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Research Paper

A multicomponent holistic care pathway for people who use drugs in Tayside, Scotland

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ABSTRACT

Background: People Who Use Drugs (PWUD) are at high risk of non-fatal overdose and other drug-related harms. The United Kingdom drugs policy landscape makes it challenging to support those at risk. Tayside, in East Scotland, has a sizeable population at risk of drug-related harms. In 2021, the National Health Service implemented a care pathway for PWUD to provide multidimensional healthcare interventions. We aimed to quantify drug-related harms; assess wider health and well-being; and understand substance use trends and behaviours, among those engaged in the pathway.

Methods: Existing community-embedded blood-borne virus pathways were adapted to provide multiple healthcare assessments over three visits. We undertook an observational cohort study to analyse uptake and outcomes for the initial cohort of PWUD engaged at appointment one.

Results: From August 2021–September 2022, 150 PWUD engaged with the pathway. Median age was 39 (34–42) years, 108 (72%) were male, and 124 (83%) lived in deprived areas. Seventy (47%) had been disengaged from healthcare for over a year. Polysubstance use was reported by 124 (83%), 42 (28%) disclosed injecting daily, and 54 (36%) shared equipment. Fifty-four (36%) experienced recent non-fatal overdose, and there were six overdose fatalities (4.1 [1.5–9.0] per 100PY). The offer of take-home naloxone was accepted by 108 (72%). Fourteen (9%) were diagnosed with Hepatitis C and two (1%) with HIV. Renal, hepatological, and endocrine impairment were observed among 30 (20%), 23 (15%), and 11 (7%), people respectively. Ninety-six (65%) had high risk of clinical depression. Forty-eight (32%) declined Covid-19 vaccination.

Conclusion: The pathway engaged PWUD with high exposure to recent non-fatal overdose and other drug-related harms, alongside co-morbid health issues. Our results suggest multi-dimensional health assessments coupled with harm reduction in community settings, with appropriate linkage to care, are warranted for PWUD. Service commissioners should seek to integrate these assessments where possible.

Introduction

Globally, 14.8 (10.0–21.7) million people aged 15–64 are estimated to inject illicit drugs (Degenhardt et al., 2023). People who use drugs experience myriad, often compounding, harms driven by psycho-social, structural, and behavioural factors, related to substance use. Injection drug use is particularly associated with heightened risk of blood-borne virus transmission, such as hepatitis C and HIV, and substantial co-morbidity and mortality (Degenhardt et al., 2016; Larney et al., 2017). It has been estimated that, globally, approximately 68% (65–72) of people who use drugs inject at least once daily and increased injecting frequency has been linked to higher rates of skin and soft tissue infections, non-fatal and fatal overdose (Baltes et al., 2020; Colledge, Leung, et al., 2020; Larney et al., 2017). People who use drugs may also be at heightened risk of co-occurring mental health conditions; heart disease; liver disease (due to viral hepatitis); renal disease; and endocrine disorders, which exacerbate existing conditions and accelerate overall health deterioration (Gudin et al., 2015; Jones & McCance-Katz, 2019; Liu et al., 2019; Scott et al., 2018; Vervoort et al., 2022). Evidence shows that those who inject more frequently, and are therefore at higher

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risk of harm, are less likely to routinely visit a general practitioner to avail of preventive healthcare which bridges multiple illnesses (Nambiar et al., 2014). Indeed, evidence suggests people who use drugs face multiple barriers to engaging in routine healthcare to screen and manage co-occurring conditions, due to frequent experiences of structural barriers, stigma, distrust, and frustration (Chan Carusone et al., 2019; Lloyd, 2013; Muncan et al., 2020; Treloar et al., 2016). This is important as, alongside the direct harms linked to substance use, approaches to addressing these complications concurrently are given infrequent prominence in the literature relative to transmissible infections, non-fatal overdose, and mortality, individually. In Scotland, where this study is situated, the confluence of risks to the health and well-being of people who use drugs has resulted in a public health crisis with one of the highest overdose fatality rates in Western Europe (Christie, 2021; Ghose et al., 2022; National Records of Scotland, 2022).

Several studies have assessed approaches to addressing specific health domains among people who use drugs. Salient examples include: co-locating hepatitis C care within mental health pathways; embedding psychological assessment within harm reduction sites; recommending cardiac screening within substance use treatment settings; embedding liver fibrosis screening within drug and alcohol settings; and evaluating depressive symptomology and suicidality in relevant health settings and within networks of people who use drugs (Colledge, Larney, et al., 2020; Harney et al., 2021; Malaguti et al., 2022; Marshall et al., 2015; Mwangi et al., 2019; Yucel et al., 2022). While the substantial risk of non-fatal overdose (42% [35–48] ever) among people who use drugs, and the overdose fatality burden (6.9 deaths per 100,000 people), is widely documented (Colledge et al., 2019; Peacock et al., 2018), there is a lack of published work on renal or endocrine screening. Despite the abundance of published work on individual disease areas, few have sought to evaluate holistic integrated approaches which combine screening and intervention for a range of health issues among people who use drugs within harm reduction or outreach settings. Furthermore, while much work has documented disease burden among people who use drugs, few have assessed linkage to onward care for specific conditions, such as depression. Examining approaches to whole-person care is critically important as unmet health need has been linked to increased odds of recent non-fatal overdose, consequently increasing mortality risk (Tomko et al., 2022). Poor existing healthcare provision has led to calls for holistic healthcare delivery to enhance utilisation among people who use drugs with multimorbidity and reduce disparities between people who use, and those who do not use, drugs (Cullen et al., 2009; Heidari et al., 2022; Kushner & Habraken, 2021).The multi-morbidity burden among people who use drugs demands healthcare providers examine local and regional policies and explore opportunities to re-design services to ensure a whole-person approach.

Through leveraging existing therapeutic relationships, and availing of strong partnerships with charities, social enterprises, and voluntary groups working in our region to address the health and social needs of people who use drugs, we developed a regional 'one-stop' multi-visit holistic care bundle within needle and syringe provision sites and community outreach clinics in Tayside, a region in the East of Scotland. This region had historically high levels of injection drug use which saw overdose fatalities increase by 39% from 2016–21 (Tayside Drug Death Review Group, 2017, 2022). Mirrored nationally, this phenomenon led the Scottish Government to publish a 'national mission' to reduce overdose fatalities and improve the well-being of people who use drugs (Scottish Government, 2022, 2023). Responding to these developments, we describe a decentralised care pathway, which offers regular blood pressure monitoring; weight checks; cardiovascular checks; liver, endocrine, and renal function checks; respiratory assessment; wound care; mental health screening; point-of-care blood-borne virus screening and treatment, harm reduction provision; vaccinations; and referral to support systems such as foodbanks and temporary accommodation. In describing this model, we specifically aim to quantify a reference prevalence level of transmissible infections, recent non-fatal overdose, and overdose fatalities; and identify any cardio-metabolic issues or impaired mental health. We also sought to understand substance use trends and behaviours, uptake of harm reduction provisions, acceptance of vaccination offers, and linkage to onward relevant care where required. These outcomes are reported for the initial cohort of people engaged in the pathway for their first appointment.

Methods

Study design

This is an observational cohort study conducted at Ninewells Hospital and Medical School, Dundee, Tayside, Scotland. On 17 August 2021, the pathway was implemented through nurse-led services in needle and syringe provision sites and regional outreach clinics which serve the health needs of people who use drugs in five towns/cities (Supplementary File: Fig. 1). The pathway consists of three holistic healthcare engagements lasting approximately 60 minutes. Each engagement is appointed at least six months following the previous one. Though several assessments and interventions at each engagement are the same, there are small differences; these are outlined in detail in the Supplementary File (Figs. 2–4). Contingency – an approved intervention (National Institute for Health and Clinical Excellence (NICE), 2007) – of £20 (GBP) is provided in the form of a voucher for a grocery store chain each time a person attends. The study population included those who engaged for a first appointment within the pathway; these people were observed for outcomes from the date of their visit to 31 December 2022. Therefore the observation period for the study was 17 August 2021–31 December 2022.

Setting

Tayside is a geographic region in the East of Scotland with a population of approximately 416,000 people. The health needs of residents are served by the National Health Service (NHS), which is free-of-charge at the point of delivery. The region is demographically and socio-economically diverse; home to some of the wealthiest, and most deprived, areas of Scotland. Since 2004, blood-borne virus services have been led regionally through the Sexual Health and Blood-borne Virus Managed Care Network, which brings together NHS services, the charity sector, partners from governmental and educational institutions, and representatives from the police service, into a single group to enable a multi-dimensional approach to service delivery. This nurse-led pathway, implemented via the managed care network, is delivered at the point of need in community settings which are routinely attended by people who use drugs. Prior to implementing this model of care, these settings offered conventional blood-borne virus screening and treatment alongside harm reduction provision. The needle and syringe provision sites are typically exclusively used by people who use drugs, while the outreach clinics are embedded within community health centres which are also attended by people who do not use drugs. All interventions (Supplementary File Figs. 2–4) are delivered in these community settings. For this pilot, hepatitis C testing was performed using the Cepheid GeneXpert platform with the Xpert HCV VL Fingerstick Assay.

Participants

All adults ($\geq$18 years) who received care at a first appointment through the pathway – i.e. people availing of the service through needle and syringe provision sites and outreach clinics in Tayside – were eligible for inclusion.

Variables

This evaluation used data routinely collected in delivery of the pathway. Individuals were differentiated using their community health

Table 1
Cohort characteristics ($n = 150$).

Characteristic	Count
Gender – *n* (%)	
Male	108 (72)
Female	42 (28)
Age at first visit	
Median (IQR)	39 (34–42)
Tayside region – *n* (%)	
Dundee	105 (70)
Angus	15 (10)
Perth	30 (20)
Deprivation quintile – *n* (%)	
1	85 (57)
2	39 (26)
3	14 (9)
4/5	10 (7)
Unknown	2 (1)
Days since last clinical engagement[†]	
Median (IQR)	380 (171–656)

[†] $n = 140$: ten unknown.

index number, a unique identifier allocated to every person registered with the NHS in Scotland. The following data were collected: community health index number; gender (at birth); date of visit; postcode, to derive deprivation status using the Scottish Index of Multiple Deprivation (Scottish Government, 2020); location of clinic; results of hepatitis C testing; hepatitis C infection and treatment history; hepatitis C genotype; HIV status; hepatitis B status; liver function test results; weight and height (to derive Body Mass Index [BMI]); pulse oximetry; Covid-19 vaccination status; electrocardiogram results; wound care assessment outcomes; blood pressure status; take-home naloxone receipt; injecting equipment provision; substance use parameters including injection trends and sharing behaviour; mental health assessments and outcomes; mortality status (and causes); and non-fatal overdose history. De-identified data were stored using Microsoft Excel 2013 and held on secure servers with controlled access.

Variable definitions

Sustained Virologic Response (SVR) was undetectable (<10IU/mL) hepatitis C RNA at least 12 weeks post treatment. Loss to follow up was defined as non-attendance for SVR test, with no test received by the censor date. Hepatitis C treatment completion was ≥80% of prescribed direct acting antiviral doses taken over the treatment period. Hepatitis C re-infection was defined as detectable RNA following confirmed previous SVR. Underweight was defined as BMI ≤18.5; healthy weight was defined as BMI 18.5–24.9; and overweight was defined as BMI ≥25. Low blood pressure was 70–90 mmHg/40–60 mmHg; normal blood pressure was 90–120 mmHg /60–80 mmHg; pre-high was 120–140 mmHg/80–90 mmHg; high blood pressure was ≥140 mmHg/≥90 mmHg. High risk of depression was defined as a score of ≤40 on the Warwick-Edinburgh Mental Well-being Scale (this threshold is correlated with high depression risk) (Taggart and Parkinson, 2015). Injection site condition was defined as 'good' or 'poor' following nurse assessment aided by the assessment of injecting risk tool (see supplementary file). Quality of injecting technique was similarly evaluated and dichotomised into 'good' or 'poor' based on clinical assessment aided by the assessment of injecting risk tool. 'Recent' injection drug use was defined as within the previous six months. Non-fatal overdose was defined as (independently or in combination): 1) evidence in medical records of presentation to ambulatory or other emergency health services following excessive consumption of illicit (or illicitly obtained controlled) substances; 2) self-report response to, 'have you overdosed in the last 12 months?', as part of the assessment of injecting risk tool assessment algorithm. 'Recent' non-fatal overdose was defined as within the previous 12 months. Overdose fatality was – aligned to the Tayside Drug Death Review Group definition (Tayside Drug Death Review Group, 2022) – defined as death directly resulting from the presumed non-intentional overdose of illicit (or illicitly obtained controlled) substances. Where toxicological findings indicated the presence of a controlled substance, but this may not necessarily have been a crucial factor contributing to mortality, this would not be considered an overdose fatality. This definition does not include intentional self-poisoning, and therefore diverges subtly from the National Records of Scotland definition (National Records of Scotland, 2019, 2020, 2021).

Table 2
Cohort biochemistry and electrocardiogram findings.

	Assessment	*n* (%)
Biochemistry outcomes	Renal function	
	All within normal ranges[†]	112 (75)
	≥1 outside normal ranges	30 (20)
	Not tested	8 (5)
	Thyroid function	
	All within normal ranges[‡]	61 (41)
	≥1 outside normal ranges	11 (7)
	Not tested	78 (52)
	Liver function	
	All within normal ranges[¶]	119 (80)
	≥1 outside normal ranges	23 (15)
	Not tested	8 (5)
	Fib-4 score	
	≤1.45	125 (83)
	1.46–3.24	13 (9)
	≥3.25	3 (2)
	Not calculated	9 (6)
Electrocardiogram outcomes[§]	Sinus bradycardia	20 (19)
	ST abnormality[‖]	19 (18)
	T wave abnormality[#]	14 (14)
	Abnormal sinus rhythm	13 (13)
	Short PR interval	7 (7)
	Early repolarisation	4 (4)
	Borderline Right Axis Deviation	2 (2)
	Prolonged QT interval	2 (2)
	Right ventricular conduction delay	2 (2)
	Sinus arrhythmia	2 (2)
	Sinus tachycardia	2 (2)
	Other heterogenous findings observed in one person[††]	15 (15)

[†] Sodium 133–146 mmol/L; potassium 3.5–5.3 mmol/L; urea 2.5–7.8 mmol/L; creatinine 62–106 (males) or 44–80 (females) μmol/L; eGFR >60 mL/min.
[‡] Thyroid–stimulating hormone: 0.4–4.0 mU/L; FT4 11.5–22.7 pmol/L.
[¶] ALT: ≤30IU/mL; AST: 10–45 IU/L; Albumin: 35–50 g/L; ALP 30–130 IU/L; Total BR: ≤21 μmol/L; GGT 3–73 U/L; AFP ≤6 kU/L.
[§] n is total number of individuals in which the observation was made; (%) is this figure as a proportion of all abnormal electrocardiogram findings.
[‖] Including elevation, depression, other deviations, and non-specific abnormalities.
[#] Including non-specific and moderate abnormalities.
[††] Findings for individual people are collapsed for disclosure reasons.

Data sources

Nurses record outcomes of interventions and assessments on a local database as part of routine practice to enable functioning of the pathway; this database was the source of most data underpinning this report. To assess risk of depression, the Warwick-Edinburgh Mental Well-being Scale was used (Tennant et al., 2007). The NEO 360 system (NEO360, 2020), which includes modules for injecting equipment provision and the assessment of injecting risk tool, an iterative questionnaire used throughout NHS Scotland to assess injecting risk behaviour, was the source for these data points (Supplementary File, pp.6–15). Non-fatal overdose data was triangulated from 1) medical

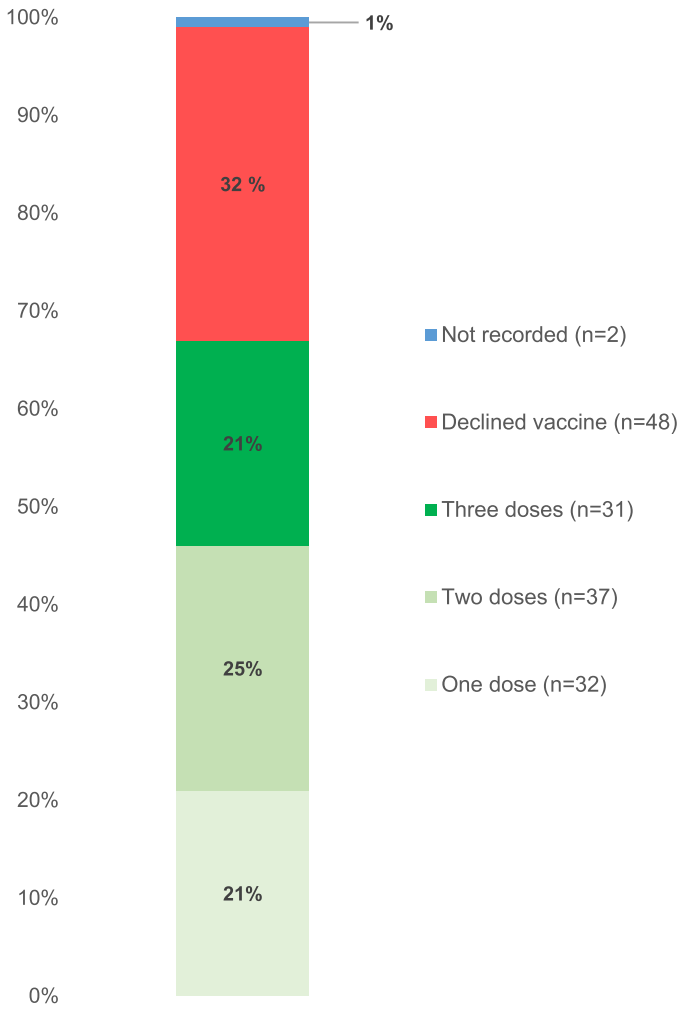

Fig. 1. Covid-19 vaccination status among cohort ($n = 150$).

records and 2) the assessment of injecting risk tool following self-report to nursing staff; the highest value was used. Mortality status was derived from medical records.

Study size

The pilot evaluation was capped at the first 150 people. The rationale for the cap is it triggered the internal evaluation point for the pilot, for decision making on refining the design and continuation of the service. Further, it allowed sufficient time to elapse for treatment follow-up to occur by the censor date.

Statistical methods

Descriptive statistics were used to derive counts and proportions. Missing data were reported as such. Contingency tables and the chi-squared test were used to test associations between multiple factors and experience of non-fatal overdose in the previous 12 months. Mortality rates were calculated per 100 person years (PY) of observation, assuming a Poisson distribution. All statistics were undertaken using Stata BE 17 and p values of ≤ 0.05 were assumed to demonstrate statistical significance. Hepatitis C treatment initiation was censored at 12/08/2022 to allow adequate time from date of treatment initiation to date of SVR assessment (follow-up for which was censored at 31/12/2022). Follow-up for mortality and for prescribing outcomes commenced from the date of the individual's visit to the same censor date (31/12/2022).

Approvals

As this was a retrospective NHS service evaluation of a model used for routine care delivery – such evaluations may include access to individual data, as well as provision of questionnaires and interviews without NHS ethical review (such work is not classed as 'research' by the NHS Research Ethics Service) – which used routinely-collected healthcare data, NHS ethical review was not required (NHS Health Research Authority, 2013; NHS National Patient Safety Agency, 2007). Instead, Caldicott Guardian approval, a procedure that ensures the protection and appropriate use of identifiable data (NHS Tayside, 2015), was obtained for data access (IGTCAL11438). The evaluation was registered with the relevant NHS Tayside clinical governance risk group (ref: 023–21).

Results

From 17 August 2021 to 01 September 2022, 150 people were engaged through the pathway. Median age was 39 (IQR 34–42) years and 108 (72%) were male (Table 1). Eighty-five (57%) resided in areas of least socio-economic resource. Seventy (47%) had been disengaged from healthcare for over a year: median time since an individual was last engaged in healthcare relevant to substance use was 380 (IQR 171–656) days.

Fifty-four (36%) people had evidence of recent non-fatal overdose. Thirty-three (61%) had experienced one, while 21 (39%) experienced more than one. No variables were significantly associated with likelihood of having experienced recent non-fatal overdose (gender ($p = .237$), age ($p = .496$), polysubstance use ($p = .774$), quality of injecting technique, ($p = .314$) injecting equipment sharing ($p = .580$), or mental health status ($p = .054$)). Eight (5%) people died during observation over 145 person-years (median follow-up: 1 year (IQR 0.8–1.3). Among those who died: six (75%) were confirmed overdose fatalities (five [83%] male). This equates to a crude morality rate of 5.5 (2.4–10.9) per 100 PY and an overdose fatality rate of 4.1 (1.5–9.0) per 100 PY.

Everyone received a point-of-care hepatitis C RNA test and 14 (9%) had active infection. Of those diagnosed with hepatitis C, five (36%) were incident infections whilst nine (64%) were re-infections. Median time to treatment was 40 (22–80) days. All were treated with direct acting antivirals: 12 (86%) completed treatment whilst two (14%) did not. Seven (50%) were followed-up and obtained SVR whilst five (36%) were lost to follow up and the remaining two (14%) died prior to follow-up. With respect to other blood-borne viruses two (1%) tested positive for HIV (not new diagnoses). All tested negative for hepatitis B surface antigen.

Renal, hepatological, and endocrine impairment were observed among 30 (20%), 23 (15%), and 11 (7%), people respectively (Table 2). Of all participants, 147 (98%) received an electrocardiogram, with 83 (57%) returning normal readings. Among 64 (43%) people, 102 abnormal findings were observed. The most frequent observations were sinus bradycardia and ST abnormality (Table 2).

Eighty-six people (57%) were within a healthy weight range, whilst 16 (11%) were underweight and 45 (30%) were overweight. Sixty-one people (41%) had pre-high or high blood pressure.

With respect to vaccination, four (3%) individuals were fully vaccinated against hepatitis B. One hundred (67%) people had at least one dose of Covid-19 vaccine, of which 22 (22%) were administered by our nurses as part of this pilot. Of those with two doses, eight (22%) received their second dose as part of the pilot. Of those with three, one (3%) received the third dose as part of the pilot. Forty-eight (32%) people declined the vaccine offer (Fig. 1).

Ninety-six (65%) participants had a score indicating high risk of clinical depression. The median score was 36 (IQR: 28–44). Among those with high risk, 38 (40%) were already prescribed an antidepressant by their general practitioner, whilst 19 (20%) were subsequently prescribed one following counselling from the nursing team.

Thirty-seven (39%) individuals with high risk of depression were not prescribed an anti-depressant following their assessment. The median time from assessment to initiation of antidepressant medication was 125 (IQR 84–185) days for those with high-risk scores.

With respect to injecting-related injury: eight (5%) people required wound care from the nursing team. When offered take-home naloxone, 108 (72%) accepted (Fig. 2), while 69 (46%) accepted sterile injecting-related equipment. Regarding substance use, 130 (87%) people self-reported recent injection drug use, 124 (83%) reported polysubstance use, and 113 (75%) disclosed concurrent use of prescribed and non-prescribed medications (Table 3). Fifty-three (35%) reported injecting less than once per week, but 27 (28%) reported injecting at least once daily. Fifty-four (36%) people disclosed sharing injecting equipment with peers.

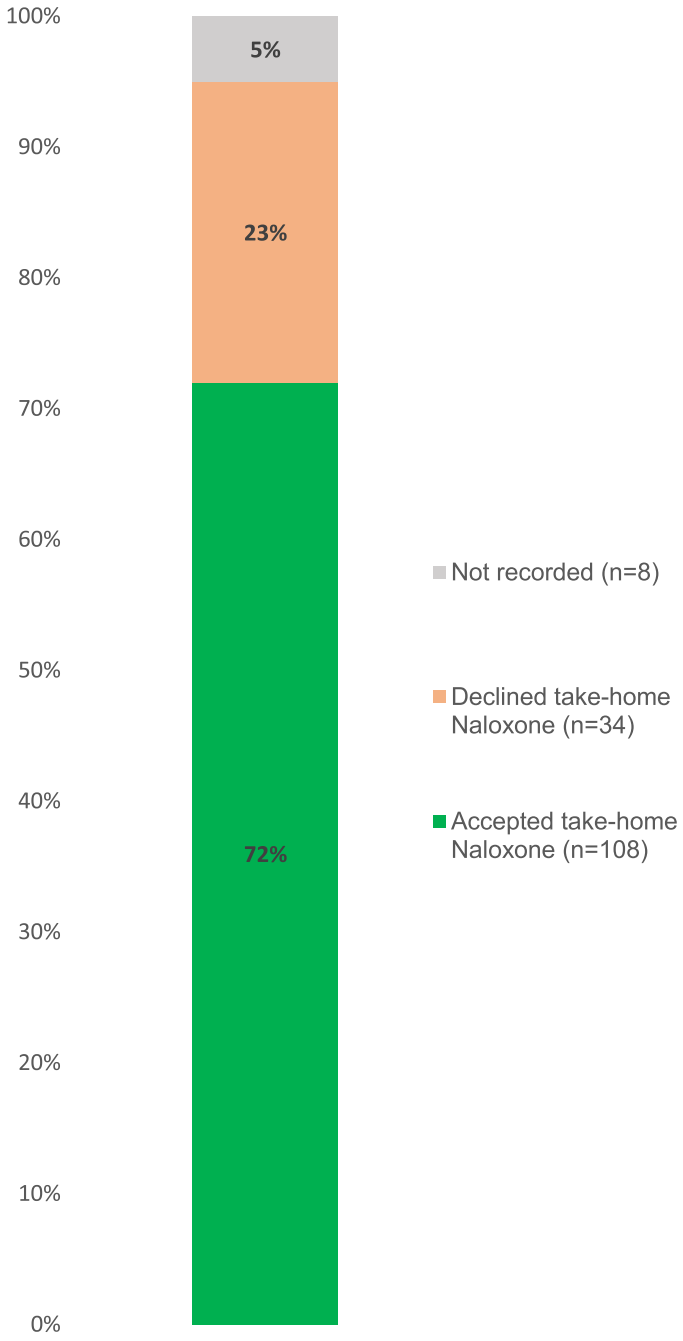

Fig. 2. Take-home Naloxone offer uptake ($n = 150$).

Table 3
Cohort substance use-related parameters ($n = 150$).

Parameter	n (%)
Injected in last six months	
Yes	130 (87)
No	0 (0)
Not reported	20 (13)
Polysubstance use	
Yes	124 (83)
No	5 (3)
Not reported	21 (14)
Concomitant use of prescribed and non-prescribed substances	
Yes	113 (75)
No	16 (11)
Not reported	21 (14)
Injecting frequency	
Less than once a week	53 (35)
Most days	33 (22)
Daily	15 (10)
More than once a day	27 (18)
Not reported	22 (15)
Shares injecting equipment with others	
Yes	54 (36)
No	72 (48)
Not reported	24 (16)
Appropriate injecting equipment used	
Yes	113 (75)
No	16 (11)
Not reported	21 (14)
Condition of injecting sites	
Good	116 (77)
Poor	13 (9)
Not reported	21 (14)
Injecting sites used[†]	
Primarily arms	49 (33)
Primarily feet	1 (1)
Primarily groin	64 (43)
Primarily hands	2 (1)
Primarily legs	12 (8)
Not reported	22 (14)
Number of injecting sites used	
One	91 (61)
Two	24 (16)
Three	8 (5)
Four	5 (3)
Not reported	22 (15)
Injecting technique	
Good	35 (23)
Poor	92 (62)
Not reported	23 (15)

[†] All reported sites used: neck, arms, hands, groin, legs, feet. Often several of these sites were used by participants.

Although appropriate injecting equipment was used by 113 (75%) people for the injection sites they typically accessed, thirteen people (9%) had injection sites in poor condition (Table 3). The groin ($n = 64$; 43%) and arms ($n = 49$; 33%) were the most common injection sites and, importantly, several sites were typically used, with 37 (28%) people reporting routine use of more than one. Notably, injecting technique was poor for 92 (61%) participants.

Discussion

In this observational study in Scotland, we aimed to quantify the prevalence of transmissible infections and non-fatal overdose, and estimate the overdose fatality rate, in a cohort of people who use drugs accessing a novel holistic care pathway. More than one-third of people experienced recent non-fatal overdose and our overdose fatality rate was higher than global figures. Together with the wider results, our data suggest implementing low-threshold integrated healthcare for people who use drugs is a useful strategy for diagnosis and management of multiple conditions. To enable this approach generally, we must reduce health system fragmentation both at the organisational (medical

disciplines, etc.) and intersectoral (civil society, etc.) levels (de Leeuw, 2017). Fragmentation has been repeatedly shown to compromise care quality and reduce patient satisfaction, with implementation of integrated care slow to follow policy directives despite reported improvements in care quality and service access (Baxter et al., 2018; Frandsen et al., 2015; Joo, 2023; Mackie & Darvill, 2016). Healthcare integration remains one of key challenges in healthcare systems globally, but implementing integrated holistic care is critical in the contemporary context of increasing multi-morbidity, including among people who use drugs (Colledge, Larney, et al., 2020; Colledge et al., 2019; Larney et al., 2017; Larney et al., 2020; Raus et al., 2020). To this end, our study provides useful evidence to policy makers and commissioners on the clinical aspects of integrating healthcare interventions for people who use drugs as well as an illustration of a structural model, our managed care network, through which to facilitate implementation.

Prevalence of recent non-fatal overdose was similar (36%) to other Scottish data (Scottish Government, 2021b) and was substantially higher than global estimates among people who use drugs of 21% (15–26) (Colledge et al., 2019). The overdose fatality rate was also high compared to global estimates of 0.5 (0.5–0.6) per 100PY (Larney et al., 2020). Consequently, it is critical that stakeholders work to address the legislative environment in Scotland which inhibits evidenced-based harm reduction initiatives (Scottish Parliament Information Centre (SPICe), 2022). Reforming the Misuse of Drugs Act 1971 – not only ineffective in reducing substance use and associated harms, it also drives physical and psychological harm among people who use drugs (Holland, 2020; Release, 2021; Scottish Government, 2021a, 2021c) – to enable a health-led and evidence-based approach to substance use is critical. This could include safe consumption facilities and drug checking services (both prohibited), alongside anti-stigma campaigns, pathways to harm reduction, and trauma-informed care. Many organisations support decriminalisation of drugs for personal use, yet the 1971 Act endures with its attendant cycle of incarceration, liberation, and associated harms and the limitations it places on approaches to policing substance use (Csete et al., 2016; House of Commons Health and Social Care Committee, 2019; Royal Society for Public Health, 2016; United Nations, 2019). Scottish police support drug checking services, and would value legislative change to enable 'public health-oriented' policing, whilst some US police have favoured expansive treatment policies including improved access to naloxone (Falzon et al., 2022; Murphy & Russell, 2021; Speakman et al., 2023). Further advocacy and education is needed to combat legal arrangements, both in the UK and internationally, premised on ill-conceived moral frameworks. Dissuasion commissions, similar to those in in Portugal and Australia, present a solution to minimising incarceration within the current legislative framework, and fit with a wider policy of harm reduction and proportionality, given there is no strong link between harsh penalties and the prevalence of substance use.

Take-home naloxone uptake was high, suggesting good acceptability. Coupled with the frequency of fatal and non-fatal overdose reported here and elsewhere in the literature, this speaks to the urgent need for policy makers globally to facilitate access to take-home naloxone. Though simplified provision is improving internationally, there is still strictly controlled or no access to naloxone, including in clinical environments, consequent to restrictive policies that limit supply in many countries (Moustaqim-Barrette et al., 2021; World Health Organization, 2021). Access can be inequitable even in more facilitative contexts, despite its demonstrated efficacy and cost-efficacy, and WHO targets to improve access (Coffin & Sullivan, 2013; Langham et al., 2018; McDonald & Strang, 2016; Olsen et al., 2018; Perez-Figueroa et al., 2023; World Health Organization, 2014). Evidence suggests around nine percent of take-home naloxone kits are used for peer administration, while 20 times the estimated required amount of take-home naloxone is needed to ensure good access at all overdose events (Bird et al., 2015; McAuley et al., 2015). This is unlikely to be achieved unless global harmonisation of supply regulations is undertaken to improve access, and leadership is required on this from supra-national agencies such as the UN, the WHO, and the INCB, to mitigate against internal political contexts which can hamper progress (Perez-Figueroa et al., 2023). The current patchwork of national and regional policy initiatives (EMCDDA, 2019) is insufficient to equitably upscale access where there is clear demand and need.

Despite high levels of injection drug use – and the high proportion of people who disclosed sharing injecting equipment – blood-borne virus prevalence was low. HIV prevalence was 1%, whilst there were no cases of hepatitis B. Chronic hepatitis C prevalence, estimated at 9%, was considerably below Tayside's previous estimate of 26% (20–32) and is likely consequent to recent rapid scale-up of hepatitis C treatment (Byrne, Beer, et al., 2022; Hickman et al., 2019). This reduction contrasts starkly with global hepatitis C prevalence estimates of 19% (14–24) among people who use drugs (Degenhardt et al., 2023). All participants with hepatitis C commenced treatment, and previous outreach models trialled in Scotland also achieved high treatment rates at 96% and 67% (Byrne, Radley, et al., 2022; Radley et al., 2020). These compare favourably to global treatment initiation estimates in high-income countries of 45% (11% in 2020 alone), and is coherent with evidence demonstrating co-location of hepatitis C care in outreach sites ensures effective treatment initiation (Cunningham et al., 2022; Oru et al., 2021; Polaris Observatory, 2022). All WHO member states have endorsed viral hepatitis elimination by 2030, yet few countries provide free hepatitis c treatment and implementation of care recommendations is heterogenous (Palayew, Razavi, et al., 2020; Palayew, Stumo, et al., 2020). Some countries have bare minimum policies in place for screening, while nations are least likely to have policies addressing hepatitis for the most vulnerable populations such as people who use drugs (Cox et al., 2020; Palayew, Razavi, et al., 2020). Our results, and the wider evidence base, suggest national governments must further commit to prevailing guidelines on task-shifting and healthcare integration for people who use drugs if elimination by 2030 is to be achieved. Ideally within holistic care pathways, embedded in low-threshold environments.

Regarding wider health issues: renal, thyroid, and liver impairment were identified among 20%, 7%, and 15% of participants. Opioid use has been linked to renal impairment (Mallappallil et al., 2017), and we found a higher prevalence of this relative to a US study, which mirrored the global estimated prevalence of 12–13%, despite similar age profiles (Akkina et al., 2012; Hill et al., 2016). Our liver fibrosis prevalence mirrored some international studies (15%), but was lower than a Dutch study in older participants (26%) (Baum et al., 2021; Kaberg et al., 2019; van Santen et al., 2018). Similar to us, these studies integrated screening in injecting equipment provision sites and addictions clinics. One Iranian study recruited from an addictions service and demonstrated impaired thyroid function in their cohort, whilst we found fewer than 10% of participants had abnormal thyroid function (Gozashti et al., 2014). Given this conflicting evidence, the added value of thyroid screening remains unclear. However, the multimorbidity we observed is often associated with lower socio-economic resource (Alvarez-Galvez et al., 2023). Over 80% of our cohort lived in areas of least resource which highlights the imperative to ensure health policies deliver not only equality in provision, but promote equity in access for people who use drugs, given their heightened risk of multimorbidity, fatal, and non-fatal overdose (Altekruse et al., 2020; van Draanen et al., 2020). Currently global health systems have poor policy preparedness for multimorbidity and do not meet the needs of vulnerable people experiencing it, due to being disease oriented around single medical specialties with little attention to health equity (ICARE4EU consortium, 2017; NICE, 2016; The Economist Intelligence Unit, 2020). It is critical that, in future, policy makers seek to diminish the silos between medical specialties and implement policies directly encouraging holistic care for vulnerable populations, particularly regarding mental health.

Worsening mental health has been associated with risk of fatal and non-fatal overdose among people who use drugs (Eeckhaut et al., 2020;

EMCDDA, 2021; Mathers et al., 2013; van Draanen et al., 2022). Depression risk was higher than global estimates at 65% in our cohort. Recent international work estimated a 54% (46–62) prevalence of depression among people who use drugs (Degenhardt et al., 2023). We were surprised not to find a significant association between high risk of depression and likelihood of experiencing non-fatal overdose. Particularly considering evidence from a Swedish cohort found that people who use drugs with comorbid depression and anxiety had 80% higher hazard of overdose fatality (Fridell et al., 2019). Similarly, a Canadian study found that depression predicted increased likelihood of non-fatal overdose (Pabayo et al., 2013). Taken together, the wider evidence suggests screening for – and intervening upon where possible – psychological well-being in this population is critical to impacting upon likelihood of fatal and non-fatal overdose. To that end, the proportion of our participants who were subsequently prescribed an antidepressant is encouraging, but more work is needed to improve the therapeutic offer for those with impaired mental health, including integrating non-pharmaceutical therapies, and creating policy contexts to enable integrated commissioning of substance use and mental health services by public health authorities (Black, 2021).

Covid-19 vaccination uptake was high, but a substantial proportion declined the vaccine offer. Given people who use drugs are at elevated risk of severe illness from Covid-19 (Allen et al., 2021; Baillargeon et al., 2021; Wang et al., 2021), new initiatives to increase vaccine uptake should be designed and trialled, including educational and trust-building initiatives. This is challenging as research suggests people who use drugs are aware of their heightened risk, yet remain ambivalent due to poor healthcare experiences (Aronson et al., 2022). Australian, US, and Spanish reports have described similar reluctance to accept vaccination among people who use drugs (Iversen et al., 2022; Lazarus et al., 2023; Strathdee et al., 2021). Relative to these studies, the Tayside uptake could be viewed as encouraging. A smaller proportion of our cohort had been vaccinated against hepatitis B, national data puts hepatitis B vaccination uptake at 70% among people who use drugs, with figures for the UK and wider European region varying from 26–84% (ECDC, 2022; UKHSA, 2023). UK and international guidelines recommend pre-exposure immunisation for people who use drugs, but WHO policy does not mention this group in Covid-19 vaccination guidelines despite their heightened risk from infection (Schnier et al., 2014; UKHSA, 2013; World Health Organization, 2012, 2023). As we move away from the acute phase of the pandemic in many countries, consideration should be given to this in future policies to facilitate targeted interventions to improve uptake.

As multimorbidity rises globally, including among people who use drugs, the consequent health systems pressure has become a major concern for policy makers. Traditional care delivery is insufficient to respond to the complexity, with many patients experiencing disrupted care pathways and poor outcomes (Winkelmann et al., 2022). Health systems are poorly prepared to tackle this issue from a policy perspective: in many countries guidelines, polices and strategies for addressing multimorbidity simply do not exist (ICARE4EU consortium, 2017; NICE, 2016; The Economist Intelligence Unit, 2020). Policy makers should seek to provide pathways for expanding the roles of health professionals to integrate services, whilst ensuring sufficient resources are available to sustain holistic community care pathways for people who use drugs (Winkelmann et al., 2022). In a permissive policy environment, it would be feasible to provide the interventions bundled in this pathway through a safe consumption facility, which have been demonstrated to reduce drug-related harms and mortality (Bazazi et al., 2015; Fairbairn et al., 2008; Folch et al., 2018; Gledhill, 2019; Goldenberg et al., 2020; Lake et al., 2015; Marshall et al., 2011). Whilst local initiatives provide examples within the boundaries of what is currently feasible, they are not acceptable replacements for safe effective alternatives which require wider policy reform (Harm Reduction International, 2022; Scottish Government, 2021b; Shorter et al., 2022). Wider systems changes, including legislative changes, are critical to addressing the ongoing overdose crisis, whilst attending to the wider health needs of people who use drugs. Ultimately, all people who use drugs deserve a well-funded and appropriately designed health service delivered within the principles of health equity, which current systems do not deliver; this is a policy failure.

Limitations

This study has several limitations. First, the use of routinely collected healthcare data is open to errors and potential biases, including linkage problems and mischaracterisation at input (Hemkens et al., 2016). We minimised this by using community health index numbers and manually checking inconsistencies at the individual level. Second, people with lived experience of substance use were not involved in development of the pathway; it was designed based on the experience of the clinical and nursing teams delivering the service. Therefore areas of relevant healthcare may be missing. We intend in future work to consult people who use drugs on their experience of the pathway and how it could be improved. Third, due to the nature of implementing a novel pathway, not all interventions were delivered to all people: these were few in number, and are transparently reported, but this may have led to inaccurate conclusions. Fourth, the number of non-fatal overdoses may have been prone to recall bias (Coughlin, 1990), where self-report was used in favour of medical records. This may have led to overestimation of non-fatal overdose episodes however, in the context of the substance use data reported, we believe the likelihood of overestimation was minimal. Finally, this work was undertaken in a regional setting within a health service which is free at the point of delivery, and the sample size was small, therefore the international generalisability of the findings is inherently limited. Furthermore, the small sample means the true prevalence of some outcomes may be unrepresentative of the larger population – particularly internationally – and it will have limited the power of the statistical tests to expose associations which may have been present but not detected (e.g. with respect to mental health; albeit the Warwick-Edinburgh Mental Well-being Scale was not designed to screen for depression in clinical practice despite use in national surveys in Scotland and England (Public Health Scotland, 2018)).

Conclusions

Our holistic care pathway identified substantial ongoing drug-related harms among people who use drugs in Scotland, which are higher than international estimates of comparable harms. Exposure to non-fatal overdose and overdose fatality were noteworthy, alongside significant risk of co-morbid depression and vaccine hesitance. Whilst care models like this offer holistic approaches to supporting the health of people who use drugs, to stem the tide of drug-related harms wider policy change is imperative which includes facilitation of safe consumption spaces in the UK as hubs for holistic healthcare, and improved dissemination of take-home naloxone globally. Beyond policy, our data provide an insight into the utility of integrated care models in addressing a range of co-morbidities among people who use drugs and provides useful evidence to practitioners seeking to enact similar models internationally. Future work will focus on evaluating the impact of this intervention to improve access to a range of interventions to improve the health of people who use drugs and reduce overdose fatality rates in Tayside.

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Ethical review and consent to participate

Not applicable.

Data statement

The data underpinning this work were obtained from routinely held NHS records in line with approval granted by the NHS Caldicott Guardian. The individuals to whom the data relates did not explicitly consent to its use for research purposes. Consequently, the authors unable to share this data. However, any interested parties may submit requests for relevant data to NHS Tayside Information Governance by email on: informationgovernance.tayside@nhs.scot.

CRediT authorship contribution statement

Christopher J Byrne: Conceptualization, Methodology, Formal analysis, Investigation, Data curation, Writing – original draft, Writing – review & editing, Visualization, Project administration. **Andrew Radley:** Conceptualization, Methodology, Formal analysis, Investigation, Data curation, Writing – review & editing. **Emma Fletcher:** Conceptualization, Writing – review & editing. **Donna Thain:** Conceptualization, Writing – review & editing. **Brian P Stephens:** Conceptualization, Formal analysis, Investigation, Data curation, Writing – review & editing. **John F Dillon:** Conceptualization, Methodology, Writing – review & editing, Supervision.

Declaration of Competing Interest

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Ethics approval

The authors declare that the work reported herein did not require ethics approval because it did not involve animal or human participation.

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Supplementary materials

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References

Akkina, S. K., Ricardo, A. C., Patel, A., Das, A., Bazzano, L. A., Brecklin, C., Fischer, M. J., & Lash, J. P. (2012). Illicit drug use, hypertension, and chronic kidney disease in the US adult population. *Translational Research, 160*(6), 391–398. https://doi.org/10.1016/j.trsl.2012.05.008

Allen, B., El Shahawy, O., Rogers, E. S., Hochman, S., Khan, M. R., & Krawczyk, N. (2021). Association of substance use disorders and drug overdose with adverse COVID-19 outcomes in New York City: January-October 2020. *Journal of Public Health (Oxford, England), 43*(3), 462–465. https://doi.org/10.1093/pubmed/fdaa241

Altekruse, S. F., Cosgrove, C. M., Altekruse, W. C., Jenkins, R. A., & Blanco, C. (2020). Socioeconomic risk factors for fatal opioid overdoses in the United States: Findings from the Mortality Disparities in American Communities Study (MDAC). *PLoS ONE, 15*(1), Article e0227966. https://doi.org/10.1371/journal.pone.0227966

Alvarez-Galvez, J., Ortega-Martin, E., Carretero-Bravo, J., Perez-Munoz, C., Suarez-Lledo, V., & Ramos-Fiol, B. (2023). Social determinants of multimorbidity patterns: A systematic review. *Frontiers in Public Health, 11*, Article 1081518. https://doi.org/10.3389/fpubh.2023.1081518

Aronson, I. D., Bennett, A. S., Ardouin-Guerrier, M. A., Rivera-Castellar, G., Gibson, B., Santoscoy, S., & Vargas-Estrella, B. (2022). How vaccine ambivalence can lead people who inject drugs to decline COVID-19 vaccination and ways this can be addressed: Qualitative study. *JMIR Formative Research, 6*(3), e35066. https://doi.org/10.2196/35066

Baillargeon, J., Polychronopoulou, E., Kuo, Y. F., & Raji, M. A. (2021). The impact of substance use disorder on COVID-19 outcomes. *Psychiatric Services, 72*(5), 578–581. https://doi.org/10.1176/appi.ps.202000534

Baltes, A., Akhtar, W., Birstler, J., Olson-Streed, H., Eagen, K., Seal, D., Westergaard, R., & Brown, R. (2020). Predictors of skin and soft tissue infections among sample of rural residents who inject drugs. *Harm Reduction Journal, 17*(1), 96. https://doi.org/10.1186/s12954-020-00447-3

Baum, M. K., Tamargo, J. A., Ehman, R. L., Sherman, K. E., Chen, J., Liu, Q., Mandler, R. N., Teeman, C., Martinez, S. S., & Campa, A. (2021). Heroin use is associated with liver fibrosis in the Miami Adult Studies on HIV (MASH) cohort. *Drug and Alcohol Dependence, 220*, Article 108531. https://doi.org/10.1016/j.drugalcdep.2021.108531

Baxter, S., Johnson, M., Chambers, D., Sutton, A., Goyder, E., & Booth, A. (2018). The effects of integrated care: A systematic review of UK and international evidence. *Bmc Health Services Research, 18*, Article 350. https://doi.org/10.1186/s12913-018-3161-3

Bazazi, A. R., Zelenev, A., Fu, J. J., Yee, I., Kamarulzaman, A., & Altice, F. L. (2015). High prevalence of non-fatal overdose among people who inject drugs in Malaysia: Correlates of overdose and implications for overdose prevention from a cross-sectional study. *International Journal of Drug Policy, 26*(7), 675–681. https://doi.org/10.1016/j.drugpo.2014.11.010

Bird, S. M., Parmar, M. K., & Strang, J. (2015). Take-home naloxone to prevent fatalities from opiate-overdose: Protocol for Scotland's public health policy evaluation, and a new measure to assess impact. *Drugs (Abingdon Engl), 22*(1), 66–76. https://doi.org/10.3109/09687637.2014.981509

Black, C. (2021). *Independent review of drugs: Phase two report*. U. Government. https://www.gov.uk/government/collections/independent-review-of-drugs-by-professor-dame-carol-black.

Byrne, C. J., Beer, L., Inglis, S. K., Robinson, E., Radley, A., Goldberg, D. J., Hickman, M., Hutchinson, S., & Dillon, J. F. (2022). Real-world outcomes of rapid regional hepatitis C virus treatment scale-up among people who inject drugs in Tayside, Scotland. *Alimentary Pharmacology & Therapeutics, 55*(5), 568–579. https://doi.org/10.1111/apt.16728

Byrne, C. J., Radley, A., Inglis, S. K., Beer, L., Palmer, N., Duc Pham, M., Allardice, K., Wang, H., Robinson, E., Hermansson, M., Semizarov, D., Healy, B., Doyle, J. S., & Dillon, J. F. (2022). Reaching people receiving opioid agonist therapy at community pharmacies with hepatitis C virus: An international randomised controlled trial. *Alimentary Pharmacology & Therapeutics, 55*(12), 1512–1523. https://doi.org/10.1111/apt.16953

Chan Carusone, S., Guta, A., Robinson, S., Tan, D. H., Cooper, C., O'Leary, B., de Prinse, K., Cobb, G., Upshur, R., & Strike, C. (2019). "Maybe if I stop the drugs, then maybe they'd care?"-Hospital care experiences of people who use drugs. *Harm Reduction Journal, 16*(1), 16. https://doi.org/10.1186/s12954-019-0285-7

Christie, B. (2021). Record drug deaths need radical response, says Scottish college. *BMJ, 372*, n593. https://doi.org/10.1136/bmj.n593

Coffin, P. O., & Sullivan, S. D. (2013). Cost-effectiveness of distributing naloxone to heroin users for lay overdose reversal. *Annals of Internal Medicine, 158*(1), 1–9. https://doi.org/10.7326/0003-4819-158-1-201301010-00003

Colledge, S., Larney, S., Peacock, A., Leung, J., Hickman, M., Grebely, J., Farrell, M., & Degenhardt, L. (2020). Depression, post-traumatic stress disorder, suicidality and self-harm among people who inject drugs: A systematic review and meta-analysis. *Drug and Alcohol Dependence, 207*, Article 107793. https://doi.org/10.1016/j.drugalcdep.2019.107793

Colledge, S., Leung, J., Larney, S., Peacock, A., Grebely, J., Hickman, M., Cunningham, E., Trickey, A., Stone, J., Vickerman, P., & Degenhardt, L. (2020). Frequency of injecting among people who inject drugs: A systematic review and meta-analysis. *International Journal of Drug Policy, 76*, Article 102619. https://doi.org/10.1016/j.drugpo.2019.102619

Colledge, S., Peacock, A., Leung, J., Larney, S., Grebely, J., Hickman, M., Cunningham, E., Trickey, A., Stone, J., Vickerman, P., & Degenhardt, L. (2019). The prevalence of non-fatal overdose among people who inject drugs: A multi-stage systematic review and meta-analysis. *International Journal of Drug Policy, 73*, 172–184. https://doi.org/10.1016/j.drugpo.2019.07.030

Coughlin, S. S. (1990). Recall bias in epidemiologic studies. *Journal of Clinical Epidemiology, 43*(1), 87–91. https://doi.org/10.1016/0895-4356(90)90060-3

Cox, A. L., El-Sayed, M. H., Kao, J. H., Lazarus, J. V., Lemoine, M., Lok, A. S., & Zoulim, F. (2020). Progress towards elimination goals for viral hepatitis. *Nature reviews*

Gastroenterology & hepatology, 17(9), 533–542. https://doi.org/10.1038/s41575-020-0332-6

Csete, J., Kamarulzaman, A., Kazatchkine, M., Altice, F., Balicki, M., Buxton, J., Cepeda, J., Comfort, M., Goosby, E., Goulao, J., Hart, C., Kerr, T., Lajous, A. M., Lewis, S., Martin, N., Mejia, D., Camacho, A., Mathieson, D., Obot, I., … Beyrer, C. (2016). Public health and international drug policy. *Lancet, 387*(10026), 1427–1480. https://doi.org/10.1016/S0140-6736(16)00619-X

Cullen, W., O'Brien, S., O'Carroll, A., O'Kelly, F. D., & Bury, G. (2009). Chronic illness and multimorbidity among problem drug users: A comparative cross sectional pilot study in primary care. *BMC Family Practice [Electronic Resource], 10*, 25. https://doi.org/10.1186/1471-2296-10-25

Cunningham, E. B., Wheeler, A., Hajarizadeh, B., French, C. E., Roche, R., Marshall, A. D., Fontaine, G., Conway, A., Valencia, B. M., Bajis, S., Presseau, J., Ward, J. W., Degenhardt, L., Dore, G. J., Hickman, M., Vickerman, P., & Grebely, J. (2022). Interventions to enhance testing, linkage to care, and treatment initiation for hepatitis C virus infection: A systematic review and meta-analysis. *The Lancet Gastroenterology and Hepatology, 7*(5), 426–445. https://doi.org/10.1016/S2468-1253(21)00471-4

de Leeuw, E. (2017). Engagement of sectors other than health in integrated health governance, policy, and action. *Annual Review of Public Health, 38*, 329–349. https://doi.org/10.1146/annurev-publhealth-031816-044309

Degenhardt, L., Charlson, F., Stanaway, J., Larney, S., Alexander, L. T., Hickman, M., Cowie, B., Hall, W. D., Strang, J., Whiteford, H., & Vos, T. (2016). Estimating the burden of disease attributable to injecting drug use as a risk factor for HIV, hepatitis C, and hepatitis B: Findings from the Global Burden of Disease Study 2013. *The Lancet Infectious Diseases, 16*(12), 1385–1398. https://doi.org/10.1016/S1473-3099(16)30325-5

Degenhardt, L., Webb, P., Colledge-Frisby, S., Ireland, J., Wheeler, A., Ottaviano, S., Willing, A., Kairouz, A., Cunningham, E. B., Hajarizadeh, B., Leung, J., Tran, L. T., Price, O., Peacock, A., Vickerman, P., Farrell, M., Dore, G. J., Hickman, M., & Grebely, J. (2023). Epidemiology of injecting drug use, prevalence of injecting-related harm, and exposure to behavioural and environmental risks among people who inject drugs: A systematic review. *The Lancet Global Health, 11*(5), e659–e672. https://doi.org/10.1016/S2214-109X(23)00057-8

ECDC. (2022). *Prevention of hepatitis B and C in the EU/EEA*. https://www.ecdc.europa.eu/sites/default/files/documents/Evidence%20brief%20hepatitis%20B%20and%20C.pdf.

Eeckhaut, M. C. W., Wagner, J., Neitzke-Spruill, L., Walker, R., & Anderson, T. L. (2020). Is the gender gap in overdose deaths (still) decreasing? An examination of opioid deaths in Delaware, 2013-2017. *Journal of Studies on Alcohol and Drugs, 81*(1), 68–73. https://doi.org/10.15288/jsad.2020.81.68

EMCDDA. (2019). *Take-home Naloxone*. Retrieved 06/06/2023 from https://www.emcdda.europa.eu/publications/topic-overviews/take-home-naloxone_en.

EMCDDA. (2021). *Drug-related deaths and mortality in Europe: Update from the EMCDDA expert network*. https://www.emcdda.europa.eu/system/files/publications/13762/TD0221591ENN.pdf.

Fairbairn, N., Wood, E., Stoltz, J. A., Li, K., Montaner, J., & Kerr, T. (2008). Crystal methamphetamine use associated with non-fatal overdose among a cohort of injection drug users in Vancouver. *Public Health, 122*(1), 70–78. https://doi.org/10.1016/j.puhe.2007.02.016

Falzon, D., Aston, E. V., Carver, H., Masterton, W., Wallace, B., Sumnall, H., Measham, F., Fletcher, E., Gittins, R., Priyadarshi, S., & Parkes, T. (2022). Challenges for drug checking services in Scotland: A qualitative exploration of police perceptions. *Harm Reduction Journal, 19*(1), 105. https://doi.org/10.1186/s12954-022-00686-6

Folch, C., Lorente, N., Majo, X., Pares-Badell, O., Roca, X., Brugal, T., Roux, P., Carrieri, P., Colom, J., Casabona, J., & group, R. s. (2018). Drug consumption rooms in Catalonia: A comprehensive evaluation of social, health and harm reduction benefits. *International Journal of Drug Policy, 62*, 24–29. https://doi.org/10.1016/j.drugpo.2018.09.008

Frandsen, B. R., Joynt, K. E., Rebitzer, J. B., & Jha, A. K. (2015). Care fragmentation, quality, and costs among chronically ill patients. *American Journal of Managed Care, 21*(5), 355–362. https://www.ncbi.nlm.nih.gov/pubmed/26167702.

Fridell, M., Backstrom, M., Hesse, M., Krantz, P., Perrin, S., & Nyhlen, A. (2019). Prediction of psychiatric comorbidity on premature death in a cohort of patients with substance use disorders: A 42-year follow-up. *BMC Psychiatry [Electronic Resource], 19*(1), 150. https://doi.org/10.1186/s12888-019-2098-3

Ghose, R., Cowden, F., Veluchamy, A., Smith, B. H., & Colvin, L. A. (2022). Characteristics of non-fatal overdoses and associated risk factors in patients attending a specialist community-based substance misuse service. *British Journal of Pain, 16*(4), 458–466. https://doi.org/10.1177/20494637221095447

Gledhill, R (2019). *What is the current evidence for the efficacy of drug consumption rooms?* P. H. England. https://transformdrugs.org/assets/files/PDFs/DrugConsumptionRoomsEvidenceBriefing20190329.pdf.

Goldenberg, S., Watt, S., Braschel, M., Hayashi, K., Moreheart, S., & Shannon, K. (2020). Police-related barriers to harm reduction linked to non-fatal overdose amongst sex workers who use drugs: Results of a community-based cohort in Metro Vancouver, Canada. *International Journal of Drug Policy, 76*, Article 102618. https://doi.org/10.1016/j.drugpo.2019.102618

Gozashti, M. H., Mohammadzadeh, E., Divsalar, K., & Shokoohi, M. (2014). The effect of opium addiction on thyroid function tests. *Journal of Diabetes & Metabolic Disorders, 13*(1), 5. https://doi.org/10.1186/2251-6581-13-5

Gudin, J. A., Laitman, A., & Nalamachu, S. (2015). Opioid Related Endocrinopathy. *Pain Medicine (Malden, Mass.), 16*(Suppl 1). https://doi.org/10.1111/pme.12926. S9-15.

Harm Reduction International. (2022). *The global state of harm reduction 2022*. https://hri.global/wp-content/uploads/2022/11/HRI_GSHR-2022_Full-Report_Final-1.pdf.

Harney, B. L., Brereton, R., Whitton, B., Pietrzak, D., Paige, E., Roberts, S. K., Birks, S., Saraf, S., Hellard, M. E., & Doyle, J. S. (2021). Hepatitis C treatment in a co-located mental health and alcohol and drug service using a nurse-led model of care. *Journal of Viral Hepatitis, 28*(5), 771–778. https://doi.org/10.1111/jvh.13487

Heidari, O., Genberg, B. L., Perrin, N., Dangerfield, D. T., 2nd, Farley, J. E., Kirk, G., & Mehta, S. H. (2022). Multimorbidity classes indicate differential patterns of health care engagement among people who inject drugs. *Journal of Substance Abuse Treatment, 142*, Article 108806. https://doi.org/10.1016/j.jsat.2022.108806

Hemkens, L. G., Contopoulos-Ioannidis, D. G., & Ioannidis, J. P. A. (2016). Routinely collected data and comparative effectiveness evidence: Promises and limitations. *Cmaj, 188*(8), E158–E164. https://doi.org/10.1503/cmaj.150653

Hickman, M., Dillon, J. F., Elliott, L., De Angelis, D., Vickerman, P., Foster, G., Donnan, P., Eriksen, A., Flowers, P., Goldberg, D., Hollingworth, W., Ijaz, S., Liddell, D., Mandal, S., Martin, N., Beer, L. J. Z., Drysdale, K., Fraser, H., Glass, R., … Hutchinson, S. J. (2019). Evaluating the population impact of hepatitis C direct acting antiviral treatment as prevention for people who inject drugs (EPIToPe) - a natural experiment (protocol). *BMJ Open, 9*(9), Article e029538. https://doi.org/10.1136/bmjopen-2019-029538

Hill, N. R., Fatoba, S. T., Oke, J. L., Hirst, J. A., O'Callaghan, C. A., Lasserson, D. S., & Hobbs, F. D. (2016). Global prevalence of chronic kidney disease - A systematic review and meta-analysis. *PLoS ONE, 11*(7), Article e0158765. https://doi.org/10.1371/journal.pone.0158765

Holland, A. (2020). An ethical analysis of UK drug policy as an example of a criminal justice approach to drugs: A commentary on the short film Putting UK Drug Policy into Focus. *Harm Reduction Journal, 17*(1), Article 97. https://doi.org/10.1186/s12954-020-00434-8

House of Commons Health and Social Care Committee. (2019). *Drugs policy*. https://publications.parliament.uk/pa/cm201919/cmselect/cmhealth/143/143.pdf.

ICARE4EU consortium. (2017). How to improve care for people with multimorbidity in Europe? *Policy Brief, 23*. http://www.icare4eu.org/pdf/PB_23.pdf.

Iversen, J., Wand, H., Kemp, R., Bevan, J., Briggs, M., Patten, K., Heard, S., & Maher, L. (2022). Uptake of COVID-19 vaccination among people who inject drugs. *Harm Reduction Journal, 19*(1), 59. https://doi.org/10.1186/s12954-022-00643-3

Jones, C. M., & McCance-Katz, E. F. (2019). Co-occurring substance use and mental disorders among adults with opioid use disorder. *Drug and Alcohol Dependence, 197*, 78–82. https://doi.org/10.1016/j.drugalcdep.2018.12.030

Joo, J. Y. (2023). Fragmented care and chronic illness patient outcomes: A systematic review. *Nursing Open, 10*(6), 3460–3473. https://doi.org/10.1002/nop2.1607

Kaberg, M., Edgren, E., Hammarberg, A., & Weiland, O. (2019). Hepatitis C virus (HCV) related liver fibrosis in people who inject drugs (PWID) at the Stockholm Needle Exchange - evaluated with liver elasticity. *Scandinavian Journal of Gastroenterology, 54*(3), 319–327. https://doi.org/10.1080/00365521.2019.1580764

Kushner, R., & Habraken, N. (2021). *Changing policies and addressing inequities: The health and wellbeing of people who use drugs*, 23/11/2021. CATIE. Retrieved 31/05/2023 from https://blog.catie.ca/2021/11/23/changing-policies-and-addressing-inequities-the-health-and-wellbeing-of-people-who-use-drugs/.

Lake, S., Hayashi, K., Milloy, M. J., Wood, E., Dong, H., Montaner, J., & Kerr, T. (2015). Associations between childhood trauma and non-fatal overdose among people who inject drugs. *Addictive Behaviors, 43*, 83–88. https://doi.org/10.1016/j.addbeh.2014.12.014

Langham, S., Wright, A., Kenworthy, J., Grieve, R., & Dunlop, W. C. N. (2018). Cost-Effectiveness of Take-Home Naloxone for the Prevention of Overdose Fatalities among Heroin Users in the United Kingdom. *Value in Health: The Journal of the International Society for Pharmacoeconomics and Outcomes Research, 21*(4), 407–415. https://doi.org/10.1016/j.jval.2017.07.014

Larney, S., Peacock, A., Mathers, B. M., Hickman, M., & Degenhardt, L. (2017). A systematic review of injecting-related injury and disease among people who inject drugs. *Drug and Alcohol Dependence, 171*, 39–49. https://doi.org/10.1016/j.drugalcdep.2016.11.029

Larney, S., Tran, L. T., Leung, J., Santo, T., Santomauro, D., Hickman, M., Peacock, A., Stockings, E., & Degenhardt, L. (2020). All-cause and cause-specific mortality among people using extramedical opioids A systematic review and meta-analysis. *JAMA Psychiatry, 77*(5), 493–502. https://doi.org/10.1001/jamapsychiatry.2019.4170

Lazarus, J. V., Villota-Rivas, M., Ryan, P., Buti, M., Grau-Lopez, L., Cuevas, G., Espada, J. L., Moron, W., Palma-Alvarez, R. F., Feld, J. J., & Valencia, J. (2023). Combined COVID-19 vaccination and hepatitis C virus screening intervention in marginalised populations in Spain. *Communications Medicine (London), 3*(1), 66. https://doi.org/10.1038/s43856-023-00292-y

Liu, Z., Jiang, Y., Yuan, H., Fang, Q., Cai, N., Suo, C., Jin, L., Zhang, T., & Chen, X. (2019). The trends in incidence of primary liver cancer caused by specific etiologies: Results from the Global Burden of Disease Study 2016 and implications for liver cancer prevention. *Journal of Hepatology, 70*(4), 674–683. https://doi.org/10.1016/j.jhep.2018.12.001

Lloyd, C. (2013). The stigmatization of problem drug users: A narrative literature review. *Drugs-Education Prevention and Policy, 20*(2), 85–95. https://doi.org/10.3109/09687637.2012.743506

Mackie, S., & Darvill, A. (2016). Factors enabling implementation of integrated health and social care: A systematic review. *British Journal of Community Nursing, 21*(2), 82–87. https://doi.org/10.12968/bjcn.2016.21.2.82

Malaguti, A., Byrne, C. J., Sani, F., Power, K., Eriksen, A., & Dillon, J. F. (2022). Drug network identification predicts injecting risk behavior among people who inject drugs on hepatitis C virus treatment in Tayside, Scotland. *Behavioral Medicine*. https://doi.org/10.1080/08964289.2022.2142501

Mallappallil, M., Sabu, J., Friedman, E. A., & Salifu, M. (2017). What do we know about opioids and the kidney? *International Journal of Molecular Sciences, 18*(1). https://doi.org/10.3390/ijms18010223

Marshall, A. D., Micallef, M., Erratt, A., Telenta, J., Treloar, C., Everingham, H., Jones, S. C., Bath, N., How-Chow, D., Byrne, J., Harvey, P., Dunlop, A., Jauncey, M., Read, P., Collie, T., Dore, G. J., & Grebely, J. (2015). Liver disease knowledge and acceptability of non-invasive liver fibrosis assessment among people who inject drugs in the drug and alcohol setting: The LiveRLife Study. *International Journal of Drug Policy, 26*(10), 984–991. https://doi.org/10.1016/j.drugpo.2015.07.002

Marshall, B. D., Milloy, M. J., Wood, E., Montaner, J. S., & Kerr, T. (2011). Reduction in overdose mortality after the opening of North America's first medically supervised safer injecting facility: A retrospective population-based study. *The Lancet, 377*(9775), 1429–1437. https://doi.org/10.1016/S0140-6736(10)62353-7

Mathers, B. M., Degenhardt, L., Bucello, C., Lemon, J., Wiessing, L., & Hickman, M. (2013). Mortality among people who inject drugs: A systematic review and meta-analysis. *Bulletin of the World Health Organization, 91*(2), 102–123. https://doi.org/10.2471/BLT.12.108282

McAuley, A., Aucott, L., & Matheson, C. (2015). Exploring the life-saving potential of naloxone: A systematic review and descriptive meta-analysis of take home naloxone (THN) programmes for opioid users. *International Journal of Drug Policy, 26*(12), 1183–1188. https://doi.org/10.1016/j.drugpo.2015.09.011

McDonald, R., & Strang, J. (2016). Are take-home naloxone programmes effective? Systematic review utilizing application of the Bradford Hill criteria. *Addiction, 111*(7), 1177–1187. https://doi.org/10.1111/add.13326

Moustaqim-Barrette, A., Dhillon, D., Ng, J., Sundvick, K., Ali, F., Elton-Marshall, T., Leece, P., Rittenbach, K., Ferguson, M., & Buxton, J. A. (2021). Take-home naloxone programs for suspected opioid overdose in community settings: A scoping umbrella review. *BMC Public Health [Electronic Resource], 21*(1), Article 597. https://doi.org/10.1186/s12889-021-10497-2

Muncan, B., Walters, S. M., Ezell, J., & Ompad, D. C. (2020). "They look at us like junkies": Influences of drug use stigma on the healthcare engagement of people who inject drugs in New York City. *Harm Reduction Journal, 17*(1), 53. https://doi.org/10.1186/s12954-020-00399-8

Murphy, J., & Russell, B. (2021). Police Officers' addiction frameworks and policy attitudes. *Addictive Behaviors, 122*, Article 107007. https://doi.org/10.1016/j.addbeh.2021.107007

Mwangi, C., Karanja, S., Gachohi, J., Wanjihia, V., & Nganga, Z. (2019). Depression, injecting drug use, and risky sexual behavior syndemic among women who inject drugs in Kenya: A cross-sectional survey. *Harm Reduction Journal, 16*, Article 35. https://doi.org/10.1186/s12954-019-0307-5

Nambiar, D., Stoove, M., & Dietze, P. (2014). A cross-sectional study describing factors associated with utilisation of GP services by a cohort of people who inject drugs. *BMC Health Services Research [Electronic Resource], 14*, 308. https://doi.org/10.1186/1472-6963-14-308

National Institute for Health and Clinical Excellence (NICE). (2007). *Drug misuse in over 16s: Psychosocial interventions*. Retrieved 12/12/2022 from https://www.nice.org.uk/guidance/cg51.

National Records of Scotland. (2019). *Drug-related deaths in Scotland in 2018*. https://www.nrscotland.gov.uk/files/statistics/drug-related-deaths/2018/drug-related-deaths-18-pub.pdf.

National Records of Scotland. (2020). *Drug-related deaths in Scotland in 2019*. N. R. o. Scotland. https://www.nrscotland.gov.uk/files/statistics/drug-related-deaths/2019/drug-related-deaths-19-pub.pdf.

National Records of Scotland. (2021). *Drug-related deaths in Scotland in 2020*. https://www.nrscotland.gov.uk/files/statistics/drug-related-deaths/20/drug-related-deaths-20-pub.pdf.

National Records of Scotland. (2022). *Drug-related deaths in Scotland in 2021*. https://www.nrscotland.gov.uk/files/statistics/drug-related-deaths/21/drug-related-deaths-21-report.pdf.

NEO360. (2020). *NEO360*. Retrieved 08/12/2022 from https://neo360.co/.

NHS Health Research Authority. (2013). *Defining Research: NRES guidance to help you decide if your project requires review by a Research Ethics Committee*. Retrieved 26/04/2023 from https://www.clahrc-eoe.nihr.ac.uk/wp-content/uploads/2014/04/defining-research.pdf.

NHS National Patient Safety Agency. (2007). *Defining research*. https://www.pi.nhs.uk/data/consent/NRES_leaflet_Defining_Research.pdf.

NHS Tayside. (2015). *Information Governance: Caldicott approval procedure*. NHS Tayside. http://taysidesequoia.com/wp-content/uploads/2020/07/Caldicott-application-process.pdf.

NICE. (2016). *Multimorbidity: Assessment, prioritisation and management of care for people with commonly occurring multimorbidity*. https://www.ncbi.nlm.nih.gov/pubmed/27683922.

Olsen, A., McDonald, D., Lenton, S., & Dietze, P. M. (2018). Assessing causality in drug policy analyses: How useful are the Bradford Hill criteria in analysing take-home naloxone programs? *Drug and Alcohol Review, 37*(4), 499–501. https://doi.org/10.1111/dar.12523

Oru, E., Trickey, A., Shirali, R., Kanters, S., & Easterbrook, P. (2021). Decentralisation, integration, and task-shifting in hepatitis C virus infection testing and treatment: A global systematic review and meta-analysis. *The Lancet Global Health, 9*(4), e431–e445. https://doi.org/10.1016/S2214-109X(20)30505-2

Pabayo, R., Alcantara, C., Kawachi, I., Wood, E., & Kerr, T. (2013). The role of depression and social support in non-fatal drug overdose among a cohort of injection drug users in a Canadian setting. *Drug and Alcohol Dependence, 132*(3), 603–609. https://doi.org/10.1016/j.drugalcdep.2013.04.007

Palayew, A., Razavi, H., Hutchinson, S. J., Cooke, G. S., & Lazarus, J. V. (2020). Do the most heavily burdened countries have the right policies to eliminate viral hepatitis B and C? *The Lancet Gastroenterology and Hepatology, 5*(10), 948–953. https://doi.org/10.1016/S2468-1253(20)30011-X

Palayew, A., Stumo, S. R., Cooke, G. S., Hutchinson, S. J., Jauffret-Roustide, M., Maticic, M., Harris, M., Metwally, A. M., Razavi, H., Lazarus, J. V., & Hep, C. S. G. (2020). The Hep-CORE policy score: A European hepatitis C national policy implementation ranking based on patient organization data. *PLoS ONE, 15*(7), Article e0235715. https://doi.org/10.1371/journal.pone.0235715

Peacock, A., Leung, J., Larney, S., Colledge, S., Hickman, M., Rehm, J., Giovino, G. A., West, R., Hall, W., Griffiths, P., Ali, R., Gowing, L., Marsden, J., Ferrari, A. J., Grebely, J., Farrell, M., & Degenhardt, L. (2018). Global statistics on alcohol, tobacco and illicit drug use: 2017 status report. *Addiction, 113*(10), 1905–1926. https://doi.org/10.1111/add.14234

Perez-Figueroa, R. E., Oser, C. B., & Malinowska, K. (2023). Access to naloxone in underserved communities. *BMJ, 381*, 894. https://doi.org/10.1136/bmj.p894

Polaris Observatory, H. C. V. C (2022). Global change in hepatitis C virus prevalence and cascade of care between 2015 and 2020: A modelling study. *The Lancet Gastroenterology and Hepatology, 7*(5), 396–415. https://doi.org/10.1016/S2468-1253(21)00472-6

Public Health Scotland. (2018). *Mental health and wellbeing (WEMWBS)*. Scottish Government. Retrieved 29/06/2023 from https://www.healthscotland.scot/health-topics/mental-health-and-wellbeing/wemwbs.

Radley, A., de Bruin, M., Inglis, S. K., Donnan, P. T., Hapca, A., Barclay, S. T., Fraser, A., & Dillon, J. F. (2020). Clinical effectiveness of pharmacist-led versus conventionally delivered antiviral treatment for hepatitis C virus in patients receiving opioid substitution therapy: A pragmatic, cluster-randomised trial. *The Lancet Gastroenterology and Hepatology, 5*(9), 809–818. https://doi.org/10.1016/S2468-1253(20)30120-5

Raus, K., Mortier, E., & Eeckloo, K. (2020). Challenges in turning a great idea into great health policy: The case of integrated care. *BMC Health Services Research, 20*(1). https://doi.org/10.1186/s12913-020-4950-z

Release. (2021). *On the 50th anniversary of the misuse of drugs act, cross-party MPs demand reform Of UK Drug Laws*. Retrieved 07/06/2023 from https://www.release.org.uk/50YearsOfFailure.

Royal Society for Public Health. (2016). *Taking a new line on drugs*. https://www.rsph.org.uk/about-us/news/stop-criminalising-drug-users.html.

Schnier, C., Wallace, L., Tempelton, K., Aitken, C., Gunson, R. N., Molyneaux, P., Mc, I. P., Povey, C., Goldberg, D., & Hutchinson, S. (2014). Use of laboratory-based surveillance data to estimate the number of people chronically infected with hepatitis B living in Scotland. *Epidemiology and Infection, 142*(10), 2121–2130. https://doi.org/10.1017/S0950268813003105

Scott, J. K., Taylor, D. M., & Dudley, C. R. K. (2018). Intravenous drug users who require dialysis: Causes of renal failure and outcomes. *Clinical Kidney Journal, 11*(2), 270–274. https://doi.org/10.1093/ckj/sfx090

ScottishGovernment. (2020). *Scottish index of multiple deprivation*. Retrieved 11/04/2023 from https://www.gov.scot/collections/scottish-index-of-multiple-deprivation-2020/.

Scottish Government. (2021a). *Medication Assisted Treatment (MAT) standards: Access, choice, support. Standard 10 Trauma Informed Care*. Retrieved 07/06/2023 from https://www.gov.scot/publications/medication-assisted-treatment-mat-standards-scotland-access-choice-support/pages/15/.

Scottish Government. (2021b). *Reset and Rebuild - sexual health and blood borne virus services: Recovery plan*. https://www.gov.scot/publications/reset-rebuild-recovery-plan-sexual-health-blood-borne-virus-services/pages/4/.

Scottish Government. (2021c). *Tackling the stigma of addiction*. Retrieved 07/06/2023 from https://www.gov.scot/news/tackling-the-stigma-of-addiction/.

Scottish Government. (2022). *National drugs mission plan: 2022-2026*. S. Government. https://www.gov.scot/publications/national-drugs-mission-plan-2022-2026/.

Scottish Government. (2023). *Drug deaths taskforce response: Cross government approach*. Retrieved 31/05/2023 from https://www.gov.scot/publications/drug-deaths-taskforce-response-cross-government-approach/.

Scottish Parliament Information Centre (SPICe). (2022). *Tackling drugs deaths and drug harm joint committee parliamentary debate*. https://www.parliament.scot/-/media/files/committees/criminal-justice-committee/tackling-drug-deaths-and-drug-harm-spice-briefing-paper.pdf.

Shorter, G. W., Harris, M., McAuley, A., Trayner, K. M., & Stevens, A. (2022). The United Kingdom's first unsanctioned overdose prevention site; A proof-of-concept evaluation. *International Journal of Drug Policy, 104*, Article 103670. https://doi.org/10.1016/j.drugpo.2022.103670

Speakman, E. M., Hillen, P., Heyman, I., Murray, J., Dougall, N., Aston, E. V., & McAuley, A. (2023). 'I'm not going to leave someone to die': Carriage of naloxone by police in Scotland within a public health framework: A qualitative study of acceptability and experiences. *Harm Reduction Journal, 20*(1), 20. https://doi.org/10.1186/s12954-023-00750-9

Strathdee, S. A., Abramovitz, D., Harvey-Vera, A., Vera, C. F., Rangel, G., Artamonova, I., Chaillon, A., Ignacio, C., Calderon, A., Martin, N. K., & Patterson, T. L. (2021). Prevalence and correlates of SARS-CoV-2 seropositivity among people who inject drugs in the San Diego-Tijuana border region. *PLoS ONE, 16*(11), Article e0260286. https://doi.org/10.1371/journal.pone.0260286

Taggart, F. S.-B., & Parkinson, J (2015). *Warwick-Edinburgh mental well-being scale (WEMWBS) user guide, version 2*. NHS Health Scotland.

Tayside Drug Death Review Group. (2017). *Drug deaths in Tayside, Scotland: 2016 Annual Report*. N. Tayside. https://www.nhstayside.scot.nhs.uk/OurServicesA-Z/PublicHealth/PROD_213564/index.htm.

Tayside Drug Death Review Group. (2022). *Drug deaths in Tayside, Scotland: 2021 Annual Report*. N. Tayside. https://www.nhstayside.scot.nhs.uk/OurServicesA-Z/PublicHealth/PROD_213564/index.htm.

Tennant, R., Hiller, L., Fishwick, R., Platt, S., Joseph, S., Weich, S., Parkinson, J., Secker, J., & Stewart-Brown, S. (2007). The Warwick-Edinburgh Mental Well-being

Scale (WEMWBS): Development and UK validation. *Health and Quality of Life Outcomes [Electronic Resource], 5*, 63. https://doi.org/10.1186/1477-7525-5-63

The Economist Intelligence Unit. (2020). *Assessing health system preparedness for multiple chronic conditions*. https://impact.economist.com/perspectives/sites/default/files/eiu_health_system_preparedness_final.pdf.

Tomko, C., Schneider, K. E., Rouhani, S., Urquhart, G. J., Nyeong Park, J., Morris, M., & Sherman, S. G (2022). Identifying pathways to recent non-fatal overdose among people who use opioids non-medically: How do psychological pain and unmet mental health need contribute to overdose risk? *Addictive Behaviors, 127*, Article 107215. https://doi.org/10.1016/j.addbeh.2021.107215

Treloar, C., Rance, J., Yates, K., & Mao, L. (2016). Trust and people who inject drugs: The perspectives of clients and staff of Needle Syringe Programs. *International Journal of Drug Policy, 27*, 138–145. https://doi.org/10.1016/j.drugpo.2015.08.018

UKHSA. (2013). *The Green Book: Immunisation against infectious disease*. UKHSA. https://www.gov.uk/government/collections/immunisation-against-infectious-disease-the-green-book.

UKHSA, P., PHS and PHW. (2023). *Shooting Up: Infections and other injecting-related harms among people who inject drugs in the UK. Data to end of 2021*. U. Government. https://www.gov.uk/government/publications/shooting-up-infections-among-people-who-inject-drugs-in-the-uk.

United Nations. (2019). *United Nations Chief Executives Board for Coordination. Second regular session of 2018—Summary of deliberations*. https://digitallibrary.un.org/record/3792232?ln=en.

van Draanen, J., Tsang, C., Mitra, S., Karamouzian, M., & Richardson, L. (2020). Socioeconomic marginalization and opioid-related overdose: A systematic review. *Drug and Alcohol Dependence, 214*, Article 108127. https://doi.org/10.1016/j.drugalcdep.2020.108127

van Draanen, J., Tsang, C., Mitra, S., Phuong, V., Murakami, A., Karamouzian, M., & Richardson, L. (2022). Mental disorder and opioid overdose: A systematic review. *Social Psychiatry and Psychiatric Epidemiology, 57*(4), 647–671. https://doi.org/10.1007/s00127-021-02199-2

van Santen, D. K., Schim van der Loeff, M. F., Cartier van Dissel, J., Martens, J. P. D., van der Valk, M., & Prins, M. (2018). High proportions of liver fibrosis and cirrhosis in an ageing population of people who use drugs in Amsterdam, the Netherlands. *European Journal of Gastroenterology & Hepatology, 30*(10), 1168–1176. https://doi.org/10.1097/MEG.0000000000001213

Vervoort, D., An, K. R., Elbatarny, M., Tam, D. Y., Quastel, A., Verma, S., Connelly, K. A., Yanagawa, B., & Fremes, S. E. (2022). Dealing with the epidemic of endocarditis in people who inject drugs. *Canadian Journal of Cardiology, 38*(9), 1406–1417. https://doi.org/10.1016/j.cjca.2022.06.004

Wang, Q. Q., Kaelber, D. C., Xu, R., & Volkow, N. D. (2021). COVID-19 risk and outcomes in patients with substance use disorders: Analyses from electronic health records in the United States. *Molecular Psychiatry, 26*(1), 30–39. https://doi.org/10.1038/s41380-020-00880-7

Winkelmann, J., Williams, G., Rijken, M., Polin, K., & Maier, C (2022). Chronic conditions and multimorbidity: Skill-mix innovations for enhanced quality and coordination of care. In C. Maier, M. Kroezen, R. Busse, & M. Wismar (Eds.), *Skill-mix innovation, effectiveness and implementation: Improving primary and chronic care* (pp. 152–220). Cambridge University Press. https://doi.org/10.1017/9781009031929.007.

World Health Organization. (2012). *Guidance on prevention of viral hepatitis B and C among people who inject drugs*. World Health Organization. https://www.who.int/publications/i/item/9789241504041.

World Health Organization. (2014). *WHO-UNODC "Stop Overdose Safely (S-O-S)" initiative*. Retrieved 06/06/2023 from https://www.who.int/initiatives/joint-unodc-who-programme-on-drug-dependence-treatment-and-care/S-O-S-initiative.

World Health Organization. (2021). *Opioid overdose*. Retrieved 06/06/2023 from https://www.who.int/news-room/fact-sheets/detail/opioid-overdose.

World Health Organization. (2023). *WHO SAGE Roadmap for prioritizing uses of COVID-19 vaccines*. https://www.who.int/publications/i/item/WHO-2019-nCoV-Vaccines-SAGE-Roadmap.

Yucel, E., Bearnot, B., Paras, M. L., Zern, E. K., Dudzinski, D. M., Soong, C. P., Jassar, A. S., Rosenfield, K., Lira, J., Lambert, E., Wakeman, S. E., & Sundt, T. (2022). Diagnosis and management of infective endocarditis in people who inject drugs: JACC state-of-the-art review. *Journal of the American College of Cardiology, 79*(20), 2037–2057. https://doi.org/10.1016/j.jacc.2022.03.349