

## Supplementary material

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## 1. Non-pharmaceutical responses to COVID-19 in England

In the UK, non-pharmaceutical interventions included:

- a) Restrictions on movement and closure of schools, workplaces, and non-essential services ('lockdown'), which were announced on 23 March 2020, gradually lifted during summer 2020, and reintroduced between November 2020 and spring 2021;
- b) International travel bans, which operated intermittently using a 'traffic light' system in which travel to and from countries was restricted based on the prevalence of COVID-19;
- c) Behavioural advice, including promotion of handwashing, physical distancing, and face coverings;
- d) Support for vulnerable groups such as the 'Everyone In' scheme, which provided hotel and other temporary accommodation for people experiencing homelessness.

Further information about non-pharmaceutical interventions in the UK is available at:

- The UK Department for Health and Social Care's report on COVID-19 non-pharmaceutical interventions.<sup>1</sup>
- The Institute for Government's 'timeline of UK government coronavirus lockdowns and restrictions'.<sup>2</sup>
- Data and information about the 'Everyone In' scheme.<sup>3</sup>
- Information about the 'traffic light' system for international travel.<sup>4</sup>

## 2. ICD-10 codes for hospital admissions included in the study

We used the primary (first-listed) diagnosis to classify infections. Diagnoses were classified using the International Classification of Diseases version 10 (ICD-10).<sup>5</sup> The codes for infections are shown in Table 1. Algorithms for admissions included in the study are shown in Table 2.

Table 1: ICD-10 codes for bacterial infections

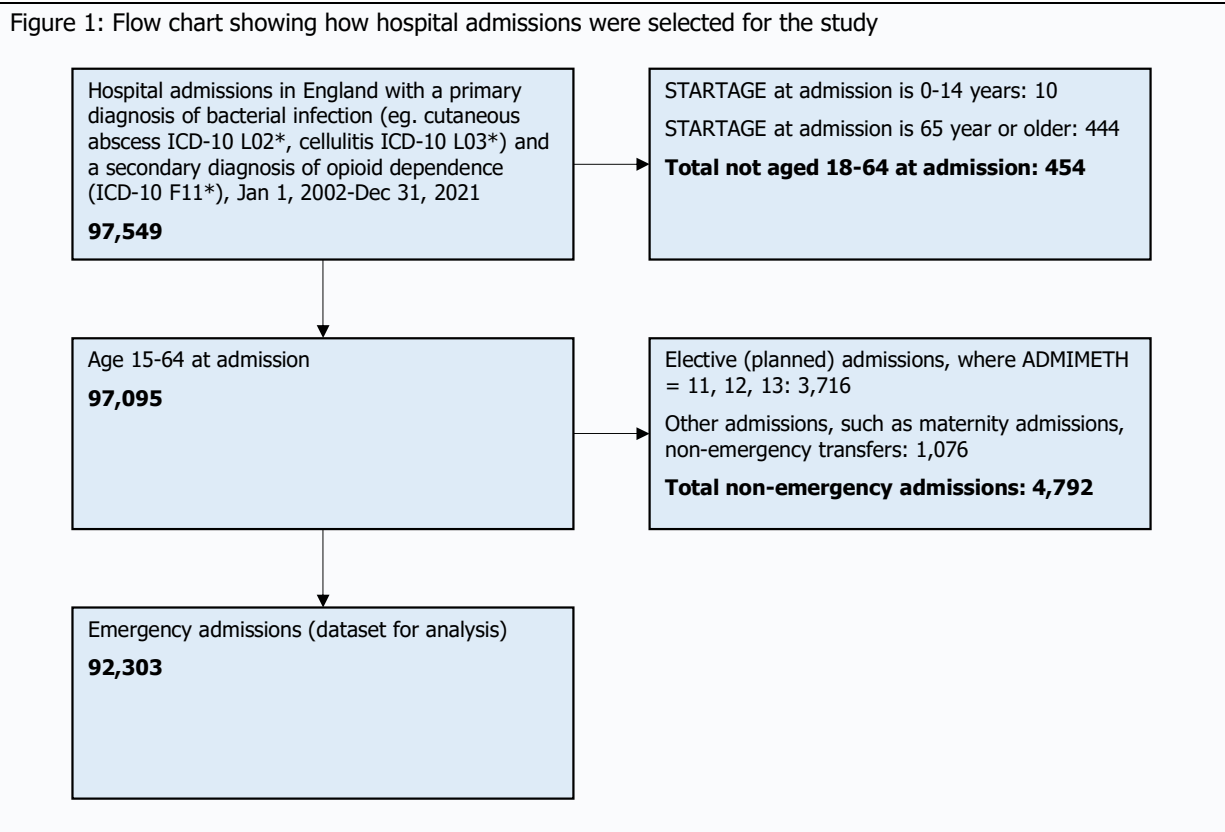
Localized or invasive	Infection focus	ICD-10 codes	Description of codes		
Localized	Cutaneous abscess	L02*	Cutaneous abscess, furuncle and carbuncle		
		L03*	Cellulitis		
		A480	GAS gangrene (GAS = group A streptococcus)		
		L08*	Other local infections of skin and subcutaneous tissue		
		L97*	Ulcer of lower limb, not elsewhere classified		
		L984	Chronic ulcer of skin, not elsewhere classified		
Localized	Other skin and soft tissue infection	R02*	Gangrene, not elsewhere classified		
		I80*	Phlebitis and thrombophlebitis		
		Invasive	Endocarditis	B376	Candidal endocarditis
				I33*	Acute and subacute endocarditis
				I38*	Endocarditis, valve unspecified
				I39*	Endocarditis and heart valve disorders in diseases classified elsewhere
Invasive	Septicaemia	A40*	Streptococcal sepsis		
		A41*	Other sepsis		
		B377	Candidal sepsis		
		R572	Septic shock		
Invasive	Osteomyelitis and septic arthritis	M00-M03	Infectious arthropathies		
		M86	Osteomyelitis		
		M465	Other infective spondylopathies		
Invasive	Necrotising fasciitis	M726	Necrotizing fasciitis		

Table 2: Definitions of emergency hospital admissions included in the study

Cause of hospital admission	Primary diagnosis	Secondary diagnosis
Opioid-injection associated bacterial infection	Bacterial infections (see Table 1)	F11* (Mental and behavioural disorders due to use of opioids)
Non opioid-related streptococcal and staphylococcal skin infections	L* (Diseases of the skin and subcutaneous tissue)	B950-5 (Streptococcus group A / group B / group D / pneumonia / other / unspecified as the cause of diseases classified to other chapters) B956-8 (Staphylococcus aureus / other / unspecified as the cause of diseases classified to other chapters) But NOT F11*
Admissions for drug-related mental and behavioural disorders Hospital admissions related to drug misuse (measure 1) <sup>6</sup>	F11-F16, F18, F19	Any
Admissions for poisoning by drug misuse Hospital admissions related to drug misuse (measure 2) <sup>6</sup>	T400-9; T436	Any

### 3. Flow-chart of data included in the study

We used data from the Hospital Episode Statistics database, which includes 'finished consultant episodes' from National Health Service hospitals in England.<sup>7</sup> A 'finished consultant episode' is an episode of care within a hospital led by a specific doctor and specialty. We defined admissions as episodes where EPIORDER = 1 (ie. we only included the first episode within a continuous spell to avoid double-counting of admissions) and EPISTAT = 3 (ie. the episode is 'finished' rather than ongoing). A flow chart showing how we derived the study sample is shown in Figure 1.



#### 4. Proportion of opioid injecting-associated infections that have a secondary diagnosis of opioid dependence

In this study, we defined hospital admissions due to opioid-injection related bacterial infections as those with a primary diagnosis of a bacterial infection, and a secondary diagnosis of F11 (mental health behavioural disorders due to opioids).

We tested the sensitivity of this definition using data from a cohort study of individuals identified as having opioid use disorder in primary care practices. Linked data from hospitals was available for this cohort. We could therefore calculate the proportion of hospital admissions with a diagnosis of bacterial infection where the diagnosis F11 was reported. This is shown in the table below.<sup>8,9</sup> Approximately half of admissions had a secondary diagnosis of opioid dependence, and this proportion was consistent over time.

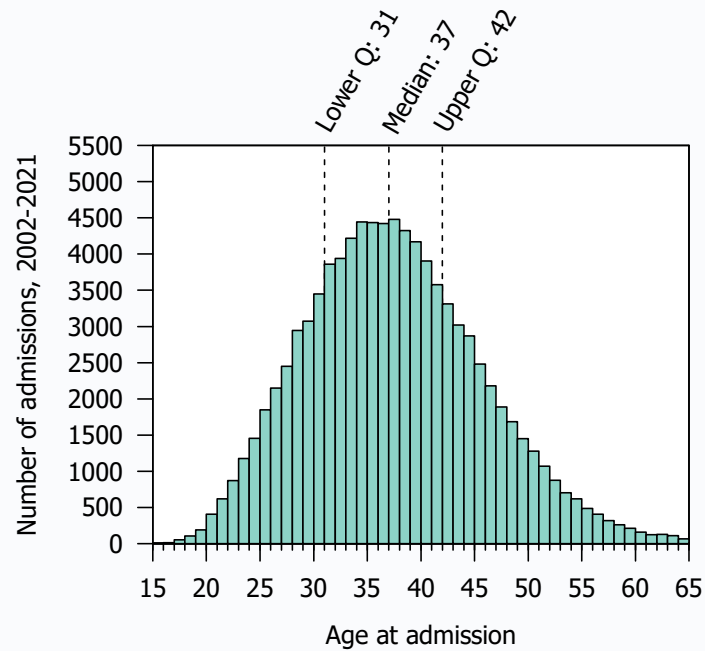
Table 3: Number of hospital admissions due to bacterial infections in the "HUPIO" cohort, and the proportion with a secondary diagnosis of opioid dependence

Year	Admissions with a primary diagnosis of bacterial infections in the cohort	Number with a secondary diagnosis of opioid dependence (F11)	%
Total	36,516	19,296	52.8
2001	501	271	54.1
2002	603	346	57.4
2003	919	506	55.1
2004	1,018	565	55.5
2005	1,098	571	52.0
2006	1,247	741	59.4
2007	1,460	816	55.9
2008	1,631	885	54.3
2009	1,532	780	50.9
2010	1,603	928	57.9
2011	1,520	784	51.6
2012	1,773	935	52.7
2013	2,024	999	49.4
2014	2,545	1,345	52.8
2015	2,889	1,528	52.9
2016	3,489	1,861	53.3
2017	4,046	2,094	51.8
2018	4,531	2,338	51.6
2019	2,087	1,003	48.1

## 5. Histogram of age at admission

A histogram showing the distribution of age at admission is shown in Figure 2.

Figure 2: Histogram of age at admission for patients with an opioid-injection associated bacterial infection



## 6. Characteristics of hospital admissions, stratified by infection type

Table 4: Characteristics of localised infections

Variable	Level	All admissions	All localised infections	Cutaneous abscess	Cellulitis	Other skin and soft tissue infections	Phlebitis & thrombophlebitis
Total		92,303 (100.0)	79,890 (100.0)	29,634 (100.0)	20,046 (100.0)	8,377 (100.0)	21,833 (100.0)
Age group	15-24	4,898 (5.3)	4,414 (5.5)	1,667 (5.6)	985 (4.9)	220 (2.6)	1,542 (7.1)
	25-34	32,382 (35.1)	28,711 (35.9)	10,470 (35.3)	6,443 (32.1)	2,388 (28.5)	9,410 (43.1)
	35-44	38,511 (41.7)	33,430 (41.8)	12,603 (42.5)	8,344 (41.6)	3,911 (46.7)	8,572 (39.3)
	45-54	14,234 (15.4)	11,657 (14.6)	4,400 (14.8)	3,594 (17.9)	1,566 (18.7)	2,097 (9.6)
	55-64	2,278 (2.5)	1,678 (2.1)	494 (1.7)	680 (3.4)	292 (3.5)	212 (1.0)
	Median [IQR]	37 [31-42]	36 [31-42]	36 [31-42]	37 [32-43]	38 [33-44]	34 [30-40]
	Mean [sd]	37.0 [8.2]	36.7 [8.1]	36.7 [7.9]	37.8 [8.5]	38.7 [8.0]	35.0 [7.5]
Sex	Female	25,944 (28.1)	22,301 (27.9)	9,451 (31.9)	5,212 (26.0)	2,002 (23.9)	5,636 (25.8)
	Male	66,359 (71.9)	57,589 (72.1)	20,183 (68.1)	14,834 (74.0)	6,375 (76.1)	16,197 (74.2)
Ethnicity	White or White Other	85,809 (93.0)	74,249 (92.9)	27,450 (92.6)	18,605 (92.8)	7,836 (93.5)	20,358 (93.2)
	Black/African/Caribbean/Black British	853 (0.9)	719 (0.9)	291 (1.0)	182 (0.9)	121 (1.4)	125 (0.6)
	Asian/Asian British	703 (0.8)	589 (0.7)	261 (0.9)	166 (0.8)	51 (0.6)	111 (0.5)
	Mixed/Multiple ethnic groups	899 (1.0)	759 (1.0)	309 (1.0)	182 (0.9)	94 (1.1)	174 (0.8)
	Other or unknown	4,039 (4.4)	3,574 (4.5)	1,323 (4.5)	911 (4.5)	275 (3.3)	1,065 (4.9)
Index of Multiple Deprivation	1 - most deprived	52,657 (57.0)	45,759 (57.3)	16,728 (56.4)	11,305 (56.4)	4,938 (58.9)	12,788 (58.6)
	2	20,403 (22.1)	17,648 (22.1)	6,593 (22.2)	4,500 (22.4)	1,818 (21.7)	4,737 (21.7)
	3	10,024 (10.9)	8,652 (10.8)	3,249 (11.0)	2,201 (11.0)	920 (11.0)	2,282 (10.5)
	4	5,325 (5.8)	4,515 (5.7)	1,802 (6.1)	1,103 (5.5)	412 (4.9)	1,198 (5.5)
	5 - least deprived	2,746 (3.0)	2,324 (2.9)	899 (3.0)	623 (3.1)	199 (2.4)	603 (2.8)
	Missing	1,148 (1.2)	992 (1.2)	363 (1.2)	314 (1.6)	90 (1.1)	225 (1.0)
Homelessness		7,602 (8.2)	6,450 (8.1)	2,110 (7.1)	1,823 (9.1)	1,125 (13.4)	1,392 (6.4)
Discharge method	With clinical advice	73,598 (79.7)	65,212 (81.6)	24,138 (81.5)	15,881 (79.2)	6,485 (77.4)	18,708 (85.7)
	Before medically advised	14,899 (16.1)	12,628 (15.8)	4,856 (16.4)	3,557 (17.7)	1,607 (19.2)	2,608 (11.9)
	Died	732 (0.8)	95 (0.1)	34 (0.1)	25 (0.1)	19 (0.2)	17 (0.1)
	Other	3,074 (3.3)	1,955 (2.4)	606 (2.0)	583 (2.9)	266 (3.2)	500 (2.3)
Duration (days)	Median [IQR]	3 [1-5]	2 [1-5]	3 [2-6]	2 [1-4]	2 [1-6]	2 [1-4]
	Mean [sd]	4.8 [6.9]	4.2 [5.6]	4.8 [5.6]	3.7 [4.7]	4.9 [7.8]	3.6 [5.1]
Operative procedure		31,283 (33.9)	24,398 (30.5)	16,528 (55.8)	3,186 (15.9)	1,664 (19.9)	3,020 (13.8)
28-day readmission		17,366 (18.8)	15,058 (18.8)	4,979 (16.8)	3,833 (19.1)	1,818 (21.7)	4,428 (20.3)

IQR = interquartile range; sd = standard deviation



Table 5: Characteristics of invasive infections

Variable	Level	All admissions	All invasive infections	Endocarditis	Septicaemia	Osteomyelitis & septic arthritis	Necrotising fasciitis
Total		92,303 (100.0)	12,413 (100.0)	2,152 (100.0)	6,087 (100.0)	3,905 (100.0)	269 (100.0)
Age group	15-24	4,898 (5.3)	484 (3.9)	90-100*	242 (4.0)	144 (3.7)	<10*
	25-34	32,382 (35.1)	3,671 (29.6)	812 (37.7)	1,654 (27.2)	1,159 (29.7)	46 (17.1)
	35-44	38,511 (41.7)	5,081 (40.9)	882 (41.0)	2,384 (39.2)	1,688 (43.2)	127 (47.2)
	45-54	14,234 (15.4)	2,577 (20.8)	320 (14.9)	1,401 (23.0)	772 (19.8)	84 (31.2)
	55-64	2,278 (2.5)	600 (4.8)	40-50*	406 (6.7)	142 (3.6)	<10*
	Median [IQR]	37 [31-42]	38 [32-45]	36 [31-42]	39 [33-46]	38 [33-44]	42 [35-46]
	Mean [sd]	37.0 [8.2]	38.8 [8.8]	36.6 [7.9]	39.6 [9.2]	38.5 [8.4]	41.3 [7.5]
Sex	Female	25,944 (28.1)	3,643 (29.3)	627 (29.1)	1,939 (31.9)	983 (25.2)	94 (34.9)
	Male	66,359 (71.9)	8,770 (70.7)	1,525 (70.9)	4,148 (68.1)	2,922 (74.8)	175 (65.1)
Ethnicity	White or White Other	85,809 (93.0)	11,560 (93.1)	2,005 (93.2)	5,649 (92.8)	3,650 (93.5)	256 (95.2)
	Black/African/Caribbean/Black British	853 (0.9)	134 (1.1)	20-30*	60 (1.0)	48 (1.2)	<10*
	Asian/Asian British	703 (0.8)	114 (0.9)	10-20*	79 (1.3)	22 (0.6)	<10*
	Mixed/Multiple ethnic groups	899 (1.0)	140 (1.1)	30-40*	59 (1.0)	44 (1.1)	<10*
	Other or unknown	4,039 (4.4)	465 (3.7)	70-80*	240 (3.9)	141 (3.6)	<10*
Index of Multiple Deprivation	1 - most deprived	52,657 (57.0)	6,898 (55.6)	1,178 (54.7)	3,313 (54.4)	2,262 (57.9)	145 (53.9)
	2	20,403 (22.1)	2,755 (22.2)	488 (22.7)	1,379 (22.7)	831 (21.3)	57 (21.2)
	3	10,024 (10.9)	1,372 (11.1)	239 (11.1)	693 (11.4)	396 (10.1)	44 (16.4)
	4	5,325 (5.8)	810 (6.5)	137 (6.4)	408 (6.7)	250 (6.4)	15 (5.6)
	5 - least deprived	2,746 (3.0)	422 (3.4)	80-90*	216 (3.5)	113 (2.9)	<10*
	Missing	1,148 (1.2)	156 (1.3)	20-30*	78 (1.3)	53 (1.4)	<10*
Homelessness		7,602 (8.2)	1,152 (9.3)	194 (9.0)	504 (8.3)	432 (11.1)	22 (8.2)
Discharge method	With clinical advice	73,598 (79.7)	8,386 (67.6)	1,363 (63.3)	3,776 (62.0)	3,044 (78.0)	203 (75.5)
	Before medically advised	14,899 (16.1)	2,271 (18.3)	425 (19.7)	1,105 (18.2)	718 (18.4)	23 (8.6)
	Died	732 (0.8)	637 (5.1)	192 (8.9)	405 (6.7)	10 (0.3)	30 (11.2)
	Other	3,074 (3.3)	1,119 (9.0)	172 (8.0)	801 (13.2)	133 (3.4)	13 (4.8)
Duration (days)	Median [IQR]	3 [1-5]	6 [3-14]	7 [3-21]	4 [2-10]	8 [3-15]	14 [6-24]
	Mean [sd]	4.8 [6.9]	10.7 [13.2]	14.8 [18.5]	8.1 [10.5]	11.4 [12.8]	18.0 [15.8]
Operative procedure		31,283 (33.9)	6,885 (55.5)	1,183 (55.0)	2,832 (46.5)	2,639 (67.6)	231 (85.9)
28-day readmission		17,366 (18.8)	2,308 (18.6)	433 (20.1)	1,152 (18.9)	681 (17.4)	42 (15.6)

IQR = interquartile range; sd = standard deviation

\* Redacted to prevent disclosure of small cell counts

## 7. Characteristics of hospital admissions, stratified by year of admission

Table 6: Characteristics of admissions by year, 2002-2008

Variable	Level	Total	2002	2003	2004	2005	2006	2007	2008
Total		92,303 (100.0)	3,827 (100.0)	5,100 (100.0)	4,599 (100.0)	4,093 (100.0)	4,147 (100.0)	3,935 (100.0)	3,970 (100.0)
Age group	15-24	4,898 (5.3)	667 (17.4)	869 (17.0)	649 (14.1)	441 (10.8)	382 (9.2)	298 (7.6)	257 (6.5)
	25-34	32,382 (35.1)	2,042 (53.4)	2,719 (53.3)	2,373 (51.6)	2,065 (50.5)	2,035 (49.1)	1,822 (46.3)	1,711 (43.1)
	35-44	38,511 (41.7)	937 (24.5)	1,311 (25.7)	1,314 (28.6)	1,327 (32.4)	1,452 (35.0)	1,493 (37.9)	1,614 (40.7)
	45-54	14,234 (15.4)	172 (4.5)	183 (3.6)	237 (5.2)	243 (5.9)	245 (5.9)	282 (7.2)	335 (8.4)
	55-64	2,278 (2.5)	9 (0.2)	18 (0.4)	26 (0.6)	17 (0.4)	33 (0.8)	40 (1.0)	53 (1.3)
	Median [IQR]	37 [31-42]	31 [26-36]	31 [26-36]	31 [27-37]	32 [28-38]	33 [28-38]	34 [29-39]	35 [29-40]
	Mean [sd]	37.0 [8.2]	31.2 [7.1]	31.2 [6.8]	32.2 [7.2]	33.0 [7.0]	33.5 [7.2]	34.2 [7.3]	35.0 [7.4]
Sex	Female	25,944 (28.1)	1,102 (28.8)	1,426 (28.0)	1,340 (29.1)	1,103 (26.9)	1,081 (26.1)	1,113 (28.3)	1,112 (28.0)
	Male	66,359 (71.9)	2,725 (71.2)	3,674 (72.0)	3,259 (70.9)	2,990 (73.1)	3,066 (73.9)	2,822 (71.7)	2,858 (72.0)
Ethnicity	White or White Other	85,809 (93.0)	3,408 (89.1)	4,367 (85.6)	4,051 (88.1)	3,679 (89.9)	3,823 (92.2)	3,612 (91.8)	3,736 (94.1)
	Black/African/Caribbean/Black British	853 (0.9)	29 (0.8)	52 (1.0)	33 (0.7)	46 (1.1)	42 (1.0)	48 (1.2)	21 (0.5)
	Asian/Asian British	703 (0.8)	14 (0.4)	25 (0.5)	20 (0.4)	20 (0.5)	21 (0.5)	27 (0.7)	23 (0.6)
	Mixed/Multiple ethnic groups	899 (1.0)	21 (0.5)	37 (0.7)	36 (0.8)	35 (0.9)	30 (0.7)	31 (0.8)	36 (0.9)
	Other or unknown	4,039 (4.4)	355 (9.3)	619 (12.1)	459 (10.0)	313 (7.6)	231 (5.6)	217 (5.5)	154 (3.9)
Index of Deprivation	1 - most deprived	52,657 (57.0)	2,357 (61.6)	3,074 (60.3)	2,787 (60.6)	2,479 (60.6)	2,475 (59.7)	2,308 (58.7)	2,196 (55.3)
	Multiple	20,403 (22.1)	738 (19.3)	1,011 (19.8)	962 (20.9)	785 (19.2)	819 (19.7)	872 (22.2)	863 (21.7)
	3	10,024 (10.9)	305 (8.0)	478 (9.4)	410 (8.9)	390 (9.5)	417 (10.1)	371 (9.4)	476 (12.0)
	4	5,325 (5.8)	191 (5.0)	245 (4.8)	213 (4.6)	218 (5.3)	230 (5.5)	227 (5.8)	268 (6.8)
	5 - least deprived	2,746 (3.0)	80 (2.1)	119 (2.3)	101 (2.2)	101 (2.5)	118 (2.8)	111 (2.8)	126 (3.2)
	Missing	1,148 (1.2)	156 (4.1)	173 (3.4)	126 (2.7)	120 (2.9)	88 (2.1)	46 (1.2)	41 (1.0)
Homelessness		7,602 (8.2)	307 (8.0)	385 (7.5)	319 (6.9)	317 (7.7)	261 (6.3)	217 (5.5)	182 (4.6)
Discharge method	With clinical advice	73,598 (79.7)	2,985 (78.0)	4,030 (79.0)	3,628 (78.9)	3,230 (78.9)	3,340 (80.5)	3,248 (82.5)	3,276 (82.5)
	Before medically advised	14,899 (16.1)	715 (18.7)	941 (18.5)	831 (18.1)	720 (17.6)	654 (15.8)	572 (14.5)	558 (14.1)
	Died	732 (0.8)	16 (0.4)	24 (0.5)	25 (0.5)	23 (0.6)	19 (0.5)	25 (0.6)	27 (0.7)
	Other	3,074 (3.3)	111 (2.9)	105 (2.1)	115 (2.5)	120 (2.9)	134 (3.2)	90 (2.3)	109 (2.7)
Duration (days)	Median [IQR]	3 [1-5]	4 [2-7]	3 [2-7]	3 [2-7]	3 [2-6]	3 [2-5]	3 [1-5]	3 [1-5]
	Mean [sd]	4.8 [6.9]	6.4 [8.1]	6.1 [9.0]	5.7 [7.5]	5.5 [7.9]	4.8 [6.4]	4.7 [6.5]	5.0 [8.1]
Operative procedure		31,283 (33.9)	966 (25.2)	1,487 (29.2)	1,342 (29.2)	1,096 (26.8)	1,053 (25.4)	1,140 (29.0)	1,210 (30.5)
28-day readmission		17,366 (18.8)	696 (18.2)	909 (17.8)	758 (16.5)	772 (18.9)	740 (17.8)	680 (17.3)	690 (17.4)
Primary diagnosis	Cutaneous abscess	29,634 (32.1)	1,208 (31.6)	1,546 (30.3)	1,468 (31.9)	1,287 (31.4)	1,246 (30.0)	1,244 (31.6)	1,244 (31.3)
	Cellulitis	20,046 (21.7)	778 (20.3)	1,097 (21.5)	994 (21.6)	847 (20.7)	877 (21.1)	807 (20.5)	810 (20.4)
	Other skin and soft tissue infections	8,377 (9.1)	225 (5.9)	327 (6.4)	291 (6.3)	324 (7.9)	313 (7.5)	307 (7.8)	327 (8.2)
	Phlebitis and thrombophlebitis	21,833 (23.7)	1,341 (35.0)	1,745 (34.2)	1,429 (31.1)	1,259 (30.8)	1,363 (32.9)	1,224 (31.1)	1,207 (30.4)
	Endocarditis	2,152 (2.3)	52 (1.4)	84 (1.6)	79 (1.7)	80 (2.0)	89 (2.1)	63 (1.6)	105 (2.6)
	Septicaemia	6,087 (6.6)	111 (2.9)	172 (3.4)	163 (3.5)	149 (3.6)	128 (3.1)	147 (3.7)	143 (3.6)
	Osteomyelitis or septic arthritis	3,905 (4.2)	112 (2.9)	129 (2.5)	175 (3.8)	147 (3.6)	131 (3.2)	143 (3.6)	134 (3.4)
	Necrotizing fasciitis	269 (0.3)							

IQR = interquartile range; sd = standard deviation

Table 7: Characteristics of admissions by year, 2009-2015

Variable	Level	Total	2009	2010	2011	2012	2013	2014	2015
Total		92,303 (100.0)	3,590 (100.0)	3,653 (100.0)	3,264 (100.0)	3,352 (100.0)	3,793 (100.0)	4,424 (100.0)	5,074 (100.0)
Age group	15-24	4,898 (5.3)	186 (5.2)	174 (4.8)	129 (4.0)	109 (3.3)	97 (2.6)	107 (2.4)	99 (2.0)
	25-34	32,382 (35.1)	1,454 (40.5)	1,418 (38.8)	1,211 (37.1)	1,261 (37.6)	1,368 (36.1)	1,485 (33.6)	1,571 (31.0)
	35-44	38,511 (41.7)	1,529 (42.6)	1,590 (43.5)	1,472 (45.1)	1,493 (44.5)	1,713 (45.2)	1,979 (44.7)	2,316 (45.6)
	45-54	14,234 (15.4)	366 (10.2)	394 (10.8)	379 (11.6)	435 (13.0)	563 (14.8)	763 (17.2)	956 (18.8)
	55-64	2,278 (2.5)	55 (1.5)	77 (2.1)	73 (2.2)	54 (1.6)	52 (1.4)	90 (2.0)	132 (2.6)
	Median [IQR]	37 [31-42]	35 [30-40.75]	36 [30-41]	36 [31-41]	36 [31-42]	37 [32-42]	37 [32-43]	38 [33-44]
	Mean [sd]	37.0 [8.2]	35.7 [7.5]	36.1 [7.6]	36.7 [7.6]	36.8 [7.4]	37.2 [7.3]	37.9 [7.6]	38.5 [7.6]
Sex	Female	25,944 (28.1)	956 (26.6)	973 (26.6)	880 (27.0)	913 (27.2)	1,104 (29.1)	1,250 (28.3)	1,419 (28.0)
	Male	66,359 (71.9)	2,634 (73.4)	2,680 (73.4)	2,384 (73.0)	2,439 (72.8)	2,689 (70.9)	3,174 (71.7)	3,655 (72.0)
Ethnicity	White or White Other	85,809 (93.0)	3,385 (94.3)	3,454 (94.6)	3,095 (94.8)	3,157 (94.2)	3,598 (94.9)	4,192 (94.8)	4,833 (95.3)
	Black/African/Caribbean/Black British	853 (0.9)	22 (0.6)	35 (1.0)	26 (0.8)	35 (1.0)	38 (1.0)	37 (0.8)	32 (0.6)
	Asian/Asian British	703 (0.8)	33 (0.9)	30 (0.8)	26 (0.8)	26 (0.8)	18 (0.5)	43 (1.0)	39 (0.8)
	Mixed/Multiple ethnic groups	899 (1.0)	38 (1.1)	30 (0.8)	23 (0.7)	27 (0.8)	28 (0.7)	56 (1.3)	57 (1.1)
	Other or unknown	4,039 (4.4)	112 (3.1)	104 (2.8)	94 (2.9)	107 (3.2)	111 (2.9)	96 (2.2)	113 (2.2)
Index of Deprivation	1 - most deprived	52,657 (57.0)	2,100 (58.5)	2,064 (56.5)	1,852 (56.7)	1,891 (56.4)	2,102 (55.4)	2,534 (57.3)	2,894 (57.0)
	2	20,403 (22.1)	772 (21.5)	845 (23.1)	698 (21.4)	744 (22.2)	822 (21.7)	979 (22.1)	1,167 (23.0)
	3	10,024 (10.9)	417 (11.6)	402 (11.0)	381 (11.7)	389 (11.6)	468 (12.3)	472 (10.7)	583 (11.5)
	4	5,325 (5.8)	176 (4.9)	218 (6.0)	203 (6.2)	191 (5.7)	251 (6.6)	251 (5.7)	264 (5.2)
	5 - least deprived	2,746 (3.0)	95 (2.6)	98 (2.7)	102 (3.1)	112 (3.3)	124 (3.3)	167 (3.8)	137 (2.7)
	Missing	1,148 (1.2)	30 (0.8)	26 (0.7)	28 (0.9)	25 (0.7)	26 (0.7)	21 (0.5)	29 (0.6)
Homelessness		7,602 (8.2)	131 (3.6)	120 (3.3)	140 (4.3)	152 (4.5)	206 (5.4)	310 (7.0)	387 (7.6)
Discharge method	With clinical advice	73,598 (79.7)	3,009 (83.8)	3,114 (85.2)	2,726 (83.5)	2,776 (82.8)	3,156 (83.2)	3,608 (81.6)	4,056 (79.9)
	Before medically advised	14,899 (16.1)	471 (13.1)	438 (12.0)	404 (12.4)	456 (13.6)	486 (12.8)	655 (14.8)	817 (16.1)
	Died	732 (0.8)	22 (0.6)	22 (0.6)	27 (0.8)	24 (0.7)	25 (0.7)	23 (0.5)	31 (0.6)
	Other	3,074 (3.3)	88 (2.5)	79 (2.2)	107 (3.3)	96 (2.9)	126 (3.3)	138 (3.1)	170 (3.4)
Duration (days)	Median [IQR]	3 [1-5]	2 [1-5]	2 [1-5]	2 [1-5]	3 [1-5]	3 [2-5]	2 [1-5]	2 [1-5]
	Mean [sd]	4.8 [6.9]	4.5 [6.6]	4.2 [7.1]	4.4 [6.3]	4.5 [6.0]	4.4 [5.9]	4.4 [6.0]	4.3 [6.3]
Operative procedure		31,283 (33.9)	1,070 (29.8)	1,192 (32.6)	1,050 (32.2)	1,128 (33.7)	1,363 (35.9)	1,539 (34.8)	1,834 (36.1)
28-day readmission		17,366 (18.8)	626 (17.4)	641 (17.5)	593 (18.2)	533 (15.9)	718 (18.9)	827 (18.7)	1,002 (19.7)
Primary diagnosis	Cutaneous abscess	29,634 (32.1)	1,131 (31.5)	1,196 (32.7)	973 (29.8)	1,100 (32.8)	1,299 (34.2)	1,492 (33.7)	1,748 (34.5)
	Cellulitis	20,046 (21.7)	758 (21.1)	787 (21.5)	748 (22.9)	755 (22.5)	831 (21.9)	970 (21.9)	1,095 (21.6)
	Other skin and soft tissue infections	8,377 (9.1)	335 (9.3)	366 (10.0)	366 (11.2)	306 (9.1)	352 (9.3)	440 (9.9)	436 (8.6)
	Phlebitis and thrombophlebitis	21,833 (23.7)	1,072 (29.9)	1,005 (27.5)	892 (27.3)	832 (24.8)	859 (22.6)	951 (21.5)	1,059 (20.9)
	Endocarditis	2,152 (2.3)	71 (2.0)	56 (1.5)	44 (1.3)	78 (2.3)	83 (2.2)	101 (2.3)	161 (3.2)
	Septicaemia	6,087 (6.6)	114 (3.2)	132 (3.6)	139 (4.3)	133 (4.0)	198 (5.2)	243 (5.5)	308 (6.1)
	Osteomyelitis or septic arthritis	3,905 (4.2)	109 (3.0)	111 (3.0)	102 (3.1)	133 (4.0)	150 (4.0)	205 (4.6)	230 (4.5)
	Necrotizing fasciitis	269 (0.3)				15 (0.4)	21 (0.6)	22 (0.5)	37 (0.7)

IQR = interquartile range; sd = standard deviation

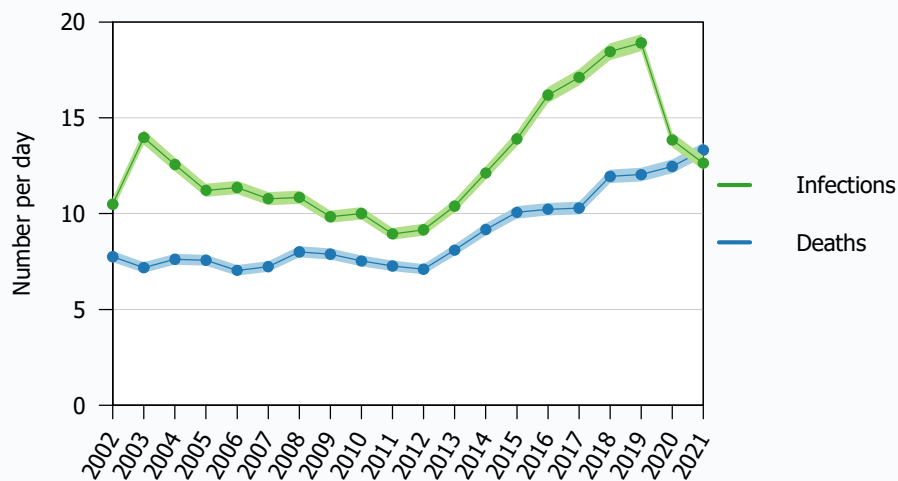
Table 8: Characteristics of admissions by year, 2016-2021

Variable	Level	Total	2016	2017	2018	2019	2020	2021	
Total		92,303 (100.0)	5,923 (100.0)	6,245 (100.0)	6,734 (100.0)	6,902 (100.0)	5,066 (100.0)	4,612 (100.0)	
Age group	15-24	4,898 (5.3)	106 (1.8)	83 (1.3)	77 (1.1)	75 (1.1)	59 (1.2)	34 (0.7)	
	25-34	32,382 (35.1)	1,636 (27.6)	1,639 (26.2)	1,559 (23.2)	1,428 (20.7)	847 (16.7)	738 (16.0)	
	35-44	38,511 (41.7)	2,816 (47.5)	3,022 (48.4)	3,228 (47.9)	3,284 (47.6)	2,467 (48.7)	2,154 (46.7)	
	45-54	14,234 (15.4)	1,188 (20.1)	1,311 (21.0)	1,652 (24.5)	1,774 (25.7)	1,398 (27.6)	1,358 (29.4)	
	55-64	2,278 (2.5)	177 (3.0)	190 (3.0)	218 (3.2)	341 (4.9)	295 (5.8)	328 (7.1)	
	Median [IQR]		37 [31-42]	38 [34-44]	39 [34-44]	39 [35-45]	40 [35-46]	41 [36-47]	42 [37-48]
	Mean [sd]		37.0 [8.2]	39.0 [7.6]	39.2 [7.6]	40.0 [7.5]	40.8 [7.8]	41.6 [7.8]	42.2 [7.9]
Sex	Female	25,944 (28.1)	1,636 (27.6)	1,872 (30.0)	1,967 (29.2)	2,030 (29.4)	1,397 (27.6)	1,270 (27.5)	
	Male	66,359 (71.9)	4,287 (72.4)	4,373 (70.0)	4,767 (70.8)	4,872 (70.6)	3,669 (72.4)	3,342 (72.5)	
Ethnicity	White or White Other	85,809 (93.0)	5,609 (94.7)	5,866 (93.9)	6,347 (94.3)	6,512 (94.3)	4,750 (93.8)	4,335 (94.0)	
	Black/African/Caribbean/Black British	853 (0.9)	63 (1.1)	68 (1.1)	65 (1.0)	57 (0.8)	60 (1.2)	44 (1.0)	
	Asian/Asian British	703 (0.8)	44 (0.7)	67 (1.1)	59 (0.9)	66 (1.0)	49 (1.0)	53 (1.1)	
	Mixed/Multiple ethnic groups	899 (1.0)	66 (1.1)	65 (1.0)	88 (1.3)	70 (1.0)	73 (1.4)	52 (1.1)	
	Other or unknown	4,039 (4.4)	141 (2.4)	179 (2.9)	175 (2.6)	197 (2.9)	134 (2.6)	128 (2.8)	
Index of Deprivation	1 - most deprived	52,657 (57.0)	3,376 (57.0)	3,363 (53.9)	3,640 (54.1)	3,779 (54.8)	2,801 (55.3)	2,585 (56.0)	
	2	20,403 (22.1)	1,303 (22.0)	1,494 (23.9)	1,618 (24.0)	1,660 (24.1)	1,181 (23.3)	1,070 (23.2)	
	3	10,024 (10.9)	661 (11.2)	751 (12.0)	805 (12.0)	771 (11.2)	582 (11.5)	495 (10.7)	
	4	5,325 (5.8)	356 (6.0)	382 (6.1)	420 (6.2)	414 (6.0)	310 (6.1)	297 (6.4)	
	5 - least deprived	2,746 (3.0)	201 (3.4)	218 (3.5)	205 (3.0)	224 (3.2)	161 (3.2)	146 (3.2)	
	Missing	1,148 (1.2)	26 (0.4)	37 (0.6)	46 (0.7)	54 (0.8)	31 (0.6)	19 (0.4)	
Homelessness		7,602 (8.2)	513 (8.7)	693 (11.1)	951 (14.1)	1,021 (14.8)	557 (11.0)	433 (9.4)	
Discharge method	With clinical advice	73,598 (79.7)	4,745 (80.1)	4,860 (77.8)	5,134 (76.2)	5,343 (77.4)	3,866 (76.3)	3,468 (75.2)	
	Before medically advised	14,899 (16.1)	939 (15.9)	1,070 (17.1)	1,204 (17.9)	1,165 (16.9)	911 (18.0)	892 (19.3)	
	Died	732 (0.8)	52 (0.9)	55 (0.9)	83 (1.2)	82 (1.2)	55 (1.1)	72 (1.6)	
	Other	3,074 (3.3)	187 (3.2)	260 (4.2)	313 (4.6)	312 (4.5)	234 (4.6)	180 (3.9)	
Duration (days)	Median [IQR]		3 [1-5]	2 [1-5]	3 [1-5]	3 [1-5]	2 [1-5]	2 [1-5]	
	Mean [sd]		4.8 [6.9]	4.3 [5.8]	4.5 [6.4]	4.6 [6.8]	4.8 [6.9]	4.2 [5.5]	
Operative procedure		31,283 (33.9)	2,221 (37.5)	2,508 (40.2)	2,632 (39.1)	2,619 (37.9)	2,010 (39.7)	1,823 (39.5)	
28-day readmission		17,366 (18.8)	1,148 (19.4)	1,281 (20.5)	1,411 (21.0)	1,382 (20.0)	1,049 (20.7)	910 (19.7)	
Primary diagnosis	Cutaneous abscess	29,634 (32.1)	2,133 (36.0)	2,100 (33.6)	2,141 (31.8)	2,229 (32.3)	1,489 (29.4)	1,360 (29.5)	
	Cellulitis	20,046 (21.7)	1,286 (21.7)	1,186 (19.0)	1,458 (21.7)	1,594 (23.1)	1,254 (24.8)	1,114 (24.2)	
	Other skin and soft tissue infections	8,377 (9.1)	548 (9.3)	585 (9.4)	668 (9.9)	785 (11.4)	549 (10.8)	527 (11.4)	
	Phlebitis and thrombophlebitis	21,833 (23.7)	1,131 (19.1)	993 (15.9)	986 (14.6)	988 (14.3)	765 (15.1)	732 (15.9)	
	Endocarditis	2,152 (2.3)	178 (3.0)	157 (2.5)	171 (2.5)	198 (2.9)	151 (3.0)	151 (3.3)	
	Septicaemia	6,087 (6.6)	364 (6.1)	887 (14.2)	903 (13.4)	706 (10.2)	495 (9.8)	452 (9.8)	
	Osteomyelitis or septic arthritis	3,905 (4.2)	257 (4.3)	309 (4.9)	382 (5.7)	372 (5.4)	325 (6.4)	249 (5.4)	
	Necrotizing fasciitis	269 (0.3)	26 (0.4)	28 (0.4)	25 (0.4)	30 (0.4)	38 (0.8)	27 (0.6)	

## 8. Comparison between time trends in hospital admissions and time trends in drug-related deaths

Figure 3 shows the rate of hospital admissions due to injection-associated infections per day from the present study, compared to the rate of drug-related deaths per day from published Office for National Statistics data. This is also included in Figure 1 in the main article. Drug-related deaths are defined by the ICD-10 code for the underlying cause of death, and includes deaths due to "Mental and behavioural disorders due to drug use" (F11-F16 and F18-19), "Accidental poisoning by drugs, medicaments and biological substances" (X40-X44), "Intentional self-poisoning by drugs, medicaments and biological substances" (X60-X64), "Assault by drugs, medicaments and biological substances" (X85), and "Poisoning by drugs, medicaments and biological substances, undetermined intent" (Y10-Y14).<sup>10,11</sup>

Figure 3: Rate of hospital admissions due to injection-association infections per day; compared to the rate of drug-related deaths per day. Shaded bands are 95% confidence intervals.



## 9. Additional figures describing the distribution of patient age

Figure 4: Number of hospital admissions due to injection-associated infections per day, by age group

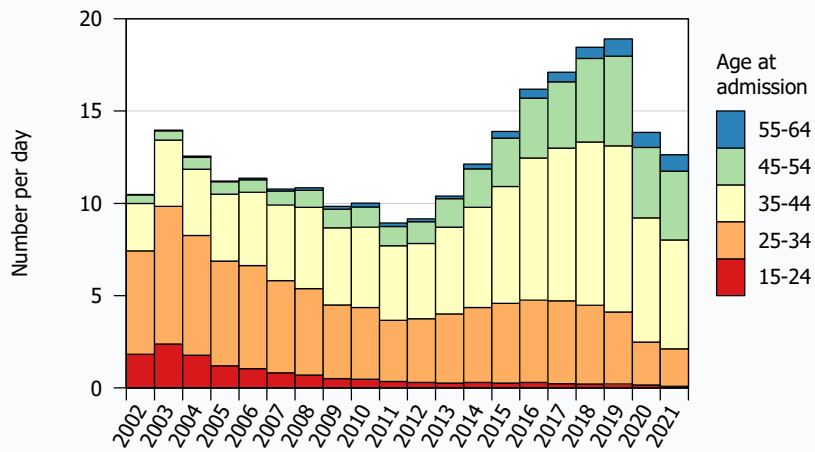
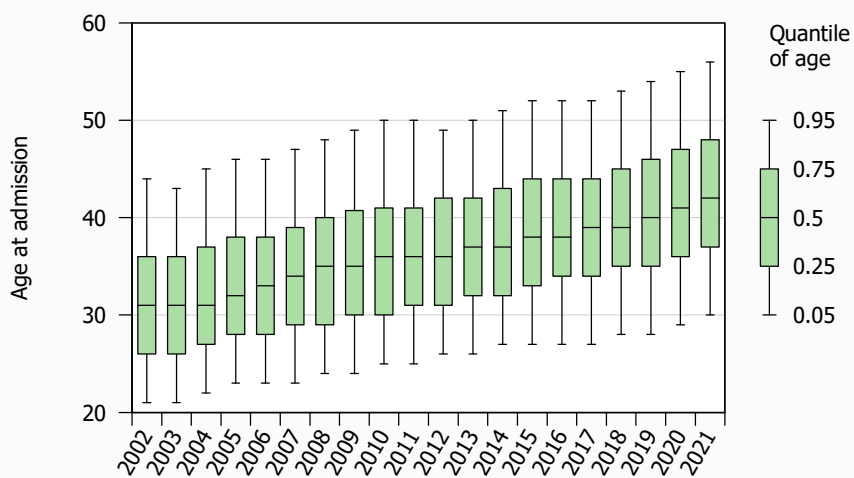


Figure 5: Distribution of age at admission for hospital admissions due to injection-associated infections in England



## 10. Figures for time series analyses of invasive infections, skin infections unrelated to opioids, poisoning due to illicit drugs, and mental and behavioural disorders related to illicit drugs

Figure 6: Invasive infections (endocarditis, septicaemia, osteomyelitis and septic arthritis, necrotising fasciitis)

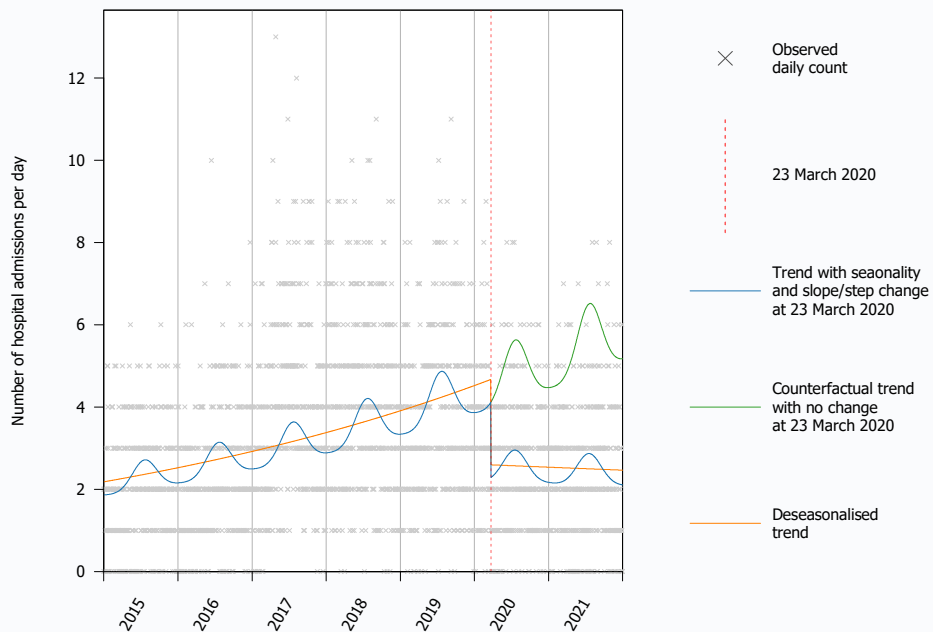


Figure 7: Streptococcal and staphylococcal skin infections that are not related to opioids

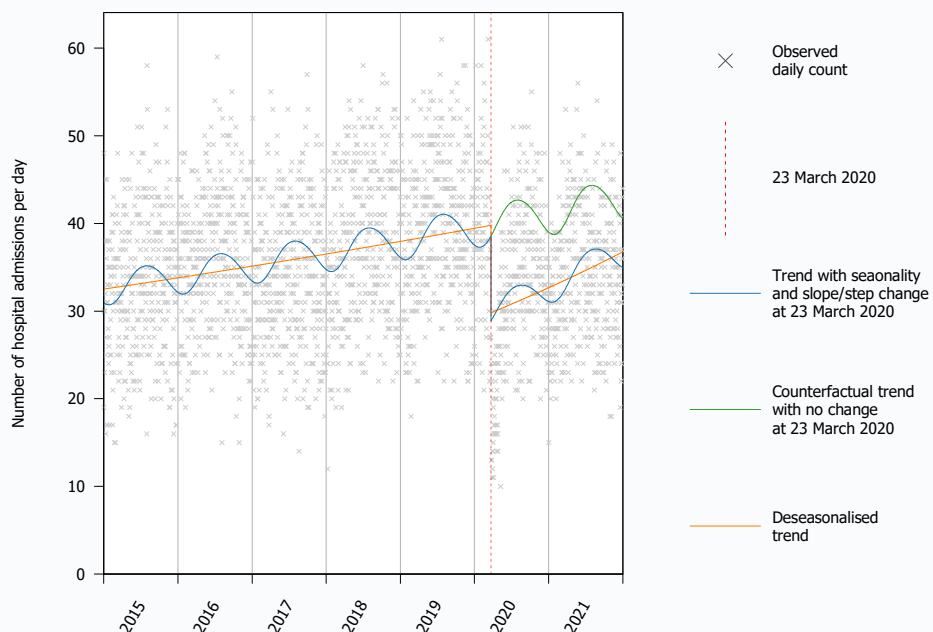


Figure 8: Non-infectious complications of drug use, measure 1 - hospital admissions with a primary diagnosis of drug-related mental and behavioural disorders

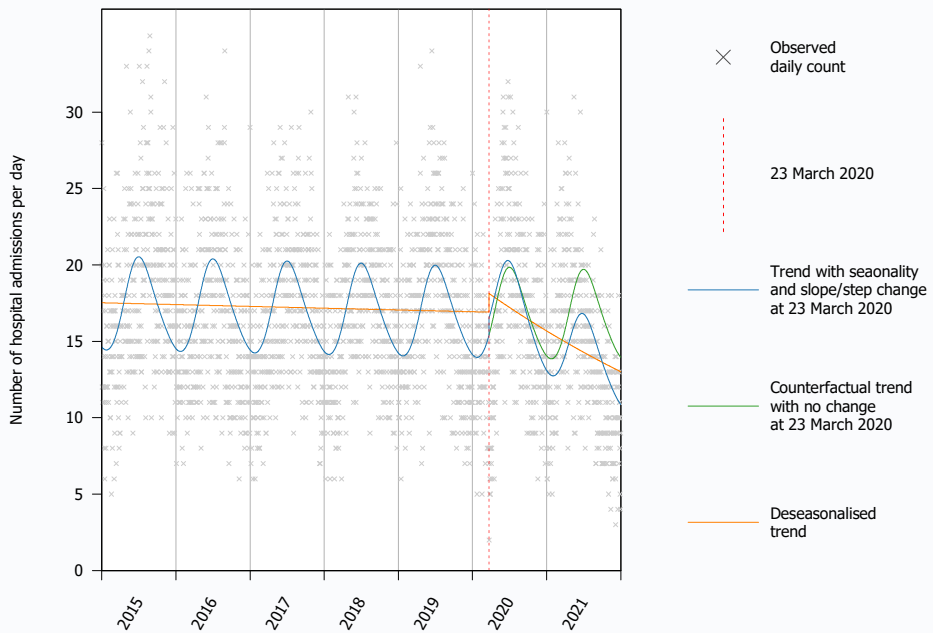
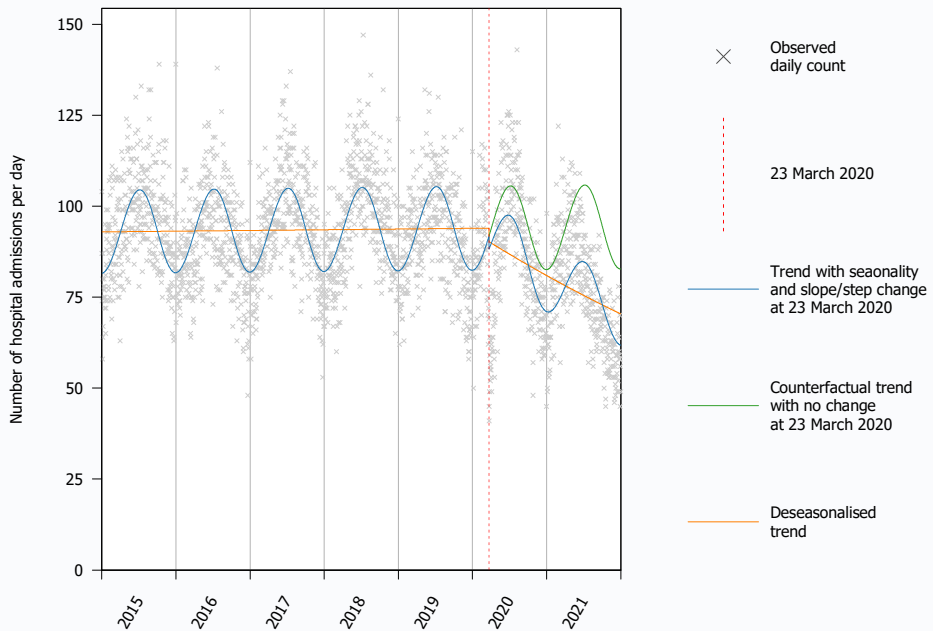


Figure 9: Non-infectious complications of drug use, measure 2 - hospital admissions with a primary diagnosis of poisoning by drugs





## 11. Coefficients from time series analysis

Table 9: Coefficients from time series model

Variable		Incidence rate ratio (95% confidence interval)
Intercept (number of admissions on 1 January 2015 and with other variables at baseline)		5.900 (5.253-6.625)
Slope before 23 March 2020*		1.069 (1.062-1.077)
Slope after 23 March 2020†		0.905 (0.867-0.945)
Step-change at 23 March 2020		0.647 (0.616-0.679)
First harmonic pair	Sine term	0.960 (0.947-0.974)
	Cosine term	1.002 (0.988-1.016)
Second harmonic pair	Sine term	0.921 (0.909-0.934)
	Cosine term	1.012 (0.998-1.026)

\* Defined as the number of days after 15 January 2015, divided by 365

† Defined as the number of days after 23 March 2020, divided by 365

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