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ORIGINAL ARTICLE

Outcomes following suicidal crisis among hazardous and harmful alcohol users in the Crisis Resolution Team

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ABSTRACT: *Despite associations between alcohol use and suicidal acts, little research measures prognoses of alcohol-using patients treated by Crisis Resolution Teams (CRTs), an intensive community-based intervention. We estimated the association of alcohol use amongst patients accepted following suicidal acts or ideation in four London-based Crisis Resolution Teams, with death-by-any-cause or recontact with crisis care. We analysed the electronic health records of 1615 CRT patients accepted following suicidal acts or ideation over 38 months, following STROBE guidelines. Using logistic regression we estimated the association of alcohol use (indicated by risk-assessment, AUDIT, or ICD-10 diagnosis) with death-or-recontact at (i) 30-days and (ii) 1-year after treatment start, adjusted for age, sex, ethnicity, psychiatric diagnosis, and severity of need. Hazardous, harmful, or dependent drinking was identified in 270 cases at baseline (16.7%); 73 (4.5%) were alcohol dependent. By 1-year, 622 patients (38.5%) had recontacted crisis care or died. After adjustment, alcohol use at a hazardous, harmful, or dependent level was not associated with increased odds of death-or-recontact at 30-days (AOR 1.17, 95%CI 0.73, 1.88) or 1-year (AOR 1.17, 95%CI 0.85, 1.60). Patients with hazardous, harmful, and dependent alcohol use are a small proportion of CRT patients, despite being more commonly encountered in emergency settings from which patients may be referred to CRTs, indicating a potential gap in provision. Those who are included in CRTs are not at increased risk*

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of death-or-recontact within 1 year of treatment, suggesting that their inclusion can work, at least in a sample with predominantly hazardous or harmful alcohol use.

KEY WORDS: *alcohol drinking, crisis intervention, mental disorders, suicide, treatment outcome.*

INTRODUCTION

Alcohol use is a risk factor for suicide and suicide attempts (Darvishi *et al*. 2015). There is little research about interventions that target suicidal behaviour in those with Alcohol Use Disorder (Hurzeler *et al*. 2021; Padmanathan *et al*. 2020). Whilst generic crisis interventions such as Crisis Resolution Teams (CRTs) are effective in reducing patient suicides (Kapur *et al*. 2016), little evidence exists supporting their effectiveness in alcohol-using patients, and patients intoxicated at the time of presentation are often excluded from generic crisis pathways (Bendelow *et al*. 2019; Urban *et al*. 2020; Robins *et al*. 2021a,b).

Since 2002, CRTs have been implemented throughout England, providing intensive multidisciplinary mental health assessment and treatment delivered in the patient's home for those experiencing a mental health crisis, as an alternative to acute in-patient treatment. CRTs also facilitate earlier discharge for those in in-patient care. They receive referrals from any source, but commonly emergency departments, community mental health teams, or Health Based Places of Safety. CRTs are staffed by a multidisciplinary team including psychiatrists, psychiatric nurses, social workers, support workers, and sometimes psychologists and occupational therapists. They offer a 24-h, 7 day a week service, and daily home visits at the start of the CRT treatment episode, with visits several times a week in later weeks. Treatment is provided until the patient has recovered sufficiently to be transferred to lower intensity secondary care or primary care, typically within a month (Lloyd-Evans *et al*. 2020).

The CRT model has been refined over the past two decades, with the attention moving away from an exclusive focus on 'Severe Mental Illness' – that is, schizophrenia, bipolar disorder and severe depression – towards a transdiagnostic intervention providing acute care in the least restrictive environment wherever feasible (Hunt *et al*. 2014; McGarry 2019). Patients in suicidal crisis are now much more likely to be managed by CRTs than admitted to hospital (Kapur *et al*. 2016).

The original remit of CRTs focused purely on patients with Severe Mental Illness as a means of reducing in-patient admission. In the early policy documents setting out the remit of CRTs, patients with a primary diagnosis of alcohol or substance use disorder were explicitly excluded (Department of Health 2001). Recent CRT guidance has taken a more inclusive tone, recommending the delivery of brief alcohol interventions (Joint Commissioning Panel for Mental Health 2013) and provision of care for those with substance use disorder (Centre For Mental Health 2016). Although the extent and nature of structured support for alcohol use disorder provided within CRTs remains variable (Lloyd-Evans *et al*. 2018), it seems likely that alcohol use disorder is or will be an increasing feature of CRT caseloads.

Only three studies consider alcohol use within the CRT. A small study (n = 30) of people who had repeated episodes of CRT care in the UK found one patient with an ICD-10 diagnosis of alcohol dependence (Lunawat & Karale 2014). A wider study using data from 2003 to 2011 in England found that the 1256 CRT patients who died by suicide were less likely to be alcohol dependent (OR 0.4 95%CI 0.3, 0.6) or have a history of 'alcohol misuse' (OR 0.6 95%CI 0.6, 0.7) compared to deaths by suicide in the community by people not under the care of a CRT (Hunt *et al*. 2014). Most recently, a Dutch randomized controlled trial of 246 patients found no significant difference in mean AUDIT score (mean difference 0.72, P = 0.6) between patients who were hospitalized within 6 weeks of starting intensive home treatment (score 5.70) and those who were not (score 4.98). However, those with a primary diagnosis of any substance use disorder were excluded from the trial (Barakat *et al*. 2021).

This study aims to characterize the extent of alcohol use amongst a cohort of suicidal adult patients under the care of four London CRTs, and estimate the association of alcohol use, where used at a hazardous, harmful, or dependent level, with an adverse outcome – defined here as death or recontact with crisis care – up to a year following CRT treatment. Given the poor outcomes for alcohol-using patients in other community treatment settings (Parra-Uribe *et al*. 2017; Richards *et al*. 2020), we hypothesized that CRT patients

drinking alcohol in a hazardous, harmful, or dependent way will have a higher frequency of death or recontact with crisis care in the 30-days and 1 year following the start of their CRT treatment episode, relative to non-drinkers and low risk drinkers.

METHODS

Design and setting

This study uses electronic health record data from a cohort of suicidal patients receiving treatment under four CRTs, which are part of the South London and Maudsley (SLaM) NHS Trust. SLaM is the largest mental health care provider in Europe, serving a population of approximately 1.3 million (South London and Maudsley NHS Foundation Trust 2021). See Figure S1 in section i of supplementary material for diagram of the SLaM crisis care pathway.

Participants

All adults on the CRT caseload between 1st January 2016 and 28th February 2019 were eligible for inclusion. Treatment episodes from 1st January 2016 onwards were included as this was when the Acute Referral Centre – a 24-h central triage hub responsible for all acute assessments and admission decisions – became operational. Treatment episodes after 28th February 2019 were excluded to allow a year of follow-up prior to the impact of the Covid-19 pandemic on rates of mortality and service contact (Stewart *et al*. 2020).

Patients rejected at assessment were excluded. Patients are rejected for various reasons, including patients with severe alcohol dependence where in-patient medically assisted withdrawal may be required (National Institute for Health and Care Excellence (NICE) 2011). Complexity such as psychiatric comorbidity can also be a reason to consider in-patient medically assisted withdrawal (NICE 2011). However, alcohol dependence per se is not necessarily a reason for rejection. Episodes closed within one week were also excluded, as in previous CRT research (Lloyd-Evans *et al*. 2020; Soldini *et al*. 2021), as these typically represent immediate disengagement or discharge (summarized in supplementary material sections iii–v). Episodes closed and re-opened on the same day were treated as the same episode, as this was typically due to inter-borough transfer.

The index date for each episode was defined as the date of acceptance on to the caseload. Individuals were excluded if they did not have documented suicidal behaviour or risk of suicide in the 30 days prior to index date (see Measures); if they resided or moved outside of a SLaM borough in the year following their index date; or if they were referred to a CRT as part of facilitated discharge from in-patient care as admitted patients have a distinct clinical profile with a lower likelihood of recent alcohol use (Tulloch *et al*. 2014). Repeat episodes of the same individual were excluded to prevent bias via repeat measurement. See Figure 1 for application of exclusion criteria.

Data sources

The data used were drawn from information recorded in electronic health records by clinicians working in one of four SLaM CRTs. The SLaM Biomedical Research Centre Clinical Record Interactive Search (CRIS) data resource was used to extract anonymized data from electronic health records regarding clinical diagnosis, risks, demographics, and therapeutic contact. The design, operation and development of CRIS has been described elsewhere (Perera *et al*. 2016). Table S1 in section ii of the supplementary material outlines details of the different CRIS fields from which each variable was derived.

Ethical approval

Ethical approval was granted via the Oxford C Research Ethics Committee, reference (08/H0606/71+5), which covers all uses of CRIS as an anonymized database for secondary analysis (Stewart *et al*. 2009). Specific approval from the CRIS oversight committee was approved under the project title 'Project 20-007: The profile of alcohol use in suicidal crisis (Home Treatment Team)'.

All patient identifiable information was removed prior to use by the CRIS application, including patient names, and family or friends' names. All data remained within the NHS firewall during analysis. Patients who had not consented for their anonymized data to be used for research purposes were not included in the data extraction.

Measures

For each variable the record closest to the index date was used, from within a permitted window of up to 30 days prior to index, to 2 days after. This timespan was chosen as it captured most of the available records whilst still providing information that was likely representative of the patient's presentation at the index date.

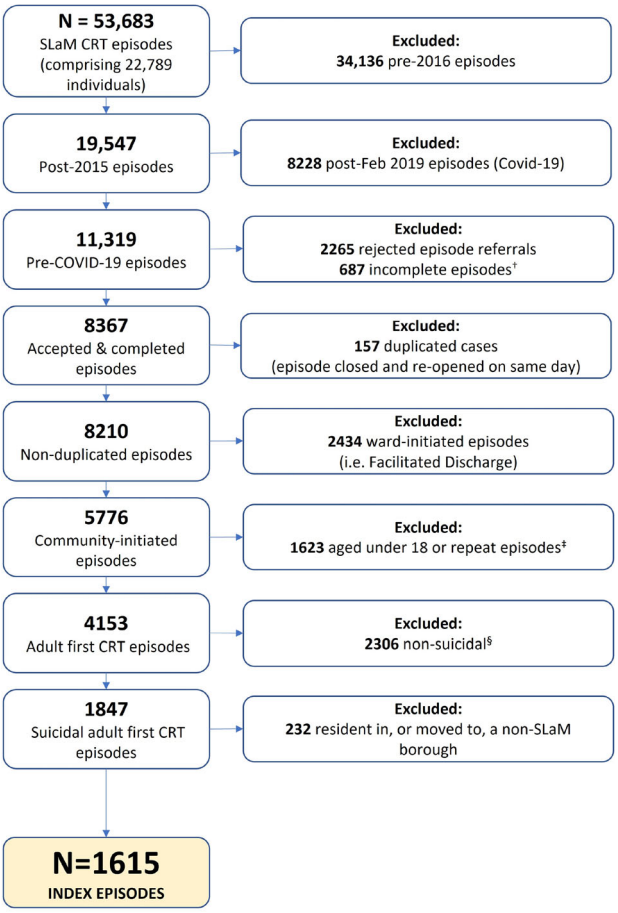

FIG. 1 Application of exclusion criteria to dataset. †Comprised of 665 episodes closed within one week, and 22 episodes open at point of data extraction. ‡Exact count of cases aged <18 suppressed to prevent risk of de-anonymization. §Suicidal cases defined as any case meeting one or more of the following criteria: Referral reason or presentation reason recorded as 'Self-harm/Suicide'; HoNOS Non-accidental self-injury item score of 3 or 4; Risk event related to attempted suicide or deliberate self-harm; Risk assessment answer of 'Yes' to either or both items 'Has the patient made a plan to end his/her life?' or 'Is the patient expressing suicidal ideation?'; Risk tool rating of 'Yes' to self-harm/suicide risk; Primary or secondary ICD-10 intentional self-harm diagnosis code (x60-x84) recorded within 30 days prior to index.

The 2-day post-index window was included as SLaM clinical governance audit standards set a 48-h limit on entry of clinical information into electronic health records following entry to the CRT caseload.

Cohort definition: Suicidality

Patients were deemed to be suicidal if they met any of the following criteria:

- Referral or presentation reason recorded as 'Self-harm/Suicide'
- Health of the Nation Outcome Scales (HoNOS) *Non-accidental self-injury* item score of 3 (moderately severe problem) or 4 (severe to very severe problem; McClelland *et al*. 2000; Wing *et al*. 1998).
- Recorded risk event related to attempted suicide or deliberate self-harm
- Risk assessment answer of 'Yes' to either or both items 'Has the patient made a plan to end his/her life?' or 'Is the patient expressing suicidal ideation?'.
- Risk tool rating of 'Yes' to self-harm/suicide risk.
- Primary or secondary ICD-10 intentional self-harm diagnosis code (x60-x84) recorded within 30 days prior to index.

Exposure: Hazardous, harmful or dependent alcohol use

Patients were deemed to be using alcohol at a hazardous, harmful or dependent level if they met any of the following criteria:

- Risk assessment answer of 'Yes' to item 'Does the patient misuse alcohol?'
- Alcohol Use and Disorders Identification Test (AUDIT) total score >7, indicating a risk category of Hazardous drinking (score 8–15), Harmful drinking (score 16–19), or (Possible) dependence (score ≥ 20). The AUDIT is a ten-item self-report tool that screens for the spectrum of Alcohol Use Disorders, covering the domains of consumption, dependence symptoms, and consequences of alcohol use. It has been well validated across a range of clinical contexts (Babor *et al*. 2001).
- Any primary or secondary ICD-10 diagnosis within codes F10.1 (Harmful use of alcohol), F10.2 (Alcohol dependence), or F10.3–F10.7 (conditions consequent to alcohol dependence)

Outcome: Death or Recontact

The primary outcome of interest was all-cause mortality, or any recontact with SLaM emergency psychiatric care – a proxy for escalation of risk. Due to death being a rare event, mortality and recontact variables were collapsed into a composite endpoint, *Death or Recontact*.

All-cause mortality was chosen rather than suicide-specific mortality as CRIS does not routinely provide cause of death information. Although obtaining cause-specific mortality information was theoretically feasible, the sample size and relatively small number of deaths meant that reporting cause-specific information could violate reporting restrictions for these data, designed to minimize risk of de-anonymization.

Recontact with emergency psychiatric care was defined as contact with any of the following:

- Acute Referral Centre, which receives all requests for psychiatric in-patient admission and CRT treatment, whether from the community or psychiatric consultation-liaison services within emergency departments
- SLaM centralized Place of Safety, which receives those detained under the Mental Health Act (1983, updated 2007).
- Consultation-Liaison Psychiatry Teams, which assess individuals who attend or are admitted to acute hospitals in psychiatric crisis.

Two variables were derived: *Death or Recontact within 30 days of index*, and *Death or Recontact within 1 year of index*. Recontact events from within the first 2 days after index date were excluded to ensure clear temporal separation between exposure and outcome.

Covariates

Other variables included as covariates in the regression analysis were:

- age in years at index (a continuous variable)
- sex
- ethnicity (categorized into *White*, *Black*, and *Other*)
- Severity of need, according to tertile of total HoNOS score, that is, the total score across the 12 clinician-rated HoNOS scales used to measure clinical outcomes over the two weeks prior to the rating date (McClelland *et al*. 2000; Wing *et al*. 1998). The total score can be used as an aggregate measure of severity of psychopathology (Brooker *et al*. 2005).
- primary or secondary ICD-10 psychiatric diagnosis from within year prior to index (World Health Organization 2016), specifically:
  - F2x – Schizophrenia/psychotic disorders
  - F3x – Affective disorders
  - F6x – Personality disorders
  - F0x/F4x/F5x/F7x/F8x/F9x – Other psychiatric disorder (i.e. organic, anxiety, behavioural, developmental, or unspecified disorder)
  - F11 – F19 Substance Use Disorder (SUD) (excluding F17 tobacco)

Patient diagnoses are typically recorded up to the point of discharge in order to be informed by clinical assessment during the period of treatment and monitoring. Therefore, diagnoses recorded up to a month after index were included.

Analysis

All analyses were performed using R version 3.6.1 (R Core Team 2016).

Primary analysis

Descriptive analyses were conducted using means, standard deviations, counts and proportions as appropriate for variable type. Unadjusted associations with the outcome variable, *Death or Recontact within 1 year of index*, were conducted using *t*-tests, χ^2 tests or Fisher's exact test as appropriate.

For the primary analysis, multivariable binomial logistic regression was used to model the association between alcohol use at a hazardous, harmful, or dependent level and a composite outcome: *Death or Recontact*. Two models were fitted to estimate the association within two periods: (i) within 30 days and (ii) within 1 year. We adjusted for age, sex, ethnicity, severity of

need using HoNOS tertiles, diagnosis of a non-alcohol Substance Use Disorder (SUD), and diagnosis of grouped psychiatric disorders (non-affective psychotic disorders, affective disorders, personality disorders, and other). Odds ratios, confidence intervals and *P*-values are reported for the exposure of interest and all covariates. No set threshold for statistical significance was applied; odds ratios, confidence intervals and *P*-values were all considered in assessing the magnitude and meaning of the results (Sterne & Smith 2001).

Missing data

Missing data were imputed using Multiple Imputation by Chained Equations, using the *mice* package (Van Buuren & Groothuis-Oudshoorn 2011) and following published guidance (Sterne *et al*. 2009; Van Buuren 2018). All exposures, outcomes, and covariates from the primary analysis were included in the imputation model in their original form (e.g. AUDIT score, Risk assessment, and alcohol-related diagnoses were imputed separately, rather than the composite *Hazardous, harmful, or dependent alcohol use*). A range of auxiliary variables were also included to assist the accuracy of the imputation model; see Table S3 in section VI of supplementary material for further details. The final imputation model contained 38 variables. Fifty imputed data sets were generated. Variable distributions were compared between observed and imputed data. Results from the analyses were combined using Rubin's rules (Rubin 1987; Van Buuren 2018).

Sensitivity analysis

The results of the primary analysis, which used multiple imputation to impute missing values, were compared with the results of a complete case analysis, which excluded any cases for which there were missing data in any of variables included in the primary regression model.

A further sensitivity analysis was conducted to examine the effect of departures from the Missing At Random assumption in the imputed alcohol-related variables (Van Buuren 2018). Two regression models were re-fit with amended data representing the extremes of possible deviation from the Missing At Random assumption, that is, all the imputed indicators comprising the *Hazardous, harmful, or dependent alcohol use* variable set to 'Yes' or 'No', respectively.

RESULTS

In the 38-month study period, 2280 individuals in suicidal crisis were treated by the CRTs. Seventy per cent (n = 1615) were on the caseload for 1 week or longer (median 26 days) and comprise the sample for this study. Evidence of alcohol use at a hazardous, harmful, or dependent level was observed in under 17% of the sample (n = 270). Of this group, 73 had indication of alcohol dependence, comprising just 4.5% of the sample. Patients with hazardous, harmful, or dependent alcohol use were more likely to be male, have white ethnicity, have a comorbid personality disorder, and have a higher tertile HoNOS score (Table 1). All variables except age and sex had missing data, and the proportion missing was particularly marked for the AUDIT (65%). The overall presence of missing data was not associated with the primary exposure (*Hazardous, harmful or dependent alcohol use*) or outcome (*Death or Recontact*).

In the first 30 days there were 144 recontacts with emergency psychiatric care, but fewer than 5 deaths. At 1 year, this rose to 599 recontact events (37.1%) and 23 (1.4%) deaths, with median time to death-or-recontact of 120 days.

In unadjusted analyses, *Hazardous, harmful, or dependent alcohol use*, white and black ethnicity, severity of psychopathology (HoNOS total score tertile), SUD diagnosis, and all psychiatric diagnoses except anxiety disorders, were associated with an adverse outcome. Sample characteristics and unadjusted associations with *Death or Recontact within 1 year* are shown in Table 2.

After adjustment for age, sex, ethnicity, diagnoses, and severity of psychopathology, *Hazardous, harmful, or dependent alcohol use* was not associated with *Death or Recontact within 30 days* (AOR 1.17, 95%CI 0.73, 1.88) (Table 3). However, increased odds of *Death or Recontact within 30 days* were associated with the presence of a past-year diagnosis of personality disorder (AOR 1.65, 95%CI 1.06, 2.58), and other psychiatric disorder (AOR 1.70, 95%CI 1.16, 2.48).

After adjustment for age, sex, ethnicity, diagnoses, and severity of psychopathology (HoNOS tertile), *Hazardous, harmful, or dependent alcohol use* was not associated with *Death or Recontact within 1-year* (AOR 1.17, 95%CI 0.85, 1.60) (Table 4). However, increased odds of *Death or Recontact within 1-year* were associated with the presence of a past-year diagnosis of non-affective psychotic disorder (AOR 2.32, 95%CI 1.67, 3.24), personality disorder (AOR 1.71, 95%CI 1.26, 2.32), and other psychiatric disorder (AOR 1.29, 95% CI 1.02, 1.63). Higher severity of psychopathology (upper tertile of HoNOS score) was associated with approximately 50% higher odds of *Death or Recontact within 1 year*(AOR 1.57, 95%CI 1.18,2.08), with a

TABLE 1 *Clinical characteristics of CRT patient episodes ≥1 week* (n = *1615), stratified by* Hazardous, harmful, or dependent alcohol use. *Cells counts <5 suppressed to prevent risk of de-anonymization*

		Exposure: Hazardous, harmful, or dependent alcohol use				
		No		Yes		
Variable	Categories	*n*	%	*n*	%	*P*-value
Sex	Female	789	58.7	130	48.1	0.002
	Male	556	41.3	140	51.9	
Ethnicity	Asian	90	6.7	11	4.1	<0.001
	Black	309	23.0	38	14.1	
	Mixed race	55	4.1	13	4.8	
	White	614	45.7	164	60.7	
	Other or Not stated	162	12.0	25	9.3	
	Missing	115	8.6	19	7.0	
Discharge destination	GP	258	19.2	67	24.8	0.027
	CMHT	906	67.4	175	64.8	
	In-patient	84	6.2	7	2.6	
	Other	97	7.2	21	7.8	
Diagnosis: Psychotic disorder	Yes	241	17.9	37	13.7	0.081
Diagnosis: Affective disorder	Yes	592	44.0	108	40.0	0.139
Diagnosis: Anxiety disorder	Yes	292	21.7	51	18.9	0.256
Diagnosis: Personality disorder	Yes	189	14.1	65	24.1	<0.001
Diagnosis: Other psychiatric diagnosis	Yes	68	5.1	11	4.1	0.546
SUD diagnosis	Yes	61	4.5	26	9.6	0.002
Diagnosis: Missing	Yes	89	6.6	12	4.4	0.227
HoNOS total score tertile	Lower: [2,13)	494	36.7	78	28.9	<0.001
	Middle: [13,17)	381	28.3	75	27.8	
	Upper: [17,44]	288	21.4	93	34.4	
	Missing	182	13.5	24	8.9	
Death or Recontact within 30 days	Yes	115	8.6	31	11.5	0.157
Death or Recontact within 1 year	Yes	493	36.7	121	44.8	0.014

HAZARDOUS, HARMFUL OR DEPENDENT ALCOHOL USE = Presence of any of the following: 1. Risk assessment answer of 'Yes' to item 'Does the patient misuse alcohol?', 2. AUDIT total score >7, or a recorded risk category of at least 'Hazardous/Increasing risk', 3. Any primary or secondary ICD-10 diagnosis within codes F10.1 (Harmful use of alcohol), F10.2 (Alcohol dependence) or F10.3–F10.7 (conditions consequent to alcohol dependence).

AUDIT: Alcohol Use and Disorders Identification Test (Babor *et al*. 2001), CMHT: Community Mental Health Team, SUD = Substance Use Disorder, HoNOS: Health of the Nation Outcome Scales (McClelland *et al*. 2000; Wing *et al*. 1998)

Diagnosis = Any past-year primary or secondary ICD-10 diagnosis, categorized as follows: SUD diagnosis = Any F11 – F19 excluding F17 (tobacco); Psychotic disorders = F20 – F29: Schizophrenia, schizotypal, delusional, and other non-mood psychotic disorders; Affective disorders = F30 – F39: Mood (affective) disorders; Anxiety disorders = F40 – F49: Anxiety, dissociative, stress-related, somatoform and other nonpsychotic mental disorders; Personality disorders = F60 – F69: Disorders of adult personality and behaviour; Other psychiatric diagnosis = Any other Fx diagnosis.

similar, smaller effect observed for cases in the middle tertile (AOR 1.27, 95%CI 0.97,1.65).

Results from the complete case analyses (n = 652) did not differ substantially from the primary imputed analysis. Likewise, the analyses of the simulated Missing Not At Random datasets did not deviate substantially from the results of the primary imputed analysis, that is, under conditions where the imputed alcohol use indicators were set to all 'Yes' or all 'No'. (See supplementary material sections vii–xiv for full details and comparison).

DISCUSSION

Summary of findings

Among a sample of 1615 patients engaging with CRT care immediately following suicidal crisis, hazardous, harmful, or dependent alcohol use was not associated with increased odds of all-cause mortality or recontact with emergency psychiatric care, within the 30 days or 1 year after CRT treatment. These findings suggest that hazardous, harmful, or dependent alcohol users do

TABLE 2 *Descriptive statistics for CRT episodes ≥1 week* (n = *1615), displayed as number* (n) *and percentage (%) and stratified by outcome: Death or Recontact within 1 year. Cells counts <5 suppressed to prevent risk of de-anonymization*

				Outcome: Death or recontact within year		
				No	Yes	
Variable	Range	*n*	%	Mean (SD)	Mean (SD)	*P*-value
Age	18–77	1615	100	36.9 (12.8)	37.2 (13.5)	0.592

				Outcome: Death or Recontact within 1 year				
				No		Yes		
Variable	Categories	*n*	%	*n*	%	*n*	%	*P*-value
Sex	Female	919	56.9	588	58.7	331	53.9	0.064
	Male	696	43.1	413	41.3	283	46.1	
Ethnicity	Asian	101	6.3	60	6.0	41	6.7	0.005
	Black	347	21.5	196	19.6	151	24.6	
	Mixed race	68	4.2	36	3.6	32	5.2	
	White	778	48.2	463	46.3	315	51.3	
	Other or Not stated	187	11.6	135	13.5	52	8.5	
	Missing	134	8.3	111	11.1	23	3.7	
AUDIT risk category	Score zero	216	13.4	133	13.3	83	13.5	0.368
	Lower risk	207	12.8	140	14.0	67	10.9	
	Hazardous or Harmful[1]	87	5.4	54	5.4	33	5.4	
	Possible/dependence	50	3.1	28	2.8	22	3.6	
	Missing	1055	65.3	646	64.5	409	66.6	
F10.1 Diagnosis (Harmful use)	Yes	68	4.2	37	3.7	31	5.0	0.236
F10.2-7 Diagnosis (Dependent use)	Yes	27	1.7	10	1.0	17	2.8	0.013
HAZARDOUS, HARMFUL, OR DEPENDENT ALCOHOL USE INDICATED	Yes	270	16.7	149	14.9	121	19.7	0.014
SUD diagnosis	Yes	87	5.4	43	4.3	44	7.2	0.018
Diagnosis: Psychotic disorder	Yes	278	17.2	129	12.9	149	24.3	<0.001
Diagnosis: Affective disorder	Yes	700	43.3	479	47.9	221	36.0	<0.001
Diagnosis: Anxiety disorder	Yes	343	21.2	222	22.2	121	19.7	0.264
Diagnosis: Personality disorder	Yes	254	15.7	135	13.5	119	19.4	0.002
Diagnosis: Other psychiatric diagnosis	Yes	425	26.3	242	24.2	183	29.8	0.015
Diagnosis: Missing	Yes	101	6.3	64	6.4%	37	6.0	0.849
HoNOS Total score tertile	Lower: [2,13)	572	35.4	387	38.7	185	30.1	0.001
	Middle: [13,17)	456	28.2	281	28.1	175	28.5	
	Upper: [17,44)]	381	23.6	212	21.2	169	27.5	
	Missing	206	12.8	121	12.1	85	13.8	

HAZARDOUS, HARMFUL, OR DEPENDENT ALCOHOL USE = Presence of any of the following: 1. Risk assessment answer of 'Yes' to item 'Does the patient misuse alcohol?', 2. AUDIT total score >7, or a recorded risk category of at least 'Hazardous/Increasing risk'; 3. Any primary or secondary ICD-10 diagnosis within codes F10.1 (Harmful use of alcohol), F10.2 (Alcohol dependence), or F10.3–F10.7 (conditions consequent to alcohol dependence).

AUDIT: Alcohol Use and Disorders Identification Test (Babor *et al*. 2001); HoNOS: Health of the Nation Outcome Scales (McClelland *et al*. 2000; Wing *et al*. 1998); SUD: Substance Use Disorder.

Diagnosis = Any past-year primary or secondary ICD-10 diagnosis, categorized as follows: SUD diagnosis = Any F11 – F19 excluding F17 (tobacco); Psychotic disorders = F20 – F29: Schizophrenia, schizotypal, delusional, and other non-mood psychotic disorders; Affective disorders = F30 – F39: Mood (affective) disorders; Anxiety disorders = F40 – F49: Anxiety, dissociative, stress-related, somatoform and other nonpsychotic mental disorders; Personality disorders= F60 – F69: Disorders of adult personality and behaviour; Other psychiatric diagnosis= Any other Fx diagnosis.

[1]AUDIT risk categories 'Hazardous/Increasing risk' and 'Harmful/Higher risk' combined due to low cell counts in the latter.

not necessarily have a worse prognosis after accessing Crisis Resolution Team intervention, in contrast to findings following in-patient care or crisis assessment in general hospital settings, which do report worse outcomes for alcohol users (Bowden *et al*. 2018; Chai *et al*. 2013; Jiang *et al*. 2021). The proportion of

TABLE 3 *Estimates from the logistic regression model for Death or Recontact within 30 days, fitted to the imputed analysis of CRT episodes ≥1 week (1615 individuals)*

Variable	Category	AOR (95% CI)	*P*-value
Hazardous, harmful, or dependent alcohol use	No	Ref.	
	Yes	1.17 (0.73–1.88)	0.507
Age	–	1.00 (0.98–1.01)	0.738
Sex	Female	Ref.	
	Male	1.27 (0.88–1.82)	0.199
Ethnicity	White	Ref.	
	Black	0.74 (0.45–1.21)	0.230
	Other	0.81 (0.52–1.27)	0.362
F2 Psychotic disorder dx.	No	Ref.	
	Yes	1.33 (0.79–2.22)	0.281
F3 Affective disorder dx.	No	Ref.	
	Yes	0.85 (0.57–1.28)	0.443
F6 Personality disorder dx.	No	Ref.	
	Yes	1.65 (1.06–2.58)	0.027
Other psych. disorder dx. (incl. anxiety disorders)	No	Ref.	
	Yes	1.70 (1.16–2.48)	0.006
Substance Use Disorder	No	Ref.	
	Yes	1.05 (0.53–2.06)	0.893
HoNOS total score	Lower tertile	Ref.	
	Middle tertile	1.38 (0.89–2.14)	0.144
	Upper tertile	1.42 (0.89–2.26)	0.141

AOR: Adjusted Odds Ratio (adjusted for all variables in table); HoNOS: Health of the Nation Outcome Scales.

TABLE 4 *Estimates from the logistic regression model for Death or Recontact within 1-year, fitted to the imputed analysis of CRT episodes ≥1 week (1615 individuals)*

Variable	Category	AOR (95% CI)	*P*-value
Hazardous, harmful, or dependent alcohol use	No	Ref.	
	Yes	1.17 (0.85–1.60)	0.341
Age	-	1.00 (0.99–1.01)	0.720
Sex	Female	Ref.	
	Male	1.11 (0.89–1.38)	0.355
Ethnicity	White	Ref.	
	Black	1.07 (0.81–1.41)	0.651
	Other	0.79 (0.60–1.04)	0.097
F2 Psychotic disorder dx.	No	Ref.	
	Yes	2.32 (1.67–3.24)	<0.001
F3 Affective disorder dx.	No	Ref.	
	Yes	0.88 (0.69–1.13)	0.318
F6 Personality disorder dx.	No	Ref.	
	Yes	1.71 (1.26–2.32)	0.001
Other psych. disorder dx. (incl. anxiety disorders)	No	Ref.	
	Yes	1.29 (1.02–1.63)	0.037
Substance Use Disorder	No	Ref.	
	Yes	1.39 (0.88–2.19)	0.153
HoNOS total score	Lower tertile	Ref.	
	Middle tertile	1.27 (0.97–1.65)	0.080
	Upper tertile	1.57 (1.18–2.08)	0.002

AOR: Adjusted Odds Ratio (adjusted for all variables in table); HoNOS: Health of the Nation Outcome Scales.

patients with hazardous, harmful, or dependent alcohol use is small in our sample (16.7%); under half of that found in comparable samples from settings upstream in the crisis pathway, such as the emergency department or Place of Safety (Ness *et al*. 2015; Robins *et al*. 2021a).

Of the covariates, non-affective psychotic disorder was associated with more than double the odds of *Death or Recontact* over the following year, consistent with previous reports (Barakat *et al*. 2021; Hasselberg *et al*. 2013; Werbeloff *et al*. 2016). However, this is the first time an increased risk associated with personality disorder has been described, both in the short (30-day) and longer term (1 year). This is likely due to our focused sample comprising just those patients in suicidal crisis, as personality disorder is associated with a significantly elevated risk for suicide and recurrent suicidal behaviour (Doyle *et al*. 2016; Soloff *et al*. 2000).

Strengths

Despite the ubiquity of CRTs, this is the largest study to date to examine the impact of alcohol use on outcomes for CRT patients, and the first to focus on the prognosis of alcohol-using CRT patients in suicidal crisis. This study uses a comprehensive range of structured data to identify specifically a sample at risk of suicide and estimate the extent of hazardous, harmful, or dependent alcohol use therein. Aggregated evidence from multiple structured fields informed the identification of hazardous, harmful, or dependent alcohol use, and suicidal behaviour, thus mitigating the effect of any one source being missing. By including secondary, as well as primary diagnosis data we capture diagnoses that may have been subordinate to the primary diagnosis, but still clinically relevant.

Limitations

The main limitation of our study relates to missing data in the fields concerning alcohol use. We have attempted to mitigate this limitation using multiple imputation and have found no substantial differences between the imputed datasets and the complete case analysis. Our null findings may also reflect ascertainment bias related to gatekeeping, as CRTs may or may

not be referred patients presenting to emergency psychiatric settings – such as the Emergency Department – depending on their perceived suitability (Ness *et al*. 2015; Robins *et al*. 2021a).

All-cause mortality was combined with service-recontact into a single *Death or Recontact* outcome; a larger sample size would be required to estimate the association of hazardous, harmful or dependent alcohol use with mortality alone. Further, the low number of deaths in the sample means that reporting cause-specific deaths would undermine patient anonymity. It is possible that our outcome includes individuals who died for reasons entirely unrelated to suicidal intent. However, this is a relatively young sample (with mean age of under 40), all of whom were suicidal at baseline. Given that self-harm and previous suicide attempt are the biggest individual risk factors for death by suicide (Yoshimasu *et al*. 2008), it is reasonable to combine all-cause mortality with recontact with emergency psychiatric care as both represent clinically important and potentially avoidable adverse events that follow from an escalation of risk. Even if a death was not suicide-related, all premature deaths are of clinical importance, especially if associated with modifiable risk factors such as alcohol consumption.

Clinical implications

Our results imply that the needs of patients with hazardous, harmful, or dependent alcohol use can be met by CRT treatment, particularly the proportion with less severe alcohol use disorder. Further research is needed to establish how representative these patients in the CRT are of hazardous, harmful or dependent alcohol use in other crisis settings upstream of the CRT, to establish whether gatekeeping is diverting alcohol-using patients elsewhere. Stigma or therapeutic pessimism can serve as barriers to alcohol users accessing crisis pathways (Bendelow *et al*. 2019; Lombardo *et al*. 2019), and alcohol users often feel excluded from services after a suicidal crisis, despite national policies that call for inclusive services (Samaritans 2022) and substance misuse being explicitly ruled out as a legitimate reason to withhold psychological interventions (National Institute for Health Care and Excellence (NICE) 2022).

Particularly of note is the paucity of alcohol dependence in our sample (approximately 4.5%). This is perhaps unsurprising given that medically assisted withdrawal is likely necessary in this group and national guidance recommends that for patients with significant psychiatric comorbidity, consideration should be given to in-patient medically assisted withdrawal (National Institute for Health and Care Excellence (NICE) 2011) – although suicidality is not explicitly referred to. Our results do point to a potential treatment gap when considered in the light of research showing that patients who are intoxicated in association with a suicidal act are less likely to be admitted to a psychiatric in-patient unit following crisis assessment (Robins *et al*. 2021b). This is especially concerning given that alcohol dependence is associated with a two-fold increase in the odds of death or representation to crisis care following a suicidal act (Robins *et al*. 2021b).

CONCLUSION

This is the largest study to consider the relationship between alcohol use and patient outcomes among those treated by CRTs and the first to consider those in suicidal crisis specifically. With inclusive eligibility criteria being a priority for patients and policymakers alike (Wheeler *et al*. 2015), CRTs will continue to encounter patients who use alcohol. Our study suggests that hazardous or harmful alcohol use in suicidal patients accessing CRTs for at least a week does not increase odds of death or recontact with emergency care up to a year after the crisis.

RELEVANCE FOR CLINICAL PRACTICE

Hazardous, harmful or dependent alcohol use does not seem to be common among CRT patients, and alcohol dependence is largely absent, especially relative to prevalences reported in emergency department or Place of Safety settings. However, where it is found hazardous or harmful alcohol use does not appear to increase odds of death or recontact with crisis care, suggesting that CRT treatment may be appropriate for people with a mild to moderate Alcohol Use Disorder. Given CRTs are a common crisis intervention for suicidal crisis, the lack of alcohol dependence in our sample may also point to an unmet treatment need for this high-risk group.

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DATA AVAILABILITY STATEMENT

The ethical approval to access CRIS data (Oxfordshire Research Ethics Committee C (18/SC/0372)) requires the data to be stored behind an NHS firewall with access governed by a patient-led oversight committee. For this reason, the data cannot be made available in the manuscript, supporting information files or a public repository. However, subject to approval from the oversight committee, data access for research purposes is encouraged. Further information is available from cris.administrator@slam.nhs.uk.

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SUPPORTING INFORMATION

Additional Supporting Information may be found in the online version of this article at the publisher's website:

Figure S1. Diagram of patient journey through SLaM crisis care pathway

Figure S2. Lattice plot comparison of estimates from imputed and complete case analyses, outcome at 30 days.

Figure S3. Lattice plot comparison of estimates from imputed and complete case analyses, outcome at 1 year

Figure S4. Lattice plot: AORs for *Hazardous, harmful or dependent use of alcohol* across primary, complete case and MNAR sensitivity analyses, outcome at 30 days.

Figure S5. Lattice plot: AORs for *Hazardous, harmful or dependent alcohol use* across primary, complete case and MNAR sensitivity analyses, outcome at 1 year.

Table S1. Derivation of all variables extracted via CRIS

Table S2. Sample description of episodes of duration under 1 week

Table S3. Summary of all variables included in the multiple imputation model

Table S4. Sensitivity analysis results: Complete case regression, outcome at 30 days.

Table S5. Sensitivity analysis results: Complete case regression, outcome at 1 year

Table S6. Sensitivity analysis results: AORs and 95% CIs for primary, complete case and MNAR sensitivity analyses, outcome at 30 days.

Table S7. Sensitivity analysis results: AORs and 95% CIs for primary, complete case and MNAR sensitivity analyses, outcome at 1 year.