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Potential opportunities to reduce the escalation of substance misuse: A retrospective observational data linkage study in Wales

Data Report

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Background

Substance misuse is widely acknowledged as a significant public health problem[1] and may be defined as 'recurrent use that is causing actual harms (negative consequences) to the person (including dependence, but also other health, psychological or social problems), or is placing the person at a high probability/risk of suffering such harms[2]. Substance misuse is a leading cause of premature mortality and morbidity, associated with a range of physical and mental health conditions, including anxiety and depression. These comorbidities can complicate substance misuse treatment.

The identification of early opportunities for intervention is key to reducing the burden of substance misuse at both the individual and societal level and to prevent escalation to more problematic and harmful use. Earlier engagement, improving assessment of substance use-related needs, and understanding how individuals first interact with any health service, whether primary, secondary care or treatment services, are important ways that linked data can aid policymakers and planners in evidence-based policy and service design and prioritisation. This study aims to provide insight and evidence into potential opportunities for early engagement to prevent escalation to substance misuse.

This Data Insight presents the findings of a study conducted as part of the BOLD Substance Misuse Demonstrator Pilot (Phase 1) in Wales, which focuses on early intervention and prevention of escalation of substance misuse. Further information on the BOLD programme can be found here: Better Outcomes Through Linked Data (BOLD)

This research examines the type and timing of healthcare service contact prior to and after the start of problematic or enduring substance misuse in order to identify missed opportunities for prevention of escalation and promote earlier engagement to reduce substance misuse-related harm including death.

What we did

Utilising a whole population retrospective cohort study method, we used routinely collected administrative health data from the Secure Anonymised Information Linkage (SAIL) Databank for the study. Datasets used include primary care, hospital admissions and outpatients, emergency department (ED), specialist substance misuse treatment, demographic and death records.

In this study, a base cohort was established made up of individuals aged 10+ years with a first-time or 'index' substance use-related health event between 2010 to 2019.

An index substance use-related health event (index SM event) for each individual was defined as the earliest of either:

- Referral to substance misuse treatment services
- Recorded alcohol and/or drug-related Read Codes (primary care) or ICD-10 codes (emergency department or secondary care) (see Appendix A)
- Record for death where drugs and/ or alcohol was recorded as underlying or contributory cause of death

A minimum five-year look-back period was applied in each dataset and for each individual. Any individuals with evidence of a health event in the period 2005-2009 were excluded to ensure only those with no prior or recent history of substance use/misuse were included.

The data for all individuals were mapped and analysed both retrospectively and prospectively for two years. Health care activity preceding and following the index SM event date was recorded until death, moving out of Wales, or end of study, whichever came first.

We analysed the 24-month period before and after each index SM event to identify potential opportunities for intervention. We also analysed each person's journey in the health services from index SM event to the next SM event, a possible indicator of how referrals to substance misuse treatment services worked during the study.

Potential opportunities for intervention were defined as any GP consultation, inpatient admission, emergency department or outpatient attendance in the 2-years pre-index SM event or 2-years post-index SM event contact, where substance use was a presenting or related issue.

In terms of demographic variables and geographical measures, we included the following measures taken at date of index SM event:

- Age
- Sex
- Ethnicity
- Deprivation[1]

[1] As measured by Welsh Index of Multiple Deprivation (WIMD) 2014 as a measure of area-based deprivation at Lower layer Super Output Area level (LSOA) which represent approximately 1500 individuals or 650 households per area. The WIMD scores are ranked to produce quintiles, with 1

- rural/urban area of residence
- substance type

The cohort was stratified by the primary type of index substance misuse, categorised as: alcohol, opioids, stimulants, cannabinoids, or 'other drugs' which includes prescribed drugs, benzodiazepines, hallucinogens and solvents.

What we found

Demographic profile of the cohort

We identified a cohort of 168,774 individuals, around 6.0% of the national population aged 10+ years, in Wales who had an index SM event, within the study period. In terms of demographic profile, the majority were:

- Male (62.8%),
- White (71.0%)
- Resident in urban areas (66%)
- living in the most deprived areas (25%) compared with least deprived areas (12%)

The median age at index SM event was 39 years (26.8% were aged less than 25 years and 14% were aged 65+ years).

Nature of presenting substance type at index SM event

As shown in Table 1, alcohol was the primary substance of index SM event for 60.3% of the cohort with a median age of 46 years old at the start of the study. Presentations for 'Other drugs' including licit and illicit prescription drugs such as benzodiazepines, analgesics, hallucinogens, and solvents, accounted for 18.9%, with those presenting for opioids and cannabinoids comprising 6.7% and 7.1%, respectively.

The youngest median age (21 years) was amongst individuals presenting with cannabinoid as their index substance type. Whilst those reporting stimulant use represented only 3.5% of the overall cohort, more than half were identified from the substance misuse treatment database (WNDSM). they were also amongst younger aged groups with 29% were aged 18-24 years and 35% aged 25-34 years.

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representing the most deprived 20%, and 5 for the least deprived 20% of areas. https://www.gov.wales/welsh-index-multiple-deprivation

Nature of health service contact at index SM event

Overall, 66.0% of the cohort had their index SM events as either inpatient admission (36.0%) or GP consultation (30.0%). For individuals presenting with alcohol issues, the main location of presentation was at inpatients (42.0%) and GP (33.0%). For less than 1.0% (1,242) of the cohort, death was the index SM event, however, 13.0% (22,396) died during the study period.

Table 1: Distribution of index substance misuse event by year and type of substance

	All	Index substance type						
Year of index SM event	**Whole cohort** (N = 168,774)[1]	**Alcohol** (n = 101,768)[1]	**Opioid** (n = 11,296)[1]	**Cannabinoid** (n = 11,909)[1]	**Stimulant** (n = 5,872)[1]	**Drugs-Other** (n = 31,831)[1]	**Unknown** (n = 6,098)[1]	p-value[2]
2010	17,694 (10%)	11,910 (12%)	1,341 (12%)	610 (5.1%)	389 (6.6%)	3,313 (10%)	131 (2.1%)	
2011	16,731 (9.9%)	10,901 (11%)	1,121 (9.9%)	537 (4.5%)	345 (5.9%)	3,710 (12%)	117 (1.9%)	
2012	15,731 (9.3%)	9,992 (9.8%)	1,015 (9.0%)	631 (5.3%)	359 (6.1%)	3,529 (11%)	205 (3.4%)	
2013	16,137 (9.6%)	10,035 (9.9%)	1,102 (9.8%)	898 (7.5%)	365 (6.2%)	3,534 (11%)	203 (3.3%)	
2014	18,200 (11%)	10,437 (10%)	1,248 (11%)	1,473 (12%)	766 (13%)	3,388 (11%)	888 (15%)	
2015	17,715 (10%)	10,065 (9.9%)	1,105 (9.8%)	1,589 (13%)	653 (11%)	3,410 (11%)	893 (15%)	
2016	16,694 (9.9%)	9,468 (9.3%)	1,115 (9.9%)	1,607 (13%)	649 (11%)	2,860 (9.0%)	995 (16%)	
2017	16,874 (10.0%)	9,551 (9.4%)	1,152 (10%)	1,578 (13%)	792 (13%)	2,936 (9.2%)	865 (14%)	
2018	16,794 (10.0%)	9,789 (9.6%)	1,084 (9.6%)	1,445 (12%)	797 (14%)	2,774 (8.7%)	905 (15%)	
2019	16,204 (9.6%)	9,620 (9.5%)	1,013 (9.0%)	1,541 (13%)	757 (13%)	2,377 (7.5%)	896 (15%)	
Died during the study	**22,396 (13%)**	**17,121 (17%)**	**1,464 (13%)**	**348 (2.9%)**	**186 (3.2%)**	**3,000 (9.4%)**	**277 (4.5%)**	**<0.001**

[1]Median (IQR) for continuous variables or Frequency (%) for categorical variables
[2]Kruskal-Wallis rank sum test; Pearson's Chi-squared test

Opportunities for early intervention

General Practice

In the two years leading up to the index SM event date, 23.0% (38,593) of the cohort had contact with their GP. This increased to 30.0% (50,121) in the two years following the index SM event date. Overall and across different substances, the number (and percentage) of GP contacts were consistently higher in the period after the index SM event date.

Hospital admissions

Whilst a similar number of individuals in the cohort had hospital admissions before and after their index SM event, the number of admissions was substantially higher, an increase of 70.8%, after the index SM event date.

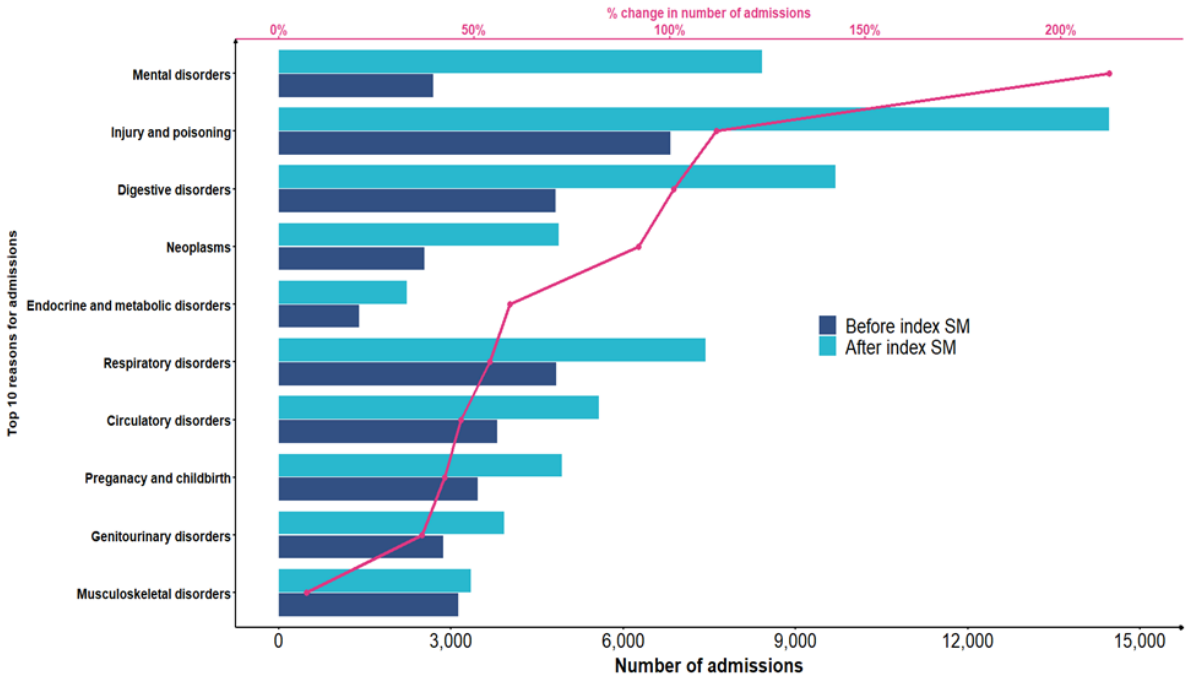
Of those who were admitted to hospital, 35.0% attended twice or more prior to the index SM event, and 41.0% attended twice or more after the index SM event.

Injury and poisoning and digestive disorders were the most common reasons for admissions in the periods both before and after the SM index event.

Admissions relating to mental disorders more than tripled after the index SM event (212.0% increase), followed by injury and poisoning (112.0% increase).

Similar results were found after stratification by type of substance, with mental disorders and injury and poisoning consistently in the top 10 reasons for admission. (Figure 1).

Figure 1: Top 10 reasons and percentage change in hospital admissions in the 2-year period before and after index SM event (All), 2008-2021



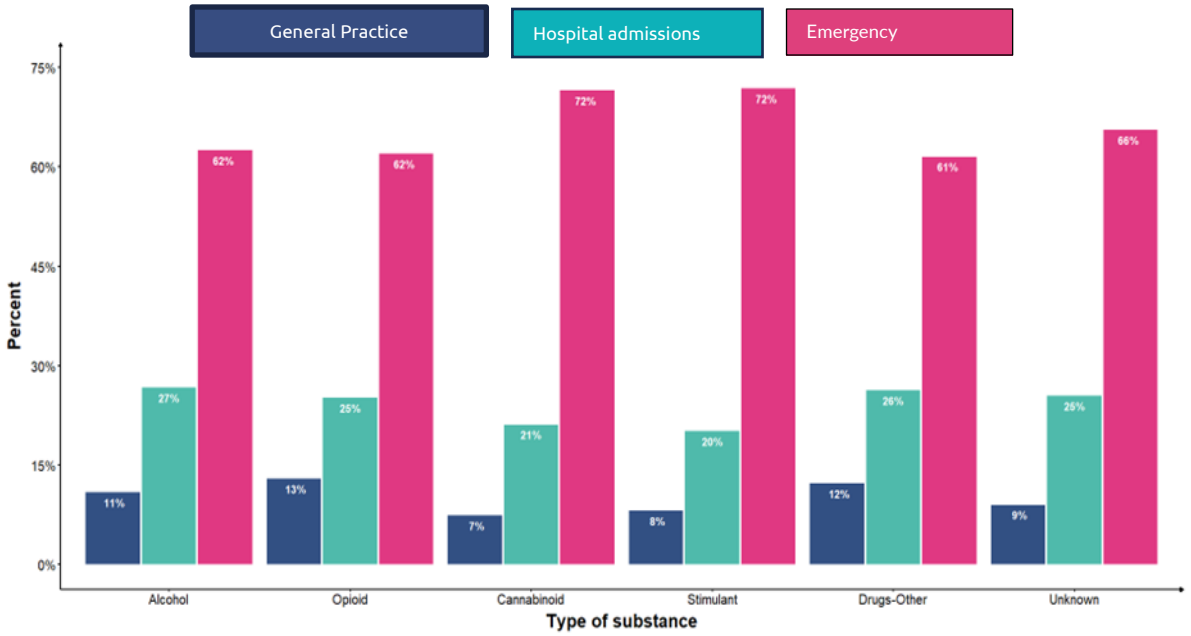
Emergency department (ED)

In the two-year period leading up to the index date, 44.4% of the cohort had at least one emergency department attendance. This increased to 47.8% in the two years post index SM event date. The median number of admissions in both periods was three.

The total number of ED attendances pre- and post-index SM event date were 162,188 and 205,999 respectively, indicating a 27.0% increase in the number of emergency admissions.
Overall and across different substance type, poisoning or overdose, and psychological/psychiatric conditions had the highest percentage increase between pre- and post-index SM event date.

The last point of contact prior to the SM index event date was mainly in the ED, ranging from 61.0% in the 'other drugs' category to 72.0% in those with cannabinoid and stimulant as the index substance.

Figure 2: Last contact by healthcare setting and substance type in the 2-year period before index substance misuse, 2008-2021



Time from index SM event to next SM health event

Overall, at least 25.0% of the cohort were more likely to have a healthcare contact within six months of index event regardless of the type of index substance, especially if they were female, aged 10 to 34 years of age, from most deprived quintile, or had their index SM contact in the emergency department.

Why it matters

This study represents the first national comprehensive examination of the pre- and post-healthcare service contacts of people with substance (drugs and/or alcohol) use presenting in both primary and secondary care settings.

This large cohort had a number (median of 6) of healthcare contacts prior to and following their index SM event which represent substantial opportunities for intervention to at least reduce further escalation to more harmful substance use and potentially more severe outcomes.

We found the highest number of individuals and frequencies of health services contact in emergency department settings: 44.0% and 48.0% of the cohort had at least one emergency department contact before and after the index SM event respectively. Also, presentation at the emergency department was the most common

last point of contact prior to the index SM event across various substance types, particularly 'Other drugs', Cannabinoids and Stimulants.

Mental health disorders, injury and poisoning had the largest percentage increase following the index SM event and were consistently in the top four reasons for hospital admissions. This is consistent with evidenced comorbidities related to mental health and substance misuse.

Our study strengthens the case for preventative interventions by highlighting that far more healthcare contacts were made after the initial SM event compared to prior to the event across all settings, even with fewer number of individuals in the period after compared to the preceding period. Evidence-based policies and prevention programmes support the provision of low threshold and rapid access to psych-social-behavioural interventions and medication-assisted treatments which have been shown to significantly reduce substance misuse and related harm, facilitate recovery from substance use disorders, prevent relapses, and improve other outcomes, such as reducing criminal behaviour and the spread of infectious diseases[3-7].

The burden of disease related to substance misuse extends far beyond drug or alcohol-related morbidity and mortality, because substance misuse is also highly comorbid with, or a risk factor for, other mental health disorders and associated harms extending to other individuals in the family and community.

In this study, we have highlighted that individuals experiencing substance misuse-related harms can be identified earlier within both primary and secondary care settings and opportunities therefore exist to initiate effective early intervention to prevent or minimise escalation into more problematic use. The number of substance misuse emergency department re-attendances, for example, may be reduced with appropriate interventions and referrals to relevant specialist services. Hence, a case could be made for the greater integration of substance misuse treatment within the health care delivery system.

What next?

Expansion of linked data

In future, it should be possible to link this cohort with the Ministry of Justice data, to investigate those who have been in contact with the criminal justice system as initial contacts for the identification and recording of substance misuse. This is likely to expand the cohort and impact on the cohort data and implications in relation to early engagement.

Further research is required to address the current under-reporting and consequential underestimation of substance misuse related deaths, this may involve mixed method analysis of contributory causes of deaths with ONS and Coronial records.

Address potential bias

Routinely collected administrative data contain limited contextual information and may represent an underestimate of total health outcomes for these individuals (e.g., where not brought to the attention of, and recorded by, these services). Hence, information on the severity of substance use, for example, were unavailable, possibly increasing the likelihood of omitted variable bias. It is possible our cohort comprised mainly individuals who are already at the more problematic end of the alcohol and drug use spectrum.

Also, as not all people with SM issues would necessarily have a healthcare record for it, our study was limited to those with SM-related healthcare records. There are also high levels of substance misuse amongst unstably housed or homeless populations. Although we tried not to introduce further bias by excluding those without a registered address, future work will look at published methods which have previously been used to identify the homeless population in the SAIL Databank. It is worth noting that this is a difficult population to identify in linked data work due to their lack of residency and it may have been possible that we were not able to capture these individuals in their entirety.

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Appendices

Appendix A: Codes used definitions of events

The International Classification of Diseases 10th Revision (ICD-10) was used to classify substance misuse deaths and hospital admissions as follows:

Drug misuse deaths

Condition	ICD-10 Code
All deaths in which the following conditions are noted as the underlying cause	
Mental and behavioural disorders due to opioids, cocaine, sedatives or hypnotics, cocaine, other stimulants including caffeine, hallucinogens, multiple drug use	F11-F16, F19
All deaths in which the following conditions are noted as the underlying cause AND where codes F11-F16, F19, T40, T424, T436 are also recorded on the death certificate	
Mental and behavioural disorders due to volatile solvents	F18
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
Poisoning by drugs, medicaments and biological substances, undetermined intent	Y10–Y14

Alcohol specific death

Condition	ICD-10 Code
Mental and behavioural disorders due to use of alcohol	F10
Alcoholic liver disease	K70
Accidental poisoning by and exposure to alcohol	X45
Intentional self-poisoning by and exposure to alcohol	X46
Poisoning by and exposure to alcohol, undetermined intent	Y15
Alcohol-induced pseudo-Cushing's syndrome	E244
Degeneration of nervous system due to alcohol	G312
Alcoholic polyneuropathy	G621
Alcoholic myopathy	G721
Alcoholic cardiomyopathy	I426
Alcoholic gastritis	K292
Alcohol-induced acute pancreatitis	K852
Alcohol-induced chronic pancreatitis	K860

Foetal alcohol syndrome (dysmorphic)	Q860
Excess alcohol blood levels	R780

Hospital admissions

Condition	ICD-10 Code
Any mental/behavioural condition (NHS Digital definition)	F11-16, F18, F19
Any poisoning by illicit drugs (NHS Digital definition)	T400-T403, T405-T409, T436
Alcoholic liver disease	K70
Accidental poisoning by and exposure to alcohol	X45
Intentional self-poisoning by and exposure to alcohol	X65
Poisoning by and exposure to alcohol, undetermined event	Y15
Evidence of alcohol involvement determined by blood alcohol	Y90
Evidence of alcohol involvement determined by level of intoxication	Y91
Alcohol-induced pseudo-Cushing's syndrome	E244
Degradation of nervous system due to alcohol	G312
Alcoholic polyneuropathy	G621
Alcoholic myopathy	G721
Alcoholic cardiomyopathy	I426
Alcoholic gastritis	K292
Alcoholic induced acute pancreatitis	K852
Alcohol-induced chronic pancreatitis	K860
Foetal alcohol syndrome (dysmorphic)	Q860
Excess blood alcohol levels	R780
Ethanol poisoning	T510
Methanol poisoning	T511
Toxic effect of alcohol, unspecified	T519

Emergency Department Admissions

Condition	Code
Poisoning or overdose - alcohol	10A
Poisoning or overdose – prescribed drug	10B
Poisoning or overdose – non-prescribed/purchased drug	10C
Poisoning or overdose – illicit drug	10D
Poisoning or overdose – other or unspecified	10Z
Chronic Alcohol Abuse	31A
Chronic Drug Abuse	31B

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