Public Health Scotland

Drug-Related Hospital Statistics

Scotland 2022/23

An Accredited official statistics release for Scotland

Publication date: 16 April 2024

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Contents

Introduction

This release by Public Health Scotland reports on hospital stays in relation to a drug use diagnosis. This report describes the number of drug-related hospital stays, the number and characteristics of patients admitted to hospital, the substances involved and the geographical variations within Scotland.

This publication also includes some topic-focused sections which are aligned to areas of stakeholder and public interest. These are outwith the core content of this publication and may be subject to change in future reports. The following topic-focused sections are included in this report:

- a description of hospital stays related to drug overdoses;
- a comparison of drug-related hospital stays among younger and older patients; and,
- new analysis of 10-year outcomes for patients with a drug-related hospital stay in 2011/12, using data from PHS's **Scottish Public Health Drug Linkage Programme**.

Data used in this report

This report includes information on inpatient and day case activity in general acute and psychiatric specialties in Scotland, where drug use was recorded as a diagnosis at some point during the patient's hospital stay. The information reported in this publication is a combination of data from the following sources:

- General acute inpatient and day case records (SMR01), years 1996/97 to 2022/23
- Psychiatric inpatient and day case records (SMR04), years 1996/97 to 2022/23

Statistical disclosure control has been applied to protect patient confidentiality. Therefore, the figures presented in these statistics may not be additive and may differ to those reported in previous publications.

Further information on the data used within this report and the methods applied is detailed in the **Methods** section below.

Terminology

Within this report, the use of technical/statistical terms (e.g. opioids, stays, 'new patients') is sometimes unavoidable. For further explanation of these terms, please refer to the **Glossary**.

Main points

In 2022/23:

- There were 9,663 drug-related hospital stays. The European Age-sex Standardised Rate (EASR) of drug-related hospital stays was 182 stays per 100,000 population. This rate decreased for a third consecutive year, from a peak of 283 per 100,000 population in 2019/20.
- The highest substance-specific stay rate (81 per 100,000 population) was for opioids (drugs similar to heroin). This rate decreased for a third consecutive year, from a peak of 141 per 100,000 population in 2019/20.
- The highest patient rate (337 per 100,000 population) was observed among people aged 35-44 years. This rate decreased for a third consecutive year, from a peak of 515 per 100,000 population in 2019/20.
- Just under half (48%) of the patients with a drug-related hospital stay lived in the most deprived areas in Scotland.
- The rate of stays for drug poisoning/overdose decreased to 21 stays per 100,000 population. This was the second consecutive decrease in overdose stay rates, and the lowest recorded rate since 2006/07.

Results and commentary

This report focusses on combined general acute and psychiatric drug-related stays. As well as overall trends in drug-related hospital stays, it addresses specific topics such as drug overdoses, and changes in rates of stays by age group.

For an overview of drug-related hospital stays over time see the accompanying **trend data dashboard**. For a more comprehensive breakdown of the statistics by drug type, location, age, sex and deprivation, see the accompanying **data explorer dashboard**.

The definition of a drug-related hospital stay includes drug poisonings/overdoses and mental & behavioural stays. For further information on the ICD10 codes used to define these groups, see **Appendix 1 - Methods.**

Discussion of drug-related psychiatric and combined general acute/psychiatric hospital trends is based on the period from 1997/98 to 2022/23. As psychiatric hospital (SMR04) stays are typically longer than general acute hospital (SMR01) stays, psychiatric episode data are submitted in two parts and compiled and quality assured over a longer time period. Therefore, the change in diagnosis coding from ICD9 to ICD10 at the start of 1996/97 had an impact on the psychiatric figures for the rest of that year. Although 1996/97 data are included in the **trend dashboard**, the commentary in all sections (other than those specifically discussing general acute hospital stays only) are based on the period from 1997/98 onwards, when SMR04 data appear to be more consistent.

Throughout this report, we make reference to ‘stays’, ‘patients’ and ‘new patients’. A ‘stay’ refers to a continuous period of time spent in a hospital setting. A ‘patient’ is an individual admitted to hospital. Each patient may have more than one stay within a financial year. A ‘new patient’ is an individual who has not had a drug-related stay in a Scottish hospital within the previous ten years.

Patient deprivation quintiles are referred to throughout the report. Quintiles divide the population into five equal groups so that 20% of the population of Scotland falls into each quintile (deprivation quintile 1 is the most deprived, deprivation quintile 5 is the

least deprived). Small geographical areas are assigned to quintiles based upon the **Scottish Index of Multiple Deprivation** (SIMD) which calculates deprivation rates with reference to a range of social and economic indicators.

For further information on definitions used in this report, see the **Appendix 1 - Methods** section of the report.

For further information on deprivation, see **Appendix 2 - Deprivation**.

Further background information and a comprehensive list of revisions to this publication is available in the **Appendix 3 - Background Information** .

For further explanations of technical terms, please refer to the **Glossary**.

1. Overall patterns and trends

The information in this section covers all drug-related hospital stays in Scotland. Data from general acute and psychiatric hospitals are combined and all diagnoses relating to drug use (mental & behavioural and overdose/poisoning diagnoses) are included.

For data relating to each individual hospital type or diagnosis type, please see the **data explorer dashboard**.

Stays, Patients, New patients

The combined drug-related stay rate had increased steadily over the time series, increasing more than threefold from 87 to 283 stays per 100,000 population between 1997/98 and 2019/20. The rate of drug-related hospital stays decreased by 101 stays per 100,000 population over the next three consecutive years to 182 stays per 100,000 population in 2022/23 (2020/21: 270 stays per 100,000 population, 2021/22: 236) (Figure 1.1).

A person may have more than one drug-related hospital stay within a financial year. In 2022/23, there were 9,663 drug-related hospital stays among 7,575 patients. Changes in the patient rate closely corresponded with changes in the stay rate. The drug-related patient rate increased threefold from 68 to 207 patients per 100,000 population during the period 1997/98 to 2019/20. Between 2020/21 and 2022/23 the patient rate decreased from 196 to 142 per 100,000 population (Figure 1.1). The average number of stays per patient has also decreased across the same time period from 1.37 stays per person in 2020/21 to 1.28 stays in 2022/23.

Patients were classed as ‘new’ patients if they had not had a drug-related stay in hospital within the previous ten years. In 2022/23, there were 3,657 new patients. Therefore, 48% of the drug-related patients in 2022/23 were new patients (i.e. had not had a similar stay in hospital within the previous ten years). This was the second consecutive year where less than 50% of patients were new patients.

The drug-related new patient rate varied little from 2006/07 to 2012/13 (from 55 to 58 new patients per 100,000 population) and then gradually increased to 104 in

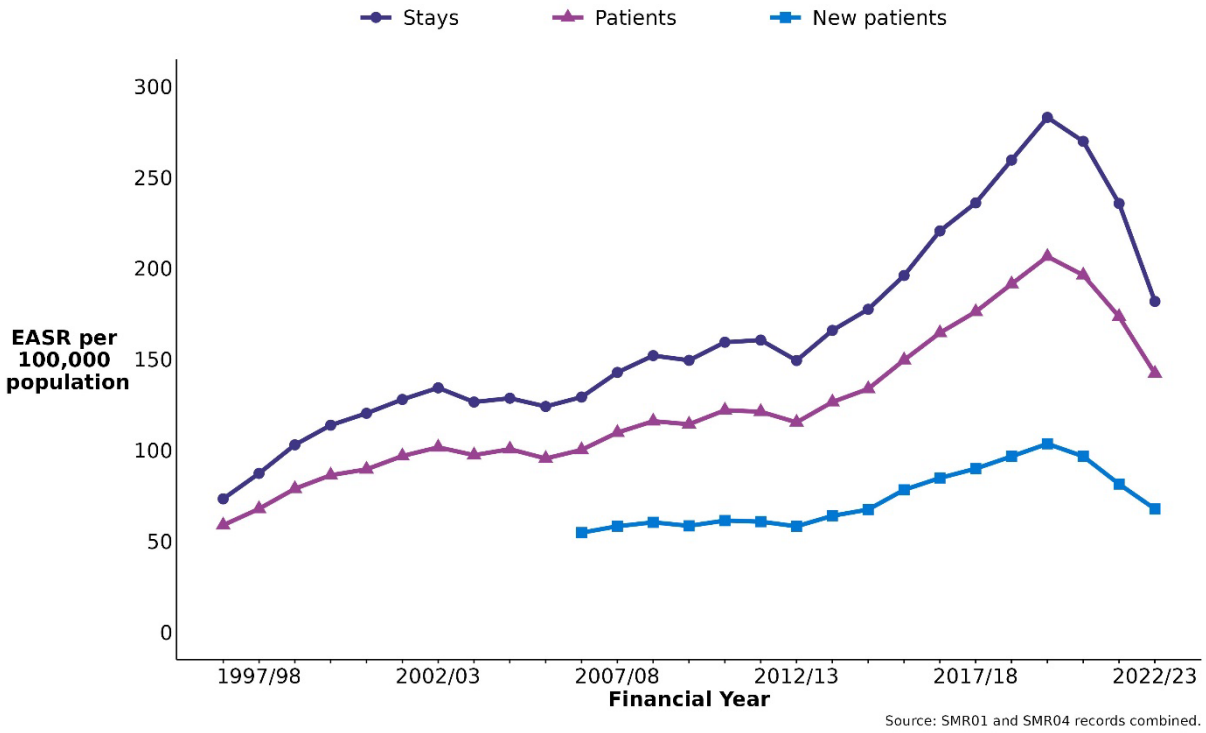
2019/20. As with the other rates described here, the new patient rate has been decreasing since 2020/21 and was 68 new patients per 100,000 population in 2022/23 (Figure 1.1).

For all three measures (stays, patients and new patients), the rates observed in 2022/23 were the lowest since 2014/15. A series of consistent rate increases were recorded from 2012/13 to 2019/20, before decreases were observed between 2020/21 and 2022/23. The impact of the of the COVID-19 pandemic and the post COVID-19 recovery, based on a month-by-month analysis of drug-related stays from January 2020 to March 2022, are described in detail within the **previous report** published in November 2022.

The interruption of the long-term increasing trend in numbers and rates of drug-related hospital stays in 2020/21 appears to have coincided with the COVID-19 lockdowns and associated restrictions. However, the continuing decreasing trend observed in 2021/22 and 2022/23 may be suggestive of a new trend in drug-related hospital stays.

It is beyond the scope of this publication to explain why drug-related hospital stays have decreased markedly in recent years. However, the Scottish Government's **NHS Recovery Plan 2021-2026**, which aimed to develop alternative pathways of care in order to reduce the need for hospital admission, may have impacted on these trends. As PHS continues to develop its public health surveillance in relation to drug-related urgent care, it may be possible to explore these changes in future reports.

Figure 1.1: Drug-related general acute/psychiatric combined hospital rates[1,2] by activity type (Scotland; 1996/97 to 2022/23*)



1. Uses European Standard Population 2013 and National Records of Scotland 2021 mid-year population estimates.
2. See **Glossary** for definitions of stays, patients and new patients

* Provisional

Hospital type

In each year of the time series, drug-related general acute stays outnumbered comparable psychiatric stays. In 2022/23, of a total of 9,663 drug-related hospital stays, 83% (7,989) were in general acute hospitals, and 17% (1,677) were in

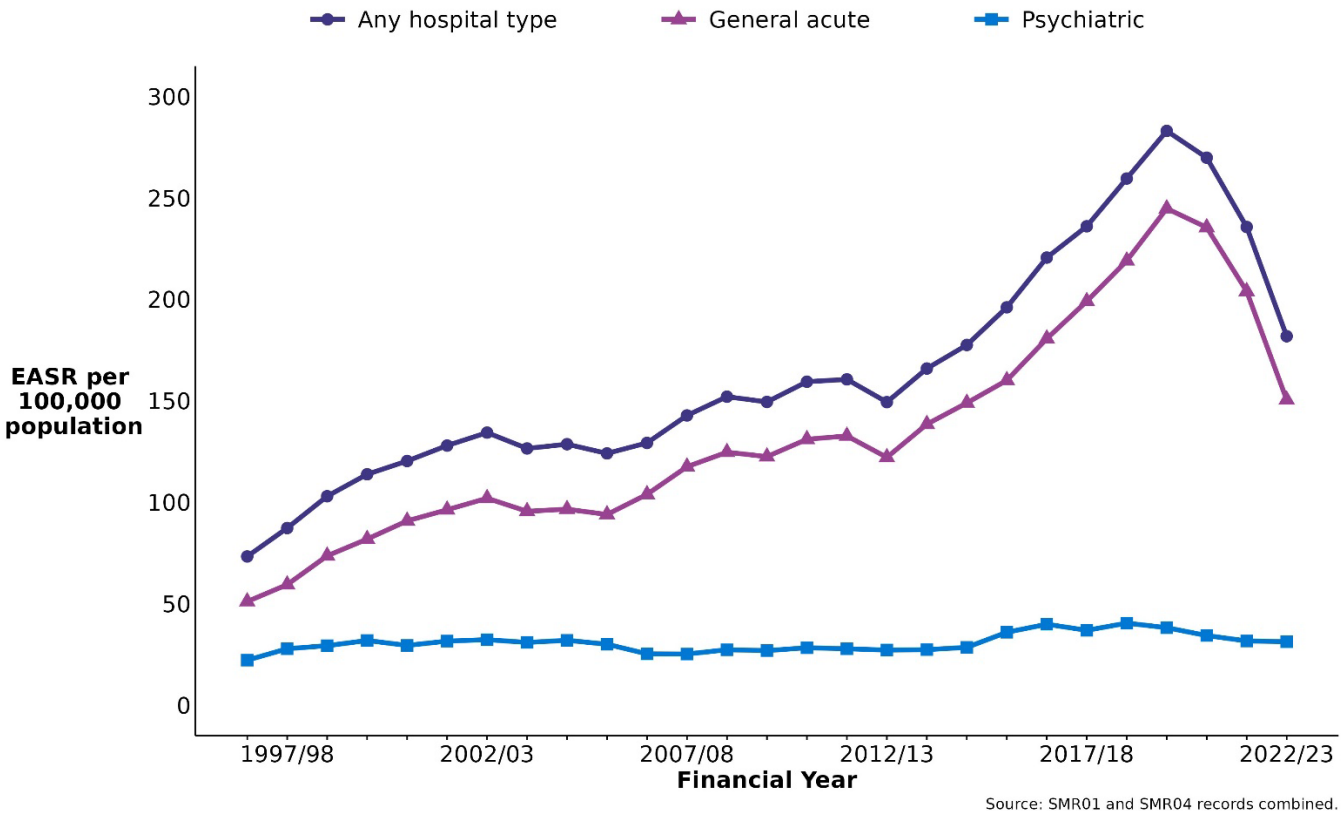
psychiatric hospitals[i]. The percentage of hospital stays in general acute hospitals decreased from 86% in 2021/22.

The rate of drug-related stays in general acute hospitals decreased for the third consecutive year from 245 per 100,000 population in 2019/20 to 151 stays per 100,000 population in 2022/23. Prior to this, there was a general increase in this rate between 1997/98 (59 stays per 100,000 population) and 2019/20 (Figure 1.2). As most drug-related hospital stays are in general acute hospitals, changes in the rate of drug-related stays in general acute hospitals exert a strong influence on the combined or 'any hospital' drug-related hospital stay rate.

In 2022/23, the rate of drug-related stays in psychiatric hospitals was 31 stays per 100,000 population. In comparison to stays in general acute hospitals, psychiatric stays remained relatively stable in comparison to 2021/22 (32 per 100,000) and across the time period. After a lengthy period of stability, the rate of drug-related psychiatric stays had increased from 29 to 40 stays per 100,000 population between 2014/15 and 2016/17 and then remained approximately the same until 2019/20 (38 per 100,000) before a decrease in 2020/21 (34) (Figure 1.2).

[i] Due to the statistical disclosure procedures applied to this data, numbers may not be additive.

Figure 1.2: Drug-related stay rates by hospital type[1,2] (Scotland; 1996/97 to 2022/23*)



1. Uses European Standard Population 2013 and National Records of Scotland 2021 mid-year population estimates.
2. See **Glossary** for definitions of stays, patients and new patients

* Provisional

Diagnosis type

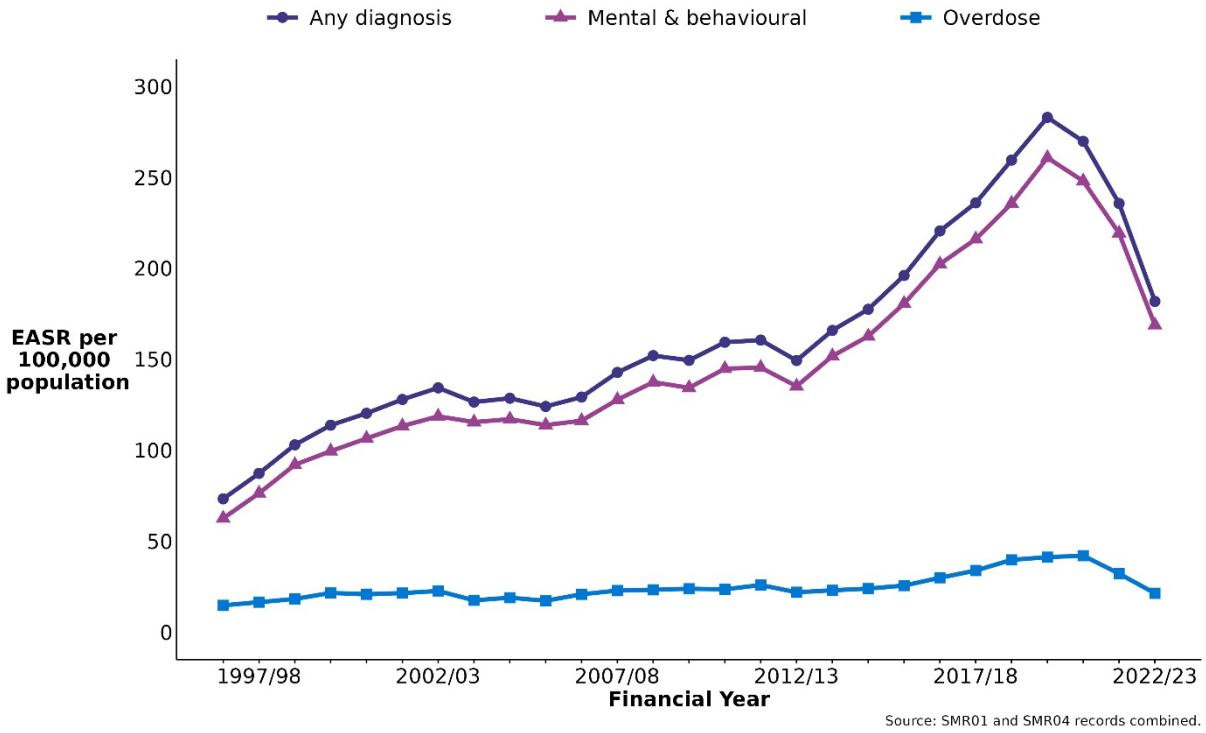
In 2022/23, of the 9,663 drug-related combined hospital stays, 8,967 (93%) included a drug-related mental & behavioural diagnosis and 1,140 (12%) included a drug poisoning/overdose diagnosis[ii] (Figure 1.3).

In 2022/23 there was a decrease in the rate of drug-related mental & behavioural stays to 169 stays per 100,000 population. This was the third consecutive year in which a decrease was recorded, with rates decreasing by more than a third from the peak in 2019/20 (261 stays per 100,000 population). Before this, rates had increased fairly consistently over the time series, with a series of substantial increases observed between 2012/13 and 2019/20 (Figure 1.3).

The rate of drug poisoning/overdose stays in 2022/23 decreased for a second consecutive year to 21 stays per 100,000 population, decreasing by half since 2020/21 (42 stays per 100,000). For more detailed analysis on drug poisoning/overdose stays, see the **Overdose section** in this report.

[ii] The sum of these percentages is greater than 100% as stays may include a diagnosis from each of these groups. A total of 444 (5%) drug-related stays included a diagnosis of both types (i.e. a mental & behavioural diagnosis and a drug poisoning/overdose diagnosis).

Figure 1.3: Drug-related general acute/psychiatric combined stay[1] rates[2], by diagnosis type (Scotland; 1996/97 to 2022/23*)



1. See **Glossary** for definitions of stays, patients and new patients
2. Uses European Standard Population 2013 and National Records of Scotland 2021 mid-year population estimates.

* Provisional.

Length of stay

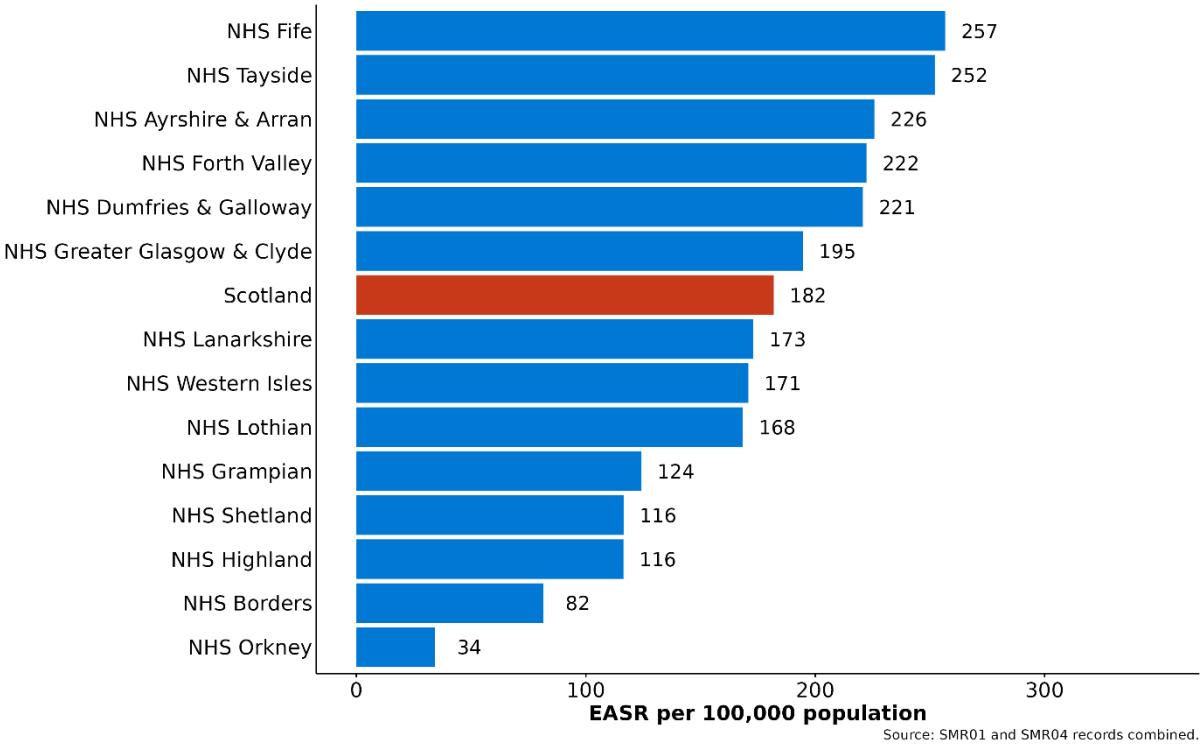
In 2022/23, 51% of drug-related general acute hospital stays were for one day or less. This was a decrease compared to the previous year (2021/22: 56%) and was outside of the range of percentages observed from 2002/03 to 2020/21, when between 54% and 61% of total stays in general acute hospitals were for one day or less. Of the remaining stays in 2022/23, 32% were between two and six days and 17% of stays were for one week or longer, both increases from the previous year (2021/22: 30% of stays were between two and six days and 14% of stays were one week or longer).

Drug-related psychiatric hospital stays tended to be longer than general acute stays, with 70% of stays in 2022/23 lasting for one week or longer.

Geography

Drug-related hospital stay rates varied widely by NHS Board (Figure 1.4). In 2022/23, the highest rates were seen in Fife (257 stays per 100,000 population), Tayside (252), and Ayrshire & Arran (226). Among mainland NHS Boards, the lowest rate was observed in Borders (82 stays per 100,000 population).

Figure 1.4: Drug-related general acute/psychiatric combined stay[1] rates[2], by NHS Board of Residence (Scotland; 2022/23[*])



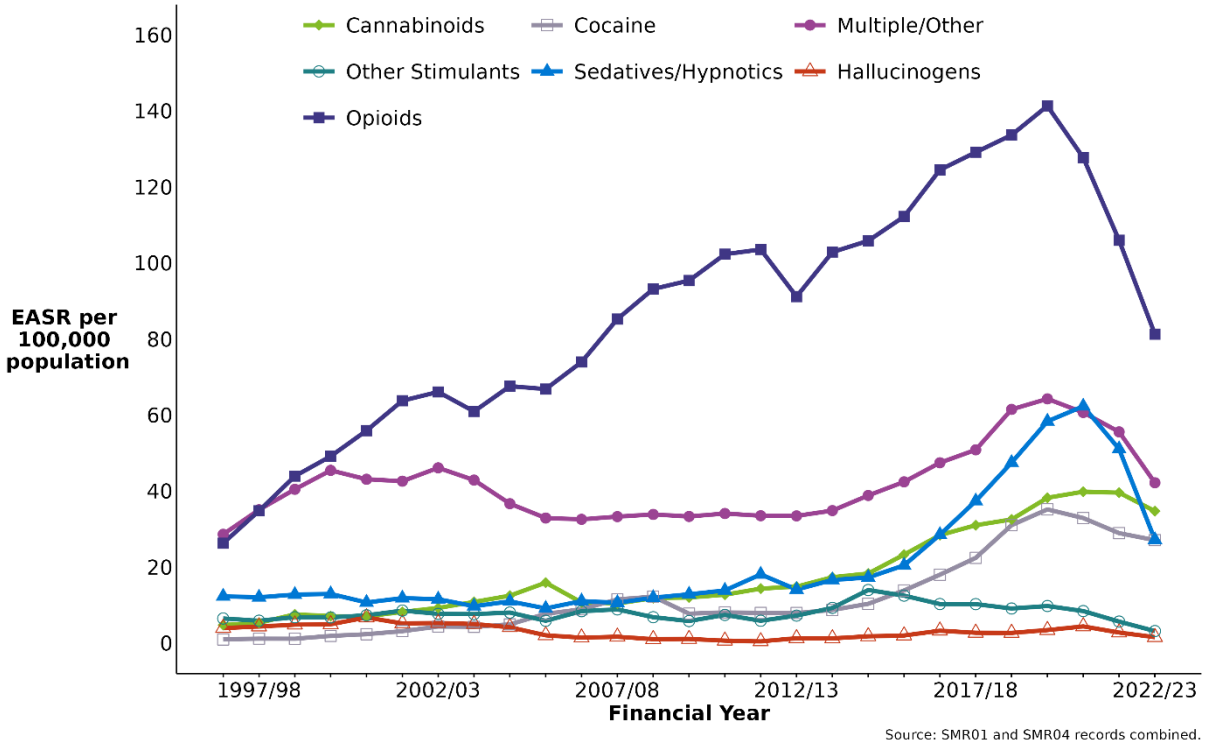
1. See **Glossary** for definitions of stays, patients and new patients
2. Uses European Standard Population 2013 and National Records of Scotland 2021 mid-year population estimates.

* Provisional.

Drug type

In 2022/23, the rate of opioid-related stays was 81 per 100,000 population. This was the third consecutive annual decrease (2020/21: 128 stays per 100,000 population; 2021/22: 106). Before these decreases, the rate had increased fairly consistently from 1997/98 (35 stays per 100,000 population) to 2019/20 (141) (Figure 1.5). The percentage of drug-related stays attributed to opioids increased from 40% (1,995) in 1997/98 to 64% (5,478) in 2011/12. After 2011/12, the percentage steadily decreased to 44% of stays in both 2021/22 (5,544) and 2022/23 (4,245).

Figure 1.5: Drug-related general acute/psychiatric combined stay[1] rates[2], by drug type (Scotland; 1996/97 to 2022/23[*])



1. See **Glossary** for definitions of stays, patients and new patients and drug types
2. Uses European Standard Population 2013 and National Records of Scotland 2021 mid-year population estimates.

* Provisional

The rate of stays attributed to 'multiple/other' drugs was 42 stays per 100,000 population in 2022/23. As with opioids, this was the third consecutive year in which this rate decreased (2020/21: 61 stays per 100,000 population and 2021/22: 56). This rate was approximately stable from 2005/06 to 2012/13 (33 and 34 stays per 100,000 population respectively) and then gradually increased to 64 stays per 100,000 population in 2019/20 (Figure 1.5).

The 2022/23 cannabinoid stay rate (35 stays per 100,000 population) decreased from 2020/21 and 2021/22 (40 stays per 100,000 population in both years). The rate of cannabinoid-related stays had increased eightfold from 5 stays per 100,000 population in 1997/98, with a marked rise from 2014/15 (18 stays per 100,000 population) until 2021/22 (Figure 1.5). While the cannabinoid stay rate decreased slightly from previous years, it remained high and was the third most commonly reported drug category in 2022/23.

In 2022/23, the cocaine stay rate (27 stays per 100,000 population) was slightly lower than in 2021/22 (29). The rate of cocaine-related stays was below 10 per 100,000 population in most years between 1997/98 (1 stays per 100,000 population) and 2013/14 (9 stays per 100,000 population), after which it increased substantially to 35 stays per 100,000 population in 2019/20 and decreased to 33 in 2020/21 (Figure 1.5).

In 2022/23, the sedative/hypnotic[iii] stay rate (27 stays per 100,000 population) decreased markedly compared to 2021/22 (51). The rate of sedative/hypnotic-related stays was consistently between 9 and 13 stays per 100,000 population between 1997/98 and 2009/10, but then increased more than fivefold to its peak in 2020/21 (62). In 2022/23, sedatives/hypnotics were the fifth most commonly reported drug category - less common, relative to other drugs, than in 2020/21 (second most common category) and 2021/22 (third most common category) (Figure 1.5). The

[iii] This group of drugs includes 'prescribable' benzodiazepines (drugs such as diazepam), 'street' benzodiazepines (for example, etizolam and alprazolam) and z-hypnotics (for example, zopiclone). See **Glossary** for more detail.

percentage of drug-related stays attributed to sedative/hypnotic decreased from 23% (3,285) in 2020/21 to 15% (1,431) in 2022/23.

Age group

The most common age of patients admitted for a drug-related hospital stay in 2022/23 were patients aged 35-44 years (337 patients per 100,000 population) (Figure 1.6). The patient rate for this age group increased from 70 patients per 100,000 population in 1997/98 to 515 per 100,000 in 2019/20. While patient rates for people aged 35-44 years have decreased substantially in the three years since 2019/20, (2020/21: 474 patients, 2021/22: 412, 2022/23: 337) it remained the most common age group among patients with a drug-related hospital stay in 2022/23.

There was a clear upward trend in drug-related patient rates among people aged 45 to 54 years from 1997/98 (18 patients per 100,000 population) to 2020/21 (314). In 2022/23 (255 patients per 100,000 population), there was a decrease in patient rates among for this age group for a second consecutive year (2021/22: 307).

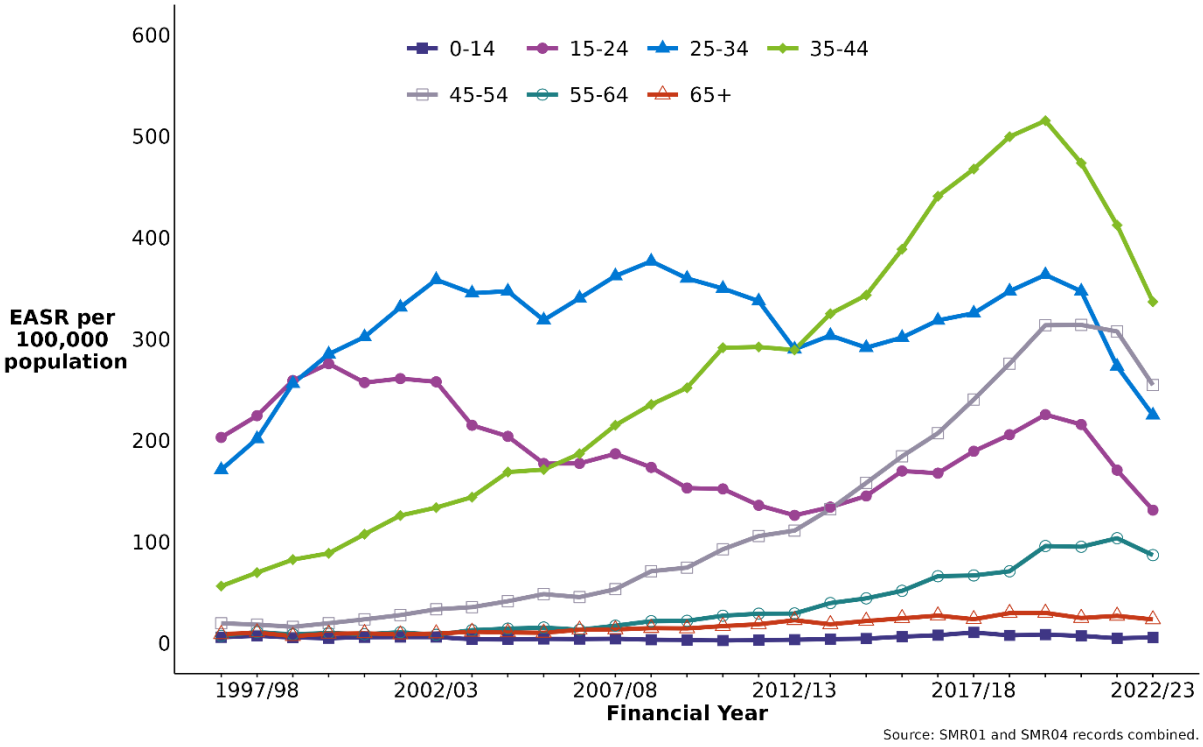
For the 25-34 years group, patient rates fluctuated between 290 and 377 patients per 100,000 population in the period from 2000/01 to 2014/15. A series of increases since 2014/15 brought the rate to 363 patients per 100,000 population in 2019/20. Since then, the rate has decreased (2020/21: 347 patients per 100,000 population and 2021/22: 273 per 100,000), with a further reduction seen in 2022/23 (225 per 100,000). The rates observed in 2022/23 for the 25-34 years group were the lowest since 1997/98 (Figure 1.6).

Following a long-term decrease early in the time series, patient rates for people aged 15 to 24 years increased from 126 in 2012/13 to 225 patients per 100,000 population in 2019/20. Patient rates among people aged 15 to 24 years then decreased between 2020/21 (216 per 100,000) and 2022/23 (131 per 100,000).

Patient rates in those aged 55 to 64 years decreased to 87 per 100,000 in 2022/23. This decrease followed a long-term increasing trend, where patient rates in the 55-64 years age group rose from 8 patients per 100,000 population in 2002/03 to 104 in 2021/22 (the highest on record for this age group).

Patient rates among people aged over 65 years increased from 10 per 100,000 population in 2002/03 to 30 in 2019/20 and have since decreased to 23 per 100,000 in 2022/23.

Figure 1.6: Drug-related general acute/psychiatric patient[1] rates[2], by age group (Scotland; 1996/97 to 2022/23[*])



1. See **Glossary** for definitions of stays, patients and new patients
2. Uses European Standard Population 2013 and National Records of Scotland 2021 mid-year population estimates.

* Provisional.

All age groups recorded decreases in patient rates in 2022/23 compared to the previous year, with the exception of the youngest age group (people aged 0 to 14 years). The youngest age group has consistently had the lowest level of patient rates

over the time series. Rates for 2022/23 were 6 patients per 100,000 population, remaining stable from the previous year (5 per 100,000).

Trends in drug-related patient rates provide evidence of an ageing patient profile[iv]:

- The median age of patients admitted to hospital in Scotland for a drug-related event has increased from 27 to 40 over the time series.
- The highest patient rates in 2022/23 were observed among people aged 35 to 44 years (337 per 100,000) and 45 to 54 years (255 per 100,000).

Meanwhile, the patient rates observed among people from younger age groups were some of the lowest observed in the time series.

- Among people aged 15 to 24 years, the patient rates in 2022/23 (131 per 100,000) were the lowest since 2012/13 (126 per 100,000).
- In the 25-34 age group, patient rates in 2022/23 (225 per 100,000) were the lowest observed since 1997/98 (202 per 100,000).

More information on differences by age cohort can be found in the section **Drug-related hospital stays in younger and older people.**

Sex

In 2022/23, 69% of patients who had a drug-related hospital stay were males (5,193 patients, rate: 197 patients per 100,000 population). The rate for females was 87 patients per 100,000 population (2,382 patients).

Between 1997/98 and 2012/13, the average sex ratio was 218 male patients for every 100 female patients. From 2012/13 to 2018/19, the rate of male patients increased more sharply than for female patients, reaching a ratio of 247 male

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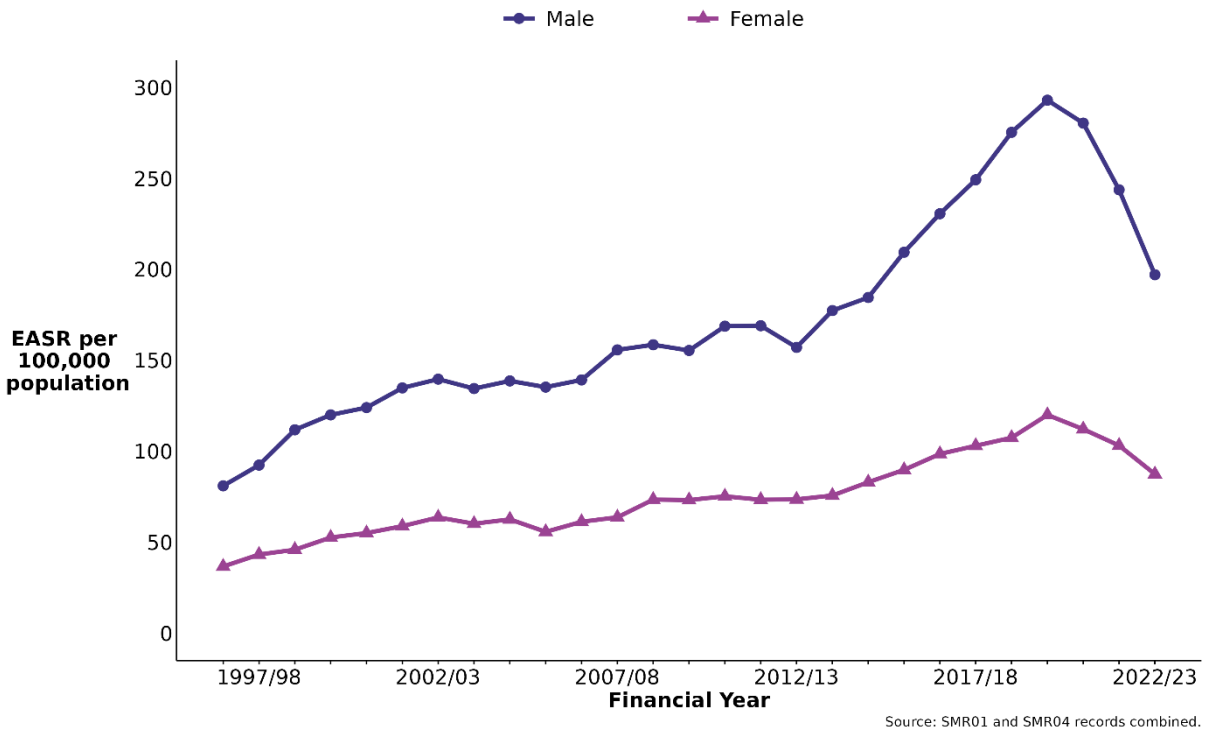
[iv] '**Older People with Drug Problems in Scotland: Addressing the Needs of an Ageing Population**' (Scottish Drugs Forum, 2017).

patients for every 100 female patients in 2018/19. Having decreased in 2020/21 (242 males to 100 females) and 2021/22 (229 males to 100 females), the ratio of male to female patients returned to 218 in 2022/23.

Male and female patient rates both followed similar trends, each increasing almost threefold over the time series and peaking in 2019/20. Rates for males and females have since decreased in 2020/21 (male: 280 per 100,000, female: 112 per 100,000), 2021/22 (male: 243 per 100,000, female: 103 per 100,000) and 2022/23 (Figure 1.7).

Figure 1.7: Drug-related general acute/psychiatric patient[1] rates[2], by sex (Scotland; 1996/97 to 2022/23[*])



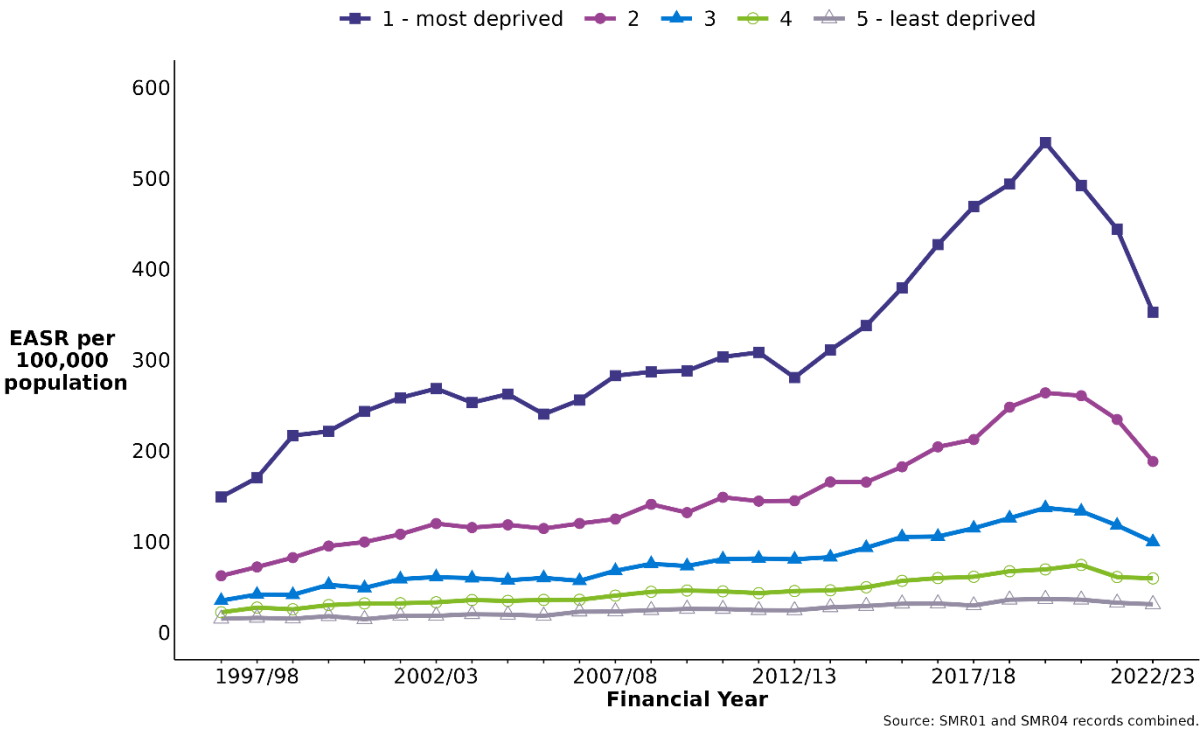
1. See **Glossary** for definitions of stays, patients and new patients
2. Uses European Standard Population 2013 and National Records of Scotland 2021 mid-year population estimates.

* Provisional.

Deprivation

Drug-related patient rates decreased across all deprivation quintiles during 2022/23, compared to 2021/22 (Figure 1.8). However, patients from the most deprived areas remained most likely to experience a drug-related hospital stay. In 2022/23, 48% of patients (3,645: 353 patients per 100,000 population) lived in deprivation quintile 1.

Figure 1.8: Drug-related general acute/psychiatric patient [1] rates[2] by deprivation quintile (Scotland; 1996/97 to 2022/23*)



1. See **Glossary** for definitions of stays, patients and new patients and an explanation of deprivation measures (Scottish Index of Multiple Deprivation),
2. Uses European Standard Population 2013 and National Records of Scotland 2021 mid-year population estimates.

* Provisional

Drug-related hospital stays for those living in the 20% most deprived areas in Scotland (deprivation quintile 1) have generally accounted for just over half of patients in each year. From 2013/14 to 2021/22, the percentage of hospital stays for those living in the 20% most deprived areas in Scotland have ranged between 50% and 53%. While not a marked reduction, 2022/23 saw the lowest percentage of drug-related hospital stays for this group in the time series.

2. Overdose

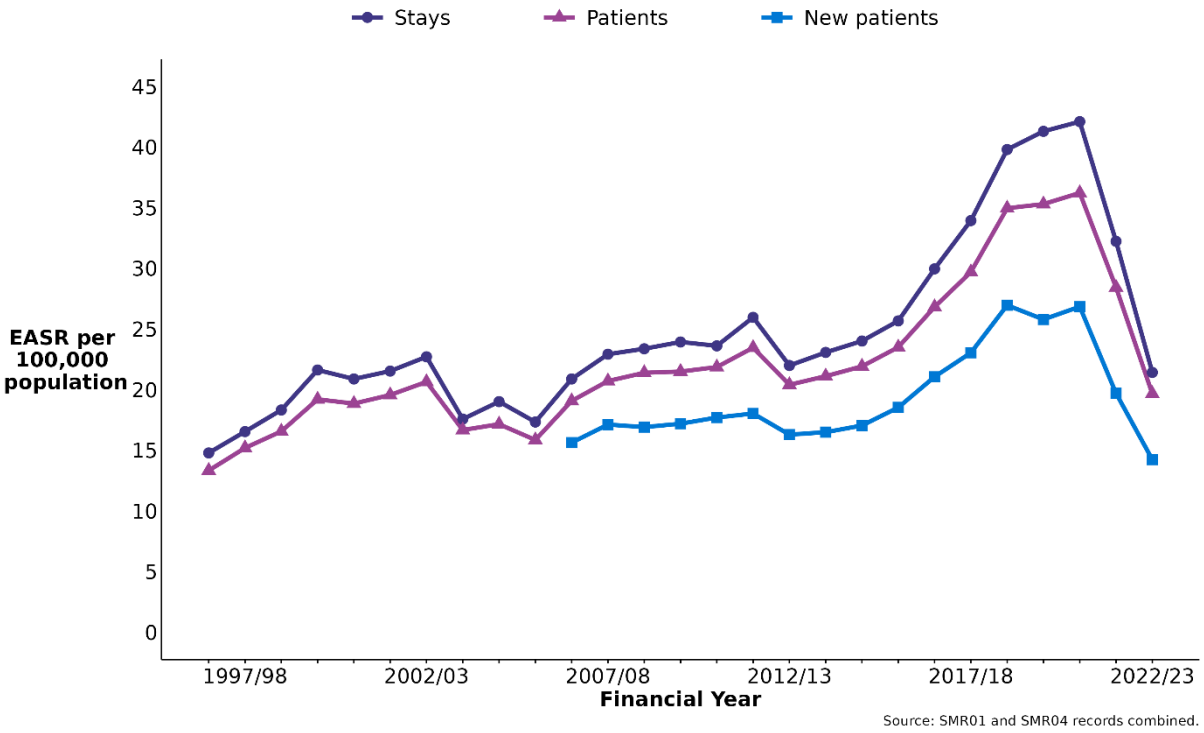
This section focuses on hospital stays where a drug poisoning/overdose diagnosis was recorded as part of a hospital stay. Drug overdoses that are treated by the Scottish Ambulance Service or in Emergency Departments and do not result in an acute hospital admission are not included. Therefore, while the data included in this section provide important information on the characteristics of hospital stays associated with drug overdose, they do not provide an accurate count of the total number of drug overdoses occurring in Scotland each year.

Although very few drug-related psychiatric hospital stays were associated with drug overdose (less than 0.3% in 2022/23), all figures discussed in this section refer to combined general acute and psychiatric stays.

Trends in overdose stays

The drug-related overdose stay rate ranged between 17 and 26 per 100,000 population in the period from 1997/98 to 2015/16. Between 2016/17 and 2020/21, drug-related overdose rates increased from 30 to 42 stays per 100,000 population, before decreasing sharply to 32 stays per 100,000 population in 2021/22 and 21 stays per 100,000 in 2022/23 (Figure 2.1). The rate of overdose stays in 2022/23 was the lowest observed in the time series since 2006/07 (21 stays per 100,000).

Figure 2.1: Drug-related combined hospital rates for overdoses[1,2] (Scotland; 1996/97 to 2022/23*)



1. See **Glossary** for definitions of stays, patients and new patients.
2. Uses European Standard Population 2013 and National Records of Scotland 2021 mid-year population estimates.

* Provisional

A person may have more than one overdose-related hospital stay within a financial year. In 2022/23, there were 1,140 overdose-related hospital stays among 1,047 patients. In 2022/23, the overdose patient rate was 20 per 100,000 population. Changes in the patient rate closely corresponded with changes in the stay rate, increasing substantially from 2015/16 onwards and decreasing sharply in both 2021/22 and 2022/23 (Figure 2.1). The overdose patient rate in 2022/23 was the lowest seen since 2006/07 (Figure 2.1).

Patients were classed as 'new' patients if they had not had a similar drug-related stay in hospital within the previous ten years.

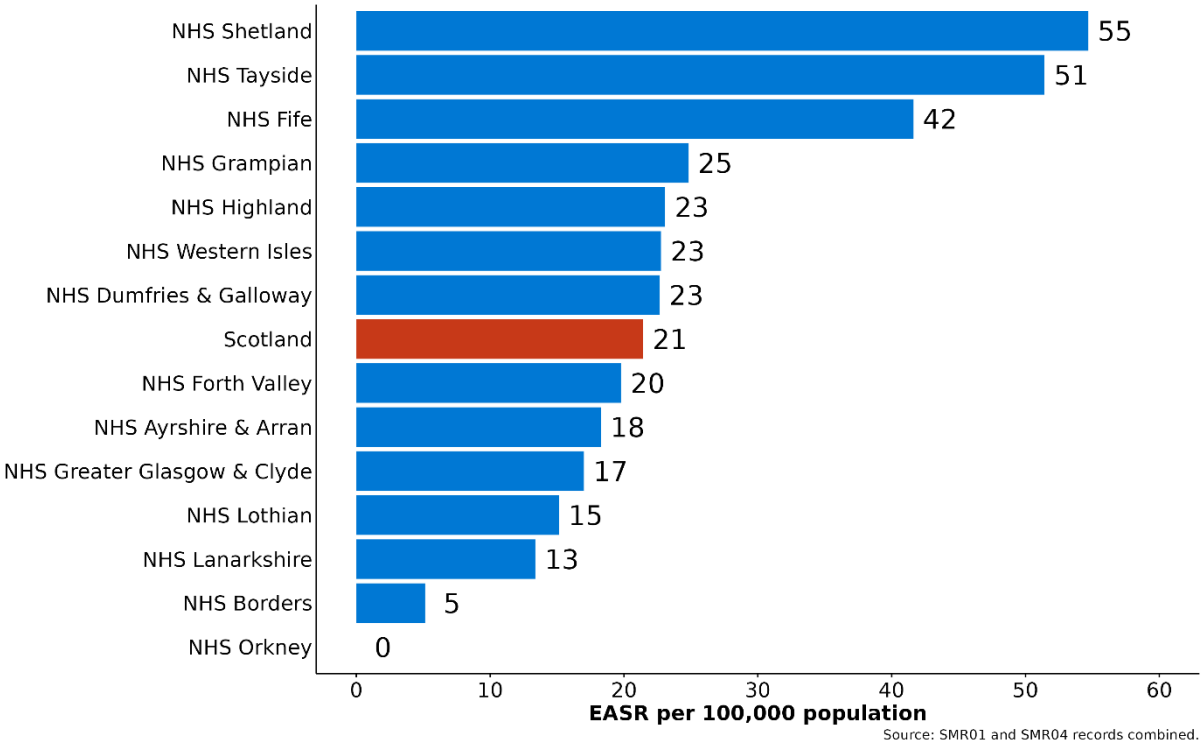
The overdose-related new patient rate varied little from 2006/07 to 2014/15 (consistently in the range of between 16 and 18 new patients per 100,000 population) then increased markedly in the following years from 21 to 27 new patients per 100,000 population between 2016/17 and 2020/21. The new patient rate decreased in 2021/22 (20 new patients per 100,000 population) and in 2022/23 (14), when the new patient rate was the lowest rate observed during the time series (Figure 2.1).

In 2022/23, 73% of overdose patients were 'new' compared with 48% of patients with a mental & behavioural diagnosis. Although it had decreased over the time series (from 82% of overdose patients and 54% of mental & behavioural patients in 2006/07), the percentage of 'new' patients was consistently higher among overdose patients than those with a mental & behavioural diagnosis. While repeated admissions have become more likely for both stay types, overdose admissions may often be a first point of drug-related contact with the acute healthcare system and therefore a valuable opportunity for harm reduction interventions.

Geography

Figure 2.2 shows overdose stay rates by NHS Board. In 2022/23, the highest overdose stay rates among mainland NHS Boards were seen in NHS Tayside (51 stays per 100,000 population), NHS Fife (42) and NHS Grampian (25). Among mainland NHS Boards, the lowest rate was observed in NHS Borders (5). Variations between NHS Boards may reflect differences in hospital admission policies or diagnostic coding practices.

Figure 2.2: Drug-related general acute/psychiatric combined stay[1] overdose rates[2], by NHS Board of Residence (Scotland; 2022/23[*])



1. See **Glossary** for definitions of stays, patients and new patients
2. Uses European Standard Population 2013 and National Records of Scotland 2021 mid-year population estimates.

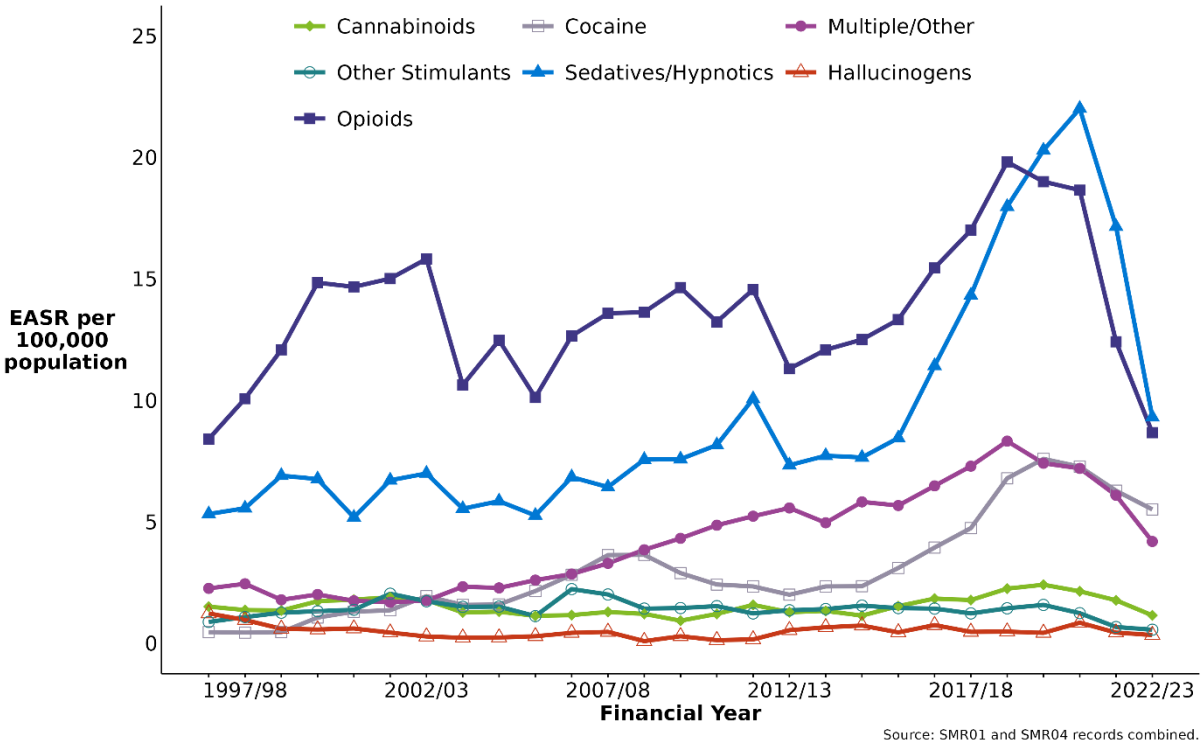
* Provisional.

Drug type

Prior to 2016/17, the sedative/hypnotic overdose stay rate fluctuated between 5 and 10 stays per 100,000 population. Between 2016/17 and 2020/21, the rate doubled from 11 to 22 stays per 100,000 population, before decreasing to 17 in 2021/22 and then almost halving in 2022/23 (9 per 100,000). Despite this decrease, sedatives/hypnotics remained the most commonly reported drugs associated with overdose stays in 2022/23 (Figure 2.3)

From 1997/98 to 2016/17, the rate of opioid-related overdose stays largely fluctuated between 9 and 15 per 100,000 population. The rates then increased, reaching a peak of 20 per 100,000 in 2018/19 and remaining stable until a sharp decrease in 2021/22 (12 per 100,000). In 2022/23, the rate of opioid-related overdose stays decreased for a second consecutive year (9 per 100,000 population). The percentage of overdose stays attributed to opioids decreased from a peak of 70% (846) in 2002/03 to 40% (456) in 2022/23.

Figure 2.3: Drug-related general acute/psychiatric combined stay[1] overdose rates[2], by drug type (Scotland; 1996/97 to 2022/23[*])

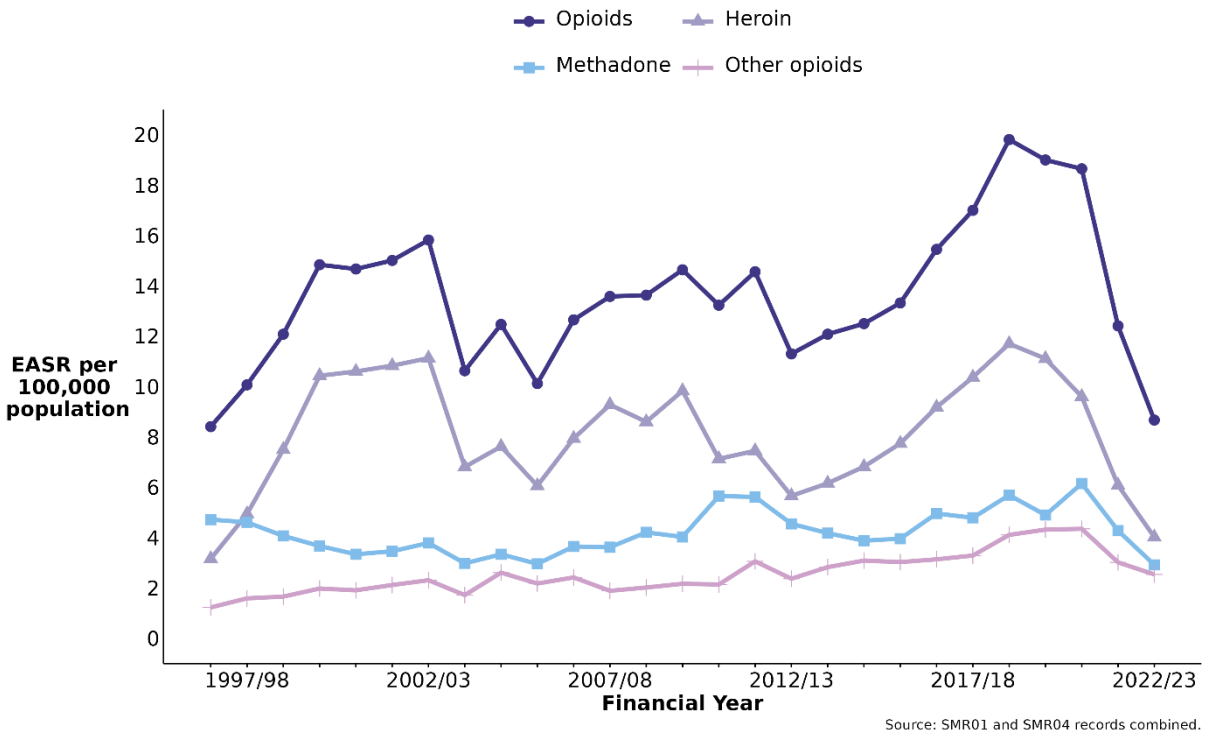


1. See **Glossary** for definitions of stays, patients, new patients and drug types referred to.
2. Uses European Standard Population 2013 and National Records of Scotland 2021 mid-year population estimates.

* Provisional

The cocaine overdose rate had increased sharply from 2 stays per 100,000 population in 2014/15 to 8 stays per 100,000 population in 2019/20. Since then, the stay rate has remained approximately stable (2020/21: 7 stays per 100,000 population, 2021/22: 6 stays per 100,000, 2022/23: 6 stays per 100,000) (Figure 2.3).

Figure 2.4: Opioid-related general acute/psychiatric combined stay[1] overdose rates[2], by opioid type* (Scotland; 1996/97 to 2022/23**)



1. See **Glossary** for definitions of stays, patients and new patients
2. Uses European Standard Population 2013 and National Records of Scotland 2021 mid-year population estimates.

* The 'All Opioids' drugs category includes heroin, methadone, and all other opioid drug categories. The 'other opioid' category refers to opium, synthetic narcotics, and other opioids (including buprenorphine). For an explanation of the drug types referred to see **Glossary**

** Provisional

Of the 456 opioid overdose stays observed in 2022/23, almost half (46%; 210) were associated with heroin. Changes in the rate of opioid overdose stays were strongly related to trends in heroin overdose stays, which increased steadily from 6 to 12 stays per 100,000 population between 2012/13 and 2018/19, before remaining relatively stable until 2020/21. Since then, decreases have been observed; 6 per 100,000 in 2021/22 and 4 per 100,000 in 2022/23, the lowest rate recorded since 1997/98 (Figure 2.4).

In 2022/23, the rate of opioid overdose stays associated with methadone was 3 per 100,000 population. Since 1997/98, the rate of methadone overdose stays has fluctuated between 3 and 6 stays per 100,000 population (Figure 2.4). The diagnostic coding scheme used for this publication (ICD-10) does not include a code for overdoses associated with other opioid substitution therapy drugs (such as buprenorphine). Any overdoses associated with these drugs will be captured in the 'Other opioid' category.

Demographics of overdose stays

As with patient rates for all drug-related hospital stays, trends in drug overdose patient rates provided some evidence of an ageing patient profile[v].

From 1997/98 to 2019/20, there was an upward trend in patient rates among those aged 35 to 44 years (rising from 14 to 89 patients per 100,000 population). Rates then decreased in 2020/21, 2021/22 and 2022/23 (86, 68 and 46 patients per 100,000 population respectively). Though the 35-44 age group remained the most common age group with an overdose-related hospital stay in 2022/23, the rate of overdose stays was the lowest seen in this group since 2013/14.

An upward trend in overdose patient rates was observed among people aged 45 to 54 years from 1997/98 to 2020/21 (increasing from 4 to 48 patients per 100,000

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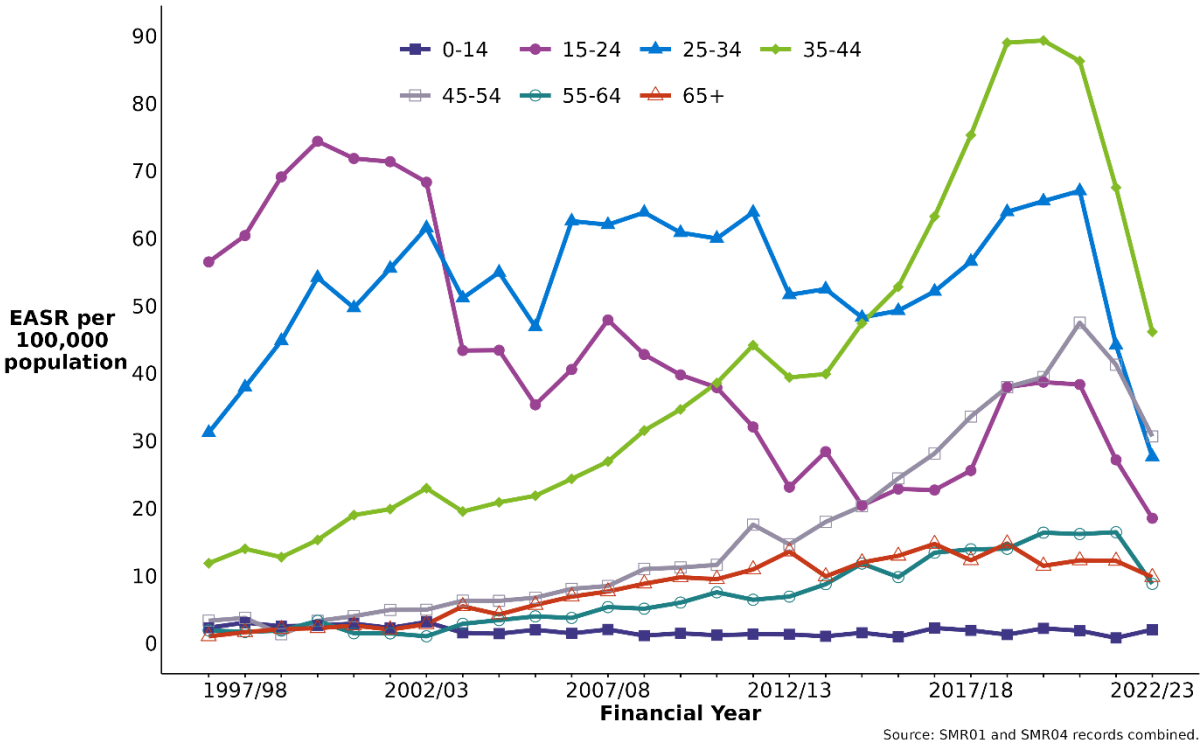
[v] **Older People with Drug Problems in Scotland: Addressing the Needs of an Ageing Population**' (Scottish Drugs Forum, 2017)

population), before a decrease to 41 patients per 100,000 population in 2021/22 and a further decrease to 31 per 100,000 in 2022/23. Overdose patient rates among those aged 55 to 64 years also increased from 2002/03 (1 patient per 100,000 population) to 2019/20 (16 patients per 100,000) and remained stable at 16 patients per 100,000 in 2020/21 and 2021/22. In 2022/23, the patient rate for overdose stays in the 55-64 age group almost halved from 2021/22 to 9 patients per 100,000; the lowest patient rate seen since 2013/14 (Figure 2.5).

Figure 2.5: Drug-related general acute/psychiatric patient[1] overdose rates[2], by age group (Scotland; 1996/97 to 2022/23[*])



1. See **Glossary** for definitions of stays, patients and new patients
2. Uses European Standard Population 2013 and National Records of Scotland 2021 mid-year population estimates.

* Provisional.

For people aged 25 to 34 years, rates fluctuated between 45 and 67 patients per 100,000 population in the period from 1998/99 to 2020/21, before falling to 44 in

2021/22. In 2022/23, overdose stays for the 25-34 age group decreased further to 28 per 100,000. For people aged 15 to 24 years, a steady decrease from 1999/00 (74 patients per 100,000 population) to 2014/15 (20) was followed by a series of increases to 39 patients per 100,000 population in 2019/20 and 38 in 2020/21. Overdose patient rates among this group decreased to 27 in 2021/22 and to 19 per 100,000 in 2022/23. For both the 15-24 and the 25-34 age groups, the 2022/23 patient rates for overdose stays were the lowest observed in the time series.

Other demographic features observed among overdose patients were:

- In 2022/23, just under two thirds (64%) of patients who had a drug-related hospital stay for overdose were males (672 males and 375 females). The percentage of males with an overdose stay in 2022/23 was less than that of mental and behavioural stays (69%; see **Section 1** for more details). A consistently lower proportion of males have been observed with overdose stays compared to mental and behavioural stays since 2007/08 with differences ranging between 2 to 6% lower. There was a sharp rise in the male overdose patient rate from 31 per 100,000 in 2015/16 to 49 per 100,000 in 2020/21, then decreasing to 37 in 2021/22 and decreasing further to 26 per 100,000 in 2022/23. Overdose patient rates for females followed a similar pattern, decreasing to 14 per 100,00 in 2022/23 from a peak of 23 in 2020/21.

- Patients from more deprived areas were more likely to experience an overdose-related hospital stay. In each year in the time series, just under half of patients with an overdose-related hospital stay lived in the 20% most deprived areas in Scotland (deprivation quintile 1: 45% in 2022/23). The percentage of patients in the most deprived areas with an overdose related hospital stay were slightly lower than those with mental and behavioural stays in 2022/23 (49%, see **Section 1** for more details). Overdose patient rates decreased in line with deprivation. The overdose patient rate in the most deprived quintile was 46 per 100,000 population compared to 26 in the second most deprived quintile, 15 in the third most deprived quintile, 9 in the fourth most deprived, and 6 in the least deprived.

Conclusion

In 2022/23, rates of drug poisoning/overdose stays and patients decreased for the second consecutive year and were the lowest rates seen since 2006/07.

For the fourth consecutive year, the most common drugs associated with stays for drug poisoning/overdoses were sedatives/hypnotics, followed by opioids. Apart from cocaine, there were decreases in stay rates across all drug types in 2022/23. It is beyond the scope of this publication to explore the potential reasons for these decreases.

3. Drug-related hospital stays in younger and older people

Explanations for the high levels of drug harms seen in Scotland have often emphasised an 'ageing cohort' of people who use drugs problematically. This group was defined in 2017[vi] (on the basis of high levels of treatment engagement and harms at that time) as 'people aged 35 years and over who have a lengthy history of problem[atic] drug use (i.e. 15 years or more)'. The size and potential health vulnerabilities of this group have been linked with changes in the number and age of people experiencing drug-related harms, such as hospital admissions (as defined in these statistics) and **drug-related deaths** in Scotland. As this cohort of individuals continues to age, with many now having moved into the 45-54 years, 55-64 years or 65+ age groups, it is important to monitor their continuing influence on drug-related healthcare activity so that services can assess and respond to the healthcare needs of this group.

Rates of stays for younger patients (aged less than 45 years) have decreased substantially in the last three consecutive years (see **Section 1**). In comparison, rates of stays for older patients decreased less markedly (45-54 and 55-64-year-olds) or remained relatively stable (65 and older) over the same time period.

This section describes stays among patients in these age groups and explores differences in their characteristics (hospital type, diagnosis, characteristics of stays, and drugs implicated). Please note, due to the age groups presented, some of the figures reported in this section are not readily available in the **data explorer dashboard**. Comparisons between age groups for these characteristics are summarised at the end of this section.

Stays, Patients, New patients

In people aged 0 to 44 years:

[vi] '**Older People with Drug Problems in Scotland: Addressing the Needs of an Ageing Population**' (Scottish Drugs Forum, 2017).

- 64% (6,204 of 9,663) of drug-related hospital stays in 2022/23 were among people aged 0-44 years. Approximately half (49%) of these stays (3,063 of 6,204) were among patients aged 35-44 years.

- 64% (4,869) of the 7,575 patients admitted in 2022/23 were aged less than 45 years. This has decreased from a peak of 95% of patients in 1999/00.

- Approximately half (49%, 2,403) of patients aged 0-44 years were 'new' patients. The percentage of patients aged less than 45 years categorised as 'new' patients has been relatively stable over time (ranging between 49% and 54% in each year since 2006/07).

In people aged 45 years and older:

- 36% percent (3,462) of drug-related hospital stays in 2022/23 were among people aged 45 years and older. People aged 45-54 years made up 67% (2,319 of 3,462) of these stays in 2022/23.

- 36% (2,703) of the 7,575 patients admitted in 2022/23 were aged 45 years or older. This has been steadily increasing from 5% of patients in 1998/98.

- 46% (1,251) of patients in this age group were identified as new patients in 2022/23. This percentage has steadily decreased from 66% in 2006/07.

Hospital type

In 2022/23, of the 6,204 drug-related stays for people aged under 45 years, 81% (4,992) and 20% (1,209) were in general acute and psychiatric hospitals respectively[vii].

- Rates of drug-related stays in general acute hospitals increased inconsistently between 2000/01 and 2011/12, before sharply increasing

[vii] Due to the statistical disclosure procedures applied to this data, numbers may not be additive.

until 2019/20 (179 to 313 stays per 100,000 population). Since 2019/20, rates of stays for people aged less than 45 years have decreased sharply by 44% (2020/21: 298, 2021/22: 242, 2022/23: 174) (Figure 3.1).

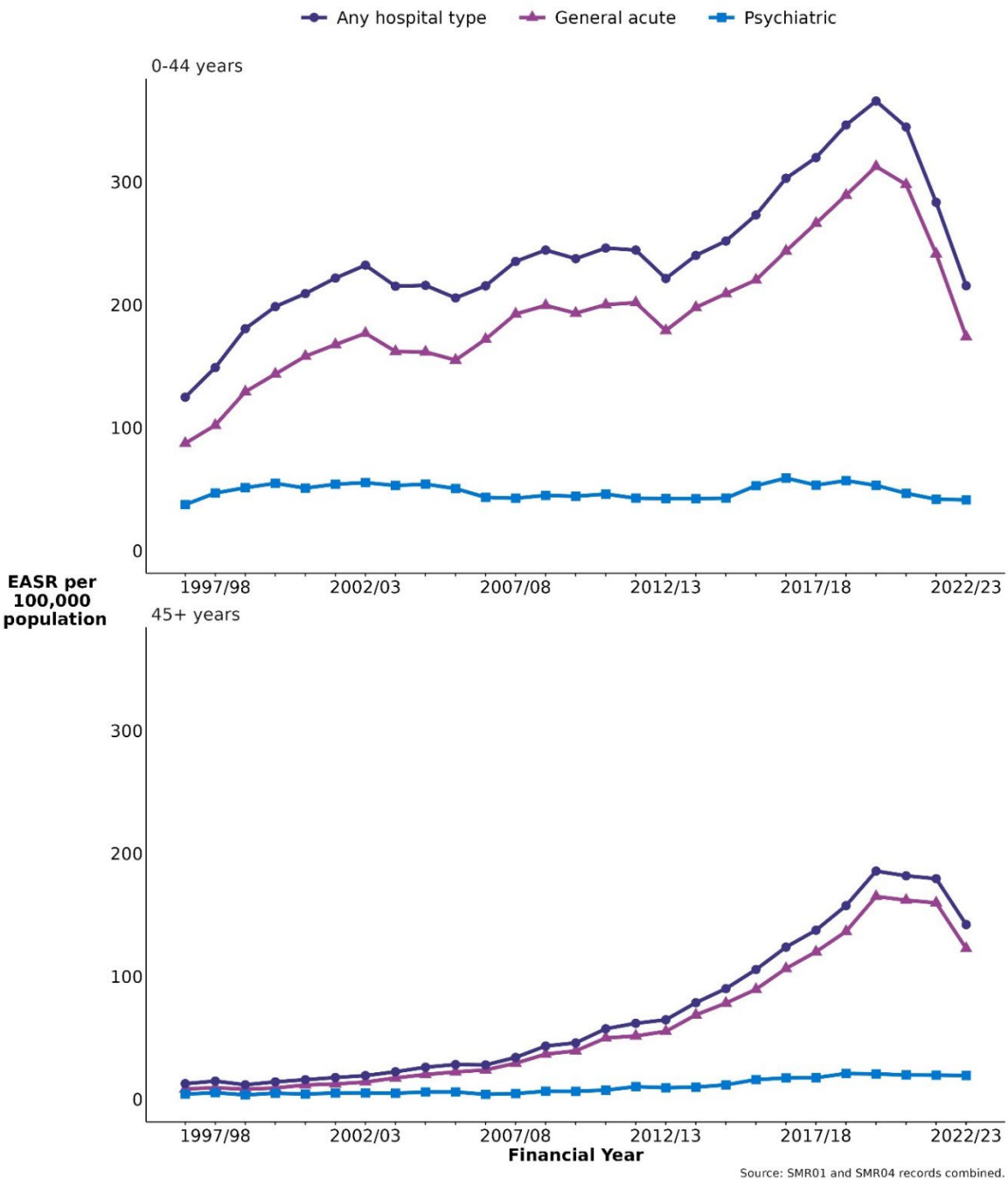
- Rates of stays in psychiatric hospitals ranged between 41 and 59 stays per 100,000 over the time series.

Of the 3,462 drug related stays among people aged 45 years and over, 86% (2,994) were in general acute hospitals, and 14% (468) were in psychiatric hospitals.

- The rate of drug-related stays in general acute hospitals decreased in 2022/23 (123 stays per 100,000). The rate of drug-related stays in general acute hospitals increased steadily between 1997/98 (8 stays per 100,000) and 2019/20 (165), with small decrease to 160 stays per 100,000 by 2021/22 and a sharper decrease compared to the previous year to 123 stays per 100,000 in 2022/23. From 2019/20 to 2022/23, drug-related stays in general acute hospital decreased by 26% in older patients, making it a less marked decline than those aged less than 45 years over the same period.

- Rates of drug-related stays in psychiatric hospitals increased from 4 stays in 1998/99 to 20 stays in 2021/22. This remained stable in 2022/23 (20 stays per 100,000).

Figure 3.1: Drug-related general acute/psychiatric combined stay rates[1] by age group and hospital type[2] (Scotland; 1996/97 to 2022/23[*])



1. Uses European Standard Population 2013 and National Records of Scotland 2021 mid-year population estimates.

2. See **Glossary** for definitions of stays, patients and new patients.

* Provisional.

Diagnosis type

In 2022/23, hospital stays among people aged under 45 years comprised:

- Mental & Behavioural: 93% (5,796) of drug-related stays included a mental & behavioural diagnosis. Rates of these stays increased between 2012/13 and 2019/20 (205 to 338 stays per 100,000 population). Mental & behavioural stays have sharply decreased in under 45s by 40% since 2019/20 (2022/23: 202 per 100,000) (Figure 3.2).

- Overdose: 11% (711) of stays included a drug-poisoning/overdose diagnosis. Poisoning/overdose stay rates increased from 29 to 56 stays per 100,000 population between 1997/98 and 2020/21, after which it decreased to 39 in 2021/22 and to 25 in 2022/23.

- 5% (306) of patients had both types of codes recorded in the same stay.

Among people aged 45 years and older:

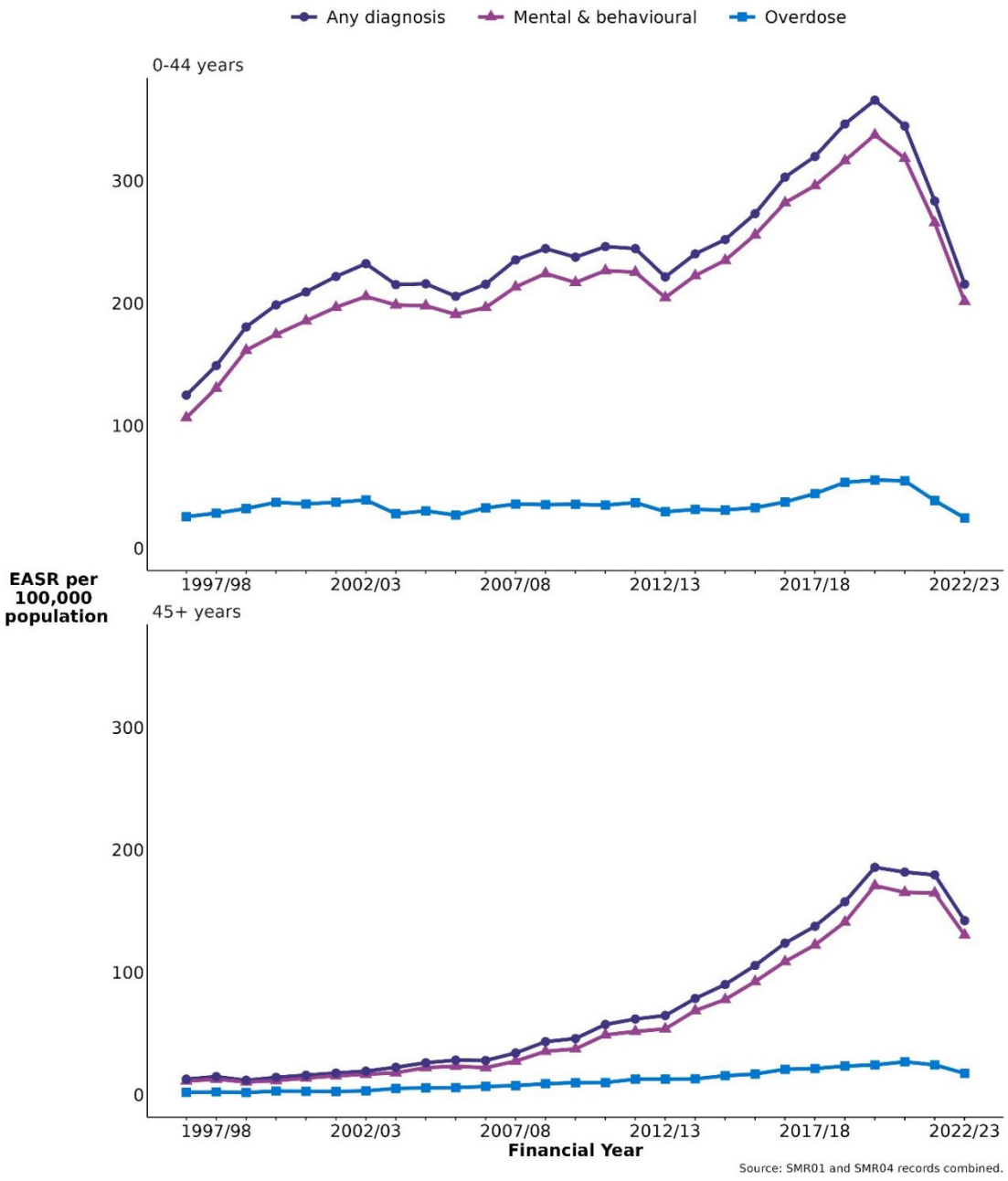
- Mental & Behavioural: 92% (3,171) of drug-related stays among people aged 45 years and older included a mental & behavioural diagnosis. Stay rates increased from 54 to 171 per 100,000 between 2012/13 and 2019/20. The rate of stays for mental & behavioural diagnosis decreased slightly to 165 in 2020/21 and remained stable at 165 in 2021/22. In 2022/23, the rate of stays decreased to 130 per 100,000 (decrease of 24% since 2019/20) (Figure 3.2).

- Overdose: 12% (429) of stays included a drug-poisoning/overdose diagnosis. Rates of stays increased from 2 per 100,000 population in 1997/98 to a peak of 27 in 2020/21. Rates for 2021/22 decreased slightly to 24 stays and decreased again to 18 stays per 100,000 in 2022/23.

- 4% (138) of stays included both diagnoses.

The percentage breakdown across the diagnosis types were approximately equal to that of the general population (mental & behavioural; 92%: overdose: 12%, both: 4% - see section on **Overall trends**).

Figure 3.2: Drug-related general acute/psychiatric combined stay[1] rates[2] by age group and diagnosis type (Scotland; 1996/97 to 2022/23[*])



1. See **Glossary** for definitions of stays, patients, new patients and explanation of the drug types referred to
2. Uses European Standard Population 2013 and National Records of Scotland 2021 mid-year population estimates.

* Provisional.

Characteristics of stays

In people aged less than 45 years:

- In 2022/23, 49% of the 6,204 stays lasted one day or less, a decrease from 2021/22 (54%). In 2022/23 the percentage of stays lasting for at least one week (23%) had increased compared to 2021/22 (18% of stays). The median length of stay was two days.
- 92% (5,730) of all hospital stays in 2022/23 were emergency admissions. This has increased from 84% in 1997/98.

In people aged 45 years and older:

- Stays for people aged 45 years and older tended to be longer than for younger patients. 34% of stays lasted for one day or less - a decrease from 41% in 2021/22. Around one third of stays in 2022/23 (32%) were for at least one week - an increase from 27% in 2021/22. The median length of stay increased slightly in 2022/23 to three days (two in 2021/22).
- 90% (3,126) of all hospital stays were via emergency admission, increasing from 71% in 1997/98.

Drug type

In people aged less than 45 years old:

- Opioids continued to be the drug most commonly associated with hospital stays, however there was a sharp decrease in rates, from a peak of 173 stays per 100,000 population in 2019/20 to 85 per 100,000 in 2022/23. (Figure 4.2). Despite comprising 39% of stays for this age group, opioid stay rates in 2022/23 were at their lowest since 1998/99 (78).
- The second most common drug category in hospital stays was 'multiple/other' drugs. Stay rates for this category have varied over time but increased to a peak of 83 by 2019/20 before decreasing over three consecutive years to 52 stays in 2022/23.

- Rates of stays involving sedatives/hypnotic drugs, cannabinoids and cocaine had seen sharp increases since 2013/14, with sedative/hypnotics peaking at 80 stays per 100,000 in 2020/21, before sharply decreasing by more than half (2022/23: 32 stays per 100,000). Rates of stays for cannabinoids peaked at 56 stays per 100,000 population in 2020/21 and have decreased to 44 in 2022/23. Rates of stays for cocaine peaked at 55 stays per 100,000 in 2019/20 before slowly decreasing (2022/23: 42 stays per 100,000).

- Rates of stays involving 'other stimulants' generally ranged between 10 and 17 stays each year of the time series, with exceptions in 204/15 and 2015/16 (23 stays and 20 stays respectively). Following a series of decreases, the 2022/23 rate was the lowest seen yet - 4 stays per 100,000.

- Rates of stays involving hallucinogens generally ranged between 3 and 9 stays per 100,000 over the time series. In 2022/23, the rate fell to 2 stays per 100,000.

In people aged 45 years and older:

- Opioids were the most commonly recorded drug associated with hospital stays in 2022/23 (54% of stays). Stay rates for opioids increased steadily over time, peaking at 104 stays per 100,000 population in 2019/20. The stay rate decreased to 77 per 100,000 in 2022/23 (Figure 3.2).

- Rates of stays involving 'multiple/other' drugs steadily increased over the time series, rising from 6 in 1997/98 to between 39 and 43 stays per 100,000 in the years between 2018/19 and 2021/22. Stay rates for 'multiple/other' drugs decreased to 31 per 100,000 in 2022/23.

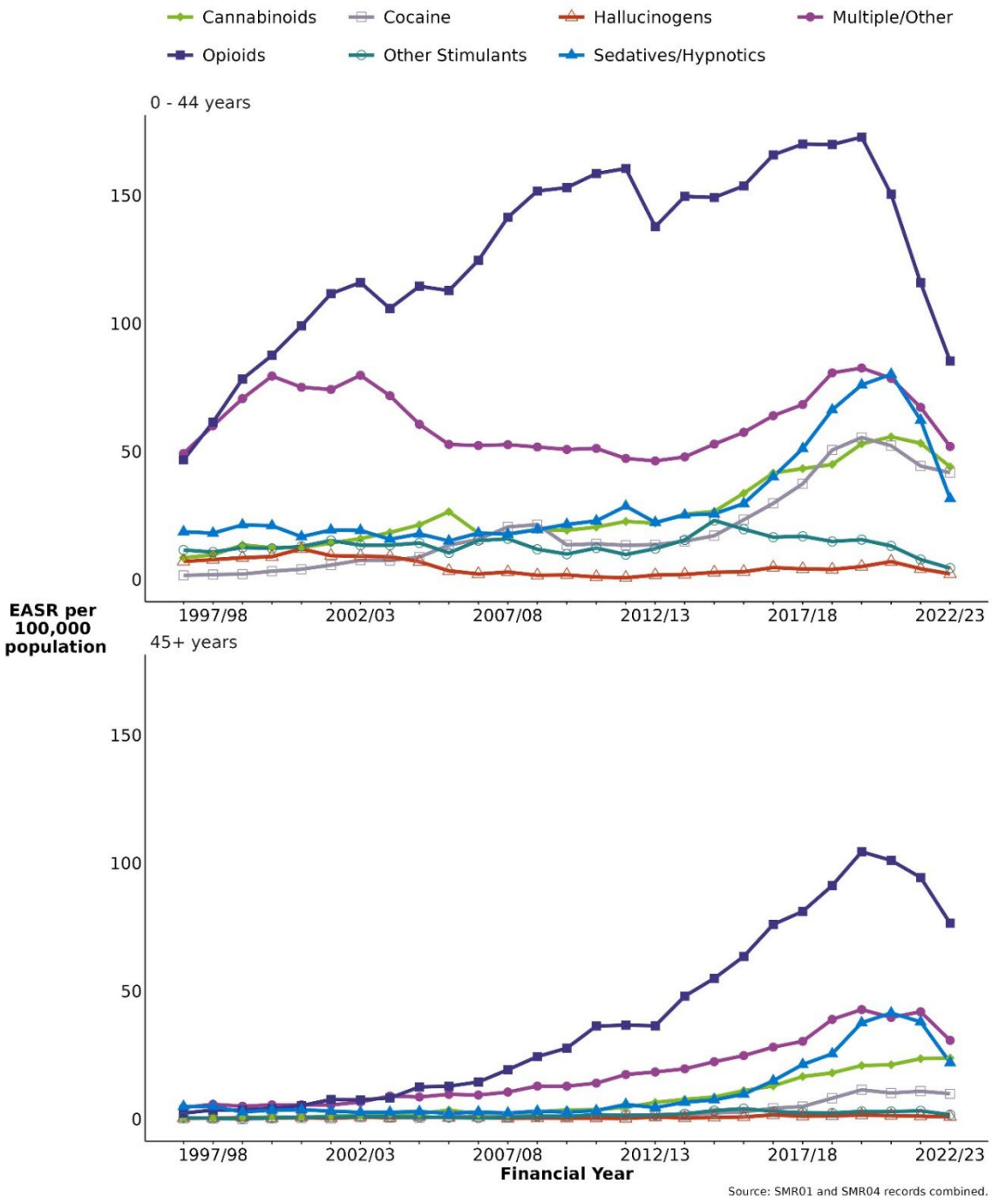
- Sedatives/hypnotics stay rates increased from 7 to 41 per 100,000 population between 2014/15 and 2020/21, before decreasing slightly to 38 in 2021/22 and more sharply to 22 per 100,000 in 2022/23.

- In 2022/23, the rates of stays involving cannabinoids and cocaine remained stable - the only two drug types that have not decreased in the last two

years. Cannabinoids continued their long-term trend by remaining at 24 stays per 100,000 in 2022/23, after increasing from 21 to 24 stays per 100,000 in 2021/22. Rates of cocaine-related stays were 10 per 100,000 in 2022/23, continuing the stable trend of rates between 8 and 11 per 100,000 since 2018.

- Rates of stays for hallucinogens and 'other stimulants' remained constant, at 1 and 2 stays per 100,000 respectively.

Figure 3.3: Drug-related general acute/psychiatric combined stay[1] rates[2] by age group and drug type (Scotland; 1996/97 to 2022/23[*])



1. See **Glossary** for definitions of stays, patients, new patients and drug types referred to.
2. Uses European Standard Population 2013 and National Records of Scotland 2021 mid-year population estimates.

* Provisional.

Conclusion

There were few differences between the under 45 years and 45 years and over drug-related patient age groups in relation to hospital type, diagnosis type or percentage of emergency admissions.

Differences were observed in relation to:

- The increasing number and percentage of people admitted to hospital with a drug-related event who were aged 45 years or over. This was also reflected in the median age of patients, which increased from 27 to 40 years over the time series from 1997/98 to 2022/23.

- The percentage of 'new' patients in the older age group was 66% in 2006/07 and has decreased to 46% over time. In comparison, the percentage of 'new' patients the younger age group has remained stable over the same time period. This indicates that the older age group increasingly comprises patients who have had other drug-related hospital admissions in the past ten years. Strengthening pathways between acute care and drug treatment services may be valuable for reducing harms among this group.

- On average, patients in the older age group stayed in hospital for longer than younger patients. Considered alongside the increase in the number of older patients with drug-related hospital admissions and the higher percentage of repeat admissions among this patient group, this suggests that enhanced community support following hospital discharge may be beneficial for older patients.

- In recent years, trends in drug types associated with hospital stays between the groups have increasingly diverged. Sharp decreases were recorded across a number of substance-specific stay rates for the younger age group. In contrast, the rate of stays for substance-specific stays did not decrease as sharply for the older age group, or have remained stable compared to previous years. These differences were most apparent in relation to opioids (the most common drug type associated with hospital

admissions among both groups), but also in cannabinoids and cocaine stays.

These differences are suggestive of an ageing effect within the population of people who use drugs problematically. Compared to their younger counterparts, drug-related patients aged 45 years and over were more likely to have multiple drug-related hospital admissions, more likely to be admitted in relation to opioid use, and more likely to stay in hospital for longer. For younger people, there were decreasing observations of acute drug-related harms associated with opioid use.

The emerging differences between age groups in their experience of acute opioid-related harms can also be seen in estimates of the **prevalence of problematic opioid use in Scotland**. These estimates describe a decrease from 2014/15 to 2019/20 in the number of people aged 15-34 years who used opioids problematically, and an increase in opioid use among people aged 50-64 years.

4. Survival analysis

The data presented in this and previous reports in this statistical series, have so far been focused on summarising trends in specific types of hospital admissions occurring within discrete time periods (financial years). Consistent and reliable monitoring of healthcare activity in relation to specific acute conditions is an effective tool for public health surveillance.

Problematic opioid use, which has been associated with the majority of drug-related hospital stays, is widely recognised as a chronic, relapsing condition that generally commences in young adulthood and may last for several decades. Opioids are also implicated in the majority of drug-related deaths that occur in Scotland and are therefore associated with Scotland's high drug-related death rates (see the latest **Accredited official statistics on drug-related deaths from National Records of Scotland** for further information). Describing outcomes for patients with this condition (or other drug-related conditions) helps to identify the potential value of interventions to treat or reduce the risks associated with problematic opioid use.

People who experience problematic drug use may also have a higher than average risk of death from other non-drug-related causes. A study of people attending drug treatment services in Scotland from 1996 to 2006 identified the five leading causes of death for this group as drug-related death, homicide, infectious diseases, suicide and digestive system diseases[viii]. While an examination of specific causes of death is not included here, in order to ensure that all mortality outcomes were captured, this section includes an analysis of all-cause survival probability among the cohort.

This topic-focused section examines mortality outcomes (all-cause and drug-related deaths) among a cohort of people who had a drug-related stay in hospital during financial year 2011/12. This analysis is based on data from PHS's **Scottish Public**

[viii] **Mortality of those who attended drug services in Scotland 1996–2006: Record-linkage study** (Merrall, Bird & Hutchinson, 2012).

Health Drug Linkage Programme. The main findings of this analysis are summarised at the end of this section.

As described in the **Introduction**, this topic-focused section has been included in this report on the basis of stakeholder and public interest and may be subject to change in future reports.

Methodology and Analysis

Survival analysis is a statistical technique for describing outcomes among groups of people. It measures the occurrence of a particular event of interest, and the amount of time it takes before that event occurs. The outcomes for groups with different characteristics can be compared using this technique, in order to establish which people had better, or worse, outcomes.

In the analysis below, we use survival analysis to examine the occurrence, and time to, death among drug-related hospital inpatients. The analysis models the time at risk of 1) any death, and 2) a drug-related death[ix] among patients with a drug-related discharge from hospital in 2011/12. Follow-up tests including **log rank tests** were used to determine where survival was significantly different by factors such as stay type and age group.

The relative risk of all-cause and drug-related deaths among the cohort is also described towards the end of this section. Relative risk is calculated using Cox proportional hazards regression modelling, which models the hazard ratio of events for people in a specific category relative to other categories of the same type (e.g. by age group).

[ix] Based on the baseline' definition for the UK Drugs Strategy – further details can be found on the **NRS website.**

Patients were categorised into groups on the basis of whether they had an opioid-related stay in 2011/12 (referred to as 'Opioid patients' or 'Non-opioid patients')[x], with 'time at risk' calculated from the date of discharge from the first opioid-related hospital stay in 2011/12 (or first drug-related stay if no opioid-related stays occurred during the year). Patients were followed-up (and data censored[xi], in the case of migration from Scotland or survival) for approximately 10 years (until 31 December 2021).

For further details on model estimation and methodology, see **Appendix 4**.

Cohort Characteristics

The characteristics of the cohort are described in Tables 4.1 and 4.2. A total of 6,539 patients were included in the analysis. Of these, 4,081 (62%) were discharged following an opioid-related stay during 2011/12 and 2,458 (38%) patients were discharged following a non-opioid drug-related stay during 2011/12.

Patients were followed-up for approximately 10 years. Opioid and non-opioid patients had similar mean follow-up times (8.2 vs. 8.7 years). Both groups included patients for whom follow-up ended on the day of discharge (day 0 of the time series), suggesting death occurred during the hospital stay (Table 4.1).

There were similar percentages of males and females within the opioid and non-opioid patient groups. People aged 25 to 34 years (34%) accounted for the highest number of patients in the cohort, closely followed by people aged 35 to 44 years (33%) (Table 4.2).

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[x] The 'Opioid patients' and 'Non-opioid patients' groupings refer to the type of stay recorded in 2011/12 only. It is possible that patients categorised as 'Non-opioid' had an opioid-related hospital stay recorded in a different financial year.

[xi] In survival analysis, data are 'censored' (removed from the analysis) to ensure that only mortality outcomes are being measured. Patients were censored during the period of analysis if they left the cohort (i.e. migrated out of Scotland) or at the end of the 10-year follow up period, if they had survived.

Table 4.1: Survival analysis, cohort description; Drug-related discharges (Scotland; 2011/12)

Measure	Opioid patients	Non-opioid patients
Number of patients	4,081 (62%)	2,458 (38%)
Time at risk (days)		
Minimum	0	0
Maximum	4,279 (11.7 years)	4,258 (11.7 years)
Mean	3,006 (8.2 years)	3,169 (8.7 years)
Deaths		
All cause death	1,554 (38%)	675 (27%)
Drug-related death (NRS definition)	736 (18%)	228 (9%)

Table 4.2: Survival analysis cohort; drug-related discharges by age and sex (Scotland 2011/12)

Age group	Opioid patients		Non-opioid patients		Total
	Male	**Female**	**Male**	**Female**	
0-14 years[i]	*	*	*	*	14 (0.2%)
15-24 years	183	133	447	118	881 (13.5%)
25-34 years	937	537	576	169	2,219 (33.9%)
35-44 years	1,100	434	416	183	2,133 (32.6%)
45-54 years	427	190	199	98	914 (14.0%)
55-64 years	75	30	63	41	209 (3.2%)
65+ years[i]	*	*	*	*	169 (2.6%)
Total	2,744 (67.2%)	1,337 (32.8%)	1,765 (71.8%)	693 (28.2%)	

* Due to small number of events, the under 14 years and over 65 years age groups have been subject to statistical disclosure procedures

i. While the under 14 years and 65 years and older age groups have been described here, they were excluded from some analyses due to small numbers of events (see below for further details).

All-cause death

This section examines the occurrence of death due to any cause among the cohort. In total, there were 2,229 deaths among the cohort during the 10-year follow-up period, accounting for 34% of 6,539 eligible patients.

Table 4.3 shows the occurrence of deaths and time at risk by stay type. Seventy percent of deaths (1,554) occurred among the opioid patient group. Follow-up time for those patients who died was approximately half that of patients who were followed-up to the end of the analysis period (mean time: 5.0 vs. 10.1 years).

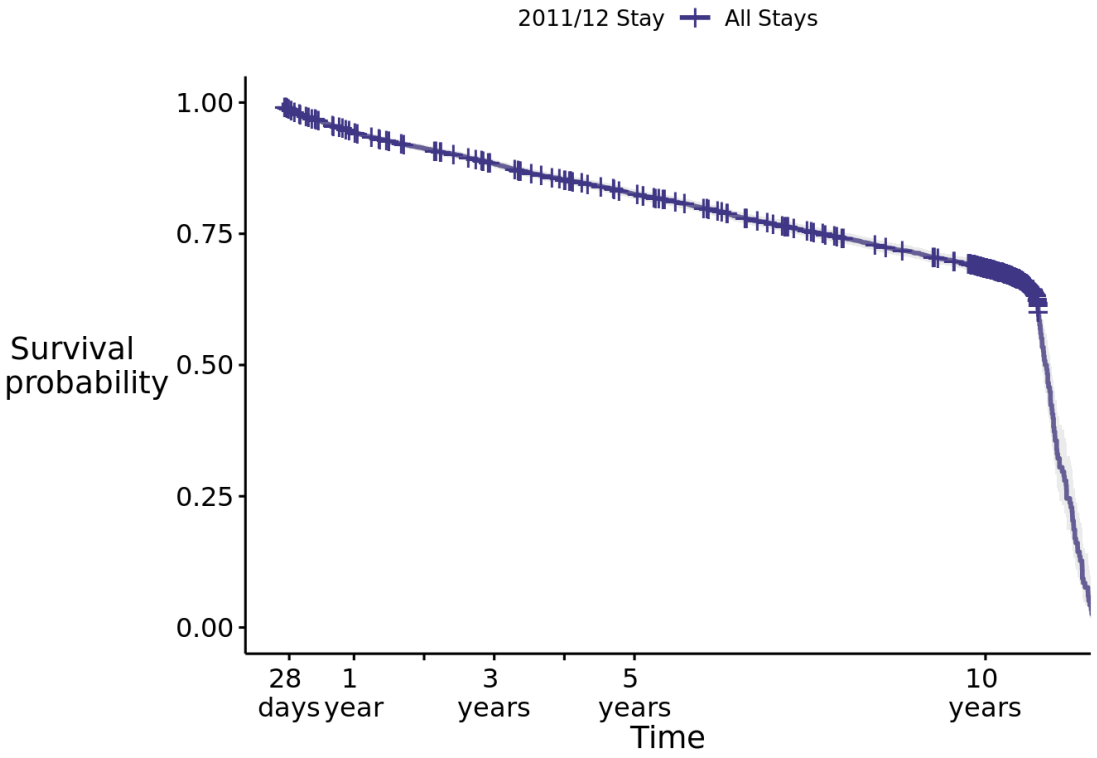
Table 4.3: Survival analysis; all cause deaths (Scotland 2011/12)

Measure	Censored[i]	All cause death
All patients	4,310 (66%)	2,229 (34%)
Number of opioid patients	2,527 (59%)	1,554 (70%)
Number of non-opioid patients	1,783 (41%)	675 (30%)
Time at risk		
Minimum	3	0
Maximum	3,927 days (10.8 years)	4,279 days (11.7 years)
Mean	3,703 days (10.1 years)	1,837 days (5.0 years)

[i]Censored: follow-up ends at migration or end of follow-up period

Firstly, all-cause survival probability was examined among the whole cohort (Figure 4.1, Table 4.4). There was a small but significant decrease in survival probability between 28 days (98.7%, 95% CIs 98.5-99.0%) and one year after discharge (94.3%, 95% CIs 93.7-94.9%). After five years (1,825 days), probability of all-cause survival had further decreased by more than ten percentage points (82.5%, 95% CIs 81.6-83.4%), which was significantly lower than at one year after discharge. After approximately 10 years of follow-up, all-cause survival had decreased by a further 14 percentage points (68.5%, 95% CIs 67.3-69.6%) compared to five years after discharge; a further statistically significant decrease.

Figure 4.1: Probability of survival for all stays - all cause death (Scotland 2011/12)



Survival plots demonstrate when how survival probability changes over time. This method also allows survival over time to be compared between groups.

Time since drug-related discharge, is shown on the (horizontal) x-axis. Survival probability (based on deaths among individuals in the group) is expressed as a percentage in the range 0% to 100% and shown on the (vertical) y-axis. The area of the y-axis is proportionate to the number of people in each group - therefore, if all had survived, 10-year survival would be 100% and if all had died, it would 0%.

A step down in the line indicates an event occurring (here, an all-cause death), and a vertical line on the chart indicates a censored event (migration, or end up of follow up-time). If the observations shown here are generalisable, it can be inferred that survival probability is higher for a group where the survival curve is above the survival curve of another group.

Table 4.4 Probability of survival for all-cause death for all stays (Scotland 2011/12)

Time	All patients		
	Cases at risk	**Estimate**[i]	**95% CIs**
28 days	6,453	98.7%	98.5-99.0
1 year	6,146	94.3%	93.7-94.9
5 years	5,335	82.5%	81.6-83.4
10 years	3,598	68.5%	67.3-69.6

[i]Kaplan-Meier survival probability estimates

Kaplan-Meier estimation is a way of calculating survival over time. For each time interval, survival probability is calculated as the number of patients alive divided by the number of patients at risk.

Statistically significant differences between two groups are demonstrated when the confidence intervals (CIs) for one group no longer overlap with the confidence intervals of another related group, and vice versa.

Stay type

All-cause survival probability was then examined by whether stays were opioid or non-opioid related (Figure 4.2 and Table 4.5) show the probability of survival over the course of the follow-up period (i.e. approximately 10 years) for opioid and non-opioid patients, taking into account all causes of death.

Figure 4.2: Probability of survival for all-cause death by stay type (Scotland 2011/12)

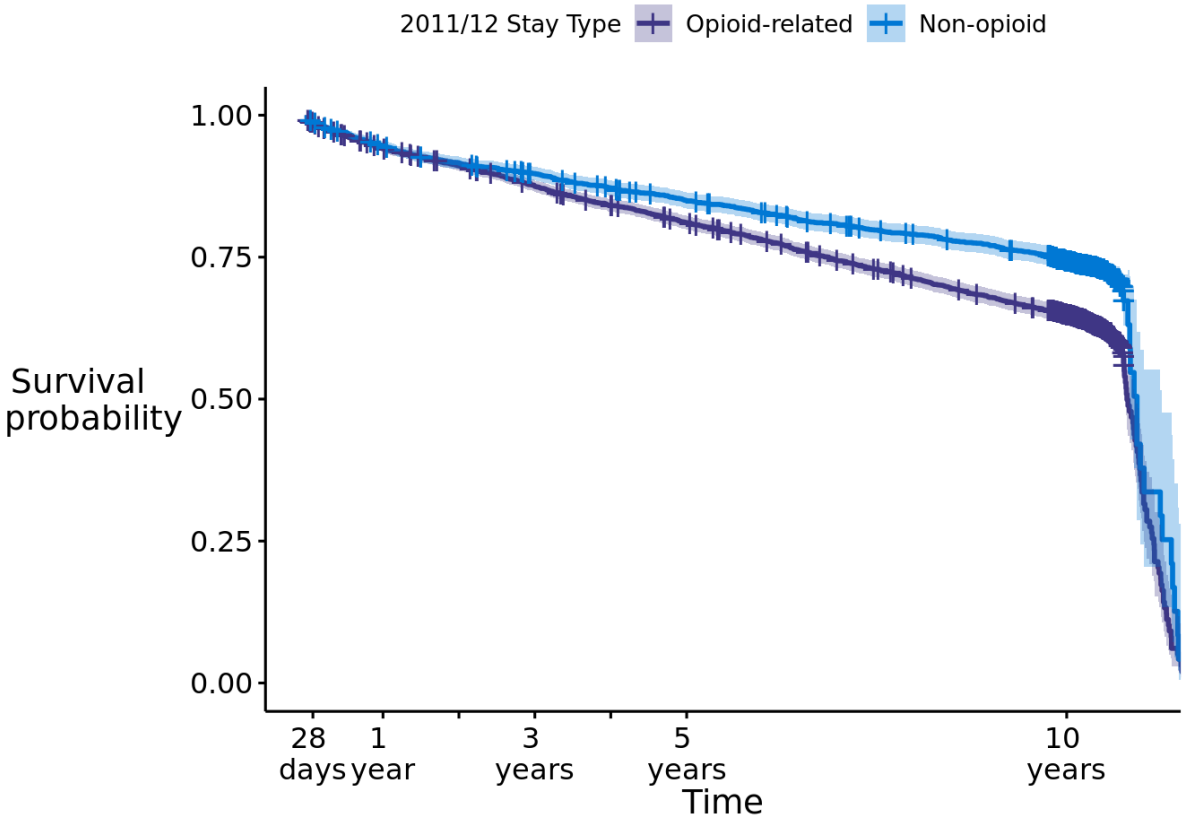


Table 4.5: Probability of survival for all-cause death by stay type (Scotland 2011/12)

Time	Opioid patients			Non-opioid patients		
	Cases at risk	Estimate[i]	95% CIs	Cases at risk	Estimate[i]	95% CIs
28 days	4,022	98.6%	98.3-99.0	2,431	98.9%	98.5-99.3
1 year	3,827	94.1%	93.4-94.9	2,319	94.6%	93.7-95.5
5 years	3,275	81.1%	79.9-82.3	2,060	84.9%	83.5-86.4
10 years	2,101	64.9%	63.5-66.4	1,497	74.4%	72.7-76.1

[i]Kaplan-Meier survival probability estimates

The probability of survival for all-cause death over the follow-up period of 10 years (3,652 days) was significantly lower for opioid patients than non-opioid patients (log rank test p-value <.001).

Log rank tests are a statistical test used to compare the survival time between two groups. They test the null hypothesis that there is no difference in the probability of death at any time between the two groups. If the p-value is less than 0.05, the null hypothesis is rejected, and it is assumed the two groups are different.

There was no statistically significant difference in survival probability between the two groups at 28 days or one year after discharge (Table 4.5, Figure 4.2). After five years (1,825 days), probability of all-cause survival for opioid patients was 81.1% (95% CIs 79.9-82.3%), which was significantly lower than for non-opioid patients (84.9%, 95% CIs 83.5-86.4%). After approximately 10 years of follow-up, the difference had increased further - all-cause survival probability among opioid patients (64.9%, 95% CIs 63.5-66.4%) was significantly lower than for non-opioid patients (74.4%, 95% CIs 72.7-76.1%).

Sex

Other variables that may help explain variation in time to all-cause death were explored, including sex. All-cause survival at approximately 10 years was 68.7% (95% CIs 67.3-70.1%) for men and 67.9% (95% CIs 65.9%-70.0%) for women (Table A4.1 **Appendix 4**). Therefore, time to all-cause death was not significantly different for men and women.

Age group

Age group (based on age at 31 March 2012, the end of the 2011/12 financial year) was also explored as a potential explanation of differences in survival[xii][xiii].

Overall probability of survival over the follow-up period (3,652 days after discharge) was significantly different between all age groups, with all-cause survival probability decreasing as patient age group at discharge increased (all log rank tests p-value <.001).

Statistically significant differences in survival probability between age groups began to emerge as soon as 28 days after hospital discharge, with patients in the oldest age groups having a lower survival probability than those in the youngest age groups (Table A4.2 **Appendix 4**, Figure 4.3). Differences in survival probability became more pronounced at one year after discharge with patients aged 35-44 years (94.6%, 95% CIs 93.7-95.6%) having significantly lower survival than 15-24 years (98.0%, 95% CIs 97.0-98.9%) and 25-34 years (96.6%, 95% CIs 95.9-97.4%) age groups; patients aged 55-64 years (82.8%, 95% CIs 77.8-88.1%) having significantly lower survival than 15-24 years, 25-34 years, 35-44 years and 45-54 years (92.0%, 95% CIs 90.3-93.8%) age groups; and patients aged 65+ years (66.9%, 95% CIs 60.1-

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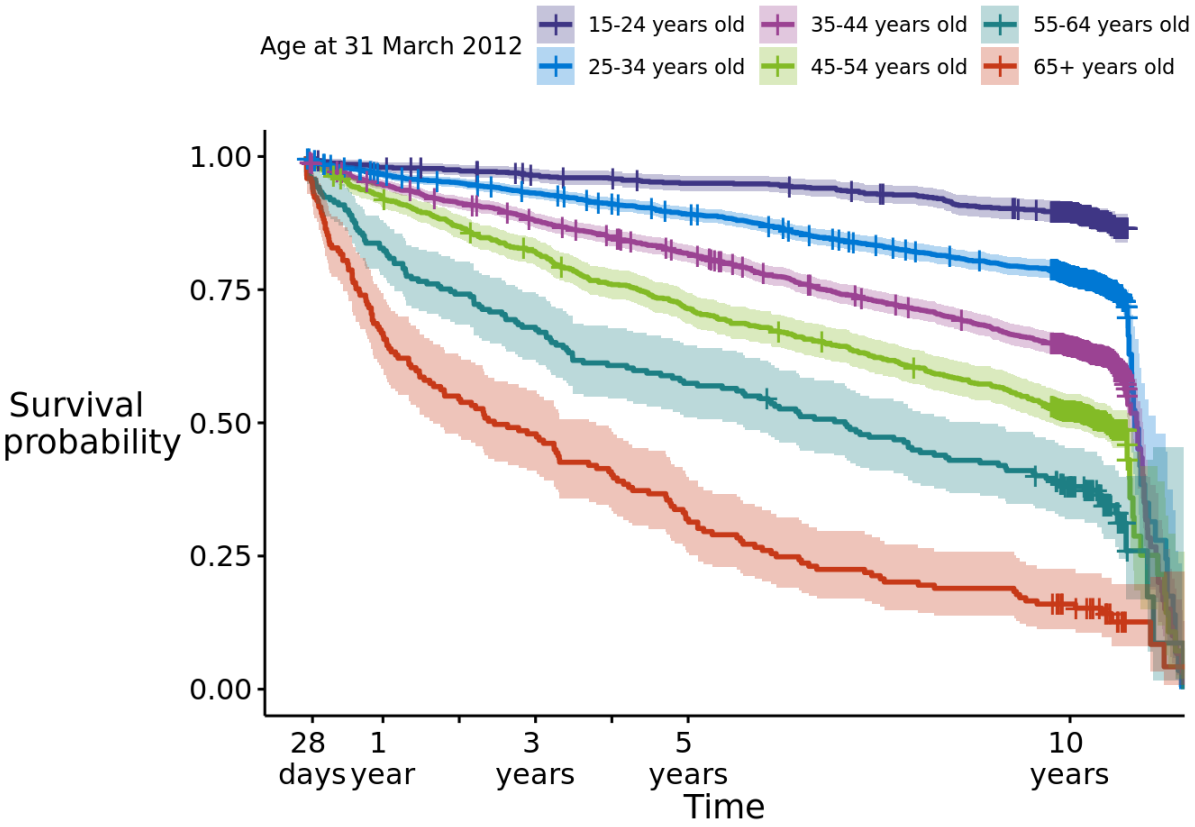
[xii] Due to small numbers, people aged 14 years and under were excluded.

[xiii] Migration censoring events were more evident in the three youngest age groups (15-24 years, 25-34 years and 35-44 years), compared to the three older age groups.

74.4%) having significantly lower survival compared to all younger age groups. After five years, the survival probability of every age group (except from 15- to 24-year-olds) was significantly lower than that of all younger age groups. These differences became even more established after ten years.

By ten years after discharge, observed survival probability decreased by more than 10% between successive patient age groups. Thus, survival at ten years was 90% for patients aged 15-24 years, 78% for patients aged 25-34 years, 64% for patients aged 35-44 years, 52% for patients aged 45-54 years, 38% for patients aged 55-64 years, and 16% for patients aged 65+ years.

Figure 4.3: Probability of survival for all-cause death by age group

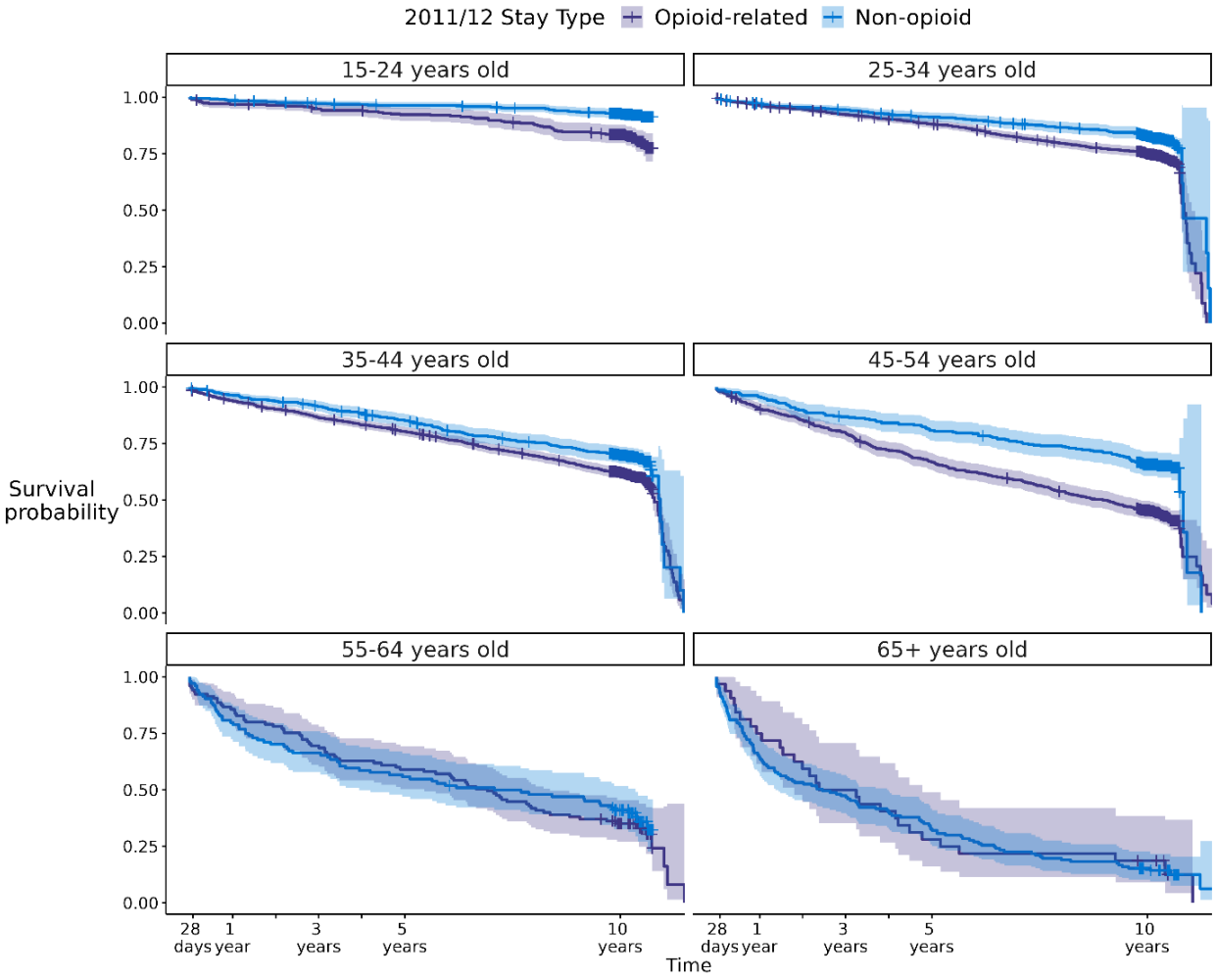


1. Due to small numbers, people aged 14 years and under were excluded.

Stay Type and Age Group

The differences in survival probability between opioid patients and non-opioid patients across different age groups were also explored (Figure 4.4). After ten years, all-cause death survival probability was significantly lower for opioid patients than non-opioid patients in all age groups up to 54 years (all log rank tests p-values <.001). For patients in the 55-64 years and 65+ age groups, 10-year survival probability for non-opioid patients was no different than for opioid patients.

Figure 4.4: Probability of survival for all-cause death by age group and stay type (Scotland 2011/12)



1. Due to small numbers, people aged 14 years and under were excluded.

Across age groups, there were no differences in survival probability between opioid patients and non-opioid patients at 28 days after discharge (Figure 4.4, Table A4.3 **Appendix 4**). At one year after discharge, opioid patients aged 45-54 years had a significantly lower survival probability (90.3%, 95% CIs 87.9-92.6%) than non-opioid patients (95.6%, 95% CIs 93.3-98.0%). At five years after discharge, significant differences in survival by opioid/non-opioid group were observed for patients aged 35-44 years and 45-54 years.

At 10 years after discharge, survival probability for opioid patients aged 45-54 years was 20 percentage points lower (45.5%) than for non-opioid patients in the same age group (65.8%). While 10-year all-cause survival was significantly lower for opioid patients in the 15-24 year, 25-34 year and 35-44 year age groups compared to non-opioid patients of the same age, differences were much less pronounced (between 7 and 9 percentage points lower) than for people aged 45-54 years (Figure 4.4, Table A4.3 **Appendix 4**).

Drug-related death

This section examines the occurrence of (**NRS-defined**) drug-related deaths among the cohort. As in the analysis of all-cause death, patients were 'censored' at the end of the 10-year follow-up period or if they migrated out of Scotland. Additionally, in order to focus specifically on drug-related deaths, patients who died of a non-drug-related cause were censored at their date of death.

Table 4.6 shows the occurrence of drug-related deaths and time at risk by stay type. Of the drug-related deaths among the cohort, just over three quarters (76%; 736) occurred among those who had an opioid-related hospital stay. Follow-up time for those patients who experienced a drug-related death was almost half of those who were followed-up to the end of the analysis period (mean time: 5.6 vs. 8.9 years).

Table 4.6: Survival analysis; drug-related deaths (Scotland 2011/12)

Measure	Censored[i]	Drug-related death
Number of patients	5,575 (85%)	964 (15%)
Number of opioid patients	3,345 (60%)	736 (76%)
Number of non-opioid patients	2,230 (40%)	228 (24%)
Time at risk (days)		
Minimum	0	0
Maximum	4,279 (11.7 years)	4,212 (11.5 years)
Mean	3,244 (8.9 years)	2,046 (5.6 years)

[i]Censored: follow-up ends at migration or end of follow-up period.

Survival probability for drug-related death was first examined among the whole cohort (Figure 4.5, Table 4.7). During the 10-year follow-up period a total of 964 drug-related deaths occurred, affecting 15% of the cohort.

As with survival probability for all-cause death, there was a small but significant decrease in survival probability for drug-related death between 28 days after discharge (99.7%, 95% CIs 99.5-99.8%) and one year after discharge (98.2%, 95% CIs 97.9-98.5%). Compared to one year after discharge, another small but significant decrease in survival probability was observed at five years after discharge (93.3%, 95% CIs 92.7-93.9%). After approximately 10 years of follow-up, survival probability for drug-related death had decreased by a further eight percentage points (84.8%, 95% CIs 83.9-85.8%) compared to five years after discharge; a further statistically significant reduction in survival probability.

Figure 4.5. Probability of survival for drug-related death for all stays (Scotland 2011/12)

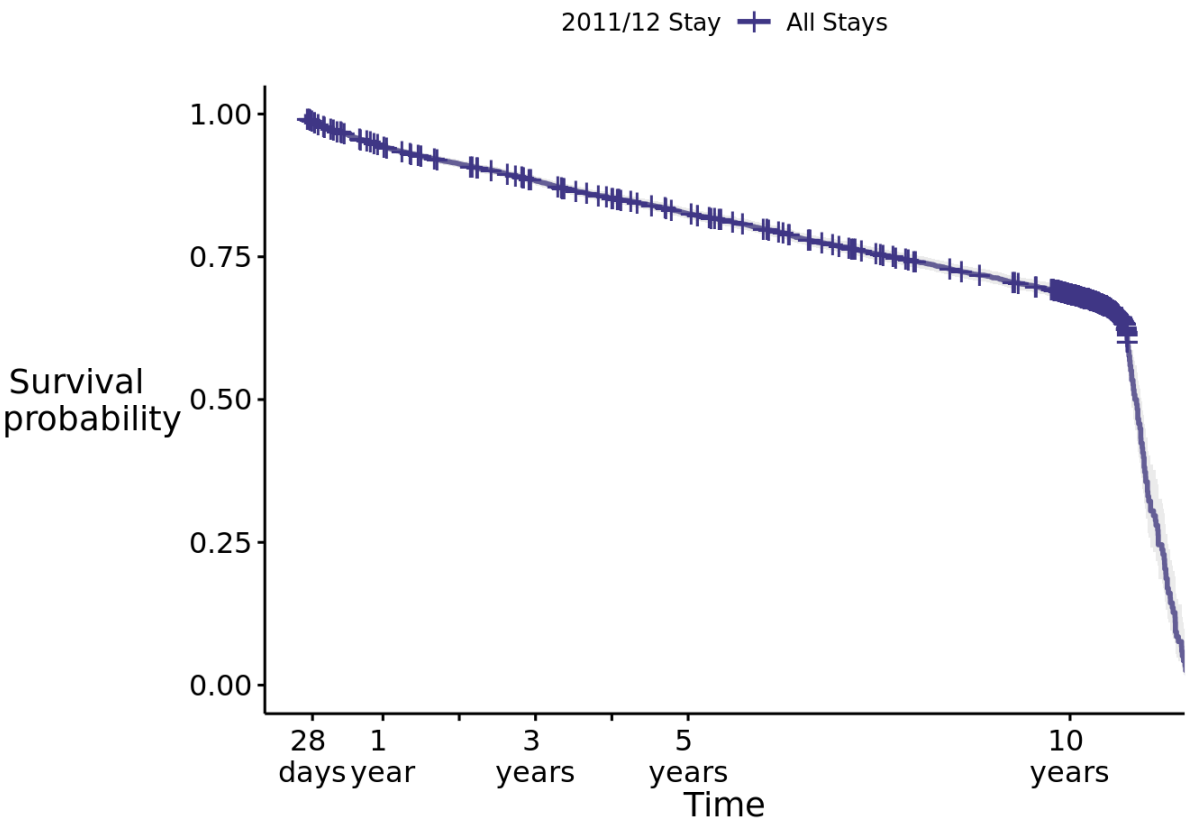


Table 4.7 Probability of survival for drug-related death for all stays (Scotland 2011/12)

Time	All patients		
	Cases at risk	**Estimate[i]**	**95% CIs**
28 days	6,453	99.7%	99.5-99.8
1 year	6,146	98.2%	97.9-98.5
5 years	5,335	93.3%	92.7-93.9
10 years	3,598	84.8%	83.9-85.8

[i]Kaplan-Meier survival probability estimates

Stay type

Survival probability for drug-related death was examined by whether stays were opioid or non-opioid related. Survival probability differed between opioid patients compared to non-opioid patients (Figure 4.6 and Table 4.8). Overall, survival probability for drug-related death was significantly lower for opioid patients compared to non-opioid patients (log rank test p-value <.001).

There were no statistically significant differences in survival probability for drug-related death between opioid and non-opioid patients after 28 days from discharge. However, from one year after discharge, probability of drug-related death survival was significantly lower among opioid patients compared to non-opioid patients. After approximately 10 years follow-up (3,652 days), excluding deaths from other causes, probability of drug-related death survival was 81.3% in opioid patients (95% CIs 80.0-82.6%) compared to 90.6% in non-opioid patients (95% CIs 89.3-91.8%).

Figure 4.6: Probability of survival for drug-related death by stay type (Scotland 2011/12)

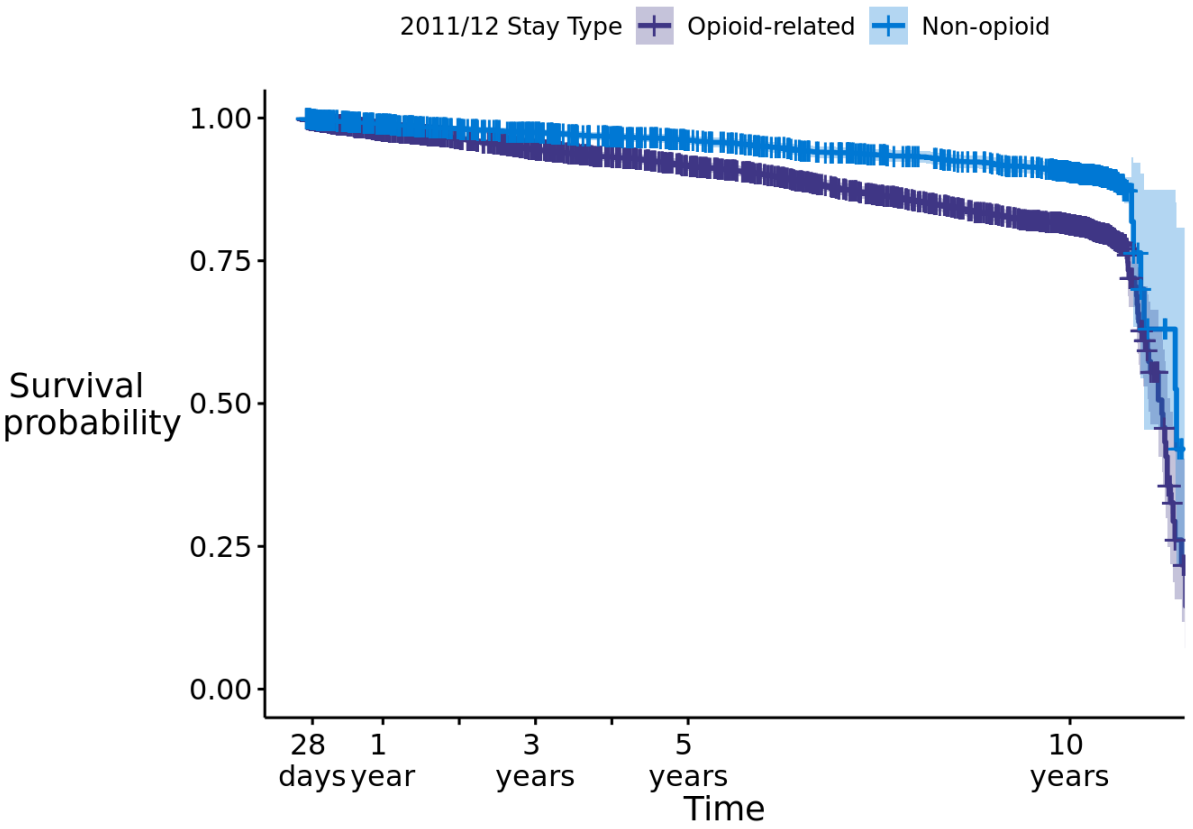


Table 4.8: Probability of survival for drug-related death by stay type (Scotland 2011/12)

Time	Opioid stay			Non-opioid stay		
	Cases at risk	Estimate	95% CIs	Cases at risk	Estimate	95% CIs
28 days	4,022	99.6%	99.4-99.8	2,431	99.8%	99.7-100.0
1 year	3,827	97.7%	97.3-98.2	2,319	99.0%	98.6-99.4
5 years	3,275	91.6%	90.8-92.5	2,060	96.1%	95.3-96.9
10 years	2,101	81.3%	80.0-82.6	1,497	90.6%	89.3-91.8

Sex

Sex was also explored as an explanatory variable for drug-related death. Survival probability was 84.5% (95% CIs 83.3-85.6%) for men and 85.6% (95% CIs 84.0-87.2%) for women at 10 years, meaning time to a drug-related death was not significantly different between the sexes (Table A4.4 **Appendix 4**).

Age group

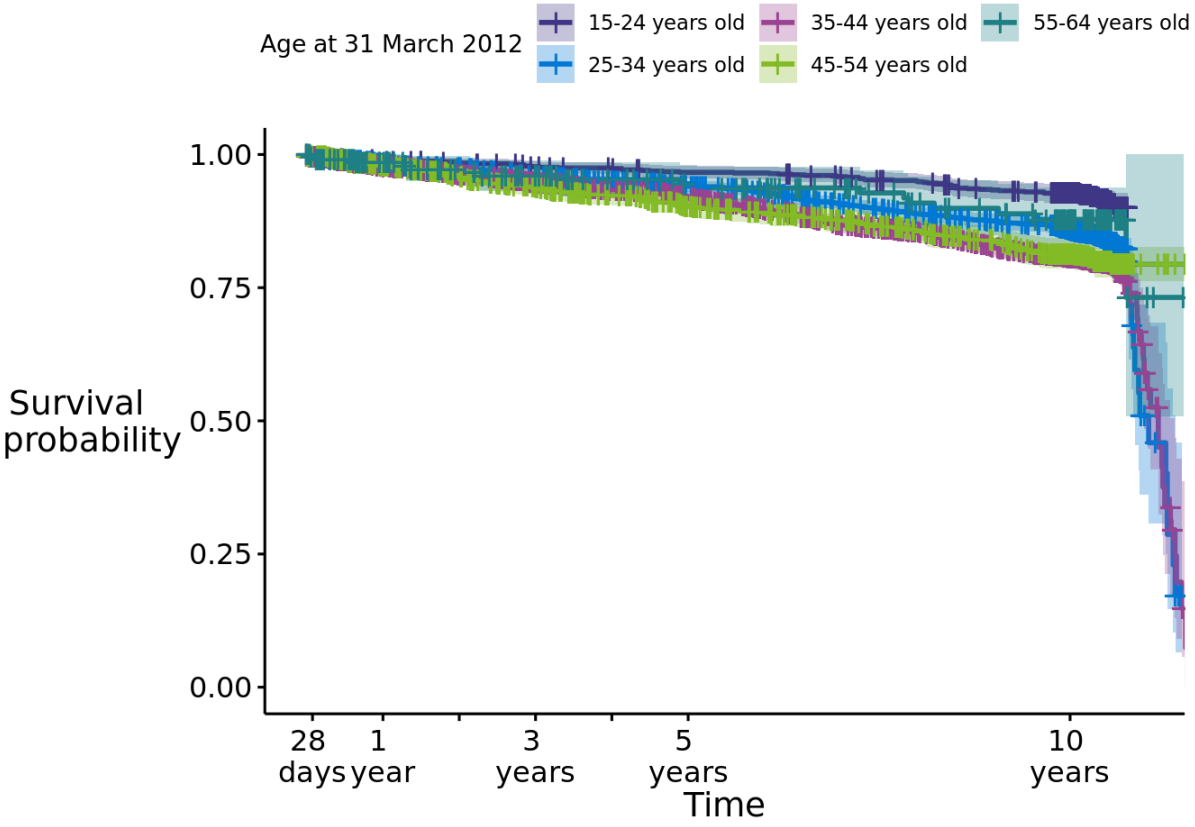
Analysis of drug-related death survival by age group (based on age at the end of the 2011/12 financial year) showed differences between the youngest and oldest age groups in overall survival across the ten-year follow-up period (3,652 days). Patients aged 25 to 34 years had significantly lower overall survival probability than those aged 15 to 24 years (log rank test p-value <.001); patients aged 35 to 44 years and 45 to 54 years had significantly lower overall survival probability than those aged 15 to 24 years and 25 to 34 years (log rank tests p-values <.05).

There were no statistically significant differences in drug-related death survival probability between age groups at 28 days or one year after hospital discharge (Figure 4.7, Table A4.5 **Appendix 4**). After five years, the drug-related death survival probability of people aged 25-34 years (94.0%, 95% CIs 93.0-95.0%), 35-44 years (92.0%, 95% CIs 90.8-93.2%) and 45-54 years (90.2%, 95% CIs 88.2-92.3%) was significantly lower than for 15-24 years (96.6%, 95% CIs 95.5-97.9%). People aged 45-54 years also had lower survival after five years than people aged 25-34 years.

By 10 years after discharge, differences in drug-related death survival probability were evident for most age groups (apart from patients aged 55-64 years). Patients aged 15-24 years had the highest survival probability for drug-related death at 10 years (92.7%, 95% CIs 91.0-94.5%). Patients aged 25-34 years (85.9%, 95% CIs 84.4-87.4%) and 35-44 years (80.7%, 95% CIs 78.9-82.5%) both had a significantly lower survival probability than all younger age groups. Patients aged 45-54 years (81.4%, 95% CIs 78.6.4-84.3%) had a lower drug-related death survival probability than patients aged 15-24 years or 25-34 years, but no difference in survival probability to patients aged 35-44 years. For patients aged 55-64 years (87.8%, 95%

CIs 82.2-93.8%), probability of drug-related death within ten years was no different to other age groups.

Figure 4.7: Probability of survival for drug-related deaths by age group[1]



1. Due to small numbers, people aged 14 years and under and 65 years and over, were excluded.

Stay Type and Age Group

Overall survival probability for drug-related death over the follow-up period of 10 years (3,652 days) was significantly lower in opioid patients compared to non-opioid patients across all age groups (all log rank tests p-values <.05).

Across age groups, there were no differences in survival probability between opioid patients and non-opioid patients at 28 days or one year after discharge (Figure 4.8,

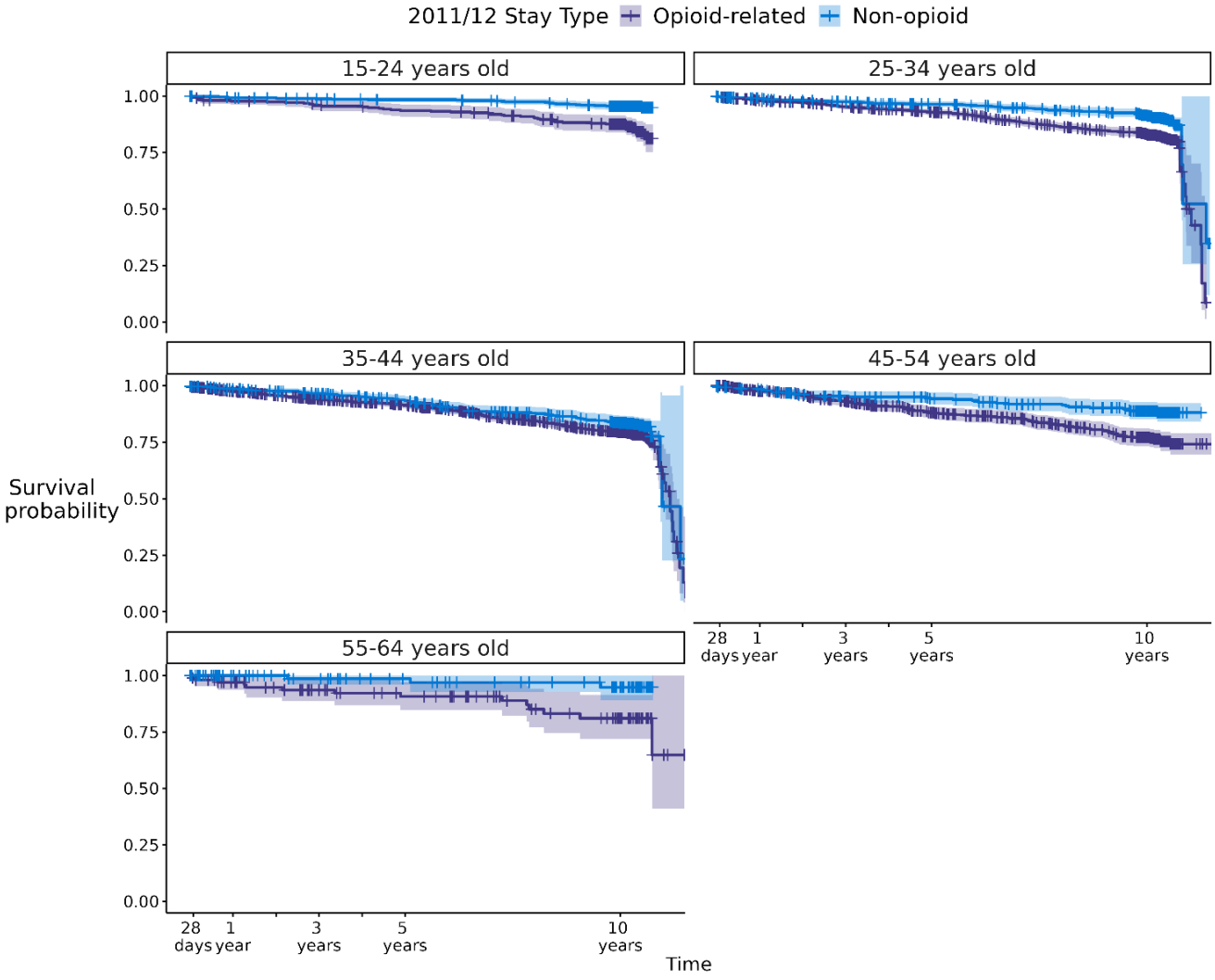
Table A4.6 **Appendix 4**). After five years, opioid patients aged 15-24 years, 25-34 years and 45-54 years had a lower drug-related death survival probability than non-opioid patients from the same age groups. At this stage, opioid patients aged 45-54 years also had lower survival than opioid patients from the 25-34 years age group.

After 10 years of follow-up, survival probability for drug-related deaths was lower for opioid patients than non-opioid patients in the 15-24 years, 25-34 years and 45-54 years age groups. For the 35-44 years and 55-64 years age groups, the differences between opioid and non-opioid patients of the same age were not significant. The largest age group-specific difference was seen among 45- to 54-year-olds, where 10-year drug-related death survival probability for opioid patients was 77.1% (95% CIs 73.4-81.1%) compared with 88.9% (95% CIs 85.1-92.8%) for non-opioid patients.

Among opioid patients, significant differences in 10-year drug-related death survival were seen when comparing specific age groups (for example, opioid patients aged 45-54 years had significantly lower survival than opioid patients aged 15-24 years) however age group differences were generally not as marked as for all-cause death.

Among non-opioid patients, people in the 25-34 years and 35-44 years age groups each had significantly lower 10-year survival than their younger counterparts. For non-opioid patients, 10-year drug-related death survival was lowest among patients aged 35-44 years at hospital discharge (83.6%, 95% CIs 80.5-86.8%) - significantly lower than all other age groups apart from 45- to 54-year-olds (Table A4.6 **Appendix 4**).

Figure 4.8: Probability of survival for drug-related death by age group and stay type (Scotland 2011/12)



1. Due to small number of events, the under 14 years and over 65 years age groups have been excluded

Relative risk for all-cause death and drug-related death

This section describes the **relative risk** of an event (all-cause death or drug-related death) among the cohort, while adjusting for other explanatory variables that influence the likelihood of those events (such as age or sex).

Relative risk or hazard ratio is a measure of the risk of a certain event happening in one group compared to the risk of the same event happening in another group.

In other words, the hazard ratio indicates whether one category within a variable is at greater or lesser risk than a defined reference category (e.g. whether the risk of death is greater for men than women). A hazard ratio of more than one indicates that the risk of the event is higher than in the reference category, while a hazard ratio of less than one indicates that the risk of the event is lower compared to the reference category. For example, if the hazard ratio when comparing males to females was 2.0, this would mean that males were twice as likely as females to die.

The **parameter estimate** indicates the expected change in the **log** of the hazard rate when there is a one unit increase in an explanatory variable (i.e. comparison of successive groups within a categorical variable) while all other explanatory variables are held constant. Positive parameter estimates indicate that the hazard rate increases with an increase in the explanatory variable. A negative parameter estimate indicates the hazard ratio will decrease with an increase in the explanatory variable. For example, we can interpret a parameter estimate value of 0.5 for the explanatory variable ‘Sex’ (where males are the reference category) as an increase by one half in the expected value of the **log** of the hazard rate for females.

Relative risk is calculated using Cox proportional hazards regression modelling, which models the hazard ratio (or relative risk) of an event compared to a reference

category. This allows us to quantify the relative likelihood of an event (for example, drug-related death within 10 years of hospital discharge) among people in different groups within the cohort (for example, people aged 35-44 years compared with people aged 45-54 years).

Table 4.9 shows that people who had a drug-related hospital stay in 2011/12 were at increased risk (1.5 times more likely) of all-cause death within 10 years if their stay was opioid-related compared to people whose stay was not opioid-related. Females were at slightly less risk of all-cause death than males, but this difference was not significant.

Table 4.9: Relative risk for all-cause death adjusting for explanatory variables

Risk Factor[i]	Parameter estimate	P-Value	Hazard Ratio (95% CI for HR)
2011/12 Non-opioid stay	-	-	1.00 (1.00-1.00)
2011/12 Opioid stay[ii]	0.40	<.001	1.50 (1.36-1.65)
Males	-	-	1.00 (1.00-1.00)
Females[iii]	-0.05	0.31	0.95 (0.87-1.05)
Age 15-24 years[iv]	-1.23	<.001	0.29 (0.24-0.36)
Age 25-34 years[iv]	-0.53	<.001	0.59 (0.53-0.66)
Age 35-44 years	-	-	1.00 (1.00-1.00)
Age 45-54 years[iv]	0.40	<.001	1.50 (1.34-1.68)
Age 55-64 years[iv]	0.93	<.001	2.53 (2.11-3.03)

i. Due to low numbers of events, the under 14 and 65+ age groups were excluded.

ii. The reference category is Non-opioid patients

iii. The reference category is Males

iv. The reference category is people aged 35-44 years

There were clear differences in the risk of all-cause death, which increased in successive age groups. Relative to people aged 35-44 years, people aged 15-24 years (around 30% as likely) and 25-34 years (around 60% as likely) were at lower risk of an all-cause death, whilst people aged 45-54 years (1.5 times more likely) and 55-64 years (2.5 times more likely) were at an increased risk.

Table 4.10 shows that people who were admitted for an opioid-related stay in 2011/12 were 1.8 times more likely to die of a drug-related death, compared to those who had been admitted for a non-opioid related stay, after accounting for age and sex. Females were at slightly less risk of drug-related death than males, but this difference was not significant.

Table 4.10: Relative risk for drug-related death adjusting for explanatory variables

Risk Factor[i]	Parameter estimate	P-Value	Hazard Ratio (95% CI for HR)
2011/12 Non-opioid stay	-	-	1.00 (1.00-1.00)
2011/12 Opioid stay[ii]	0.60	<.001	1.83 (1.57-2.13)
Males	-	-	1.00 (1.00-1.00)
Females[iii]	-0.06	0.37	0.94 (0.82-1.08)
Age 15-24 years[iv]	-0.81	<.001	0.44 (0.34-0.57)
Age 25-34 years[iv]	-0.29	<.001	0.75 (0.64-0.86)
Age 35-44 years	-	-	1.00 (1.00-1.00)
Age 45-54 years[iv]	-0.03	0.77	0.97 (0.80-1.18)
Age 55-64 years[iv]	-0.39	0.12	0.68 (0.42-1.10)

i. Due to low numbers of events, the under 14 and 65+ age groups were excluded.

ii. The reference category is Non-opioid patients

iii. The reference category is Males

iv. The reference category is people aged 35-44 years

Unlike for all-cause death, the risk of drug-related death did not increase with age. People aged 35-44 years were at most risk of drug-related death, closely followed by people aged 45-54 years (the difference in risk between these groups was not significant). People aged 25-34 years (75% as likely) and 15-24 years (around 45% as likely) were at lower risk of a drug-related death than people aged 35-44 years. Although there was a substantially lower risk of drug-related death among people aged 55-64 years (around 70% as likely) compared to people aged 35-44 years, this difference was not statistically significant due to the small number of deaths among people in that age group.

Discussion

This main focus of this statistical report is to describe the number of drug-related hospital admissions occurring in specific time periods. The objective for this topic-focused section was to provide a new perspective on patient outcomes by analysing mortality (all-cause and drug-related deaths) among a cohort of people who had a drug-related stay in hospital during financial year 2011/12. This analysis was based on data from PHS's **Scottish Public Health Drug Linkage Programme**.

Our decision to focus on deaths and to analyse patient survival by stay type (opioid and non-opioid), sex and age group was based on evidence that opioid dependence is a long-term condition which has been consistently associated with Scotland's high drug-related death rate. We wanted to understand the extent to which drug death outcomes for opioid users were different to those of non-opioid users and the influence of patient age and sex on survival probability. We also felt that mortality associated with other causes needed to be examined as the poor survival outcomes observed here have not yet been adequately recognised.

The main findings were:

- A total of 6,539 patients admitted to hospital for a drug-related diagnosis during 2011/12 were included in the analysis.
- After 10 years of follow-up, there were 964 drug-related deaths among the cohort, affecting 15% of patients. In total, approximately one third (2,229; 34%) of patients had died of any cause (including drug-related deaths) within 10 years of hospital discharge.
- Opioid patients had significantly worse 10-year outcomes (81% DRD survival; 65% all-cause survival) than non-opioid patients (91% DRD survival; 74% all-cause survival). They were 1.8 times more likely to have a drug-related death and 1.5 times more likely to have an all-cause death.
- There were no differences in survival or relative risk of death by patient sex.
- 10-year DRD survival worsened as patient age group increased. However, better DRD survival outcomes were observed among the 55-64 years age group. Patients aged 35-44 years and 45-54 years at hospital discharge had the worst 10-year DRD survival outcomes (both 81%). Ten-year DRD survival was significantly worse among opioid patients compared to non-opioid patients in the 15-24 years, 25-34 years and 45-54 years age groups.
- There was a linear relationship between 10-year all-cause survival (including drug-related deaths) and patient age group. Each successive age group experienced lower survival than their younger counterparts, ranging from 90% among people aged 15-24 years to 16% among people aged 65 years or more. Ten-year all-cause survival was significantly worse among opioid patients compared to non-opioid patients in all age groups up to 45-54 years.

The analysis presented here describes the high number of deaths that occurred within a relatively young cohort of patients who were admitted to hospital in relation to their drug use. While the risk of drug-related death was high among the cohort, it

was evident that their risk of other types of death was also unacceptably high. Opioid use and increasing age were associated with poor survival, though the risk of drug-related death was highest among middle-aged patients.

These findings underline the value of harm reduction interventions such as take-home naloxone, assertive outreach to those at risk of drug-related harm and engagement with drug treatment or harm reduction services. The significant difference in one-year drug-related death survival probability between opioid and non-opioid patients demonstrates that acute interventions such as hospital admissions present an important and impactful opportunity to intervene and prevent deaths.

Limitations

This analysis was limited by some factors, which need to be considered when reviewing these findings.

The extent to which any of the patients in this analysis continued to use drugs (opioid or non-opioid) after their discharge from hospital was not known. Likewise, it was not known whether patients changed substance type (for example, non-opioid patients started using opioids) or engaged in specialist drug treatment after discharge. These factors, which may have resulted in changes in the probability of death, were outside the scope of this analysis.

The extent to which the 2011/12 drug-related patient cohort differed in demographic composition or risk profile from drug-related patient cohorts from other financial years is not known. Because the patient cohort was large, the results shown here are likely to be generalisable to drug-related patient cohorts from other years. However, it is possible that survival probability may have altered over time due to changes in the drug market, specialist drug treatment provision or other contextual factors. It is also possible that changes in acute inpatient pathways would result in a more recent patient cohort having different characteristics than the cohort examined here.

Analysis of specific causes of death (other than drug-related death) was outside the scope of this analysis. The extent to which drug use (opioid or non-opioid) was

associated with deaths from non-drug-related causes was not known. This analysis did not include any comparison of mortality/survival with other members of the public. While the survival probability shown here was lower than expected, no comparisons with other groups should be made on the basis of this analysis.

Glossary

ADP

Alcohol and Drug Partnership (ADP) describes which of the 31 ADP areas the patient lives in, based on the postcode of their home address. ADPs are multi-agency partnerships established by the Scottish Government to deliver a co-ordinated approach to alcohol and drug related work in all local areas. This work is based on a partnership approach involving the statutory, voluntary and private sectors, and engaging the wider community. For more information about ADPs go to the **Scottish Government website.**

Cannabinoids

Drugs related to cannabis. The cannabis plant contains various cannabinoids. The primary psychoactive compound in cannabis is the cannabinoid tetrahydrocannabinol (THC). In addition to natural cannabinoids (for example, THC), this group of drugs includes synthetic (artificial) cannabinoids which are the psychoactive compounds in designer drugs with names like ‘Spice’. Cannabidiol (also known as CBD) is another cannabinoid which is recognised within this group of drugs. Many CBD preparations available in the UK (for example, cannabis oil) do not contain THC and therefore do not have a psychoactive effect. Other preparations with a higher THC concentration may produce a strong psychoactive effect. Use of cannabinoids can lead to a state of relaxation, euphoria, introspection, anxiety, paranoia, increase in heart rate and hunger. Synthetic cannabinoids have also been associated with seizures, difficulties breathing and death.

Censored

In survival analysis, data are 'censored' (removed from the analysis) to ensure that only mortality outcomes are being measured. Patients were censored during the period of analysis if they left the cohort (i.e. migrated out of Scotland) or at the end of the 10-year follow up period, if they had survived

Cocaine

A strong stimulant which is commonly snorted, inhaled as smoke, or dissolved and injected into a vein. This group includes powder cocaine and crack cocaine. The effects of cocaine may include loss of contact with reality, an intense feeling of

happiness, or agitation, a fast heart rate, sweating and large pupils. High doses can result in very high blood pressure or body temperature. After a short period of use, there is a high risk that dependence will occur. Its use is associated with stroke, heart attack, lung problems, blood infections, and sudden cardiac death.

Confidence interval

The range of values that the true population estimate would be expected to fall within if sampling the population many times. For a given point estimate with confidence intervals, the estimate is often thought of as a best available estimate with uncertainty intervals indicating a range of values in which the true value is likely to lie. A point estimate can be considered statistically significant if the null value (the value considered to indicate no difference) does not fall within the confidence intervals. Using 95% confidence intervals, statistical significance is defined as a 95% probability that the true population estimate falls within the confidence intervals.

Cox proportional hazards model

A cox's proportional hazards model is like a multiple regression model and enables the difference between survival times of particular groups of patients to be tested while allowing for other factors.

Day case

A patient who has a planned admission to a specialty for clinical care. The patient is not expected to, and does not, remain overnight.

Deprivation

If an area is identified as deprived, this can relate to the fact that the people who live there have a low income, it can also mean that there are fewer resources and opportunities in that area. The **Scottish Index of Multiple Deprivation** (SIMD) is a relative measure of deprivation across small areas in Scotland, called data zones. A data zone is a small geographical area with up to 1,000 residents. SIMD has over 30 indicators in 7 domains (income, employment, education, health, housing, geographical access to services and crime) at data zone level, which have been combined into an overall index. Rates are reported by quintiles (see quintile). SIMD is updated roughly every three years and the version used depends on the year when

the patient was discharged from hospital. More information can be found on the **PHS SIMD webpage** and in the Deprivation section in **Methods**.

Diagnosis grouping

Diagnosis grouping is broken down into: Mental & Behavioural, Overdose, and Any diagnosis (a combination of Mental & Behavioural and Overdose). Each of these groups is based on ICD10 diagnostic codes. See Analytical definitions section in **Methods** for further details.

Discharge

The end of a period of health care in a hospital setting. Each period of health care begins with a referral or admission and is ended by a discharge.

EASR

European Age-sex Standardised Rate (EASR) – the rate that would have been found if the population in Scotland had the same age and sex composition as the hypothetical standard European population. See EASR section in **Methods** for further details.

Hallucinogens

Hallucinogens are a group of drugs that alter perception of surroundings, including visual and auditory effects and changes to consciousness and emotion. These substances may be synthetic, for example LSD (lysergic acid diethylamide) or naturally occurring, for example psilocybin (the active ingredient found in 'magic mushrooms'). Most hallucinogens are not known to have long-term physical toxicity or risk of dependence, however, long term use may lead to psychological harm or exacerbation of existing mental health conditions. Unintentional injury as a result of behavioural changes due to the effects of a hallucinogenic substance is also a risk.

Heroin

See Opioids.

ICD

The International Statistical Classification of Diseases and Related Health Problems (ICD) is used to record diagnoses following hospital discharge, including deaths. The 10th revision is used in the analysis in this publication.

Inpatient

A patient who occupies an available staffed bed in a hospital. This includes patients who remain overnight (whatever the original intention) or who are expected to remain overnight but are discharged earlier.

Methadone

See Opioids.

'Multiple/other' drug type

The 'multiple/other' drugs category includes volatile solvents (such as glue, gases or aerosols), multiple drug use and use of other psychoactive substances (for example, ecstasy). This category may also be used to indicate multiple drug use when individual substances are not known or cannot be coded using existing diagnosis (ICD10) codes.

Log

Refers to the logarithmic transformation used in survival analysis to adjust a certain explanatory variable for covariates, decrease the effects of outliers and to improve the ease of interpretation of parameter estimates.

Log rank test

A statistical test used to compare the survival time between two groups.

New patient

A person admitted to hospital as an inpatient or day case patient within a given time period (for example, a financial year), who has not had a similar drug-related stay in hospital within the previous ten years.

NHS Board

One of 14 Scottish territorial NHS Boards in which the patient lives, based on the postcode of their home address.

People who are resident outside Scotland are included in a separate category labelled 'Outside Scotland'. Those with no fixed abode or unknown are placed in the category 'Other/Not Known'.

Opioids

Drugs similar to heroin or morphine. Opioids include opiates (drugs derived from opium, including morphine and heroin (diamorphine)) and semi-synthetic and synthetic drugs such as methadone, hydrocodone, oxycodone and fentanyl. Opioids are most often used medically to relieve pain. The side effects of opioids may include itchiness, sedation, nausea, respiratory depression, constipation, and euphoria. Frequent, escalating use of opioids typically results in dependence. Tolerance develops with continuous use, requiring increasing doses and leading to a withdrawal syndrome upon stopping suddenly. Accidental overdose or use alongside other depressant drugs commonly results in death from respiratory depression.

Other stimulants

The 'other stimulant' category includes stimulants other than cocaine (such as caffeine, amphetamine, methamphetamine, BZP, PMA). See the **FRANK website** for more information about specific substances.

Patient

A person admitted to hospital as an inpatient or day case patient within a given time period (for example, a financial year).

P-value

The p-value or probability value, tells you how likely it is that data could have occurred under the null hypothesis, with the null hypothesis usually stating that there is no difference between groups.

Provisional data

Submissions of data from hospitals are not yet complete. When all submissions have been received, the final figure may be different to that reported at the time of publication.

Quintile

A fifth of the Scottish population, as defined by the SIMD (see Deprivation above). The five groups of data zones range from the most deprived (1) to the least deprived (5).

Sedatives/ hypnotics

Drugs that induce sedation by reducing irritability or excitement. This group of drugs includes ‘prescribable’ benzodiazepines (drugs such as diazepam), ‘street’ benzodiazepines (for example, etizolam and alprazolam) and z-hypnotics (for example, zopiclone). While low doses 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, many of these drugs can cause unconsciousness and even death.

Stay

A period of health care in a hospital setting known as a continuous inpatient stay (CIS). A CIS is made up of individual episodes (where the patient is under the care of an individual consultant). A patient may have a number of stays during a given reporting period. Each stay begins with a referral or admission and is ended by a discharge.

Time at risk

Time "at risk" means that the subject has not had an event (such as death) before a given time (e.g. one year) and is not censored before or at that time.

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Further information

Further information and data for this publication are available from the **publication page** on our website.

The next release of this publication will be November 2024.

Open data

Data from this publication is available to download from the **Scottish Health and Social Care Open Data portal**.

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Appendices

Appendix 1 – Methods

SMR01 – General acute inpatient and day case return

Information about stays in general acute hospitals, where drug use was diagnosed as a factor in the patient's treatment are derived from the general acute inpatient and day case return (SMR01).

SMR01 is an episode based patient record relating to all inpatient and day cases discharged from hospitals (including paediatric facilities) in NHS Scotland. It does not include records from mental health, maternity, neonatal and geriatric long stay specialities. The SMR01 basic data set encompasses patient identification and demographic information, episode management information and general clinical information. Items such as waiting time for inpatient or day case admission and length of stay may be derived from the episode management information. A record is generated for each inpatient and day case episode, of which there are about 1,500,000 each year. Attendances at Accident and Emergency Departments that do not result in an admission are not included. Up to six diagnoses are recorded per SMR01 episode.

SMR04 – Mental health inpatient and day case return

Information about stays in psychiatric hospitals, where drug use was diagnosed as a factor in the patient's treatment are derived from the mental health inpatient and day case return (SMR04).

On the SMR04 form, up to six separate diagnoses can be recorded on both the admission and discharge parts of the record. Diagnosis on discharge may differ from diagnosis on admission. Discharge diagnoses are reported in these statistics as they are regarded as more accurate than admission diagnoses. A diagnosis in the first position is regarded as the main diagnosis. A diagnosis in any of the six positions (main and supplementary) is referred to as ‘in any position’.

SMR01 and SMR04 – 'Any hospital type'

Combined analysis of stays includes all general acute and psychiatric activity. Patients are counted only once per financial year, even though the same patient may have stayed in both general acute and psychiatric hospitals on multiple occasions in that time period.

The data presented in the combined analysis are derived from both general acute (SMR01) and psychiatric (SMR04) drug-related hospital records.

Analytical definitions

A period of health care in a hospital setting is known as a continuous inpatient stay (CIS). A CIS is made up of individual episodes (where the patient is under the care of an individual consultant). A patient may have more than one stay and hence the number of patients in a specific financial year can be less than the total number of stays for that period. Also, patients may have drug-related stays in multiple geographical areas during a financial year, meaning that the sum of stays across all geographical areas may not equal the Scotland total.

For the purposes of this analysis, a CIS is counted as associated with drug use if any of the episodes of which it is made up include a drug use diagnosis in any position (main position refers to primary diagnosis and five supplementary positions refer to secondary diagnoses). Drug use is recorded using the International Classification of Diseases 10th Revision (ICD10) Codes.

The following codes were used in this analysis:

i) To define a drug-related hospital stay:

Table A1.1: Drug-related hospital stay diagnosis codes

ICD 10 Code	Description
F11	Mental and behavioural disorders due to: Opioids
F12	Mental and behavioural disorders due to: Cannabinoids
F13	Mental and behavioural disorders due to: Sedatives/Hypnotics
F14	Mental and behavioural disorders due to: Cocaine
F15	Mental and behavioural disorders due to: Other Stimulants
F16	Mental and behavioural disorders due to: Hallucinogens
F18	Mental and behavioural disorders due to: Volatile Solvents
F19	Mental and behavioural disorders due to: Multiple/Other Drugs
T40.0	Poisoning by narcotics: Opium
T40.1	Poisoning by narcotics: Heroin
T40.3	Poisoning by narcotics: Methadone
T40.5	Poisoning by narcotics: Cocaine
T40.6	Poisoning by narcotics: Unspecified Narcotics
T40.7	Poisoning by narcotics: Cannabis
T40.8	Poisoning by narcotics: LSD
T40.9	Poisoning by narcotics: Unspecified Hallucinogens
For the T-codes listed below, a CIS is counted if there is a presence in the same CIS of at least one of the ICD-10 codes listed above	
T40.2	Poisoning by narcotics: Other opioids
T40.4	Poisoning by narcotics: Other synthetic narcotics
T42.3	Poisoning by antiepileptic, sedative-hypnotic and antiparkinsonism drugs: Barbiturates
T42.4	Poisoning by antiepileptic, sedative-hypnotic and antiparkinsonism drugs: Benzodiazepines
T43.6	Poisoning by psychotropic drugs NEC: Psychostimulants with abuse potential
T52	Toxic effect of organic solvents
T40.9	Poisoning by narcotics: Unspecified Hallucinogens

ii) To define a drug-related mental and behavioural hospital:

Table A1.2: Mental and behavioural hospital stay diagnosis codes:

ICD 10 Code	Description
F11	Mental and behavioural disorders due to: Opioids
F12	Mental and behavioural disorders due to: Cannabinoids
F13	Mental and behavioural disorders due to: Sedatives/Hypnotics
F14	Mental and behavioural disorders due to: Cocaine
F15	Mental and behavioural disorders due to: Other Stimulants
F16	Mental and behavioural disorders due to: Hallucinogens
F18	Mental and behavioural disorders due to: Volatile Solvents
F19	Mental and behavioural disorders due to: Multiple/Other Drugs

iii) To define a drug-related overdose hospital stay (referred as Overdose in the dashboard)

Table A1.3: 'Overdose' hospital stay diagnosis codes:

ICD 10 Code	Description
T40.0	Poisoning by narcotics: Opium
T40.1	Poisoning by narcotics: Heroin
T40.3	Poisoning by narcotics: Methadone
T40.5	Poisoning by narcotics: Cocaine
T40.6	Poisoning by narcotics: Unspecified Narcotics
T40.7	Poisoning by narcotics: Cannabis
T40.8	Poisoning by narcotics: LSD
T40.9	Poisoning by narcotics: Unspecified Hallucinogens
For the T-codes listed below, a CIS is counted if there is a presence in the same CIS of at least one of the ICD-10 Mental and Behavioural Disorder codes F11-F16, F18 or F19, or one of the ICD-10 Poisoning by Narcotics codes listed above	
T40.2	Poisoning by narcotics: Other opioids
T40.4	Poisoning by narcotics: Other synthetic narcotics
T42.3	Poisoning by antiepileptic, sedative-hypnotic and antiparkinsonism drugs: Barbiturates
T42.4	Poisoning by antiepileptic, sedative-hypnotic and antiparkinsonism drugs: Benzodiazepines
T43.6	Poisoning by psychotropic drugs NEC: Psychostimulants with abuse potential
T52	Toxic effect of organic solvents

For data on drug type, there may be some double counting, as stays, patients and ‘new patients’ may each be associated with multiple drug types (e.g. diagnoses of both opiate and cocaine use). If multiple drugs have been noted in case notes, the advised coding is to record each substance in a separate diagnosis position where possible. Sometimes the coder may be forced to use the unspecific ICD-10 code F19 (‘multiple/other drugs’), for example, if case notes only state ‘multiple/other drugs’ there is no way of identifying which substances were involved. Sometimes the F19

code may be used if the patient has many other diagnoses recorded, leaving insufficient space to record specific drugs separately.

When gathering information from stays, demographic data (age, gender, deprivation quintile) are extracted from the first episode of the stay (thus corresponding most closely to the circumstances of the patient at the point they entered hospital). However, the allocated year is defined by the date of discharge. Therefore, a stay spanning two financial years (e.g. 2012/13 and 2013/14) will be counted as having occurred in the most recent of those years, or when the patient was discharged (2013/14 in this example).

Some caution is necessary when using these data as (a) drug use may only be suspected and may not always be recorded by the hospital, and (b) where drug use is recorded, it may not be possible to identify which drug(s) may be involved.

In the length of stay analysis, length is measured from the date of initial admission of the CIS to the ultimate date of discharge for that stay.

An inpatient admission is categorised as an emergency, urgent or routine inpatient admission except for maternity and neonatal admissions. The appropriate admission category depends on the clinical condition of the patient as assessed by the receiving consultant. This measure is not standardised. More details can be found in the **PHS Data Dictionary**.

When figures are broken down by geographical area or age the numbers in some categories can be very small. In these cases both differences between categories and trends over time should be interpreted with caution because they may be misleading.

Statistical disclosure control has been applied to protect patient confidentiality. Therefore, the figures presented in these statistics may not be additive and may differ to those reported in previous publications.

European Age-sex Standardised Rates (EASR)

European Age-sex Standardised Rates (EASRs) are calculated for hospital activity indicators because the overall rate may vary with the age-sex structure of the populations. The direct standardisation method was used, with the age-sex specific rates of the local population applied to the age-sex structure of a standard population. This gives the overall rate that would have occurred in the local population if it had the same age-sex profile as the standard population. It allows valid comparisons to be made between local areas and other countries with differing population age-sex structures. In the dashboard, EASRs are expressed per 100,000 population per financial year.

The latest available National Records of Scotland (NRS) mid-year population estimates were used in the EASR calculations for NHS Board and Alcohol and Drug Partnership (ADP) analysis and for Scottish Index of Multiple Deprivation analysis. Please note that for this April 2024 release, rates for 2022/23 are based on 2021 mid-year population estimates. Mid-year population estimates for 2022 produced by NRS were not available at the time of publication. When these become available, data will be re-analysed and a planned revision of these statistics will be undertaken if a significant impact on the 2022/23 figures is seen.

The European Standard Population (ESP) is used to calculate EASRs within this publication. The ESP, which was originally introduced in 1976, was revised in 2013. Before publication of 2012/13 data in February 2014, the Drug Related Hospital Statistics publication used ESP1976 to calculate EASRs. Since 2014, the ESP2013 has been used to calculate EASRs for all years (including those before 2012/13). Therefore, findings from publications since February 2014 are not comparable with earlier publications. See Appendix A1 2013/14 report (PDF) for further details.

Deprivation

Information on deprivation is reported by the Scottish Index of Multiple Deprivation (SIMD) quintiles in the dashboard.

Socio-economic deprivation describes a range of individual and environmental factors whose effects can accrue over time. Information describing income, employment, education and other measures of affluence or deprivation are not readily available but an estimate can be made by measuring characteristics of the area in which an individual resides. If an area is identified as deprived, this can relate to the fact that the people who live there have a low income, it can also mean that there are fewer resources and opportunities in that area. SIMD has over 30 indicators in 7 domains (income, employment, education, health, housing, geographical access to services and crime), which are combined into an overall index. Neighbourhoods are ranked on the basis of their SIMD score and assigned to equally-sized groups representing different levels of deprivation (five groups (quintiles) in this instance).

Drug-related general acute hospital data are used as the basis of the indicator 'Hospital stays (CIS) related to drug use: standardised ratio' within the Health domain used for SIMD calculation. While drug-related hospital admission data contribute to the calculation of SIMD, the weight of these data within the overall SIMD index is minor (0.84%). On this basis, the use of SIMD within deprivation analysis in the DRHS publication is not considered to introduce substantial methodological bias.

See **Scottish Government website** for further details about SIMD.

When data are analysed, different levels of SIMD quintiles can be used depending on the aim of the analysis. For further information on how SIMD is used within our dashboard please see **Appendix 2**.

A minor change to the ICD codes used to identify specific substances in drug poisoning/overdoses stays was made in November 2022, and retrospectively applied to earlier year's data. Therefore, the numbers and rates presented in this publication may be different to those presented in publications prior to 2022. See **Appendix 3** for more detail.

Appendix 2 – Deprivation

The accompanying **Data explorer dashboard** uses SIMD in two different ways:

National SIMD

For the purpose of comparing different locations (for example, Scotland, NHS Board and ADP figures) on an equal basis, 'within-Scotland SIMD' quintiles should be used. To compare different locations, select the 'Location comparison' option in the Deprivation tab of the **Data explorer**. The deprivation analysis in the **Trend Data** dashboard is based on National SIMD only. National SIMD analysis only was used in all DRHS publications prior to the release of 2018/19 data on 27 October 2020.

Local SIMD

The release of 2020/21, 2021/22 and 2022/23 data also includes analysis based on within-NHS Board or within-ADP quintiles. This provides a summary of the deprivation characteristics of a specific geographical area in relation to the population of that location (see the example below for a description of the difference between National SIMD and Local SIMD). The results of this analysis cannot be compared with other locations. To generate a deprivation profile based on Local SIMD quintiles, select the 'Location profile' option in the Deprivation tab of the **Data explorer**. Note that within-NHS Board quintiles are applied to NHS Board locations and within-ADP quintiles are applied to ADPs when 'Location profile' is selected.

There are no neighbourhoods in NHS Western Isles which are comparable with the most deprived neighbourhoods in Scotland and classified as SIMD1 on a national basis. Therefore, if NHS Western Isles is analysed on a 'within-Scotland' or 'National SIMD' basis, there are no people with drug-related hospital stays from SIMD1 (stays are most common among people from SIMD2 neighbourhoods) (see Figure A2.1). However, it is possible to assign the most deprived 20% of neighbourhoods within NHS Western Isles to SIMD1 on the basis of the Local SIMD (within-NHS Board) analysis as this is based on differences in deprivation within the NHS Western Isles

population (see Figure A2.1). The main difference between National SIMD or Local SIMD is the ability to compare either within Scotland or only within the local area.

Figure A2.1: Analysis based on 'National SIMD' (or 'within-Scotland')

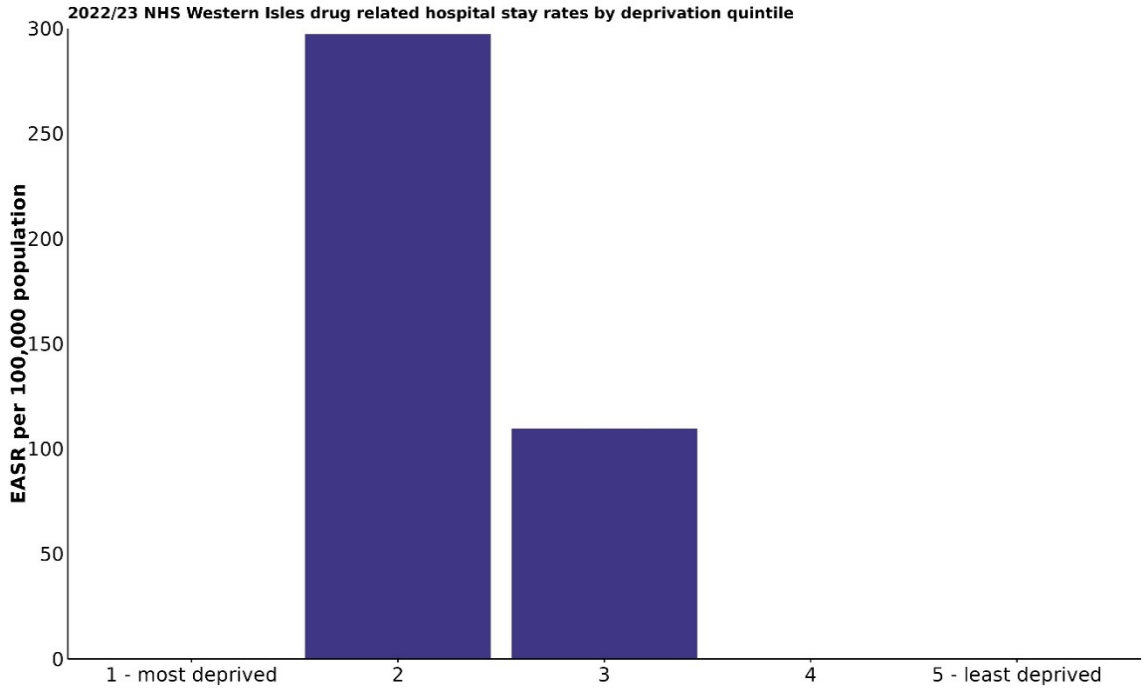
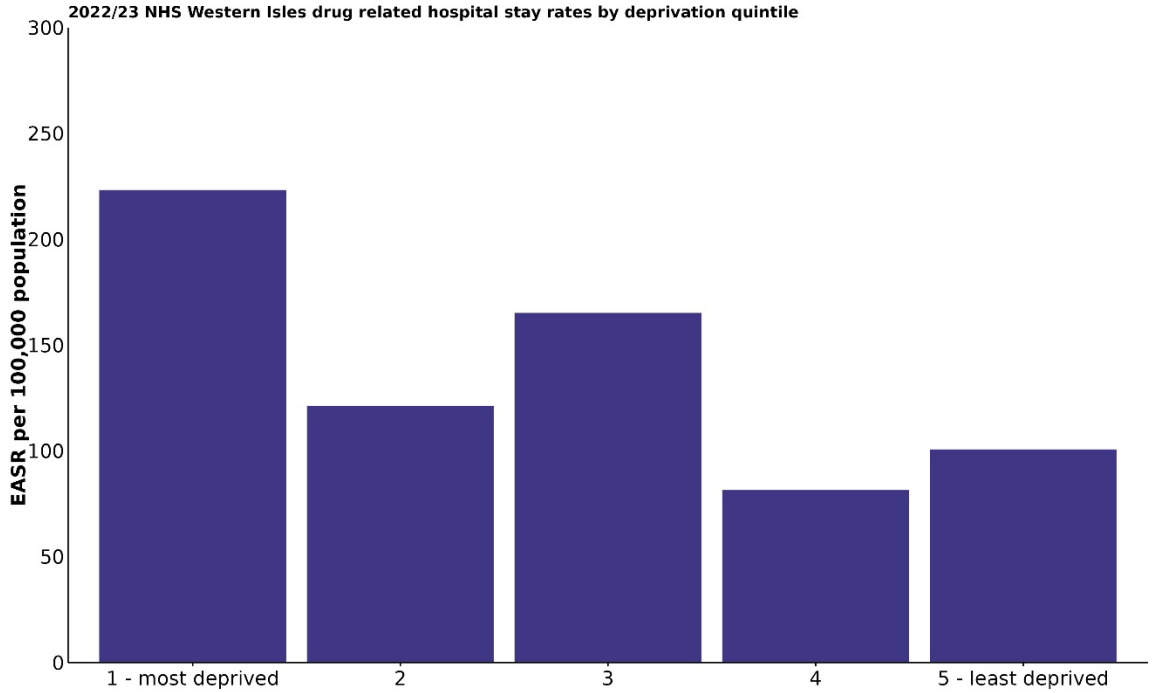


Figure A2.2: Analysis based on 'Local SIMD' (or 'within-NHS Board')



PHS' SIMD quintiles are constructed using a population weighting method. This method is different from how the Scottish Government (SG) creates SIMD quintiles. For more detail see population weighting section on the **PHS SIMD webpage**.

Appendix 3 – Background information

This report presents the number of drug-related hospital stays, the number and characteristics of patients admitted to hospital, the substances involved and the geographical variations within Scotland.

Hospital activity data are collected across the NHS in Scotland and are based on nationally available information routinely drawn from hospital administrative systems across the country. The principal data sources are the SMR01 (general acute inpatient and day case) and SMR04 (mental health inpatient and day case) returns.

Information is provided for financial years 1996/97 to 2022/23. The following differences in the time periods used should be noted:

- Time trends for 'new patients' start from 2006/07. Before 1996/97, diagnosis coding within SMR01 and SMR04 records was based on International Classification of Diseases 9th Revision (ICD9). Information Services Division(ISD) (now Public Health Scotland (PHS)) introduced International Classification of Diseases 10th Revision (ICD10) coding into SMR from 1996 onwards. The coding of drug use diagnoses changed markedly between these two ICD versions. As the identification of 'new patients' incorporates a ten-year look back of SMR records, figures in the period from 1996/97 to 2005/06 would be based partly on ICD9 codes and would be likely to overestimate the number of 'new patients' throughout this period.

- Alcohol and Drug Partnerships (ADPs) were established in 1997. Therefore, time trends for 'ADP of residence' locations start from 1997/98.

In autumn 2018, Public Health Scotland (PHS) conducted a **customer consultation** in relation to a proposed change to include stays due to drug poisoning/overdose in the definition of a drug-related hospital stay. Responses to this consultation indicated that users agreed with the proposed change. Therefore, the revised definition was implemented and came into effect for the **Drug-Related Hospital Statistics** report,

published on 28 May 2019. A full report describing the results of the consultation is available **here**.

- In January 2020, PHS conducted a further customer consultation in relation to: Drug-Related Hospital Statistics dashboard usability; data visualisation; dashboard content; and the Drug-Related Hospital Statistics publication report. Responses to this consultation indicated that users were broadly supportive of the dashboard and its features but suggested some improvements, many of which are implemented in the release of these statistics on 27 October 2020. A full report describing the results of this consultation is available **here**.

- Following the above-mentioned consultations, the definition of drug poison/overdose stays comprised selected 'T' codes from the ICD 10 chapter of Injury, Poisoning and certain other consequences of external causes. Eight of these codes could be used to identify a drug poisoning/overdose stay alone, and six further codes required any of the mental and behavioural diagnosis codes ('F' codes) in addition to be considered a relevant stay (See Table A.1). As part of our continuous process of review and quality improvement, a logical inconsistency was identified in this approach. Following consultation with clinical colleagues, a minor change to the definition was made, allowing either an F code, or one of the eight main T codes.

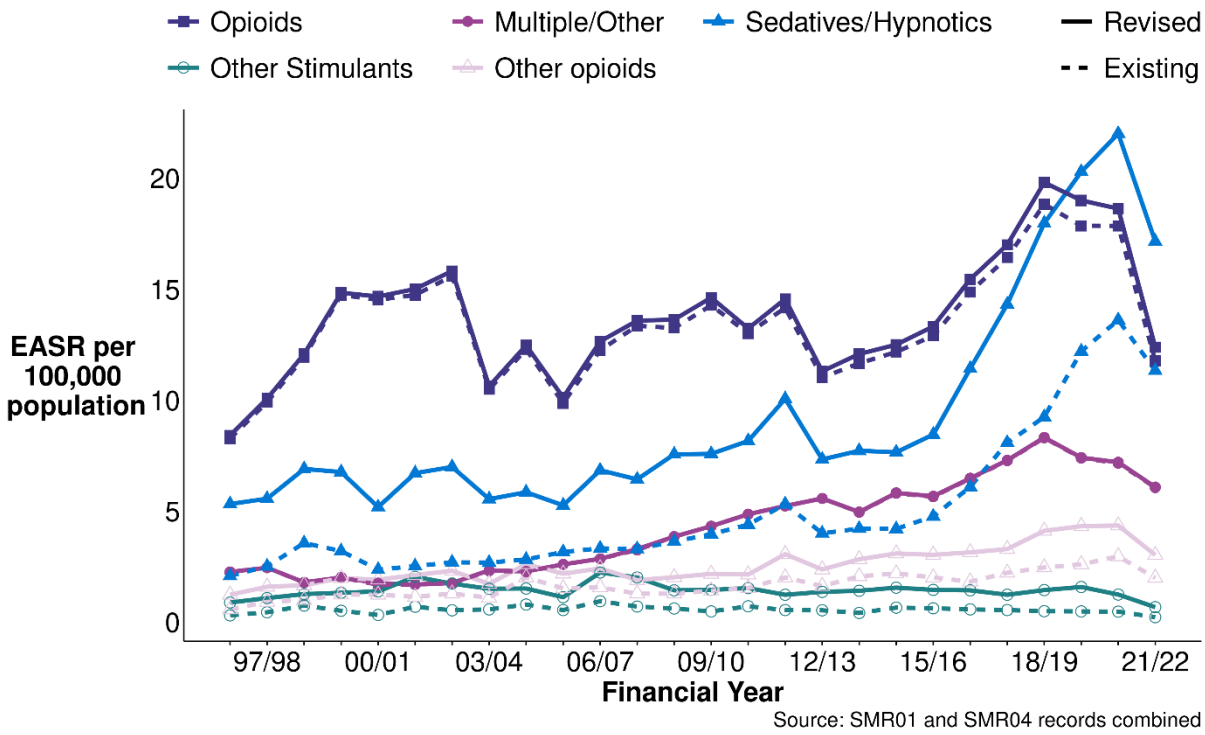
Table A3.1 Amendments to the drug poisoning/overdose definition

Drug type	Existing	Revised
Opioid	T40.0 T40.1 T40.3 T40.2 + F[a] T40.4 + F[a]	T40.0 T40.1 T40.3 T40.2 + F or T[b] T40.4 + F or T[b]
Cocaine	T40.5	T40.5
Multiple/other	T40.6 T52 + F[a]	T40.6 T52 + F or T[b]
Cannabinoids	T40.7	T40.7
Hallucinogens	T40.8 T40.9	T40.8 T40.9
Sedatives/hypnotics	T42.3 + F[a] T42.4 + F[a]	T42.3 + F or T[b] T42.4 + F or T[b]
Other stimulants	T43.6 + F[a]	T43.6 + F or T[b]

a. F: F11 to F16, F18 or F19
b. F or T: F11-F16, F18, F19, T40.0, T40.1, T40.3, T40.5, T40.6, T40.7, T40.8, T40.9

This change has not altered the number of overall stays but has resulted in increased numbers of stays and associated rates for selected drugs. For 2021/22, the rate of stays for other stimulant overdoses increased from 0.2 to 0.7 stays per 100,000 (205% increase), sedatives/hypnotic overdose rates increased from 11 to 17 (51%), other opioids increased from 2 to 3 stays (52%), and overdose rates of stays for multiple/other drugs had a negligible increase (approximately 6 stays per 100,000 population, a less than 1% increase) (Figure A3.1). For rates of the combined diagnosis types (mental & behavioural and drug poisoning/overdoses), the impact was less obvious: rates of stays for sedatives/hypnotics increased from 45 to 51 stays per 100,000 population (13%), other stimulants increased from 5 to 5.5 stays (9%), and there were minor (<1%) increases in the opioid and multiple/other drugs categories.

Figure A3.1 Drug-related general acute/psychiatric combined stay[1] overdose rates[2], by drug type* and definition (Scotland; 1996/97 to 2022/23**)



1. See **Glossary** for definitions of stays, patients and new patients.
2. Uses European Standard Population 2013 and National Records of Scotland 2021 mid-year population estimates.

* For an explanation of the drug types referred to, see **Glossary**.

** Provisional

Appendix 4 – Survival Analysis

Methodology

Data used in this analysis was obtained via the **PHS – Scottish Public Health Drug Linkage Programme**. Data was linked deterministically using the last CHI. Data was extracted for SMR records in late February 2022 and linked with deaths data in August and October 2023. Patients were eligible for inclusion in they had a drug-related hospital stay within 2011/12. Opioid stays are defined using the ICD-10 codes and the methodology detailed in the **Methods** section of the report.

We estimated observed survival probability using the Kaplan-Meier estimator (Kaplan & Meier, 1958). Estimates are presented as percentages in the range 0-100%, along with their 95% confidence intervals (CIs). Observed survival was estimated in R using the package 'survival' (Therneau, 2024). The function 'coxph' also within the 'survival' package has been used to compute the Cox proportional hazards multiple regression model; a linear model with a survival object as the response variable.

Model estimates

Table A4.1: Probability of survival for all-cause death by sex

Time	Males			Females		
	Cases at risk	Estimate[i]	95% CIs	Cases at risk	Estimate[i]	95% CIs
28 days	4,448	98.7%	98.4-99.0	2,005	98.8%	98.3-99.2
1 year	4,235	94.2%	93.6-94.9	1,911	94.4%	93.4-95.4
5 years	3,679	82.7%	81.6-83.8	1,656	82.2%	80.5-83.9
10 years	2,462	68.7%	67.3-70.1	1,136	67.9%	65.9-70.0

[i]Kaplan-Meier survival probability estimates

Table A4.2: Probability of survival for all-cause death by age group

Time	Cases at risk	Estimate[i]	95% CIs
	15-24 years		
28 days	877	99.5%	99.1-100.0
1 year	862	98.0%	97.0-98.9
5 years	824	95.0%	93.5-96.4
10 years	618	89.5%	87.5-91.6
	25-34 years		
28 days	2,203	99.3%	99.0-99.7
1 year	2,131	96.6%	95.9-97.4
5 years	1,952	89.1%	87.9-90.5
10 years	1,375	77.6%	75.9-79.4
	35-44 years		
28 days	2,102	98.7%	98.2-99.2
1 year	2,014	94.6%	93.7-95.6
5 years	1,724	81.7%	80.0-83.3
10 years	1,113	64.4%	62.4-66.5
	45-54 years		
28 days	897	98.1%	97.3-99.0
1 year	839	92.0%	90.3-93.8
5 years	648	71.4%	68.6-74.4
10 years	393	52.1%	49.0-55.5
	55-64 years		
28 days	200	95.7%	93.0-98.5
1 year	173	82.8%	77.8-88.1
5 years	120	57.4%	51.1-64.5

Time	Cases at risk	Estimate[i]	95% CIs
10 years	67	38.0%	32.0-45.3
	65+ years		
28 days	160	94.1%	90.6-97.7
1 year	113	66.9%	60.1-74.4
5 years	54	32.0%	25.6-39.8
10 years	21	16.0%	11.3-22.6

[i]Kaplan-Meier survival probability estimates

Table A4.3: Probability of survival for all-cause death by age group and stay type (Scotland 2011/12)

Time	Opioid patients			Non-opioid patients		
	Cases at risk	**Estimate[i]**	**95% CIs**	**Cases at risk**	**Estimate[i]**	**95% CIs**
	15-24 years					
28 days	314	99.4%	98.5-100.0	563	99.6%	99.2-100.0
1 year	305	96.8%	94.9-98.8	557	98.6%	97.6-99.6
5 years	288	92.4%	89.5-95.3	536	96.4%	94.9-98.0
10 years	200	83.7%	79.7-87.9	418	92.8%	90.7-95.0
	25-34 years					
28 days	1,464	99.4%	99.0-99.8	739	99.2%	98.6-99.8
1 year	1,412	96.3%	95.4-97.3	719	97.2%	96.0-98.4
5 years	1,282	88.1%	86.5-89.8	670	91.2%	89.2-93.3
10 years	874	75.0%	72.8-77.2	501	82.9%	80.2-85.7
	35-44 years					
28 days	1,507	98.4%	97.7-99.0	595	99.5%	98.9-100.0

Time	Opioid patients			Non-opioid patients		
1 year	1,438	94.0%	92.8-95.2	576	96.3%	94.8-97.8
5 years	1,223	80.3%	78.3-82.3	501	85.2%	82.4-88.1
10 years	768	62.3%	59.9-64.7	345	69.8%	66.2-73.7
	45-54 years					
28 days	604	97.9%	96.6-99.0	293	98.7%	97.4-100.0
1 year	555	90.3%	87.9-92.6	284	95.6%	93.3-98.0
5 years	409	66.9%	63.3-70.7	239	80.8%	76.4-85.4
10 years	222	45.5%	41.7-49.6	171	65.8%	60.6-71.5
	55-64 years					
28 days	99	94.3%	89.9-98.8	101	97.1%	94.0-100.0
1 year	90	85.7%	79.3-92.7	83	79.8%	72.5-87.9
5 years	62	59.0%	50.4-69.2	58	55.8%	47.0-66.2
10 years	30	35.1%	27.0-45.5	37	41.1%	32.6-51.8
	65+ years					
28 days	31	96.9%	91.0-100.0	129	93.4%	89.4-97.7
1 year	24	75.0%	61.4-91.6	89	65.0%	57.4-73.5
5 years	9	28.1%	16.2-48.9	45	32.8%	25.9-41.7
10 years	5	18.8%	9.1-38.6	16	15.3%	10.3-22.7

[i]Kaplan-Meier survival probability estimates

Table A4.4: Probability of survival for drug-related death by sex

Time	Males			Females		
	Cases at risk	Estimate[i]	95% CIs	Cases at risk	Estimate[i]	95% CIs
28 days	4,448	99.7%	99.5-99.8	2,005	99.7%	99.4-99.9
1 year	4,235	98.1%	97.7-98.5	1,911	98.4%	97.9-99.0
5 years	3,679	93.1%	92.3-93.9	1,656	93.7%	92.7-94.8
10 years	2,462	84.5%	83.3-85.6	1,136	85.6%	84.0-87.2

[i]Kaplan-Meier survival probability estimates

Table A4.5: Probability of survival for drug-related death by age group

Time	Cases at risk	Estimate[i]	95% CIs
	15-24 years		
28 days	877	99.9%	99.7-100.0
1 year	862	98.7%	98.0-99.5
5 years	824	96.6%	95.5-97.9
10 years	618	92.7%	91.0-94.5
	25-34 years		
28 days	2,203	99.6%	99.4-99.9
1 year	2,131	98.3%	97.8-98.9
5 years	1,952	94.0%	93.0-95.0
10 years	1,375	85.9%	84.4-87.4
	35-44 years		
28 days	2,102	99.5%	99.2-99.8
1 year	2,014	97.8%	97.2-98.4

Time	Cases at risk	Estimate[i]	95% CIs
5 years	1,724	92.0%	90.8-93.2
10 years	1,113	80.7%	78.9-82.5
	45-54 years		
28 days	897	99.8%	99.5-100.0
1 year	839	97.8%	96.9-98.8
5 years	648	90.2%	88.2-92.3
10 years	393	81.4%	78.6-84.3
	55-64 years		
28 days	200	99.5%	98.5-100.0
1 year	173	98.5%	96.8-100.0
5 years	120	94.5%	91.0-98.1
10 years	67	87.8%	82.2-93.8

*Due to small number of events, the under 14 years and over 65 years age groups have been excluded from analysis

[i]Kaplan-Meier survival probability estimates

Table A4.6: Probability of survival for drug-related death by age group and stay type (Scotland 2011/12)

Time	Opioid patients			Non-opioid patients		
	Cases at risk	**Estimate[i]**	**95% CIs**	**Cases at risk**	**Estimate[i]**	**95% CIs**
	15-24 years					
28 days	314	99.7%	99.1-100.0	563	100.0%	100.0-100.0
1 year	305	97.8%	96.2-99.4	557	99.3%	98.6-100.0
5 years	288	93.6%	90.9-96.3	536	98.4%	97.3-99.4

Time	Opioid patients			Non-opioid patients		
10 years	200	87.6%	84.0-91.4	418	95.6%	93.9-97.3
	25-34 years					
28 days	1,464	99.6%	99.3-99.9	739	99.7%	99.4-100.0
1 year	1,412	98.0%	97.3-98.7	719	98.9%	98.2-99.7
5 years	1,282	92.8%	91.5-94.2	670	96.4%	95.0-97.8
10 years	874	83.0%	81.1-85.0	501	91.5%	89.4-93.6
	35-44 years					
28 days	1,507	99.4%	99.0-99.8	595	99.8%	99.5-100.0
1 year	1,438	97.5%	96.7-98.3	576	98.6%	97.7-99.6
5 years	1,223	91.4%	89.9-92.8	501	93.4%	91.4-95.5
10 years	768	79.5%	77.4-81.7	345	83.6%	80.5-86.8
	45-54 years					
28 days	604	100.0%	100.0-100.0	293	99.3%	98.4-100.0
1 year	555	97.6%	96.4-98.9	284	98.3%	96.8-99.8
5 years	409	88.1%	85.4-90.9	239	94.3%	91.6-97.1
10 years	222	77.1%	73.4-81.1	171	88.9%	85.1-92.8
	55-64 years					
28 days	99	99.0%	97.1-100.0	101	100.0%	100.0-100.0
1 year	90	97.0%	93.7-100.0	83	100.0%	100.0-100.0
5 years	62	90.7%	84.8-97.2	58	98.6%	95.9-100.0
10 years	30	81.1%	71.9-91.4	37	94.8%	89.1-100.0

* Due to small number of events, the under 14 years and over 65 years age groups have been excluded from analysis

[i]Kaplan-Meier survival probability estimates

Appendix 5 – Publication metadata

Publication title

Drug-Related Hospital Statistics 2022/23

Description

Data relating to general acute and psychiatric hospital stays with a diagnosis of drug use. These data are presented at a national level and also broken down by demographic characteristics/local geographies.

Theme

Lifestyle and behaviours

Topic

Substance Use

Format

PDF report with online dashboard

Data source(s)

General acute inpatient/day case records (SMR01)

Mental health inpatient/day case records (SMR04)

Date that data are acquired

SMR01: 2 February 2024

SMR04: 1 February 2024

Release date

16 April 2024

Frequency

Annual

Timeframe of data and timeliness

General acute (SMR01) – information from the period 01/04/1996 to 31/03/2023. Analysis based on the period 1996/97 to 2022/23.

Psychiatric (SMR04) –information from the period 01/04/1996 to 31/03/2023. Analysis based on the period 1997/98 to 2022/23.

General acute & psychiatric combined (SMR01 & SMR04) – information from the period 01/04/1996 to 31/03/2023. Analysis based on the period 1997/98 to 2022/23.

Continuity of data

See **background information**.

In previous reports, length of stay was calculated as being ‘less than one week’ and ‘one week or more’. As the majority of hospital stays within general acute hospitals are for less than one week it was felt useful to provide a more granular length of stay measure. For this publication the length of stay calculation has been changed, replacing ‘less than one week’ with individual categories related to the number of stays for zero, one, two, three, four, five and six days, as well as the number of stays for seven or more days. Please note that due to the disclosure control methods used in this release, the total number of stays of zero days to six days length will not be directly comparable to the number of stays reported as being for ‘less than one week’ in previous publications.

Revisions statement

All data are revised annually to reflect any changes to analysis and to ensure the most complete information is presented. Data for the most recent financial year are labelled as provisional and may be subject to change in forthcoming publications. Minor revisions of this nature are often due to incomplete data returns at the time of the previous publication.

Revisions relevant to this publication

N/A

Concepts and definitions

See **Glossary**.

Also, refer to:

Hospital Care - Background Information: **https://publichealthscotland.scot/our-areas-of-work/acute-and-emergency-services/hospital-care/overview/what-hospital-services-cover/**

ScotPHO - Drug Use: **http://www.scotpho.org.uk/behaviour/drugs/introduction**

Relevance and key uses of the statistics

Relevant to understanding substance use in Scotland. Statistics will be used for policy making and service planning

Accuracy

Quality checks are conducted by Public Health Scotland (PHS). Figures are compared to previously published data and expected trends.

Completeness

Details of data submission issues are available on the **SMR completeness webpage**.

Comparability

The NHS Digital publishes figures on hospital admissions for drug-related mental health and behavioural disorders in England but should not be directly compared with published data from Scotland.

Accessibility

It is the policy of Public Health Scotland to make its web sites and products accessible according to published guidelines. More information on accessibility can be found on the **PHS website**.

Coherence and clarity

Data are presented within an interactive dashboard workbook. Notes have been added to ensure technical terms can be understood.

Value type and unit of measurement

Numbers, percentages and European Age-sex Standardised Rates per 100,000

Disclosure

The **PHS protocol on Statistical Disclosure Protocol** is followed to protect patient confidentiality.

Official Statistics accreditation

Accredited official statistics

UK Statistics Authority Assessment

Publication was accredited official statistics via the following reports:

- General hospital discharges (SMR01), Annual Release, accredited November 2012.
- Psychiatric hospital discharges (SMR04), accredited March 2017.

Report is now published as Drug-related Hospital Statistics.

Last published

22 November 2022

Next published

Winter 2024

Date of first publication

1998

Help email

phs.drugsteam@phs.scot

Date form completed

29 March 2024

Appendix 6 – Early access details

Pre-release access

Under terms of the 'Pre-release Access to Official Statistics (Scotland) Order 2008', PHS 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 Department of Health and Social Care (DHSC)

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’, i.e. 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:

Appendix 7 – PHS and official statistics

About Public Health Scotland (PHS)

PHS is a knowledge-based and intelligence driven organisation with a critical reliance on data and information to enable it to be an independent voice for the public's health, leading collaboratively and effectively across the Scottish public health system, accountable at local and national levels, and providing leadership and focus for achieving better health and wellbeing outcomes for the population. Our statistics comply with the **Code of Practice for Statistics** in terms of trustworthiness, high quality and public value. This also means that we keep data secure at all stages, through collection, processing, analysis and output production, and adhere to the '**five safes**'.