged with specialist services. Whilst this is higher than in some NHS board regions, it is much lower than acceptable, given that the NHS claims to be universal. Increased levels of engagement would save lives. The reasons for the current rate of engagement and implementation of the evidence regarding how services could be redesigned to optimise engagement should be implemented and engagement with specialist services monitored as a measure of accessibility and equity.

5) There is a need for a better understanding of the population at risk to characterise their demographics and life circumstances in much greater detail than is currently the case. This study should also characterise what proportion are injecting drug users (any drug). This will require a special study as current tests of routine data have identified significant gaps across Scotland.

6) Further research is recommended in the following areas
    a. Size and demographics of the population of people with a drug problem
    b. Drug taking behaviour and reasons for poly-drug use
    c. Reasons for disengagement with services and potential areas for follow-up

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Drug related deaths in NHS Lothian in 2018

1: Background:

Writing about a subject such as drug related deaths has not been easy to do in a way that is always as sensitive and respectful of all the people who have suffered this fatal outcome as it should be. Where the writing in this report seems to veer away from this, it is from a lack of skill on the part of the author not in any way from a lack of regard for the individual people involved. It is hoped such lapses will be accepted for what they are.

2: Numbers of DRDs by type and locality.

DRDs will be reported here according to the pathology report cause of death (COD). There are four possible outcomes to the detailed pathology and toxicology examination of deaths that are suspected to be drug related.

Primary DRD	A death in which drugs are included in the primary causes of death. These are the causes that are directly related to death. It is possible that other causes may also be included such as COPD. All primary DRDs **WILL** be included in the NHS Lothian annual report and the Nation Records Scotland (NRS) annual national report
Secondary DRD	A death in which drugs are included in the secondary cause of death (if one is included) but not in the primary cause of death. This may include specific drugs or evidence that chronic drug abuse has contributed to death although not directly. These cases will normally **NOT** be included in the NRS annual national report. They will also not be further analysed here but are included in the overall table of DRD numbers.
Unascertained	In these cases, no cause of death can be determined with any degree of certainty and the primary and only cause of death is "Unascertained". It is possible that drugs were involved in some, but either the samples are not adequate to show this or other causes might equally have been involved. In any case, no definite or probable cause of death has been determined. In some, but not most, of these cases, there may be a definitive indication that drugs had recently been used. In others, the person may have been a known drug user. But it is important to remember that just because someone misuses drugs does not mean that they have died through drug misuse. These cases will not be included in the NHS Lothian DRD report but **MAY** be included in the Nation Records Scotland (NRS) annual national report.
Not a DRD	In these cases, whilst a police report of a suspect drug related death was produced, a cause not involving controlled substances has been determined to be the cause(s) of death. These cases are, of course, **NOT** included in the NHS or NRS annual national report.

None of this runs counter to the national definition of a DRD which is based on ICD-10 codes attached to each death report by NRS. A summary of the NRS definition of a DRD is attached as Annex A to this report.

There are always differences between the NRS figures and the NHS figures for various reasons. These include the way in which date of death is recorded. NRS use the date on which the date is registered whereas the NHS uses the date of the "Pronouncing life extinct" (PLE) (although the preferred term should now be "Confirmation of death"). The date of PLE is usually the actual date of death although there are cases where the person has clearly been dead for some time before the body is discovered.

It should be noted that whilst NHS Lothian figures and NRS figures vary somewhat from year to year as explained, there was a particular difference in the figures reported for 2017 with the NRS figure being 137 and the NHS Lothian figure being 161. The reason(s) for this are not understood and fall outwith the scope of this report.

As this is an NHS report, the NHS figures will be used throughout.

3: NHS Lothian recorded Drug Related Deaths in 2018

For 2018, NHS Lothian was informed of 242 suspected relevant drug related deaths based on police fatality reports and area of usual residence. After full pathology and toxicology reports, the following results have been found.

151 were found to be primary drug related deaths.

21 were found to be secondary drug related deaths.

13 were found to have an unascertained cause of death.

57 cases were found to not be drug related deaths.

The NHS Lothian figure for primary DRDs (which are those enumerated by NRS) in 2017 was 161 so this represents a small fall in 2018 but in reality is a relative standstill. This is welcome but does not indicate a trend. Similar standstills have been seen before and then there has been an increase in the subsequent year or years. For instance, numbers of recorded DRDs were similar between 2014 and 2015 but then increased significantly in both 2016 and 2017. And whilst it may be a pause, it is a pause at around the highest levels recorded.

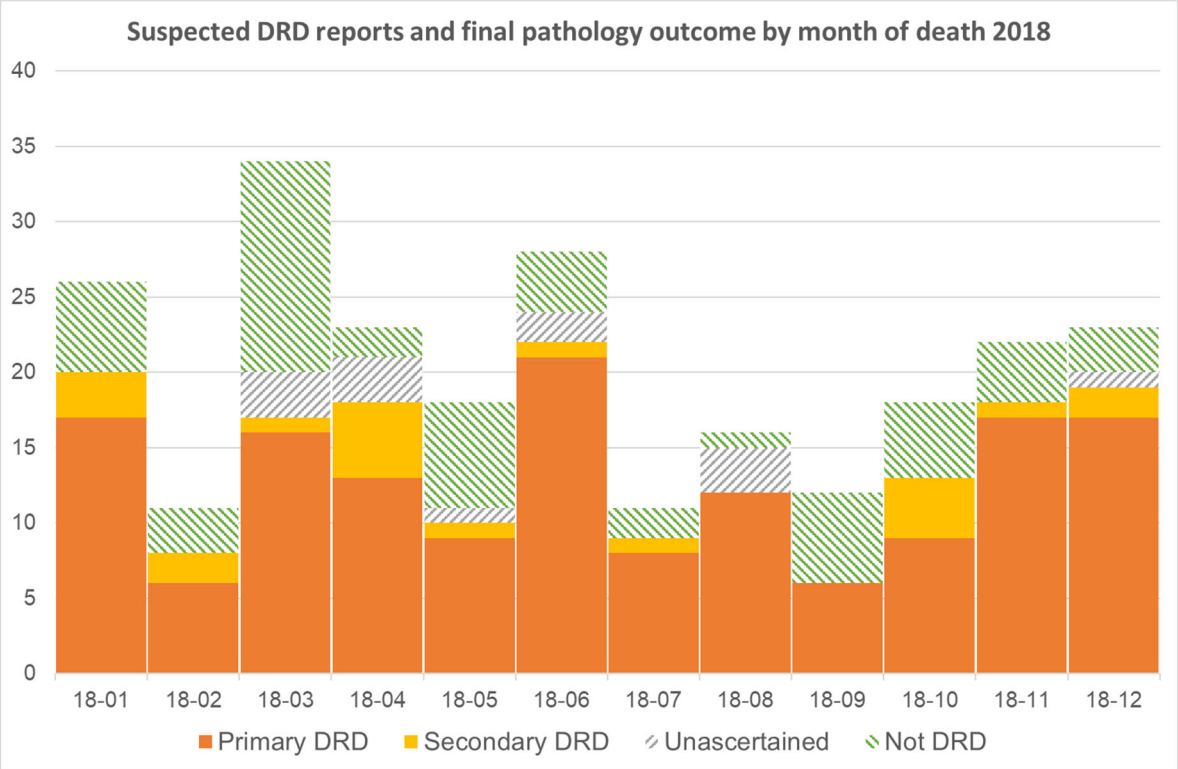
The NRS figures for DRDs in NHS Lothian in 2018 was 152. The difference is minimal and the reasons well understood (see above).

4: Reports and confirmed DRDs by month of mortality in 2018

Figure 1 shows reports of suspected DRDs received by month of death in 2018 and from these how many were confirmed as primary DRDs, secondary DRDs, unascertained cause and found not to be DRDs. Note that the values for each are stacked, so the total number of reports with a date of death in March was 34 but only 16 were found to be primary DRDs. In general, around one third of reports are found after pathology and toxicology to not be DRDs.

The reason for including this graph is to illustrate that the number of reports of suspect cases and confirmed DRDs vary a lot between months. It is important not to draw conclusions from a single or even a few months of reports before final pathology and toxicology are received unless there is a definite maintained trend in numbers or reports. Equally, the number of confirmed DRDs varies a lot between months, again making trends difficult to detect over periods of only a few months. There is an understandable desire to look very closely at the data over relatively short periods and make comparisons with previous periods or years. These should be resisted as it could result in misleading conclusions. It always pays to remember that if data are tortured sufficiently, they will confess.

Figure 1: Suspected DRD reports and final pathology outcome by month of death 2018



5: DRDs by locality in 2018

Table 1 shows the breakdown of reports by locality within NHS Lothian. No area stands out as having particularly fewer or more DRD cases in 2018 than 2017. Edinburgh NW and SE show increases in cases whilst Edinburgh SW showed a decrease.

Table 1: DRD reports by locality and outcome 2018

Area	2017 DRDs	Total Reports	Not DRD	No cause given	Primary DRD	Secondary DRD	Total DRD
Edinburgh NE	34	52	13	2	32	5	37
Edinburgh NW	13	26	5	2	17	2	19
Edinburgh SE	18	34	5	2	24	3	27
Edinburgh SW	28	34	9	2	20	3	23
East Lothian	20	24	4	1	17	2	19
Midlothian	16	29	8	2	14	5	19
West Lothian	28	41	12	2	26	1	27
HMP Addiewell	0	1	0	0	1	0	1
HMP Edinburgh	0	1	1	0	0	0	0
Totals	**161**	**242**	**57**	**13**	**151**	**21**	**172**
City of Edinburgh	93	146	32	8	93	13	106
Mid and East Lothian	36	53	12	3	31	7	38

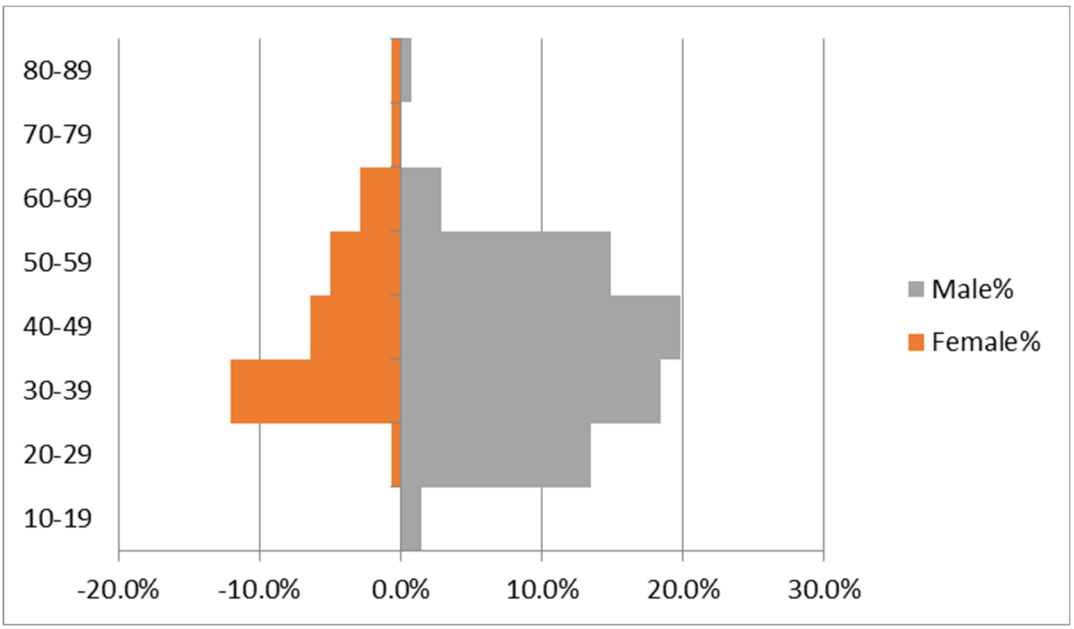
6: Age and gender of DRDs in 2018

The median age for DRDs in 2018 in NHS Lothian was 41 with an interquartile range of 33-50. That means that half of DRDs were in this age range. It also means that a quarter were older and a quarter were younger. It also means that almost 50% were aged 40 or less. Of these, around 35% were in their 30s and 15% were in their 20s. Whilst drug deaths in people over 40 form a significant part of the death toll, so do those in younger people.

Note that it is essential to see a measure of the spread of a value in the population as well as a central value such as the mean or median. A mean or median on their own are fairly meaningless. A short statistical note to illustrate this is included as Annex B.

Figure 2 shows DRD cases in 2018 by gender and decade of life for NHS Lothian.

Figure 2: DRD cases in 2018 by gender and decade of life for NHS Lothian



- The largest group by age is men and women in their 30s with over 30% of all DRD cases.
- The largest single age/gender group is men in the 40s, around 20% of all DRD cases.
- For women, the largest age/gender group is women in their 30s with around 12% of all DRD cases
- Men in their 30s are similar as a percentage to men in their 40s.
- Men in their 40s and 50s are around 35% of all DRD cases.
- Almost 15% of DRD cases are people in their 20s, mostly men.
- Close to 50% of all DRD cases were people below the age of 40.

7: Implication in death of major drug classes

Opioids	At least one opioid was implicated in around 90% (134 of 151) of DRDs in 2018 in NHS Lothian and different opioid substances were implicated 227 times overall. Opioids were the probable or possible sole cause of death in 22 DRDs. They were the most commonly implicated group of drugs in DRDs and the most common probable cause of death alone.
Benzodiazepines	Benzodiazepines were implicated in almost 75% (111 of 151) of DRDs. They are undoubtedly important but were never the possible or probable sole cause of death.
Gabapentinoids	Gabapentinoids were implicated in 51% (76 of 151) of DRDs and were probably or possible solely responsible in 5 DRDs.

Opioids are the commonest class of drugs implicated in death and the commonest cause of death where a single drug was deemed to be responsible. But the commonest situation involves at least two classes of drug and often three.

8: Drugs implicated in DRD cases in 2018

The level of implication in death has been determined from the pathology report using the opinion of the pathologists. To save space, any drug implicated in a primary DRD will be coded as follows.

10	The drug was probably the cause of death on its own
20	The drug could have caused death on its own but other drugs will or may have contributed
30	The drug was one of a number of drugs that, acting in combination, were responsible for the death
40	The drug was implicated in death alone or in combination with other drugs AND with another non-drug related factor e.g. COPD

Table 2 shows the implication of drugs in primary DRDs in NHS Lothian in 2018.

Table 2 Implication of drugs in primary DRDs in NHS Lothian in 2018

Drug name	10	20	30	40	10-40
Methadone	**1**	**4**	**62**	**12**	**79**
Diazepam	**0**	**0**	**56**	**8**	**64**
Cocaine	**1**	**2**	**45**	**8**	**55**
Pregabalin	**1**	**1**	**46**	**3**	**51**
Etizolam	**0**	**0**	**34**	**9**	**43**
Heroin	1	4	30	7	42
Gabapentin	0	3	31	4	38
Codeine	0	0	29	6	35
Dihydrocodeine	1	3	18	6	28
Alprazolam	0	0	22	3	25
Alcohol	0	2	18	3	23
Morphine	1	2	12	4	19
Mirtazapine	0	0	19	0	19
Amitryptyline	0	3	12	1	16
Buprenorphine	0	1	8	2	11
Tramadol	2	0	2	4	8
Zopiclone	0	0	6	1	7
Amphetamine	1	1	4	0	6
Oxycodone	0	1	2	1	4
MDMA (Ecstasy)	1	1	1	0	3
Fentanyl	0	1	0	0	1

In the 5 most commonly implicated drugs, three drug groups are included. This demonstrates the variety of drugs being taken. These five drugs are implicated a total of 292 times in 151 deaths, indicating again how commonly drugs are taken together.

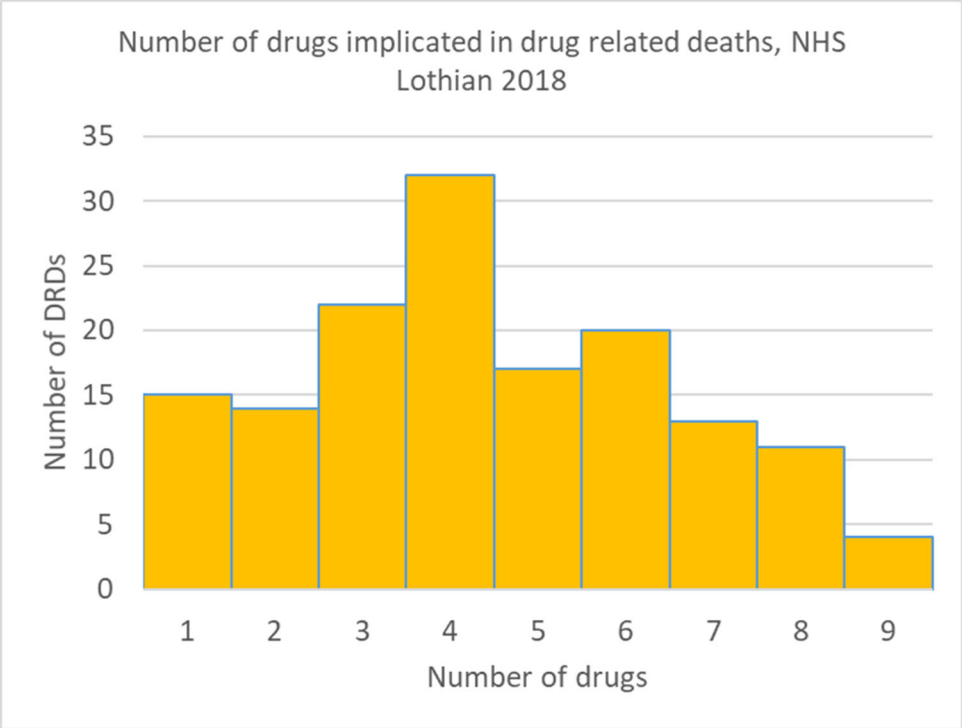
Methadone is the most commonly implicated drug but it is not often the single cause, nor (as discussed below) is it always prescribed to the person taking it. Being on opioid substitution therapy (OST) such as methadone is known to be protective and most of the 4000+ patients on OST at any one time will be prescribed some level of methadone. Its position within a landscape of poly-drug use is a reflection of its frequency of use rather any intrinsic level of risk (although, like all opioids, it is capable of causing fatalities alone).

The presence of two benzodiazepines in the five most commonly implicated drugs is an indication of their very frequent misuse. Diazepam remains the most commonly implicated but etizolam is becoming more prominent, something being seen in other areas of Scotland. All etizolam is illicitly produced and this means that the quality control of production is poor. Calculation of dose, mixing of the substance and compounding of the tablets is all unknown and likely to ne variable leading to high risks of unexpectedly high levels of substance and rapid release in some tablets. Etizolam is discussed in more detail below.

9: Number of drugs implicated in a death

For each case, an assessment of the number of drugs implicated has been made. This has been done taking care not to double count drugs by counting metabolites and different sample types. The source of the data is the final pathology and toxicology report produced by the forensic pathologists. Figure 3 shows the number of individual drugs implicated in death for each DRD in NHS Lothian in 2018.

Figure 3: Number of drugs implicated in drug related death in NHS Lothian in 2018



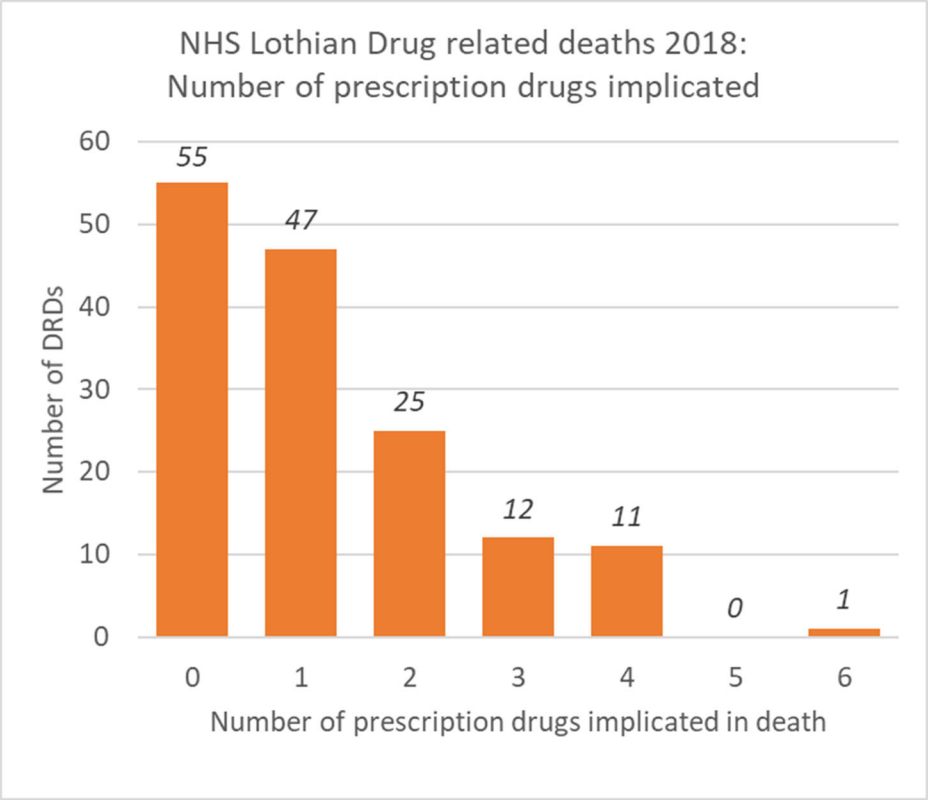
The median and mode was 4 drugs with a range of 1-9 and an interquartile range of 3-6. In two thirds of cases, 4 or more drugs were implicated in the death. There is little difference in the number of cases that involved 2 drugs and 7 drugs. Poly-drug use is the norm.

Counting drugs implicated can be tricky using the data as recorded as one drug may be detected in more than one sample and in more than one form, all of which are recorded. In general, most metabolites are not active but for some drugs these must still be recorded and included as they are the best markers of the sue of a particular drug which may itself no longer be detectable. This is the case for two of the more commonly used drugs, cocaine and heroin. For heroin, the best indicator of use is 6-monoacetylmorphine (6-MAM) which is most commonly found in urine. When this is found, it is assumed that morphine found in samples is heroin derived. Diamorphine itself is almost never detected in toxicology. For cocaine, the best indicator is benzoylecgonine although cocaine itself is often detected in post-mortem samples.

10: Implication in death of drugs prescribed to the person who died.

Of the 151 primary DRDs in 2018, 96 had one or more prescribed (i.e. prescribed by medical personnel to the person involved) drugs implicated in the cause of death with a range of 1 to 6. The most commonly implicated drug was methadone. The median number of prescribed drugs is 1 with an IQR of 0 to 2. Figure 4 summarises this data.

Figure 4: Number of prescription drugs implicated in drug related deaths in NHS Lothian 2018



11: Individual prescription drugs

Prescription drugs (i.e. POM) were implicated in 131 of 151 DRDs in 2018. This included 30 different POM. The 10 most commonly implicated drugs are shown in Table 3 with the number of times they implicated in the death of a person who had a prescription for that drug and the number of times they were not prescribed to that person.

Diazepam, the gabapentinoids and buprenorphine were more commonly non-prescrived than prescribed in the drug related deaths in which they were implicated. Diazepam was non-perscribed in more than 60% of DRDs in which it was implicated, gabapentinoids in around 70% and buprenorphine in 75% (albeit in low toatl number fo DRDs compared to diazepam and gabapentinoids). Gabapentinoids were reclassified as Class C drugs in April 2019 which may have an impact on their involvement in DRDs.

It must also be stressed that whilst records show if a drug was prescribed to that person, it is not possible to know if the drug was taken as prescribed or if extra amounts had been obtained and taken e.g. “topping up” with methadone obtained from other users.

Table 3: Number of DRDs in which specified prescription drugs were implicated in NHS Lothian 2018

Drug name	Prescribed to person involved		
	Yes	Unknown	No
Methadone	51	1	27
Diazepam	19	2	43
Pregabalin	17	1	33
Gabapentin	15	1	23
Dihydrocodeine	17	1	10
Mirtazapine	8	0	10
Amitriptyline	8	1	6
Buprenorphine	3	0	9
Zopiclone	5	1	1

12: Etizolam

Etizolam is a drug of current concern because of an increase nationally in the deaths in which it is implicated. It is often compared to the other novel benzodiazepine, alprazolam which is said to have been more prevalent in the NHS Lothian area than etizolam until recently.

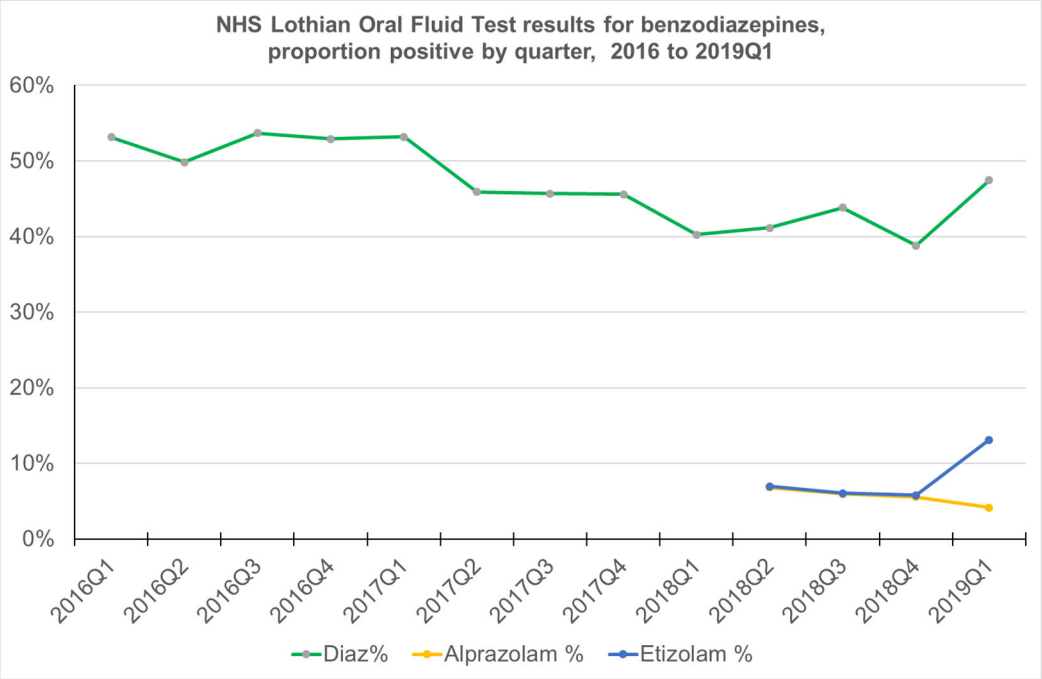
In 2018 in NHS Lothian, etizolam was implicated in almost double the number of DRDs in NHS Lothian as alprazolam although oral fluid tests (OFT) results showed very similar prevalences as shown in the figure below.

There has been a recent increase in the proportion of OFT tests that are positive to etizolam. This has been occurring since January 2019. At the same time, alprazolam results have remained level or fallen slightly. This is shown in Figure 5 below. The reason for the increase in etizolam use is not clear. It may be that etizolam supply per se has increased, resembling more closely the situation around Glasgow in previous years. However, it may be that it is being sold as other drugs. Police intelligence suggests that drugs sold on the street as Valium (diazepam) or Xanax (alprazolam) may in fact be more likely than previously to actually contain etizolam. However, as the graphic above shows, there was a similar increase in the proportion of OFT tests that were positive to diazepam in the same period.

It should be noted that a positive OFT result would be expected for 5-7 days after taking diazepam but for only 1-2 days after taking alprazolam or etizolam because of differences in the metabolic pathways of the different drugs. So direct comparison of percentage positive test results is difficult but trends can be compared.

Also note that the proportion of OFTs that were positive for diazepam also showed a marked increase in 2019 Q1 from a general slow decline in the previous quarters. The increase in both etizolam and diazepam may indicate a change in the drugs being sold and how they are being sold. Field research would be useful to clarify this.

Figure 5: NHS Lothian oral fluid tests results for benzodiazepines; proportion positive by quarter 2016 Q1 to 2019Q1



The increased use of etizolam raises cause for concern that it may lead to an increase in DRDs in 2019. Table 4 shows by quarter to date the number of DRDs in which each of the commonly encountered benzodiazepines have been implicated since 2018 Q1.

Table 4: Implication of benzodiazepines in DRDs 2018Q1 to 2019Q1 in NHS Lothian

Year	Quarter	Diazepam	Etizolam	Alprazolam
2018	Q1	14	7	13
2018	Q2	20	16	6
2018	Q3	12	5	2
2018	Q4	16	15	6
2019	Q1	21	15	10
Total		83	58	37

So far there is no indication that etizolam implication is increasing in terms of numbers but this is a partial and preliminary result. The data will be updated as more complete data and data for further periods becomes available.

13: Drug related death mortality rates in 2018.

Beyond counting DRDs, it is important to put these events into some sort of context, to understand the risk of death and to see how that varies in different circumstances. Thus is the key to understanding disease and to starting to find preventive measures. The key to this is the population at risk. One approach uses the overall population for which data is fairly readily available and reliable. The results are shown in Table 5.

The difference between the DRD mortality rate in Edinburgh (the highest) and West Lothian (the lowest) is not statistically significant (Chi-square test, p>0.05) so the death rate can be seen as effectively the same in all areas. The overall NHS Lothian DRD mortality rate is 0.17 per 1,000 population.

Table 5: Crude mortality rates due to DRD by NHS Lothian areas 2018

Crude population mortality rate					
	City of Edinburgh	East Lothian	Mid Lothian	West Lothian	NHS Lothian
Population	513,210	104,840	90,090	181,310	889,450
Population mortality rate %	0.018%	0.016%	0.016%	0.014%	0.017%
Per 1,000 people	0.18	0.16	0.16	0.14	0.17

The use of crude mortality rates is common in the field of drug related deaths (for instance, see ISD Scotland and EMCDDA reports). It is not ideal given differences in age structure between rural and urban populations within Scotland and between countries in the EU. However, they will be used in this report to maintain consistency. The EMCDDA use the population between the ages of 16-65 for their estimation of mortality rates however this would exclude some cases recorded here.

14: Population of people with a drug problem (PDP) in NHS Lothian

However, most people are not at risk of a drug related death so it is important to try and estimate the size of that population and its characteristics including mortality rates due to DRDs. This is an area in which data is deficient and has so for a long period. There are few sources of data and of those, none is adequate beyond very basic levels of detail. The possible populations to measure and the data sources are discussed in Annex C. From this, the population estimate selected is People with a Drug Problem (PDP). These figures come from the most recent estimate from ISD although this is for 2015-16. Table 6 shows the estimate of people with a drug problem population by NHS Lothian area overall and by gender and the number of DRDs in each overall and by gender.

Table 6 Estimated population of people with a drug problem (PDP) in NHS Lothian by locality

	City of Edinburgh	East Lothian	Mid Lothian	West Lothian	NHS Lothian
PDP estimate	6,000	920	760	1,300	8,980
PDPs Lower	5,600	790	650	1,100	8,140
PDPs Upper	6,500	1,100	970	1,400	9,970
PDPs Male	4,200	640	530	900	6,270
PDPs Female	1,800	280	230	400	2,710
DRDs 2018	93	17	14	26	150
DRD 2018 Male	71	9	10	15	105
DRD 2018 Female	22	8	4	11	45

15: DRD Mortality rates in the population of people with a drug problem in 2018

The estimated mortality rates in people with a drug problem overall and by NHS Lothian areas was calculated and the results are shown in Table 7 below.

The difference between the mortality rate in PDPs in West Lothian (the highest) and in City of Edinburgh (the lowest) is not is not statistically significant (Chi-square test, $p>0.05$) so the death rate in PDPs can be seen as effectively the same in all areas. The overall NHS Lothian rate of 1.7% should be used which is 17 per 1,000 people with a drug problems.

Table 7: Estimated DRD mortality rate in people with a drug problem in NHS Lothian 2018

DRD mortality rate in PDPs					
	City of Edinburgh	East Lothian	Mid Lothian	West Lothian	NHS Lothian
Middle	1.6%	1.8%	1.8%	2.0%	1.7%
Upper	1.7%	2.2%	2.2%	2.4%	1.8%
Lower	1.4%	1.5%	1.4%	1.9%	1.5%
Range	1.4%–1.7%	1.5%-2.2%	1.4%-2.2%	1.9%-2.4%	1.5%-1.8%
Male	1.7%	1.4%	1.9%	1.7%	1.7%
Female	1.2%	2.9%	1.7%	2.8%	1.7%

For NHS Lothian overall, mortality rates in male and female PDPs are the same. In the each of the 4 Local Authorities/Integration Joint Board areas, the difference between male and female mortality rate in PDPs is not statistically significant (Chi-square test, $p>0.05$). There is no clear evidence of a difference in mortality rates by gender in PDPs in 2018. For any given

year, a person who classifies as a PDP has a mortality risk of just under 2% per annum from a DRD. Other causes of death will be additional to this.

16: Engagement with NHS specialist services

N.B. IMPORTANT UPDATE:

The GP-NES data in Sections 16 and 17 was based on records of appointments from the GP-NES data system. After seeing a draft of this report, investigation by the PCFT team has shown that some, perhaps most, cases of those who had not had a recorded appointment in the period ≤3 months after disengagement had in fact been seen but the appointment not properly recorded or lost. Investigations are ongoing to confirm and properly establish the full picture. DRD deaths in service will increase and those in the 3 months after disengagement will decrease but the degree of changes is not yet clear. Data from SMS are not affected.

The two areas of NHS specialist services considered are Substance Misuse Services (SMS) and GP-NES. Individuals were taken as being currently engaged with a service if their most recent appointment had been in the 60 days prior to their date of death. If they had been in contact with either service within the previous 12 months after the last recorded appointment, the period since their last contact has been divided into <=3 months and 3-12 months since the last contact. Table 8 shows the numbers of DRDs by engagement status and Figure 6 shows this in graphical form.

Table 8: DRDs in NHS Lothian 2018 by status of engagement with NHS specialist services

SMS services, current	22
Discharged from SMS ≤ 3 months	1
Discharged from SMS services 3-12 months	1
GP-NES current	20
Discharged from GP_NES ≤ 3 months	*19*
Discharged from GP-NES services 3-12 months	11
No contact with specialist services 14 months	77

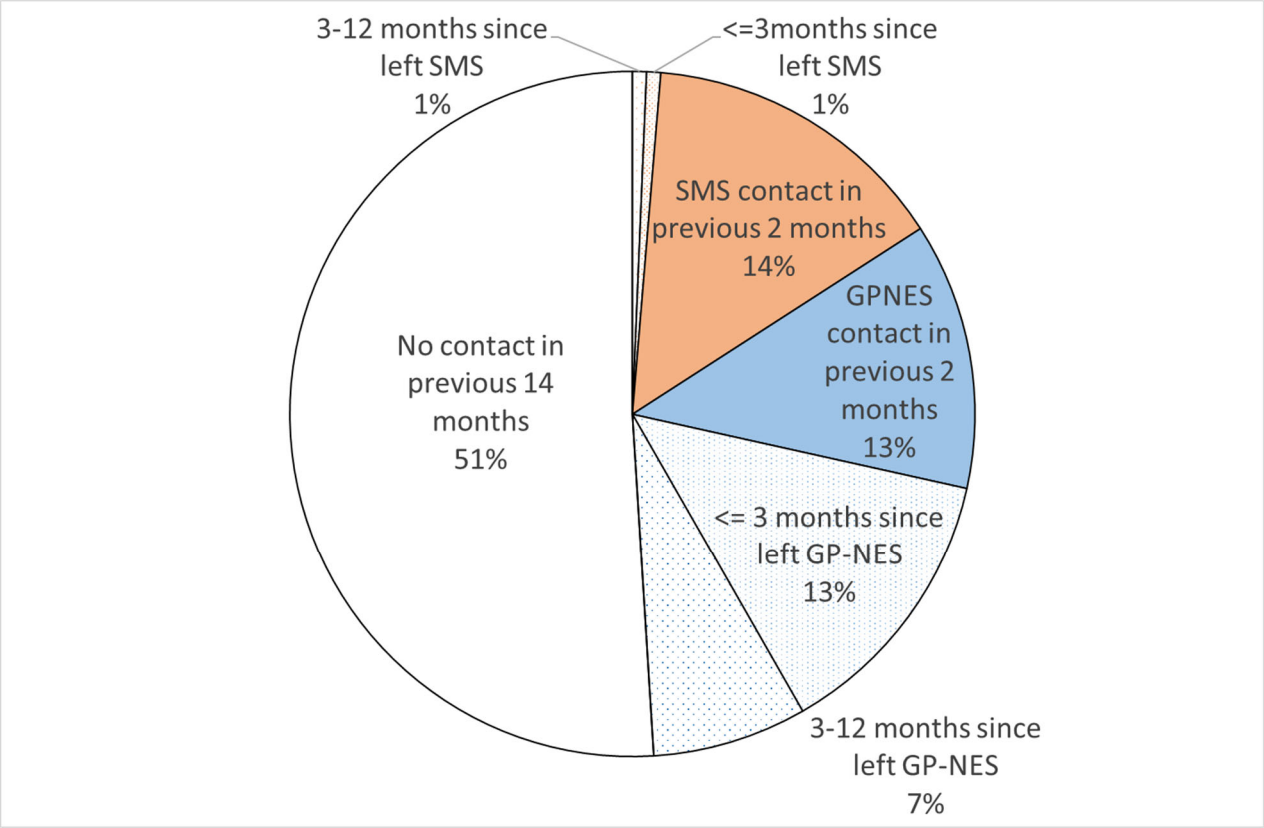
NB See comment at start of this section re GPNES post engagement deaths

Of the 151 primary DRDs, 22 were currently engaged with SMS services and 20 were currently engaged with GP-NES services. Of these, 1 was currently engaged with both, presumably during a hand-over period, so 41 of 151 (27%) were in current contact with specialist services.

This means that more than 70% were not in current contact with specialist services. For 77

(51%) there was no record of having engaged with either SMS or GP-NES in the previous 14 months. A further 33 (22%) had been engaged in specialist services within the previous 14 months, mostly with the GP-NES service and in particular, data showed that the majority of these had left the service within 3 months of their death and were not currently in SMS services either. This may indicate a group at particular risk although without knowing the overall numbers in this group (i.e. how many had disengaged in total over that period), the actual risk cannot be estimated. **However, as noted above, this may be partly a data issue.**

Figure 6: DRDs in NHS Lothian 2018 by status of engagement with NHS specialist services



NB See comment at start of this section re GPNES post engagement deaths

It is frequently said that the majority of DRDs are in people who are not in contact with specialist services. The above data shows this but adds more detail that suggests that many of those not currently in contact have been so in the relatively recent past. This may represent a group of people where interventions might be possible. It is certainly seems to be the case that as many people who suffer a drug related death are recently or currently known to specialist services as are not.

The combined SMS and GP-NES current caseload is just over 4,600. Assuming that the PDP population estimate is 9,000, then around 4,400 of these people are not currently in specialist services. Of the patients in specialist services, 1,300 were engaged with SMS and 3,300 with GP-NES. So, overall treatment levels of the PDP population in NHS Lothian is around 51% with around 14% engaged with SMS services and 37% in the GP-NES system.

17: Drug related death mortality rates in the PDP population engaged and not engaged with specialist services

Table 9 shows the numbers and mortality rates for each group for which a population is known or can be estimated:

Table 9: Mortality rates in the PDP population engaged and not engaged with specialist services

	Population	DRD in 2018	Crude mortality %
Estimated PDP population	9,000	150	1.7%
Estimated not in service	4,400	109	2.5%
In specialist services	4,600	41	0.9%
In SMS services	1,300	21	1.6%
In GP-NES	3,300	20	0.6%

In reality, people enter and leave the services during the year so it would be preferable to calculate person years at risk, but this is unlikely to be possible within a reasonable time frame. So the estimates of mortality in the table above and the discussion below are crude mortality rates based on known current caseloads and the estimated population of PDPs in NHS Lothian. The results should be taken with caution and, in particular, not taken as any implied or actual negative reflection on any part of the services provided. The reality of working with the PDP population is that it is complex, challenging and nothing like as static as dry statistics may make it seem.

The numbers in specialist services are accurate and stay fairly constant. These population sizes are accurate within close bands. For those not in specialist services, the most likely population size is 4,400 with upper and lower estimates of the population being 3,500 to 5,400, a reasonably wide variation and giving an estimated mortality rate of 2.5% in this group with a range of 2.0% to 3.1%..

The overall mortality rate for PDPs engaged with specialist services was 41 of around 4,600 patients, 0.9%. This compares to an estimated overall mortality rate of all PDP people not currently in SMS services of 2.5% indicating a highly significant lower risk of death for those engaged with specialist services (chi-square test, $P<0.01$).

Taking the lowest mortality rate in those outside specialist services at date of death (2.0%) there is still a statistically highly significant difference between the mortality rate of those in specialist services (0.9%) and those who are not (two-tailed z-test, $P<0.01$). Using the higher rates of mortality will clearly give a statistically more reliable result. Even without that, being engaged with specialist services is clearly protective. This is in accord with previous published reports.

There are currently around 1,300 patients engaged in the SMS drugs misuse service. This number is likely to remain fairly constant as the demand for services exceeds capacity i.e. case load is 100% full. 22 patients died from a DRD during 2018 whilst in SMS services, a

crude mortality rate of around 1.5%. This mortality rate is statistically different from the mid-range mortality rate in people not in service in a two tailed test at the 10% level (chi-square, $p<0.10$) but not at the commonly used 5% level (chi-square, $p>0.05$). Using a one-tailed z-test, the mortality rate in those in SMS services is lower than those not in specialist services at the 5% level (one tailed z-test, $p<0.05$).

GP-NES services had around 3,300 patients registered in 2018. It is likely that the throughput of patients would be higher than this with people joining and leaving the service but finding that figure will require further work. Taking 3,300 as the average caseload, the crude mortality figure in this service for DRDs in 2018 is 20/3300 or approximately 0.6%. Compared to the estimated mortality rate for those not in service of 2.5%, there is a statistically highly significant difference (chi-square $p<0.01$)

Comparison between mortality rates for those in SMS services and GP-NES, 1.6% and 0.6% respectively, also yields a statistically highly significant result (chi-square test, $p<0.01$). However, it has to be remembered that the issues facing those in SMS services may be different to those in GP-NES and of those not in services. They may be at higher risk due to drug use being less stable and other multiple and complex needs although this will not always be the case. But it would seem an area for further investigation as to why these figures are as they are. However, given that the process of engaging with specialist services is largely (though not always) working first with SMS and then, when stabilised, moving to GP-NES (and possibly back to SMS if problems arise), the change from highest to lowest risk of death through that process suggests that the system is working reasonably well for those engaged and staying engaged.

An area which would justify more investigation is DRD mortality in the period immediately following “discharge” from services. Discharge from service is itself a term that covers a variety of circumstances. Discharge may be planned, may be a voluntary step on the part of the patient or may be due to non-compliance with the agreed program (e.g. continued use of other drugs, repeated non-attendance at appointments). So it is difficult to draw definite conclusions about risks on this period. Numbers of DRDs in the period up to 12 months after discharge from SMS services are low (1 in the first 3 months and 1 in the 3-12 month period. However, for GP-NES, records suggest that as many or more (24) died of a DRD in the first 3 months after discharge as of those in GP-NES services. Again, it is important not to leap to any conclusions about this, but it may be an area of interest to investigate further **(See note above in Section 16. Some of this group may have been still in service but records lost or wrongly recorded)**.

The low number of DRDs that have recently been discharged from SMS services for whatever reason may be due to many of those discharged moving into GP-NES services although this has not been verified.

There also remains a separate issue of demand for specialist services outstripping the capacity available, especially in SMS. This lies outwith the remit of this report but evidence indicates that, since treatment reduces the risk of death in the short and longer term, this will have an impact on numbers of DRDs.

Multi-annual analysis 2014 to 2018

18: DRDs by year and NHS locality, 2014 to 2018

Splitting the NHS Lothian area into the City of Edinburgh and the Lothians as in Figure 7 below shows that over the 5 year period 2014 to 2018, the overall number of DRDs has increased but that in the last three years this has been due to increased numbers of DRDs in the Lothians and that over time a greater proportion of DRDs is being recorded in the Lothians.

Figure 7: DRD cases by NHS Lothian for the City of Edinburgh and the Lothians, 2014 to 2018

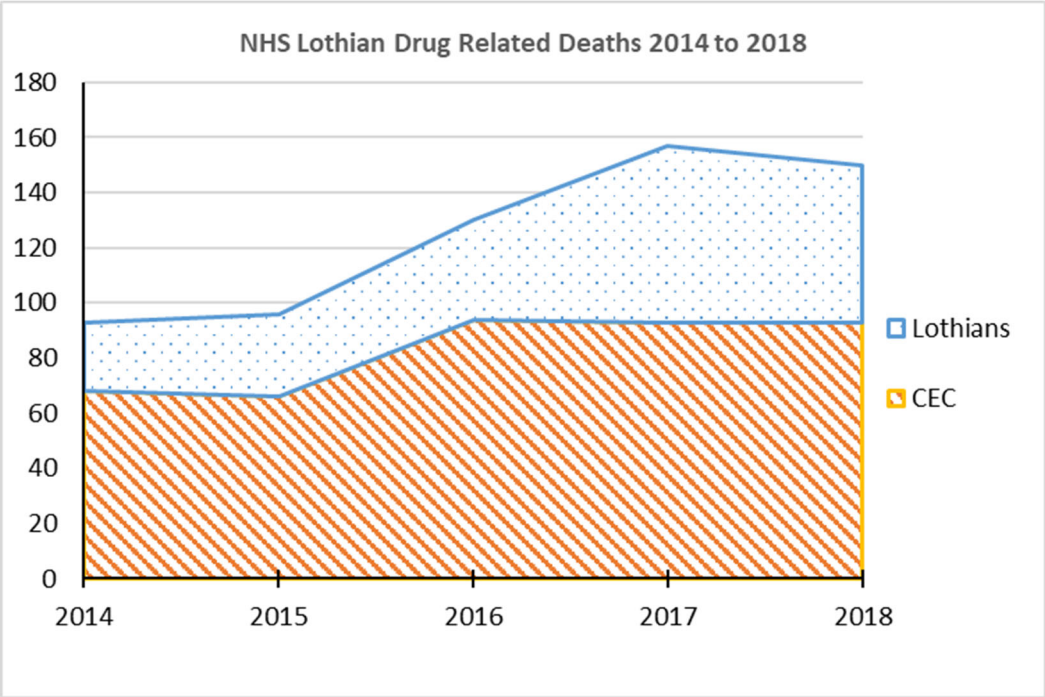


Figure 8 shows the numbers of DRDs within the City of Edinburgh by locality at the time of recording. The most marked increase over the 5 years has been in Edinburgh North East which has increased by over 50%. The other three localities have shown overall rises but in a much more variable pattern. There is no obvious explanation for this lack of consistent change in those areas which may suggest that at this level the background variation from year to year ("noise") obscures the overall trend ("signal") so that detailed analysis at this level is unlikely to yield useful insights. It should be noted that boundary changes in mid-2016 and mid-2017 within the City of Edinburgh due to the establishment of the IJBs and then ward boundary changes prior to an election may also be a cause of some of these year on year variations within and between localities. The data shown has been recorded using the boundaries current at the time. These changes will have contributed to year on year variability.

Figure 8: DRD cases by NHS Lothian locality and year for the City of Edinburgh, 2014 to 2018

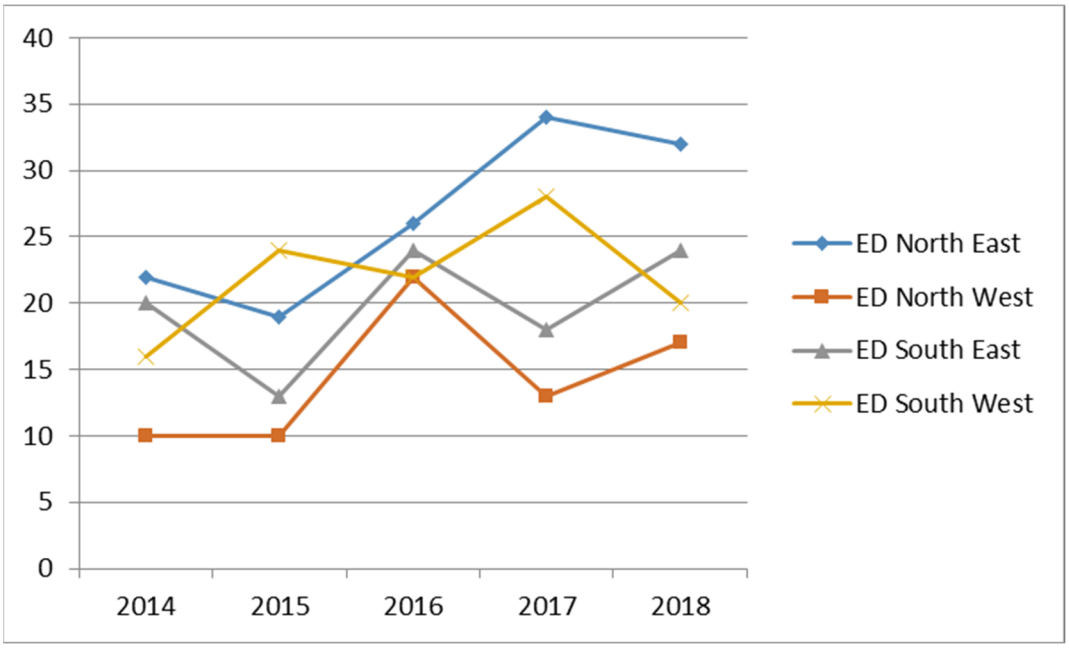
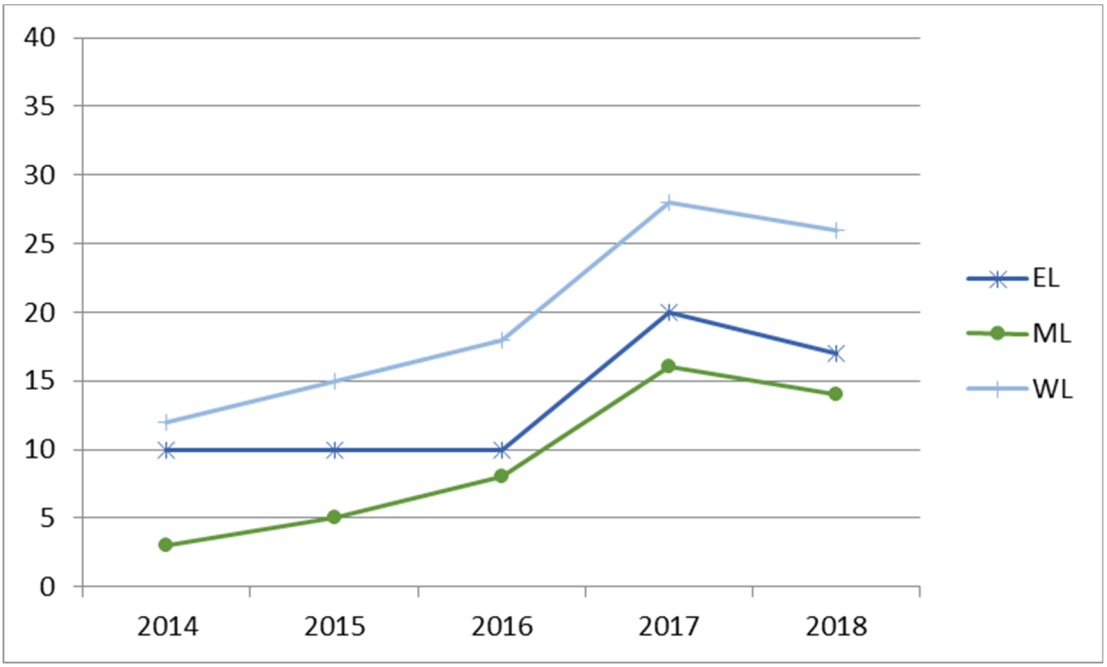


Figure 9 shows DRD from 2014 to 2018 for each of the three Lothians separately.

Figure 9: DRD cases by NHS Lothian locality and year for the Lothians, 2014 to 2018



When the three Lothians are looked at separately there are similar year on year changes in all three.

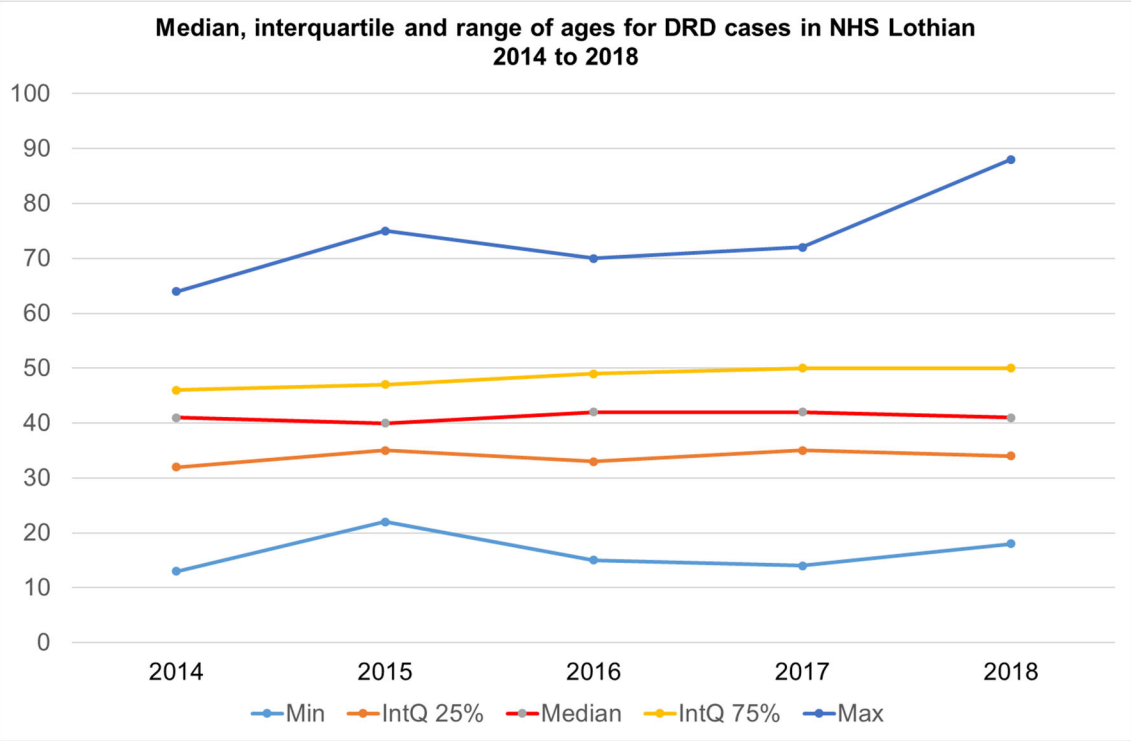
For all seven NHS localities, the DRD case numbers for 2018 were at or below maximum numbers on the preceding 4 years apart. However, the year on year variability of numbers

in several areas indicates the need to **not** take the annual numbers and how they have changed compared to the previous year as a reliable indicator of trend at locality level. Trends over time are more reliable. From this, there have been clear and lasting increases in four of the seven localities, Edinburgh NE, East Lothian, Midlothian and West Lothian.

19: Median age and ranges 2014-2018

Data for the last 5 years (2014-2018) has been gathered to analyse the age of DRDs in NHS Lothian. Figure 10 shows the median age, interquartile range and overall age range for DRD cases in NHS Lothian over the 5 year period 2014 to 2018.

Figure 10: Median interquartile and age range for DRD cases in NHS Lothian 2014 to 2018



The median age of death for DRDs recorded by NHS Lothian has been the same in the period 2014 to 2018 at 41-42 years. The interquartile range has changed slightly from 32-47 in 2014 to 34-50 in 2018 but this has not affected the median.

The current interquartile range is 33-50. That means that half of DRDs were in this age range. But it also means that a quarter were older and a quarter were younger.

The proportion of DRD cases over the age of 35 has stayed stable at around 70% since 2015 and this is the same overall for both men and women. The figure for women varies more year on year because of the relatively low numbers of cases but the lack of trend is the same.

The age group 35-64 or “>35” is often used in analysing drug deaths or in statistics on the population of people with a drug problem. This seems to have been done because pre-2000

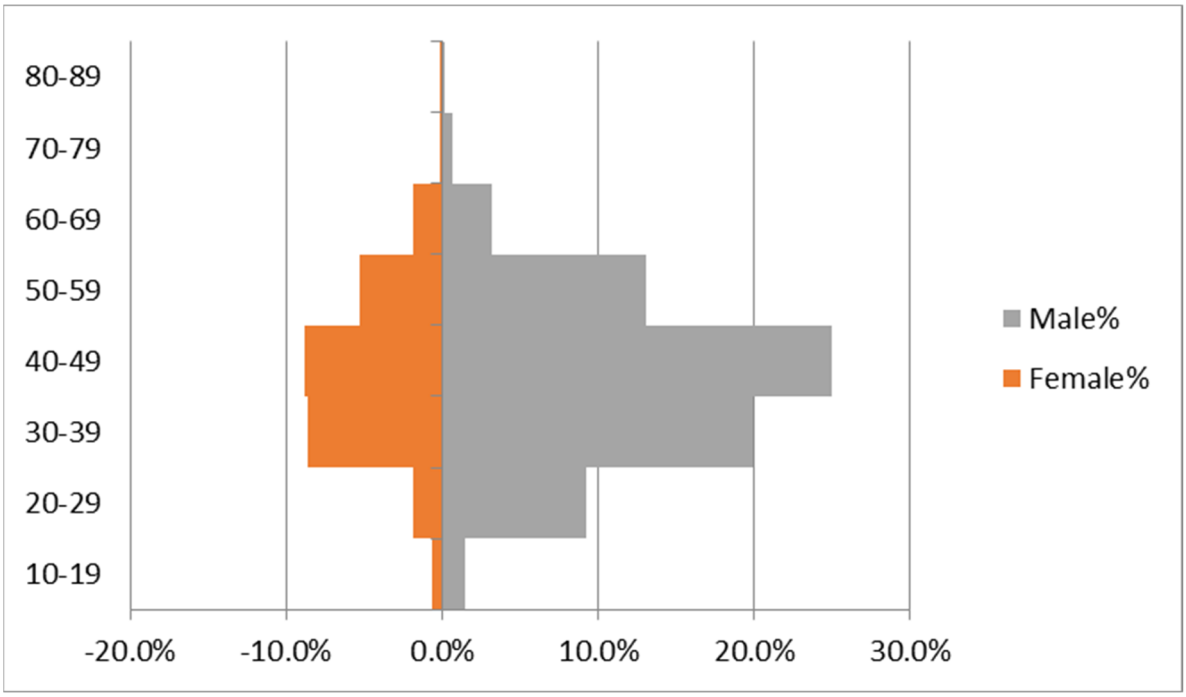
most drug deaths were in people aged <35. However, the majority of DRDs are now over 35 so using one age group to represent them all obscures important information. It is essential that analysis but adapted to the current situation and use equal age groupings across the whole age range of DRDs and PDPs

20: Gender and age of DRDs from 2014 to 2018.

From 2014 to 2018, the proportion of DRD cases has been around 72% male and 28% female. There have been some year on year fluctuations in this, but no overall trend. The median and interquartile age range is the same for women as for men over the period of 2014 to 2018.

Figure 11 shows the numbers of DRDs in NHS Lothian from 2014 to 2018 by gender and decade of life.

Figure 11: Gender and age of DRDs in NHS Lothian 2014 to 2018 by decade of life



Over the 5 years, the commonest age group overall is 40-49 and the largest single gender age group is males aged 40-49. Nonetheless, 42% of DRDs are <=39 years old. Recent figures e.g. for 2018 suggest that this may be increasing but the trend so far is not definite and could be a fluctuation rather than a trend.

21: Crude DRD mortality rate by age group 2014 to 2018.

Decade of life vs NRS/NHS age groups

When dividing populations into 10 year age ranges, NRS uses age groups such as 15-24, 25-34 etc. NHS does something similar although sometimes slightly different. When gathering data and reporting on ages of DRDs and PDP, uneven lengths of age groups are often used such as 15-24, 25-34 and 34-65. Initially these may have produced fairly even sized numbers per age group but it is a fundamentally limited approach that gives a visually easy result but will cause problems if things change over time as going back to re-analyse data is rarely popular.

Population data by single year of life was obtained for NHS Lothian from the NRS website. It was then grouped according to 5 year periods which could then be combined in either decade of life (0-9, 10-19, 20-29 etc.) or by 10 year age groupings used by the NHS and NRS (15-24, 25-34 etc.). Each was then used to calculate crude mortality rates due to DRDs from 2014 to 2018.

Linear versus relative scales

Age specific rates are often displayed as a simple percentage of a population over time e.g. in NRS and ISD DRD reports. This is common but it can lead to the problem of over emphasising the change in groups that start at a higher level. For instance, doubling the rate of 3% results in 6%. But doubling a rate of 1% results in 2%. It is still a doubling but does not look as impressive as 3% to 6% when the changes are plotted on a graph with a linear Y-axis. There are two possible solutions. One is to look at percentage change, which in the above example would both be from 100% to 200%. This has two disadvantages. It firstly ties you to an initial point which over time may become irrelevant. Secondly, you do lose the fact that one group is at a higher rate than the other initially as they all start at 100%. There is also the slightly pedantic dislike of using a percentage of a percentage.

The other non-linear way to display the two is using a logarithmic scale in which a change from 1 to 10 is the same as from 10 to 100 (assuming a base 10 logarithm). In this case a log base 2 was preferred as a doubling from 2-4 would show as the same slope as from 4 to 8 etc.

The use of different y-axis types and a simpler but relevant example (DRDs numbers in Edinburgh and Scotland) is discussed and illustrated in more detail in Annex B.

The crude mortality rates by age group were calculated for each year from 2014 to 2018 and plotted using the three different y-axis types. The results are shown in Figure 12 on the following page,

The different age-groupings produce quite different appearing results with different age grouping having the highest mortality rates. When such a minor change in data grouping produces such different results, it indicates that there is something further to look at. In this

case, it would seem to indicate that the age group with the highest mortality rate is 35-39 as this is the age group present in the age grouping 35 to 44 and 30-39.

In the graphs using a linear scale, there appears to be a diverging rate of increase between age groups, particularly using the NHS/NRS age categories. However, the logarithmic and percentage charts indicate that the rate of increase in mortality has been similar in the different age groups and that this is particularly the case using decade of life as the age categories. This is shown in Figure 12 with a more extensive set of graphs in Figure 13

Figure 12 DRD mortality rates in NHS Lothian 2014-2018 as a % of 2014 value by decade of life

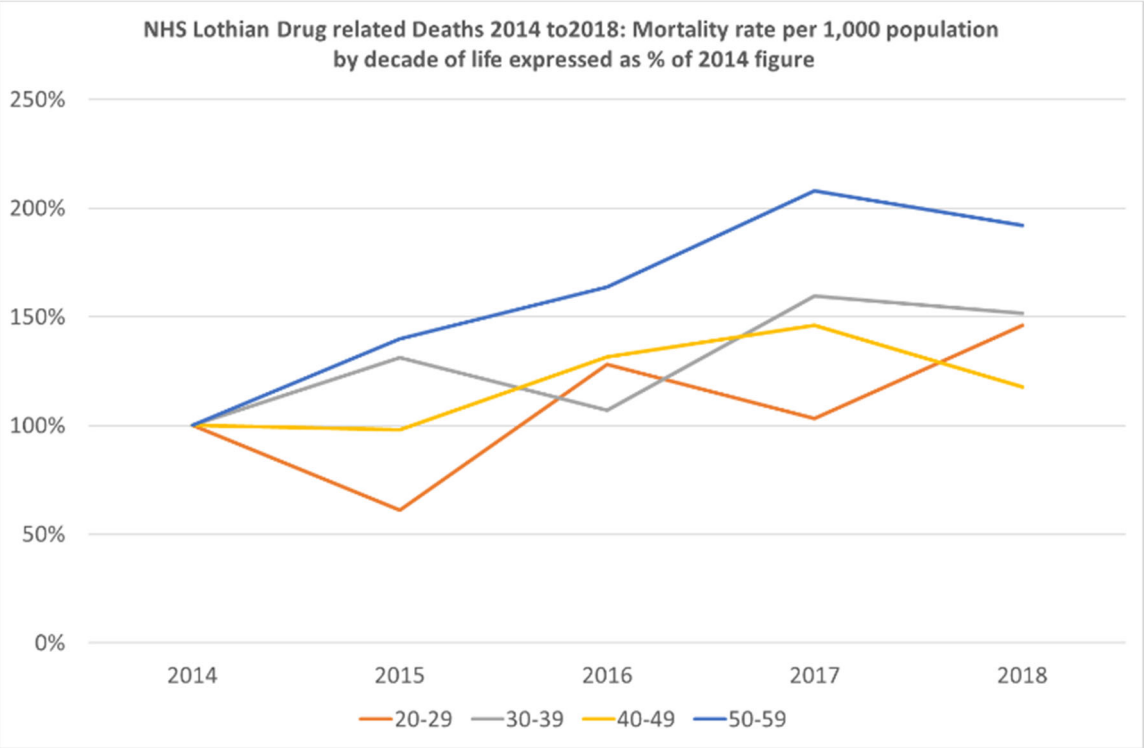
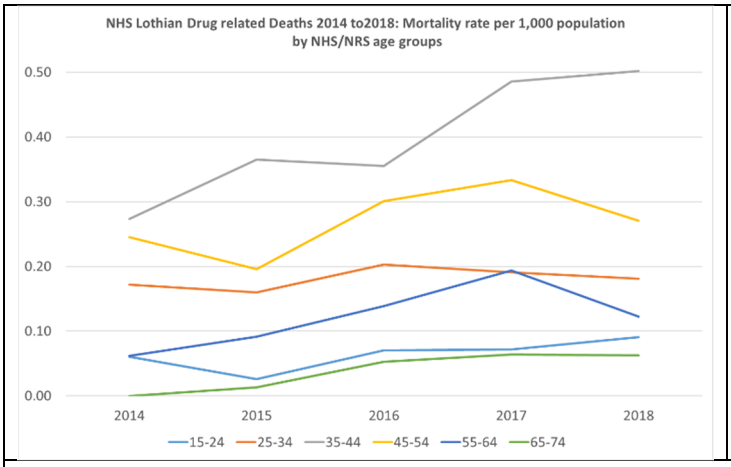
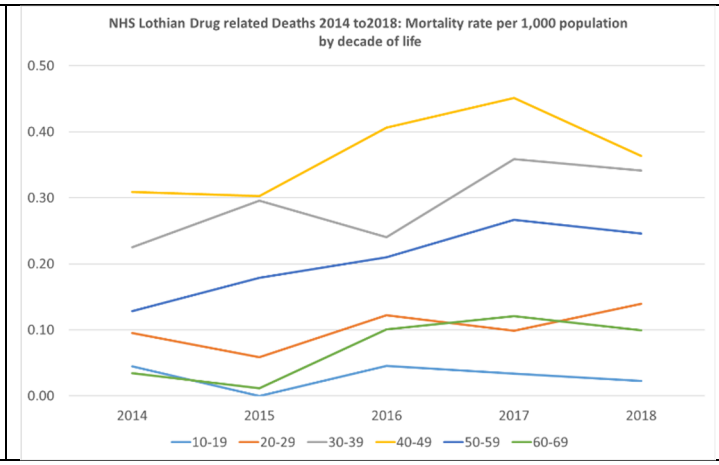


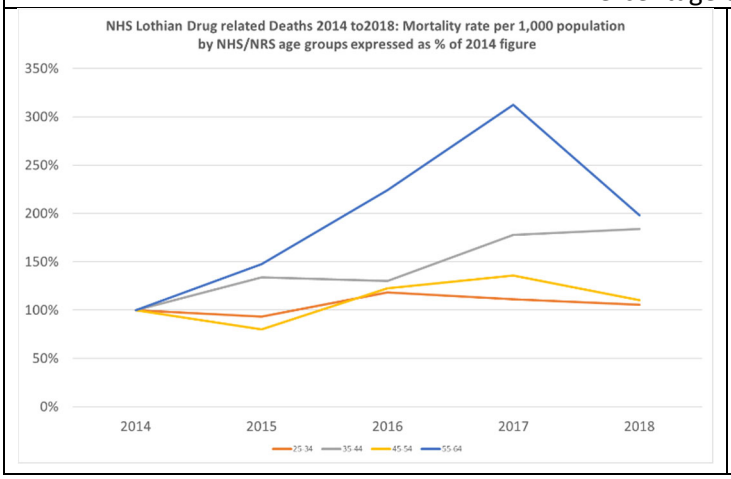
Figure 13: Crude DRD mortality rate in NHS Lothian 2014 to 2018 by age group using NHS/NRS age groups or decade of life and comparing different y-axis scaling

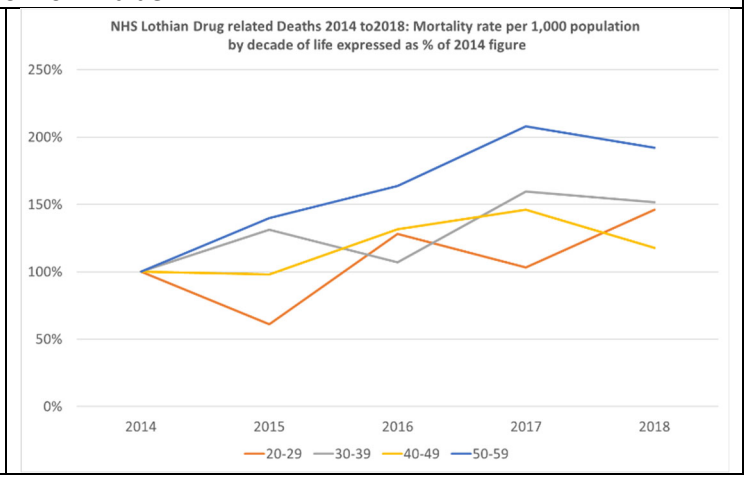
Linear scales



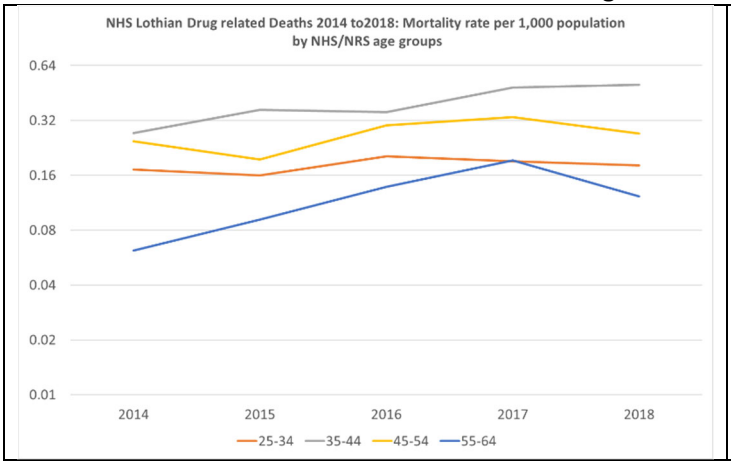


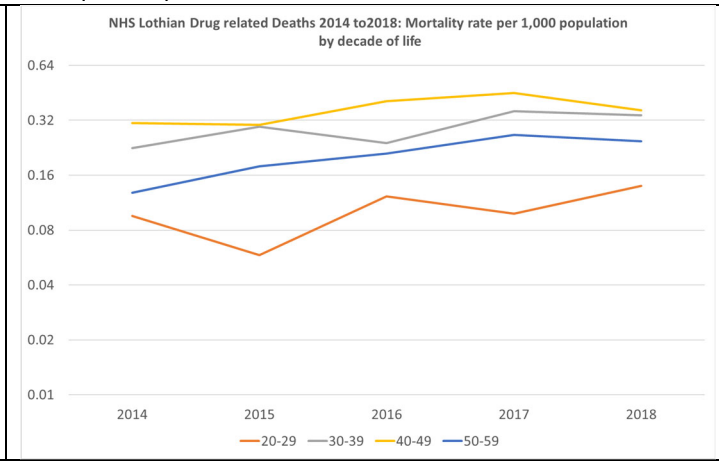
Percentage of 2014 value





Logarithmic scales (base 2)





22: DRDs 2014 to 2018 by EH postcode district

There are 48 postcode districts that start with EH and fall entirely within NHS Lothian. There are a few others that are partially within NHS Lothian and there are a few non-EH postcodes that fall partly within NHS Lothian. Almost all the population at risk are resident in the EH postcodes that fall entirely with NHS Lothian. These have therefore been used as a reasonable representation of the overall population at risk. Populations per postcode district were obtained and from the data available, each DRD was allocated to a postcode district.

Combining numbers of DRDs by those EH postcode districts for the years 2014 to 2018, the number recorded per postcode district ranged from 0 to 60 as shown in Table 10.

Table 10: Number of EH postcodes with different ranges of DRDs in 2014 to 2018

Number of DRDs	No of postcode districts
0	7
1 to 10	22
11 to 20	7
21 to 30	8
31 to 40	1
41 to 50	1
51 to 60	2
	48

Around 14% of EH postcode districts have no DRDs recorded between 2014 and 2018 and a further 45% have between 1 and 10. However of the 616 DRDs for which an EH postcode is recorded in the period, 63% are in the 11 postcodes with 20 or more DRDs recorded. The three EH postcodes with more than 40 DRDs recorded (EH6, EH7 and EH11) contain 159 DRDs over the 5 year period which is 26% of all DRDs recorded within a postcode. So, whilst DRDs are spread over most EH postcode districts in NHS Lothian, the majority are in more focused groupings. This will undoubtedly map well to the Scottish Index of Multiple Deprivation (SIMD) although this is available at datazone level rather than post code district. However, there are over 1,000 datazones in NHS Lothian so this level of resolution produces small number errors and too many data points to show patterns easily.

Note that the above table does not include DRDs recorded in people indicated to be of No Fixed Abode (NFA). There were 21 DRDs are in people recorded as NFA in the five year period. This is concerning but when put in the context of cumulative mortality rates, its true importance can be seen.

Mortality rate should be a better way overall at looking at the burden of DRD deaths within a community or area. The population in the 48 postcode districts varies widely from less than 500 to more than 50,000. So a comparison using a rate is required as well as a crude number. Looking at crude mortality rates per 1,000 population within each EH postcode district, there are large variations as indicated in Table 11.

Table 11: Numbers of EH postcode districts with different ranges of cumulative DRD mortality from 2014 to 2018

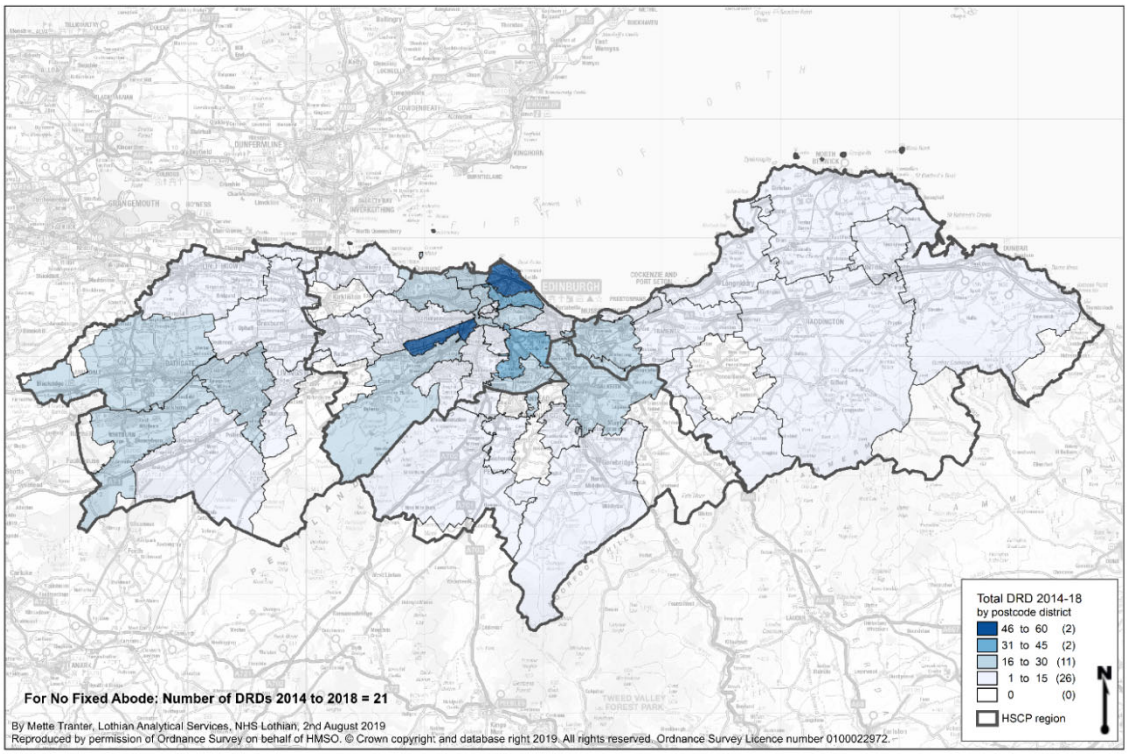
Cumulative DRD mortality rate per 1,000 populations	No of postcode districts
0	7
0.01 to 0.5	17
0.51 to 1.0	14
1.01 to 1.5	7
1.51 to 2	0
2.01 to 2.5	1
>2.5 (max 3.4)	2
	48

The cumulative mortality rate among people who are classed as NFA is difficult to calculate. It is a population with a relatively rapid turnover. Again, it would be best to measure the population in person years of risk but the data does not exist to allow this. The current rough sleeping population of Edinburgh is thought to be around 10 to 120. In a roughly two year period around 2000 rough sleepers were identified in Edinburgh. Estimates for other council areas have not yet been found but it may be fair to assume that an estimated population of 1,000 person years of risk may be about right. If that were the case then the mortality rate per 1000 would be 21, almost an order of magnitude above the next highest (3.4 per thousand in EH2). EH2 is a city centre postcode and it may be that it includes a population living in hostels that are closely linked to those who are NFA. Even if the NFA population were 5000, the mortality rate would still be above any given postcode.

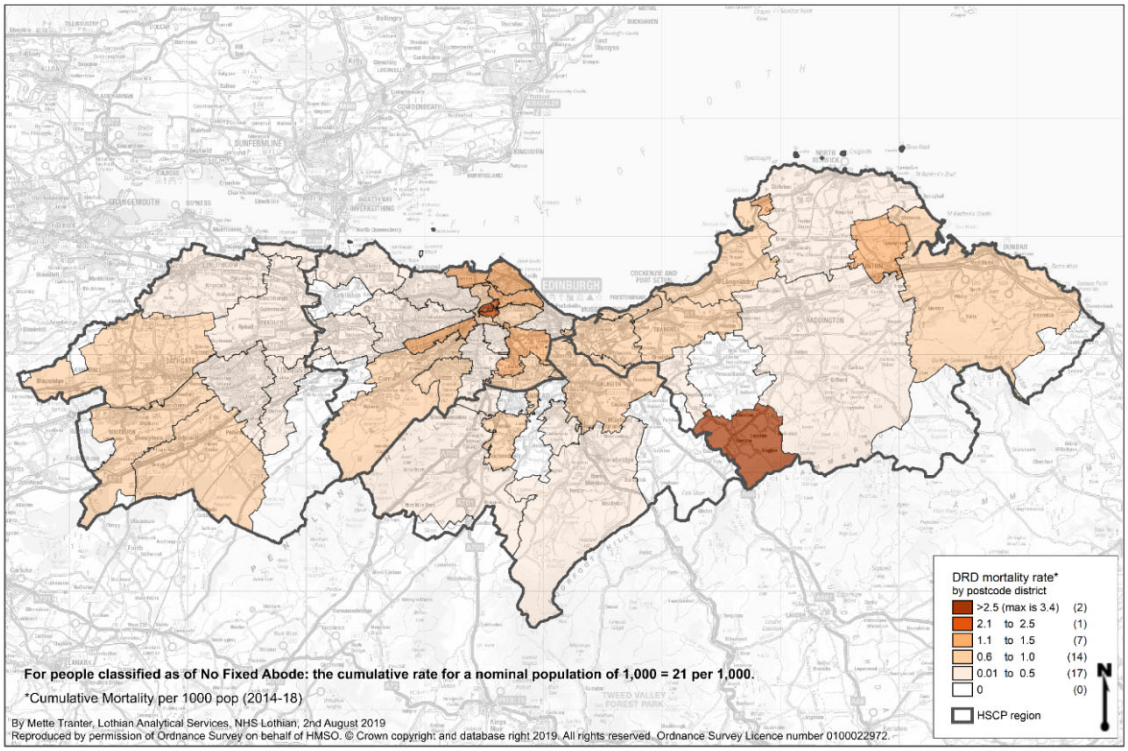
The numbers of DRDs from 2014 to 2018 and the cumulative mortality rates by EH postcode are shown in Figure 13. One of the postcode districts with the highest cumulative mortality rate is a rural district in East Lothian. The numbers of DRDs here is small but so is the resident population.

Figure 14: Drug related deaths in NHS Lothian 2014-18 by EH postcode district

Numbers of DRD cases by postcode district, totals 2014-2018



Cumulative DRD mortality rate 2014-2018 by postcode district



Maps produced by M. Tranter

Comparison and contrast of drug related deaths in NHS Lothian in 2014 and 2018

The market in drugs of misuse is complex. It is destructive of lives all along the production, supply and consumption chain. It causes misery, poverty, violence and death. It demonstrates some of the worst aspects of humanity with drug users its final victims. But it is also a highly inventive, flexible and responsive production, marketing and consumption system. It can change rapidly to create and respond to demands. It adapts quickly to limitations and interference. The recent rise of the use of social media, instant messaging and the spread of county lines have changed the day to day reality of the illicit drugs market markedly in recent years. It can be considered a commercial and political determinant of health with the agility of an IT company and the impact of the global tobacco or alcohol industries. The responses of the health system, which we would like to be proactive, very often end up being reactive. Actions taken by health and enforcement systems may have unintended consequences despite very extensive planning and fore thought.

It pays to look back for a few years to see if changes in one factor go in parallel with another (but perhaps not very far).

One way of highlighting changes is to look at two different years separated by a few years to look for changes in possible causal factors that show a similar change to the outcome, in this case drug related deaths. Correlation is not causation but it is an initial step in looking for areas that might explain changes in outcomes.

The NHS Lothian report on DRDs in 2014 shows the results for that year in detail. It is clear from reading this that in only 4 years (2014 to 2018) whilst some things have not changed, many others have. Looking at those may help us to identify interventions we can use now.

What has stayed the same is that people taking drugs and suffering DRDs are largely living in deprived areas and have a history of deprivation, neglect and multiple chronic health issues, mental and physical. All of these need to be addressed and this must never be lost sight of. But that will take time and we also need to find things that we may be able to do something about now.

Some aspects that do affect what we do have changed dramatically in this short period.

Number of DRDs, overall population and crude DRD mortality rates in PDPs in 2014 and 2018

In 2014, there were 99 DRDs in NHS Lothian. In 2018 there were 151, an increase of over 50%. Assuming a modest increase in the overall population over that time, overall population mortality rates have risen from 0.11 to 0.17 per 1,000 population.

DRD Mortality in the estimated population of people with a drug problem

The estimated number of PDPs in NHS Lothian in 2012/3 was 9.800 and in 2015/16 it was 9,000 a slight decrease. Although the two estimates of PDPs are not exactly comparable with the 2015/6 figure probably somewhat low, it is clear that drug related death mortality

rates in PDPs has increased from around 9 per 1,000 to around 16 per 1,000, a significant rise.

Median age and range:

In 2010 there were 73 DRDs recorded and 99 in 2014, an increase of 36% over a four year period. In 2018 there were 150 DRDs, a 51% increase over a four year period. The rate of increase in DRDs has not slowed.

In 2010, the median age of DRDs was 34 and had increased to 41 by 2014 (actually peaking at 43 in 2013). Since then, the median age of DRDs in NHS Lothian has stayed the same.

In 2014, some of the rise in DRDs from 2010 was ascribed to an ageing cohort of drug users who, as they aged, were at greater risk of death. As described elsewhere in this report, neither median age nor age distribution of DRDs has changed significantly since 2014. Whilst an ageing cohort may have explained some of the rise prior to 2014, it does not seem to be valid as an explanation of the much greater rise since then.

Mortality by age group in 2014 and 2018

Mortality rates in different decades of life have risen roughly equally from 2014 to 2018 when measured as part of the overall population. How this would translate to the population of people with a drug problem is difficult to know as the data for this population is an estimate overall and inadequately broken down by even simple demographic determinants such as gender and age over time. The need for better information is urgent.

Contact with specialist services in 2014 and 2018

In 2014, 48 of the 99 DRDs were in contact with specialist services at the time of death, 14 with SMD and 34 with GP-NES. In 2018, 41 of 151 DRDs were in contact with specialist services at time of death, 22 with SMD and 20 with GP-NES. The background case load of the services in 2014 is not known but it is notable that numbers of DRDs who were in contact with specialist services at the time of death has not changed greatly whilst the total number of DRDs has increased markedly in the period 2014 to 2018.

Poly-drug use in 2014 and 2018

In 2014, the median number of drugs implicated in death was 2 with and interquartile range of 1 to 3. In 2018, the median number of drugs implicated in death was 4 with and interquartile range of 3 to 6. In 2014 40% (41 of 99) of DRDs had only one drug implicated in death. In 2018 only 10% (15 of 151) had only one drug implicated in death. There has clearly been a parallel rise in numbers of DRDs and number of drugs implicated in death. This would seem to be a key difference between the two year and a dramatic change in a short time period and may be an important factor in the rise in DRD numbers.

Data prior to 2014 hasn't been looked at but it is possible that the rise in DRDs before then may also have happened in parallel with an earlier increase in poly-drug use.

Comparison of drugs implicated in DRDs in 2014 and 2018

The top twelve drugs implicated in deaths in 2014 in NHS Lothian are shown in the Table 12

Table 12: The top twelve drugs implicated in deaths in 2014 in NHS Lothian

Drug	2014 ranking	2018 ranking	2014 cases	2018 cases	2014%	2018%
Methadone	1	1	57	79	57.6%	52.7%
Heroin/morphine	2	2	46	69	46.5%	46.0%
Alcohol	3	11	24	23	24.2%	15.3%
Diazepam	4	3	21	64	21.2%	42.7%
Dihydrocodeine	5	9	14	28	14.1%	18.7%
Amitrypyline	6	13	9	16	9.1%	10.7%
Gabapentin	7	7	7	38	7.1%	25.3%
Ethylphenidate	8	N/A	6	0	6.1%	0.0%
Tramadol	9	15	6	8	6.1%	5.3%
Pregabalin	10=	5	5	51	5.1%	34.0%
Cocaine	10=	4	5	55	5.1%	36.7%
Amphetamine	10=	17	5	6	5.1%	4.0%

The top twelve drugs implicated in DRDs in 2018 are shown in Table 13.

Table 13: The top twelve drugs implicated in DRDs in 2018 in NHS Lothian

Drug	2018 Ranking	2014 ranking	2018 cases	2014 cases	2018%	2014%	% Change 14 to 18
Methadone	1	1	79	57	52.7%	57.6%	-4.9%
Heroin/morphine	2	2	69	46	46.0%	46.5%	-0.5%
Diazepam	3	4	64	21	42.7%	21.2%	21.5%
Cocaine	4	10=	55	5	36.7%	5.1%	31.6%
Pregabalin	5	10=	51	5	34.0%	5.1%	28.9%
Etizolam	6	15	43	3	28.7%	3.0%	25.6%
Gabapentin	7	7	38	7	25.3%	7.1%	18.3%
Codeine	8	19	35	2	23.3%	2.0%	21.3%
Dihydrocodeine	9	5	28	14	18.7%	14.1%	4.5%
Alprazolam	10	N/A	25	0	16.7%	0.0%	16.7%
Alcohol	11	3	23	24	15.3%	24.2%	-8.9%
Mirtazapine	12	17	19	3	12.7%	3.0%	9.6%

Of the 12 drugs in 2014, 7 appeared in the top twelve drugs in 2018 and of the 12 drugs in 2018, 8 appeared in the 2014 list. There is significant overlap but also significant change. Looking at the percentage of cases in which the drugs are involved, there are some clear changes. The rise in polypharmacy is seen by the fact that in 2014, only 5 drugs were involved in more than 10% of DRDs, whereas in 2018 all top twelve drugs were implicated in more than 10% of recorded DRDs (and in fact so was the thirteenth ranked drug, amitriptyline)

Methadone and heroin/morphine are the most common in both years and associated with similar proportions of DRDs in each. The interpretation of the overall safety of methadone

has been discussed elsewhere in this report. It is clear that when methadone is used as part of specialist drug treatment services, the risk of mortality is low.

The rise in use of gabapentinoids and benzodiazepines is clear. In many DRDs these are used in combination with an opioid. Diazepam is close to the same ranking in each list but was implicated in twice the percentage of DRDs in 2018 as in 2014. Etizolam has shown a dramatic rise as have pregabalin and gabapentin. Cocaine is also increased markedly and is often implicated in death in 2018. Again, it is possible that this combination of drugs is at least part of what is driving the increased in DRDs.

Methadone is implicated in more deaths than any other drug in 2014 and 2018. This leads to questions over its safety and to the overall rationale of OST. There are several arguments to counter this. Firstly, not all DRDs in which methadone is implicated are people to whom methadone has been prescribed. Secondly, and perhaps most importantly, it is clear that being in specialist services (including GP-NES), which usually means that methadone is prescribed, is clearly protective with a lower mortality rate than overall for PDPs. Indeed, it has been argued that one problem is the under prescribing of methadone (too low a dose) that leads users to supplementing with other drugs. The other substances used for OST, buprenorphine and dihydrocodeine, are also implicated in DRDs, although often but not always when not prescribed. OST clearly reduces the risk of death but cannot eliminate it; the important risk factor for suffering a DRD is being a PDP.

Why are numbers of drug related deaths increasing?

Despite the plateau in DRD numbers in NHS Lothian in 2018, there is little doubt that the overall trend here and elsewhere in Scotland is of a seemingly relentless rise in numbers going back over more than a decade. Some possible causes of increasing DRD numbers in NHS Lothian are discussed below to make an initial assessment of their likely current impact pulling together analysis elsewhere in this report.

- Increase in the general population
  Edinburgh and the Lothians is an area of increasing population. If the population doubled you might expect a doubling in DRDs. However, the actual rate of increase does not match the rate of increase in DRDs although it could account for a small proportion of the increase.

- Increase in the population of PDPs
  This is possible but again the evidence for this is not good either way. There certainly does not seem to be an increase in this population from the estimates available that would account for the increase in DRDs.

- Ageing drug user population
  This has been quoted as a cause but the evidence for this is not strong. That is partly because the information on the population structure of drug users is poor. However, given the lack of significant change in the age structure of DRD cases over the last 5 years, an ageing population would not seem to account for the more than 50% increase in DRDs over the same period. That the rate of increase in DRDs is similar in different decades of life suggests that the drug users in their 20s today will become the DRDs in their 30s and 40s in a few years' time. There is a need to get interventions into this younger age group before that happens.

- Change in gender balance
  Historically, fewer women than men have died from a DRD. If this were to change, that could have accounted for a rise in DRD numbers. However, evidence over the period 2014 to 2018 indicates that the proportion of women in the overall group of DRDs has stayed the same and that the mortality rate from DRDs is the same for men and women thought to be classified as a person with a drug problem.

- Co-morbidities
  Co-morbidities would seem an obvious issue that makes drug users more at risk of death, particularly those that affect the cardio-respiratory system or that impair judgement making such as mental health issues. If the proportion of PDPs with these issues is increasing, it might explain some of the rise in DRDs. But this would need knowledge of how the prevalence of these has changed over time within the population of people with a drug problem. This data is has not been examined during

this report so it may be a factor. However, unless it has itself changed rapidly, it seems unlikely to account for the relatively steep increases in DRD numbers over a short period of time.

- Poly-drug use
  The number and range of drugs found by post-mortem toxicology in DRD cases is perhaps remarkable and it is tempting to implicate this in the rise in DRD cases. The OFT results weaken this argument; they show that poly-drug use is common and normal in people who are engaged with the SMS services. Nonetheless, poly-drug use is known to be a dangerous practice and the increase in its occurrence in the period 2014 to 2018 does seem to mirror the increase in drug related deaths in that period (and possibly earlier). OFT results cannot tell us what drugs have been taken together at the same time or in what quantities and it seems likely that a DRD may well be precipitated by combining several drugs together.

- Particular depressant drugs
  Drug use is a very dynamic market. Novel Psychoactive Substances (NPS) were implicated in a rise in DRDs in 2016, at least in Edinburgh. They have virtually disappeared since the change in the law but DRDs have not fallen. Novel benzodiazepines such as alprazolam and etizolam are relatively new introductions so might have a role. The gabapentinoids have also shown a relatively recent introduction and increased use. Etizolam is currently of growing concern. But opioids are still the most commonly involved substance and to date diazepam still the next commonest implicated substance in NHS Lothian.

- Cocaine.
  Cocaine use (as measured in OFTs) has increased steadily over the years 2016 to 2018 but has now seemingly levelled off. Could this be related to the rise and now hopefully levelling off in DRD cases? It is hard to feel hopeful that the levelling off of DRDs is a real trend but time will tell. Many poly-drug DRDs involve recent use of both cocaine and opioids. How these two very different sets of drugs interact is not clear and possibly this is a risk factor and possibly in an unpredictable way. The changes in use of cocaine is one of the few areas that mirrors the recent pattern of DRD numbers in NHS Lothian. That does not mean that the two are linked but would indicate that further investigation would be justified.

Of the factors examined, poly-drug use seems the most obvious potential reason for increasing drug deaths and perhaps in particular the increasing use of “street-benzos” of unknown quality and the addition of cocaine with depressant drugs.

Areas not reported on and why

Significant life events, trauma (past and ongoing) mental health and physical health have not been included in the analysis or this report. It is clearly accepted and known that drug misuse and hence DRDs are closely linked to issues such as these overall. But many drug users share these problems and survive. This also true of the general population, many of whom have these issues but do not have a drug problem. That isn't to try and devalue the importance of these issues for drug users or the sympathy we have for people who have these issues. But we already know about these risk factors and so should be able to take them into account. Intervention for many of these issues needs to be at a much earlier stage in life and/or by other services and more generally in the population.

Recent life events also have an impact and are flags for increased risks of DRD and could be triggers for anticipatory care. Again, these risks are known and the time for intervention is before they precipitate a DRD. To know how well we are doing at this, we need to carry out studies that cover all people with drug problems who suffer such events and follow up what happens after them with and without intervention, not only for those who suffer a DRD. One such study is underway on non-fatal overdoses (NFOs) and will be reported on separately. Others are part of a longer-term programme of work that is linked to the national investigation in the increase in the rates of avoidable and amenable premature deaths.

Take home naloxone in the context of drug related deaths is not commented on in this report. This is not to downplay its importance in any way. It is because looking at a potentially life-saving measure only in a group where the outcome has always been the loss of life cannot reflect the life-saving impact. Nor can doing this evaluate how well a measure such as naloxone has been taken up. Drug related deaths are a small proportion of people with a drug problem in each year and by their nature are where such measures will be least prevalent or effective, so looking only at the circumstances surrounding DRDs will give an inaccurate and misleading picture of the real situation.

The questions that we could and should be answering are

- whether there was a point at which the NHS or other services could have intervened that would have prevented the death.
- are there predictive indicators of increased risk of an impending imminent DRD such as disengagement from services, pharmacy collections, non-fatal overdoses, life events, recent DRDs within families or known social groups
- was there anything particularly risky about the drugs taken or the way in which they were taken that we can learn from and use to educate and protect other drug users.

This report points to a possible instance of the first (shortly after disengagement with services) and seems to provide strong evidence that poly-drug use is particularly risky with "street Valium" being a particular recent trend that should be addressed.

Annex A: NRS Definition of Drug Related Deaths

Below is a summary if the definition of drug-related deaths as agreed by a working party set up by the Advisory Council on the Misuse of Drugs and used by the General Register Office for Scotland. The relevant codes from the International Classification of Diseases, Tenth Revision (ICD10), are given in brackets.

(a) deaths where the underlying cause of death has been coded to the following sub-categories of 'mental and behavioural disorders due to psychoactive substance use':
(i) opioids (F11);
(ii) cannabinoids (F12);
(iii) sedatives or hypnotics (F13);
(iv) cocaine (F14);
(v) other stimulants, including caffeine (F15);
(vi) hallucinogens (F16); and
(vii) multiple drug use and use of other psychoactive substances (F19).

b) deaths coded to the following categories and where a drug listed under the Misuse of Drugs Act (1971) was known to be present in the body at the time of death:

(i) accidental poisoning (X40 – X44);
(ii) intentional self-poisoning by drugs, medicaments and biological substances (X60 – X64);
(iii) assault by drugs, medicaments and biological substances (X85); and
(iv) event of undetermined intent, poisoning (Y10 – Y14).

3. Categories of death excluded:
a) deaths coded to mental and behavioural disorders due to the use of alcohol (F10), tobacco (F17) and
volatile substances (F18);
b) deaths coded to drug abuse which were caused by secondary infections and related complications (for example the 20 or so deaths in 2000 caused by Clostridium novyi infection);
c) deaths from AIDS where the risk factor was believed to be the sharing of needles;
d) deaths from road traffic and other accidents which occurred under the influence of drugs; and
e) deaths where a drug listed under the Misuse of Drugs Act was present because it was part of a compound analgesic or cold remedy: specific examples are:
Co-proxamol: paracetamol & dextropropoxyphene
Co-dydramol: paracetamol & dihydrocodeine
Co-codamol: paracetamol & codeine sulphate
All three of these compound analgesics, but particularly co-proxamol, have been commonly used in
suicidal overdoses.

There is a more extensive (several pages) explanation of the definition in the annual NRS publication on drug related deaths in Scotland which should be referred to in case of doubt.

Annex B: Statistical notes

Means, medians and measures of population dispersion

A commonly used measure of the centre of a distribution is the mean; it is really just the average. You add all the numbers together and divide by the number of numbers and that is the mean. Simple. But deceptively so. It works well when the distribution of a population is nice and symmetrical but if it isn't then you need something different. For that we often used the median. The median is the value in a range which has half of the population either side of it. It is the mid-point in a range rather than the average. The advantage of this is that it is not skewed by outlying values such as a few older or younger people in the case of DRDs. It really is the middle.

But a measure of the middle, be it mean or median, tells us little about a population. The mean **and** median of

29, 29, 29, 29, 29, 29, 29, 30, 30, 30, 30, 30, 30, 30, 31, 31, 31, 31, 31, 31, 31

is 30 and this is the same as the mean and median of

20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40.

But they are quite different populations. So, a mean alone is meaningless. A median without a range is going nowhere. Any summary statistic of a population should have a measure of the centre, the distribution of the population and the size of the population.

When the mean of a population is used, the measure of range is the Standard Deviation (SD). The range of the mean ± 1SD contains around two thirds of the population. The range of the mean ± 2SD contains around 95% of the population (often referred to as the "normal range"). But mean and SD are only valid where a population is of a certain type (the "bell shaped curve") and ages rarely fall into this type.

For medians, we use the interquartile range as a measure of range. This is the range of values in which half of the population is found. The lower value if the 25% interquartile and the upper is the 75% interquartile, so 50% lies between them. It is important never to show only a median (or mean) but always to include some idea of the range of values.

Linear and non-linear scales

The use of linear scales can be unintentionally misleading. When the number of drug related deaths increases from 250 to 1000, which is a large increase of 750. If numbers increase from 4 to 16, that is an increase of 12, a much smaller increase. Put into a table or graph together, they seem very different. And in pure numbers terms, they are. But in another important way, they are the same because in both cases the number of cases has increased fourfold. So the purely linear chart can look very misleading. A clear example of this is a

chart that is available from an external source of DRDs in Scotland compared with those in Edinburgh over the period 2003 to 2018..

The data are in the table on the left and the three graphs show the same data plotted on a linear scale, as a percentage of the 2003 figure (i.e. for both Scotland and Edinburgh, that is 100% and using a log base 2 Y-axis so that a doubling has the same impact for 4 to 16 as for 250 to 1000.

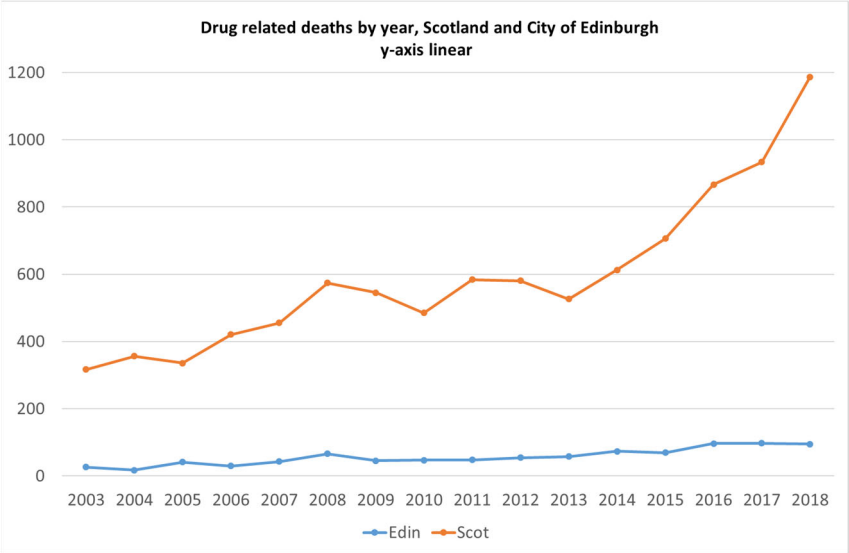
The linear graph makes Edinburgh seem to be increasing at a lower rate than the rest of Scotland looking at the slope of the lines. But looked at as a percentage of the 2003 value, the two lines rise closely together and in fact Edinburgh reached the peak level two years before the rest of Scotland in relative terms. The third graph, using a log to Base 2 for the y –axis is perhaps less intuitive but it does preserve an important piece of information that is lost in the percentage graph because it shows the fact that there are fewer DRDs in Edinburgh than Scotland whilst the similar slope of the two lines confirms that the two have risen at similar rates. This type of log-linear graph (log y axis, linear x-axis) is more usually used to flatten out highly curved lines, but they are also useful for comparing rates of change in different sized populations.

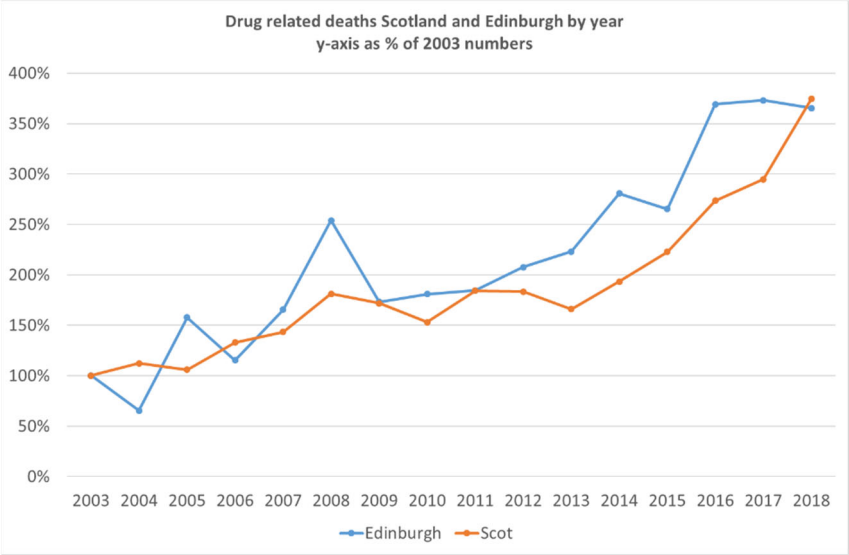
DRD in Edinburgh and Scotland 2003 to 2018

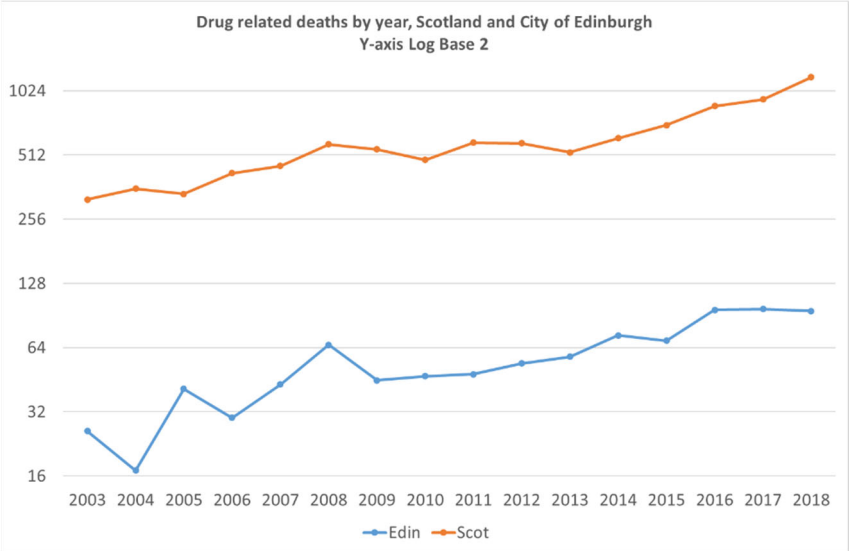
Year	Edinburgh	Scotland
2003	26	317
2004	17	356
2005	41	336
2006	30	421
2007	43	455
2008	66	574
2009	45	545
2010	47	485
2011	48	584
2012	54	581
2013	58	526
2014	73	613
2015	69	706
2016	96	867
2017	97	934
2018	95	1187

Data source: NRS Scotland

The same data has been used for all 3 graphs.







Is it a risk factor?

Speculation on risk factors is easy, backing that up with evidence is not. The only way to properly evaluate a risk factor is to look at both the affected population and the unaffected (in this case DRD cases and non-DRD people). If the people who die of a DRD have a higher rate of the factor than drug users who do not, the relative risk of death is not increased by the factor. COPD is an example where it may be possible to assess the risk. Many DRD cases have COPD noted as a co-morbidity but so do many drug users in general so you would expect a lot of DRD cases to have COPD. Only if a statistically and biologically significantly higher proportion of DRDs have COPD than the rest of the population at risk would it be a clear risk factor. The problem, as with age, is a lack of knowledge about the drug user population in general. We have great detail about every DRD but little about their surviving counterparts.

Annex C: Definitions and data sources for the population of drug users

There are various acronyms used for the population of people who misuse drugs.

PWID — People who inject drugs

Almost by definition, self-injecting drugs (apart from a few therapeutic uses such as insulin) will be misusing drugs. However, currently many and possibly most DRDs do not involve the injection of drugs. It is also unclear what proportion of problem drug users inject drugs although a rough estimate of 50% is sometimes mentioned. Nor does not injecting drugs rule out the use of drugs such as heroin which are classically thought to be injected. Smoking and even snorting such drugs is also common. PWID has uses where risks are closely linked to injecting such as blood borne viruses and soft tissue infections but is not useful in relation to DRDs.

PWUD — People who use drugs

This is probably used as an expansion of PWID. It does not seem to be a very useful term because many people use drugs of one kind or another. Even excluding alcohol use, there are many people who make occasional or regular recreational use of drugs with little or no impact on the number of DRDs. Cannabis would be the main example of this with Ecstasy another. Both are used by very large numbers of people, often younger although the latter does lead to some DRDs with little impact on their day to day lives. PWUD is used in publications but it rarely refers to a measurable or relevant population in relation to DRDs.

PDP — People with a drug problem

This is a term used by ISD in their estimates of population of problem drug users which is published every few years. It is described in more detail elsewhere. It is an estimate of people who show sustained use of opioids and/or benzodiazepines which is somewhat limited but certainly these are involved in most DRDs. It is the only estimate of the overall population of people who misuse drugs and is likely to be adequately accurate although it can only ever be an estimate.

Potential sources for demographic data on drug users

The two main sources are

ISD — Prevalence of problem drug use in Scotland

This is a series of publications with the latest published in 2019 but relating to data collected for the 2015/16 period. The reason for the delay was an issue with collecting data from one source previously used source.
The estimate combines data sources and statistical modelling to estimate the known and hidden population of PDPs. It estimates the numbers of people with an opioid and/or benzodiazepine drug use problem implying sustained use rather than occasional recreational use. This limitation in drug groups will leave some problem drug users out but most long term problem

drug users probably use one or other of these drug groups as well as others so this is probably not a big problem.

This is the only available estimate of the population from which most DRD cases come and is likely to be reasonably accurate. Data is recorded in increasing details over time but is not adequate in terms of the detail of age nor between genders.

NESI: <u>Needle Exchange Surveillance Initiative 2008-9 to 2017-18</u>

This longitudinal data collection refers only to people who inject drugs (PWID). This is an important group with implications of disease maintenance and spread to a wider population. The data is collected using a questionnaire on a voluntary basis with a set target sample size overall and per health board... The demographic data divides respondents into several age groups:≤25yrs, 26-30yrs, 31-35yrs and >35yrs. Given that the latter group is increasing over time and now represent around 75% of respondents, it would seem useful to report a more detailed breakdown although this was not done in earlier years. Gender is not reported. Nor is there any attempt to estimate the overall population of PWID which is correct given the methodology.

This is a key and important publication with many uses but the population does not relate well to those involved in DRDs, many of whom are not known injecting drug users. Nor does it provide any population estimate for PWIDs