

Why do people presenting to specialist community addiction services in England get admitted to hospital?

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Background

Alcohol and non-medical opioid use are modifiable risk factors responsible for millions of preventable deaths and hospital admissions each year [1]

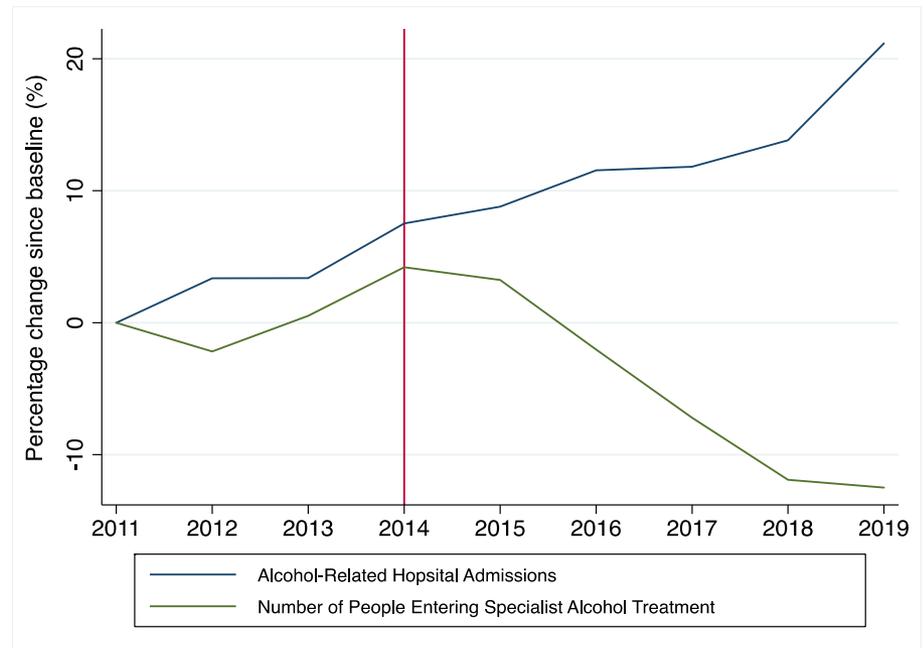
The current situation with alcohol

In 2018/19 in England there were an estimated 1.3 million hospital admissions related to alcohol [2]

This represents 7.4% of all hospital admissions, an increase of >15% compared to the previous decade [2]

Over the past decade the number of people accessing specialist addiction treatment for alcohol has reduced by >12% [3, 4]

The percentage change since 2011 in the number of alcohol related hospital admissions and the number of people entering specialist alcohol treatment



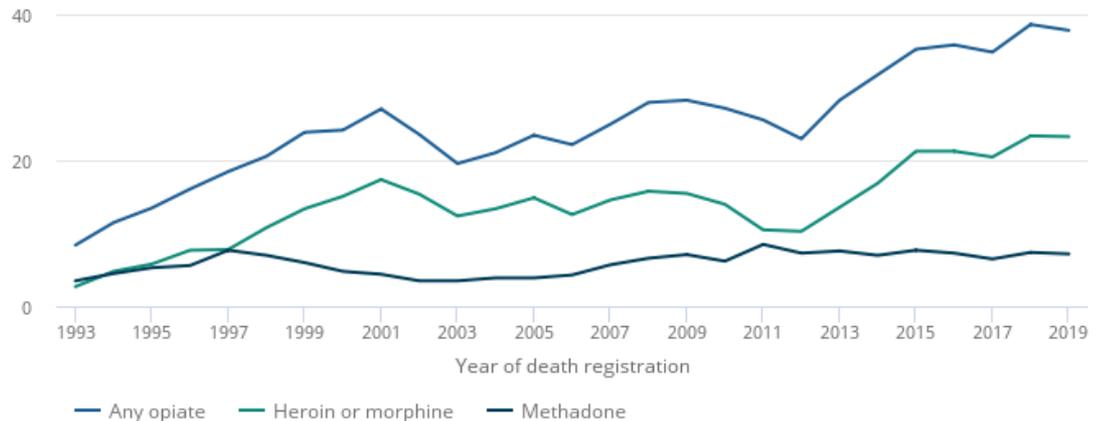
Background

Individuals with problematic use of alcohol or opioids make up >80% of people presenting to specialist addiction treatment in England [3]

The current situation with opioids

Age-standardised mortality rates for deaths by all opiates, heroin or morphine, and methadone, England and Wales, registered 1993 and 2019

Age-standardised rate per million people



Over the past decade the number of people accessing specialist addiction treatment for opioids has reduced by >7% [3, 4]

Deaths due to opioid overdose have more than doubled over the same timeframe [5, 6]

Background

- A 2016 report from the Department of Health and Social Care (DHSC) identified an “*urgent need*” to estimate the impact of specialist addiction treatment on acute care resource use and substance-related harm [7]
- The report suggested analysis of linked individual-level hospitalisation and addiction treatment data could “*...generate evidence to quantify the impact on health service utilisation*”
- Until now an understanding of the hospitalisation patterns of individuals presenting to specialist addiction treatment in England has been hindered as separate databases capture activity on hospitalisation (**Hospital Episode Statistics (HES)**) and addiction treatment (**The National Drug Treatment Monitoring System (NDTMS)**)

The Linkage

The National Drug Treatment Monitoring System (NDTMS)

All adults presenting to local authority commissioned addiction treatment services in England from the 1st April 2018 to 31st March 2019

n=268,251 people

Hospital Episode Statistics (HES) Admitted Patient Care (APC)

All people admitted to a hospital inpatient bed in England and Wales from database inception on 1st April 1997 until 1st May 2020

n=67,378,943 people

Linkage Process

Multi-stage deterministic linkage using Sex, Date of Birth, Postcode, Ethnicity, and GP Practice

n=213,814 (80%) people linked

Aims

For first time this linkage provides a resource which is able to examine the frequency of, and reasons for, inpatient hospital admission among people accessing specialist community addiction treatment in England

We aimed to interrogate the linked data to...

1) Characterise hospitalisation patterns within this cohort

2) Describe the main diagnostic reasons for hospital admission

3) Examine how individual sociodemographic and clinical risk factors impact the:

- a) Rate of inpatient hospital admission
- b) Odds of death during treatment
- c) Odds of successful treatment completion (STC)

Methods

- Each hospital admission has an ICD-10 code as the primary diagnostic reason for admission. [10] The ICD-10 has 22 ‘chapters’ each relating to disorders of a different body system. The chapter from the code recorded as the primary diagnostic reason for each admission was extracted.
- We used Latent Class Analysis (LCA) to identify distinct clinical groups of people (i.e., diagnostic clusters) such that, within each cluster, individuals held similar patterns in their primary diagnostic reason for admission. [11]
- We used adjusted multilevel regression to examine the effect of an individual’s:
Sex; Age; Socioeconomic status; Housing status (i.e., if the person had No Fixed Abode (NFA)), **Ethnicity** (as per the recorded OPCS category, [14] and collapsed into white vs non-white) and **Diagnostic cluster**

On the a) rate of hospital admission b) odds of death during addiction treatment, and c) odds of successful completion of addiction treatment

- We used Inverse Probability Weighting (IPW) to examine for any potential error due to the linkage process [12, 13]

Results (1)

- Linked hospitalisation data were available for:
 - 64,840 (86%) people presenting with problematic alcohol use, and
 - 107,296 (77%) people presenting with problematic opioid use
- Since 1st April 1997 these cohorts were responsible for a total of 374,713, and 554,936 general inpatient hospital admissions respectively
- When compared to the overall admission profile of all people in HES, both substance misuse cohorts had a significantly:

Higher mean number of admissions per person; 3.8 (all) vs 5.8 (alcohol) vs 5.2 (opioid) ($p < 0.001$)

Lower mean length of admission 4.8 days (all) vs 3.3 (alcohol) vs 4.3 (opioid) ($p < 0.001$)

Lower mean age at first admission 62.0 years (all) vs 40.8 (alcohol) vs 34.0 (opioid) ($p < 0.001$)

Higher proportion of admissions from:

Men, younger people, people from more deprived areas, people without a residential address, people of white ethnicities and emergency admissions ($p < 0.001$)

Results (2)

The top ten most common primary diagnostic reasons for admission account for one fifth (22%) of all admissions in alcohol patients

Rank of Admission	Primary reason for admission	ICD-10 chapter	ICD-10 code	Admissions in substance cohort n (%)	People who have at least one admission with this condition in substance cohort n (%)
All	All	All	All	374,713 (100.0)	64,840 (100.0)
1 (Most common)	Alcohol withdrawal state	5	F10.3	20,024 (5.3)	1158 (1.8)
2	Acute alcohol intoxication	5	F10.0	11,206 (3.0)	717 (1.1)
3	Paracetamol poisoning	19	T39.1	10,731 (2.9)	744 (1.1)
4	Alcohol dependence	5	F10.2	8,056 (2.2)	531 (0.8)
5	Chest pain, unspecified	18	R07.4	6,846 (1.8)	662 (1.0)
6	Illness, unspecified	18	R69	6,558 (1.8)	578 (0.9)
7	Abdominal pain, unspecified	18	R10.4	6,240 (1.7)	494 (0.8)
8	Other specified pregnancy related conditions	15	O26.8	4,565 (1.2)	383 (0.6)
9	Antidepressant poisoning	19	T43.2	4,346 (1.2)	331 (0.5)
10 (Least common)	Convulsions, unspecified	18	R56.8	4,120 (1.1)	227 (0.4)

Results (2)

The top ten most common primary diagnostic reasons for admission account for one sixth (16%) of all admissions in opioid patients

Rank of Admission	Primary reason for admission	ICD-10 chapter	ICD-10 code	Admissions in substance cohort n (%)	People who have at least one admission with this condition in substance cohort n (%)
All	All	All	All	554,936 (100.0)	107,296 (100.0)
1 (Most common)	Illness, unspecified	18	R69	11,387 (2.1)	1177 (1.1)
2	Abdominal pain, unspecified	18	R10.4	10,589 (1.9)	1091 (1.0)
3	Paracetamol poisoning	19	T39.1	9,744 (1.8)	802 (0.7)
4	Cellulitis and acute lymphangitis of other parts of limb	12	L03.1	9,078 (1.6)	928 (0.9)
5	Chest pain, unspecified	18	R07.4	8,719 (1.6)	1023 (1.0)
6	Opioid dependence	5	F11.2	8,625 (1.6)	1075 (1.0)
7	Other specified pregnancy related conditions	15	O26.8	7,890 (1.4)	611 (0.6)
8	Phlebitis and thrombophlebitis of other and unspecified deep vessels of lower extremities	9	I80.2	7,498 (1.4)	714 (0.7)
9	Cutaneous abscess, furuncle and carbuncle of limb	12	L02.4	6,616 (1.2)	791 (0.7)
10 (Least common)	Benzodiazepine poisoning	19	T42.4	6,473 (1.2)	546 (0.5)

Results (3)

Seven diagnostic clusters were most representative of the data from alcohol patients

	All	AC1	AC2	AC3	AC4	AC5	AC6	AC7
People n (%)	64,840 (100)	31,132 (48)	10,316 (16)	7,350 (11)	5,919 (9)	3,594 (6)	3,407 (5)	3,122 (5)
Top 5 prevalent ICD chapters (%)								
1st	18: Symptoms/Signs (46)	11: Digestive (46)	5: Mental/Behavioural (100)	15: Pregnancy (100)	18: Symptoms/Signs (93)	19: Injuries/Poisoning (100)	15: Pregnancy (100.0)	18: Symptoms/Signs (84)
2nd	19: Injuries/Poisonings (45)	18: Symptoms/Signs (36)	19: Injury/Poisoning (65)	11: Digestive (19)	19: Injury/Poisoning (89)	13: Musculoskeletal (15)	18: Symptoms/Signs (72)	11: Digestive (79)
3rd	11: Digestive (48)	19: Injury/Poisoning (29)	18: Symptoms/Signs (53)	18: Symptoms/Signs (17)	11: Digestive (88)	18: Symptoms/Signs (13)	14: Genitourinary (62)	13: Musculoskeletal (48)
4th	5: Mental/Behavioural (25)	13: Musculoskeletal (24)	11: Digestive (44)	14: Genitourinary (17)	5: Mental/Behavioural (79)	11: Digestive (11)	11: Digestive (56)	9: Circulatory (48)
5th	13: Musculoskeletal (24)	14: Genitourinary (17)	15: Pregnancy (14)	19: Injury/Poisoning (14)	13: Musculoskeletal (45)	10: Respiratory (7)	19: Injury/Poisoning (52)	19: Injury/Poisoning (46)
Description	Overall predominantly white, male, older, deprived individuals with a fixed residential address with problems with injuries and poisonings, digestive and mental and behavioural disorders	Largely digestive and injury/poisoning diagnoses with few admissions due to mental and behavioural disorders and predominantly male and older overall	Largely mental and behavioural disorders and injuries/poisoning. More deprived, and more non-white overall	Exclusively women of childbearing age, largely diagnoses relating to pregnancy and the digestive system. Less deprived overall	Largely digestive problems and problems relating to injuries/poisoning but also a high preponderance of mental and behavioural disorders. Older, male and more deprived overall	Largely injuries/poisonings and musculoskeletal disorders. Younger and more male overall	Exclusively women of childbearing age with disorders predominantly relating to pregnancy, and the genitourinary system.	Largely musculoskeletal and digestive problems. More women and older people overall

Results (3)

Seven diagnostic clusters were also most representative of the data from opioid patients

	All	OC1	OC2	OC3	OC4	OC5	OC6	OC7
People n (%)	107,296 (100)	50,325 (47)	17,910 (17)	10,866 (10)	8,501 (8)	9,442 (9)	4,897 (5)	5,355 (5)
Top 5 prevalent ICD chapters (%)								
1st	19: Injury/Poisoning (45)	11: Digestive (41)	19: Injury/Poisoning (64)	15: Pregnancy (100)	18: Symptoms/Signs (93)	19: Injury/Poisoning (100)	18: Symptoms/Signs (78)	19: Injury/Poisoning (78)
2nd	18: Symptoms/Signs (40)	18: Symptoms/Signs (30)	5: Mental/Behavioural (54)	11: Digestive (17)	19: Injury/Poisoning (83)	13: Musculoskeletal (14)	15: Pregnancy (66)	12: Skin (77)
3rd	11: Digestive (39)	19: Injury/Poisoning (24)	18: Symptoms/Signs (47)	18: Symptoms/Signs (16)	11: Digestive (79)	11: Digestive (10)	14: Genitourinary (60)	9: Circulatory (71)
4th	13: Musculoskeletal (22)	13: Musculoskeletal (21)	11: Digestive (34)	14: Genitourinary (15)	5: Mental/Behavioural (54)	12: Skin (9)	11: Digestive (57)	13: Musculoskeletal (58)
5th	15: Pregnancy (20)	10: Respiratory (16)	10: Respiratory (18)	19: Injury/Poisoning (10)	10: Respiratory (53)	10: Respiratory (7)	19: Injury/Poisoning (44)	18: Symptoms/Signs (58)
Description	Overall predominantly white, male, older, deprived individuals with a fixed residential address with problems with injuries and poisonings, digestive and musculoskeletal disorders	Largely digestive and injury/poisoning diagnoses with few admissions due to mental and behavioural disorders and predominantly male and older overall	Largely mental and behavioural disorders and injuries/ poisonings. More deprived and more non-white overall	Exclusively women of childbearing age, largely diagnoses relating to pregnancy and the digestive system. Less deprived overall	Largely digestive problems and injuries/poisonings but also a high predominance of mental and behavioural disorders. Older, and more deprived overall	Largely injuries/poisonings, and musculoskeletal disorders. Younger and more male overall	Almost exclusively women of childbearing age with disorders relating to pregnancy and the genitourinary system	Largely people with skin and circulatory disorders. More male, and older individuals

Results (3)

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3 rd	11: Digestive (39)	19: Injury/Poisoning (24)	18: Symptoms/Signs (47)	18: Symptoms/Signs (16)	11: Digestive (79)	11: Digestive (10)	14: Genitourinary (60)	9: Circulatory (71)
4 th	13: Musculoskeletal (22)	13: Musculoskeletal (21)	11: Digestive (34)	14: Genitourinary (15)	5: Mental/Behavioural (54)	12: Skin (9)	11: Digestive (57)	13: Musculoskeletal (58)
5 th	15: Pregnancy (20)	10: Respiratory (16)	10: Respiratory (18)	19: Injury/Poisoning (10)	10: Respiratory (53)	10: Respiratory (7)	19: Injury/Poisoning (44)	18: Symptoms/Signs (58)
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Results (3)

For both alcohol and opioids there was a significantly:

↑ Rate of Hospitalisation

Women
Older people
People from more deprived areas
Alcohol and opioid diagnostic clusters
2, 4, 6 and 7

↑ Odds of Death

Older people
People of a white ethnicity
Alcohol and opioid clusters 2 and 4
Alcohol diagnostic cluster 6
Opioid diagnostic cluster 7

↓ Odds of STC

Men
People from more deprived areas
People who are NFA
People of a white ethnicity
Alcohol diagnostic clusters 2 and 4
Opioid diagnostic clusters 5 and 7

AC2

Hospitalisation: **2.32** (2.24-2.40); $p < 0.001$
Death: **1.56** (1.31-1.85); $p < 0.001$
STC: **0.81** (0.78-0.86); $p < 0.001$

Mental and behavioural disorder (100%)
Injuries and poisoning (65%)

AC4

Hospitalisation: **7.06** (6.72-7.42); $p < 0.001$
Death: **2.71** (2.29-3.20); $p < 0.001$
STC: **0.72** (0.68-0.76); $p < 0.001$

Injuries and poisoning (89%)
Mental and behavioural disorder (79%)

OC7

Hospitalisation: **3.72** (3.59-3.85); $p < 0.001$
Death: **1.86** (1.62-2.12); $p < 0.001$
STC: **0.69** (0.62-0.77); $p < 0.001$

Injuries and poisoning (78%)
Skin and soft tissue disorders (77%)

No associations changed substantially following inverse probability weighting, suggesting they were not driven by bias from linkage error

Discussion and Limitations

Following adjustment diagnostic clusters with hospital admissions predominantly related to **mental and behavioural disorders** and **injuries and poisoning** demonstrated:

Significantly higher hospital admission rates

Significantly increased odds of death during treatment and

Significantly reduced odds of successful treatment completion

- The cohorts described are likely to be only representative of individuals presenting to addiction services in the year studied
- This data does not examine the hospitalisation patterns of those individuals who do not present to publicly funded specialist community addiction services

The Future

- Expand the linkage to all available years of NDTMS
- Explore the clusters of people with increased rates of hospitalisation and death;
 - Can we develop a risk score to identify these high-need, high-cost individuals?
 - Can we develop targeted interventions to these cohorts to improve outcomes?
- Explore the effects of different components of addiction treatment as potential modifiers of hospitalisation rate
- Now we have a linked database to HES...
 - Consider linkage to other HES databases including A&E, Outpatients, Critical Care, Mental Health Minimum Dataset (MHMDS)
 - Make use of existing linkages to ONS mortality records, GP records (CPRD), the Police National Computer (PNC)

Thank You

Questions?

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