

Characteristics and risk of repeat suicidal ideation and self-harm in patients who present to Emergency Departments with suicidal ideation or self-harm: a prospective cohort study

Rachel L. Cripps MSc¹; Joseph F. Hayes PhD^{1,2}; Alexandra L. Pitman, PhD^{1,2}; David P.J. Osborn, PhD^{1,2}; Nomi Werbeloff, PhD^{1,2}

¹Division of Psychiatry, University College London, UK

²Camden and Islington NHS Foundation Trust, UK

Cripps et al (2020) *Journal of Affective Disorders*

<https://www.sciencedirect.com/science/article/pii/S0165032719315058?dgci=d=coauthor>

Corresponding author:

Nomi Werbeloff, PhD

Bar Ilan University

Ramat Gan, Israel

Nomi.werbeloff@biu.ac.il

Abstract

Background: Characteristics and outcomes of patients presenting to Emergency Departments (EDs) have been under-examined. This paper describes the characteristics and risk of repeat suicidality among patients presenting to EDs with 1) suicidal ideation and 2) self-harm, compared to 3) controls in mental health crisis.

Methods: The Clinical Record Interactive Search tool identified 2211 patients who presented to three London EDs with suicidal ideation or self-harm, and 1108 control patients. All patients received a full psychosocial assessment. Chi-squared tests examined group characteristics. Cox regression models assessed the risk of re-presentation with suicidal ideation or self-harm within one year.

Results: There were a higher proportion of females and individuals under the age of 25 in the self-harm group. Patients presenting with suicidal ideation or self-harm were more likely to be white, live in more deprived areas, and less likely to receive a psychiatric diagnosis within one year compared to controls. Risk of repeat suicidality within one year was 3-4 times higher in those with baseline suicidal ideation (adjusted HR=3.66, 95% CI 2.44-5.48) or self-harm (HR=3.53 95% CI 2.47-5.04) compared to controls.

Limitations: To be included patients needed to have a full psychosocial assessment. Incomplete records meant 21.4% of the sample was excluded. This will have introduced bias which might confound observed associations.

Conclusion: Individuals presenting with either suicidal ideation or self-harm have similar risk for re-presentation within one year. Both groups would benefit from personalised risk management plans and active follow-up to reduce the risk of repeat suicidal behaviour.

Keywords: Self-harm, suicidal ideation, emergency department, psychosocial assessment

Introduction

Self-harm is the term used in the United Kingdom to describe self-inflicted injury or poisoning, regardless of intent (Kapur et al., 2013), although terminology used internationally varies (Butler and Malone, 2013). Self-harm is highly prevalent within the UK, with substantial societal and individual costs (Sgobin et al., 2015; Tsiachristas et al., 2017). Each year in England there are approximately 200,000 cases of hospital-presenting self-harm (Geulayov et al., 2016), with estimates that 16% will repeat within a year (Carroll et al., 2014). A clinical iceberg is described of adolescent suicide, hospital-presenting self-harm, and self-harm in the community, with each level differing in terms of gender ratios and methods used (Geulayov et al., 2018; Hawton et al., 2012).

Suicidal ideation and self-harm are highly prevalent in men aged 20-24, and women aged 15-19 (WHO, 2014), but comparatively rare in older adults (Perry et al., 2012). Living in areas of socioeconomic deprivation increases attendance to emergency departments (EDs) for self-harm (Skegg, 2005). A systematic review of the international literature suggests that 84% of adults who self-harm meet diagnostic criteria for a psychiatric disorder; 49% are diagnosed with depression and anxiety, 44% with depression and substance misuse, and 6% with psychosis (Hawton et al., 2013). However, relatively few patients who present to hospital following self-harm are referred to mental health services, particularly in more deprived areas of the UK (Carr et al., 2016).

Predicting who will represent to EDs with self-harm and suicidal ideation after an index presentation is a challenge (Arias et al., 2016; Larkin et al., 2014), and re-presentation rates vary widely. The current study aims to compare patients presenting to EDs with self-harm or suicidal ideation with a control group who present to EDs for assessment of a mental health problem but with no suicidal ideation or self-harm. We aimed to assess their socio-demographic and clinical characteristics and compare outcomes (re-presentation to secondary mental health services with suicidal ideation or self-harm) within one year of index presentation to the ED.

Methods

Design and Setting

We conducted a prospective cohort study using data from the pseudonymised electronic health records of Camden & Islington NHS Foundation Trust (C&I FT) using the Clinical Record Interactive Search (CRIS) tool (Werbelloff et al., 2018). C&I FT is a large mental health provider serving a geographic catchment area of two inner-city London boroughs, and approximately 470,000 residents. The CRIS tool, developed by South London and Maudsley NHS Foundation Trust Biomedical Research Centre, consists of a series of data-processing pipelines which both structure and de-identify fields in the electronic health record, rendering effectively anonymized data from the full clinical record available at the researcher interface (Perera et al., 2016). The database contains clinical notes of over 120,000 mental health service users.

Ethical approval has been obtained from the NRES Committee East of England - Cambridge Central (14/EE/0177). Informed consent was not obtained as data were pseudonymised and use of the data approved by the NRES Committee, as detailed above.

Sample

We identified patients who presented to three London EDs served by C&I FT (Royal Free Hospital, Whittington Hospital, and University College London Hospital) between 2008 and 2014 with a psychiatric presentation. We only included patients where the ED presentation was their first contact with C&I FT and they had received a psychosocial assessment, which includes an assessment of suicidal behaviour and self-harm, within 10 days of their ED presentation. Patients were divided into three groups: patients presenting after acts of self-harm, patients presenting with suicidal ideation, and patients presenting for a mental health problem but without suicidal ideation or self-harm (control group). We then followed up these groups for one year.

A cohort of 4224 fulfilled inclusion criteria. We conducted a complete case analysis, excluding people with missing data on ethnicity (n=674, 15.5%), sex (n=1, <0.1%) and social deprivation (n=230, 5.3%). A final cohort of 3319 was included in the study (see Figure 1). The outcome of repeat suicidal ideation or self-harm (combined) was slightly more prevalent among those with missing data (10.4% vs 8.2%, p=0.026).

---Insert Figure 1 ---

Measures

Exposures - suicidal ideation and self-harm

We defined three exposure groups based on data pertaining to harm to self as recorded by clinicians using a structured field of tick-boxes in electronic risk assessment forms. Patients spanning two exposure categories (i.e. who had self-harmed and were expressing current suicidal ideation), were included in the self-harm group. Those with suicidal ideation but no self-harm presentation were included in the suicidal ideation group. Those presenting for an assessment of a mental health problem but with no mention of self-harm or suicidal ideation in their electronic risk assessment were included in the control group.

Previous research investigating the risk of repeat presentation after an index presentation for self-harm has tended to focus solely on self-harm as the exposure and outcome. Patients who present to A&E with suicidal ideation are an under-investigated group. We thus designed our analysis to investigate outcomes in three exposure groups: self-harm and suicidal ideation; suicidal ideation but no self-harm; neither (control group).

Clinical outcomes

The primary outcome was a re-presentation to C&I FT services with suicidal ideation or self-harm (combined outcome). Our outcome was a combined category of self-harm and suicidal ideation because we regarded both as markers for self-destructive distress. This was defined as individuals who had a new record of either of these experiences from 14 days to a year of their index ED attendance. We excluded re-presentations within 14 days of the index presentation in order to exclude instances associated with the index presentation (e.g. booked liaison reviews for follow-up).

Confounders

Based upon previous literature (Carroll et al., 2016; Larkin et al., 2014), we identified potentially predictive/confounding characteristics *a priori* and extracted data on sex, age, ethnicity, social deprivation, and psychiatric diagnosis. Social deprivation was measured using the Index of Multiple Deprivation (IMD) which estimates area-level social deprivation at the Lower Super Output Area (approximately 400 households) (Government, 2011). For the purposes of this study, social deprivation was divided into tertiles.

We identified ICD-10 psychiatric diagnoses assigned within the one year of follow-up, categorised as follows: disorders due to psychoactive substance use (F10-F19), psychotic

disorders (F20-F29), affective disorders (F30-F39), anxiety disorders (F40-F48), personality disorders (F60-F69), and other disorders (all other F codes).

Statistical Analysis

We used chi-squared tests to compare the distribution of socio-demographic variables (sex, age, ethnicity and social deprivation) and psychiatric diagnosis between the three groups. We then used Cox proportional hazard regression models to compare the risk of re-presentation with suicidal ideation or self-harm (combined) in the three groups. End of follow-up was defined as re-presentation to C&I FT services reporting self-harm or suicidal ideation, death, or a calendar year from index ED presentation (whichever came first). Three separate models were examined: (1) crude; (2) adjusted for sex, age, social deprivation and ethnicity; and (3) adjusted for sex, age, social deprivation, ethnicity and psychiatric diagnosis within a year of index presentation. The statistical significance level was set at $p < 0.05$. The maximum number of events recorded per patient was therefore one, and we did not consider subsequent repeat presentations. Age, sex, ethnicity, and social deprivation were adjusted for within the model, as was diagnosis. Data were analysed using SPSS 25 (IBM, 2017).

Results

Of the 3319 patients included in the study, 568 (17.1%) presented with suicidal ideation, 1643 (49.5%) presented with self-harm, and 1108 (33.4%) formed the control group.

Patient characteristics

The characteristics of the total sample are summarised in Table 1. Characteristics by index presentation are shown in Table 2. There were significant group differences on all variables. There were more females in the self-harm group (55.2%) than the suicidal ideation or control groups (43.1% and 49.6%, respectively). Similarly, individuals under the age of 25 were overrepresented in the self-harm group as compared to the other two groups (32.9% *versus* 21.0% in the suicidal ideation group and 22.7% in the control group). A third (31.3%) of patients in the control group lived within the most deprived areas, as compared to 35.0% of patients presenting with suicidal ideation and 33.7% of patients presenting with self-harm. There were more patients of white ethnic origin in the self-harm and suicidal ideation groups (70.3% and 68.9%, respectively) than in the control group (61.0%). The majority of patients (80.4%) in all three groups did not receive a psychiatric diagnosis, although there was a significantly higher proportion of patients diagnosed with psychotic disorder in the control group (9.8% *versus* 3.4% in the suicidal ideation group and 2.4% in the self-harm group), and more patients with personality disorder diagnoses in the self-harm group (2.3% *versus* 0.5% in the suicidal ideation group and 0.8% in the control group).

---see Table 1 ---

---see Table 2 ---

Repeat presentation of suicidal ideation and self-harm

The rate of re-presentation with suicidal ideation or self-harm in the control group was 3.69 (95% CI 2.72-4.99) per 100 person years at risk (PYAR). The rate of repeat presentation was higher in patients who had presented at baseline with suicidal ideation (11.87 per 100 PYAR, 95% CI 9.41-14.97) or self-harm (10.98 per 100 PYAR, 95% CI 9.52-12.65) (Table 2, Figure 2). Patients presenting with suicidal ideation or self-harm at baseline were 3-4 times more likely to have a repeat presentation within one year as compared to the control group (adjusted HR=3.66, 95% CI 2.44-5.48, and adjusted HR=3.53 95% CI 2.47-5.04, respectively; Table 2).

---see Table 3 ---

---see Figure 2 ---

Discussion

Main findings

This study used routinely collected electronic health records to examine the characteristics of patients who presented to EDs for the first time after acts of self-harm or suicidal ideation, and compare their risk of re-presentation to secondary mental health services within one year to that of a control group. Our study defines a vulnerable group who continue to experience distress due to suicidal ideation and injuries arising from self-harm. They also remain at theoretical risk of suicide (Carroll et al., 2014). Our study is novel because we followed up those presenting with both suicidal ideation and self-harm, whereas most UK studies have tended to focus solely on those presenting with self-harm (Ribeiro et al., 2016). Given the similarities in these two groups in their risks of repeat self-harm and suicidal ideation, self-harm researchers may have under-investigated those presenting with suicidal ideation, who warrant further clinical attention. This group features in 2018 NICE guidelines on preventing suicide in community and custodial settings (NICE, 2011) but interventional research on this group lags behind that for people who self-harm.

Findings in the context of other studies

We are unaware of other studies that have followed up patients presenting to EDs with suicidal ideation. Instead, such research has focussed primarily on patients presenting to EDs who have self-harmed, so we lack comparative data. Other studies have described the epidemiology of suicidal ideation in community settings. A prospective community-based study of young men in the United States found that risk of suicidal ideation increases with repeated experiences, such that the more years in which suicidal ideation was reported, the greater the risk was for a subsequent report of suicidal ideation (Kerr et al., 2008). This suggests, as in our study (albeit with only one year of follow-up and defined using a higher threshold of ED attendance with suicidal ideation), a need to intervene early on. World Mental Health Surveys data shows that past-year community prevalence of suicidal ideation is 2.0% for developed countries, that women in the community are more likely to report suicidal ideation than men (Borges et al., 2010), and that most people who feel suicidal, plan suicide or make a suicide attempt do not seek treatment (Bruffaerts et al., 2011). Given the adverse outcomes amongst those who are distressed enough to seek help, and the diverse reasons for not seeking help (i.e. not based merely on severity), we may need to do much more to address barriers to seeking formal support (Pitman and Osborn, 2011).

Patients presenting with self-harm in our study were more likely to be younger than those not having self-harmed, in keeping with the literature describing self-harm frequently beginning in adolescence (Moran et al., 2012; WHO, 2014). This finding is also in line with previous studies that have reported a low prevalence of self-harm in older adults (Perry et al., 2012). However, it remains unknown whether self-harm is less common per se in older adults, or whether they are less likely to present to EDs for reasons of mobility, concealment, or dissatisfaction with ED services.

Patients presenting with suicidal ideation or self-harm were more likely to be of white ethnic origin than those in the control group. Previous literature on the association between self-harm and ethnicity has been inconclusive. A review of this topic reported that rates of self-harm are higher in some non-white ethnic minority groups (Al-Sharifi et al., 2015), while other studies have found that those of White British ethnicity report the highest levels of suicidal ideation (Aschan et al., 2013). These ethnic differences may stem from actual differences in rates of suicidal ideation and self-harm or from differences in help-seeking behaviour and access to mental health services, and warrant further investigation.

Patients presenting with self-harm lived in areas with higher social deprivation than patients in the control group. This is in line with a recent review that concluded that there is a strong and positive association between area-level deprivation and suicidal behaviour (Cairns et al., 2017).

In our study the majority of patients presenting to EDs with suicidal ideation or self-harm did not receive a psychiatric diagnosis within the following year. This is in contrast to previous literature finding that 84% of adults who self-harm meet diagnostic criteria for a psychiatric disorder (Hawton et al., 2013). The rate of psychotic disorders was higher in the control group presenting to the ED for assessment of a mental disorder than in the other two groups. This is keeping with EDs being a common pathway into care for one third of patients experiencing first episode psychosis (Heslin et al., 2011).

A review of the literature suggests that 14-22% of people who present to health care services repeat self-harm within one year (Carroll et al., 2014). In the current study, the risk of re-presentation with suicidal ideation or self-harm (combined) within one year was 3-4 times higher in those with an index presentation of either suicidal ideation or self-harm, as compared to the control group. This adds to the body of evidence suggesting that prior suicidal ideation, suicide attempts and a history of non-suicidal self-harm are risk factors for repeat self-harming behaviour (Inagaki et al., 2015).

Strengths and Limitations

We used electronic health records to study outcomes of over 3000 individuals using ED services for mental health crises. The sample is representative of ED attenders in London and may generalise to other urban areas in the UK. However Camden and Islington are both densely populated, inner-city boroughs with high levels of deprivation, so our findings may not reflect service use in rural areas or settings outside the UK. Rather than using retrospective self-report measures, which would under-represent self-harm due to shame and recall bias, the current study overcame this limitation by using a prospective cohort design and extracting verified hospital records. This measure has been found to produce more valid and reliable reports of past self-harm than self-report measures (Mitchell et al., 2016).

Due to incomplete records, 21.4% of the sample was excluded from analyses, and this will have introduced bias in relation to ethnicity and social deprivation, which might confound the associations observed. Additionally, we did not include in this study individuals who self-harm but do not present to EDs, although they represent a substantial proportion of those who self-harm (Geulayov et al., 2018). This group, and those who feel suicidal in the community, are of interest because of the potential for risk escalation in the community, unknown to services. Additionally, some selection bias may be present as patients needed to have a full psychosocial assessment to be included in the study. The proportion of patients receiving a specialist psychosocial assessment varies in England from 22% to 88% (median 58%; IQR=48-70%) (Cooper et al., 2013). Our study therefore did not measure outcomes in a substantial and vulnerable sub-group of patients.

Conclusion

We found individuals presenting to London EDs with either suicidal ideation or self-harm at baseline had an increased but similar risk for re-presentation with suicidal ideation or self-harm within one year compared with controls. Given the similarity in their risk profiles, the lack of research investigating adverse outcomes among people with suicidal ideation, and the dearth of specific interventions for this group, further observational and interventional work is needed to reduce suicide and self-harm risk in those who are suicidal as well as those who self-harm. Such interventions should be offered to those presenting with suicidal ideation or self-harm. Future research should assess clinical outcomes over a longer duration to see if outcomes differ over time.

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Table 1. Socio-demographic and clinical characteristics of the total sample.

		Total sample (n=3319)
Sex	Male	1618 (48.8%)
	Female	1701 (51.3%)
Age	<25	911 (27.4%)
	25-44	1614 (48.6%)
	45-64	620 (18.7%)
	65+	174 (5.2%)
Ethnicity	White	2222 (67.0%)
	Asian/Asian British	209 (6.3%)
	Black/Black British	402 (12.1%)
	Mixed	103 (3.1%)
	Other	383 (11.5%)
Social deprivation	Q1 (least)	1112 (33.5%)
	Q2	1107 (33.4%)
	Q3 (most)	1100 (33.1%)
Diagnosis	None	2669 (80.4%)
	Substance misuse	106 (3.2%)
	Psychotic disorder	167 (5.0%)
	Affective disorder	188 (5.7%)
	Anxiety disorder	111 (3.3%)
	Personality disorder	50 (1.5%)
	Other	28 (0.8%)

^a Patients who received a psychosocial assessment in the ED but reported no suicidal ideation or self-harm

Table 2. Socio-demographic and clinical characteristics by index presentation

		Control^a (n=1108)	Suicidal Ideation (n=568)	Self-harm (n=1643)	X², p-value
Sex	Male	559 (50.5%)	323 (56.9%)	736 (44.8%)	26.54, p<0.001 ¹
	Female	549 (49.6%)	245 (43.1%)	907 (55.2%)	
Age	<25	252 (22.7%)	119 (21.0%)	540 (32.9%)	87.62, p<0.001 ²
	25-44	535 (8.3%)	299 (52.6%)	780 (47.5%)	
	45-64	226 (20.4%)	115 (20.2%)	279 (17.0%)	
	65+	95 (8.6%)	35 (6.2%)	44 (2.7%)	
Ethnicity	White	676 (61.0%)	391 (68.9%)	1155 (70.3%)	49.09, p<0.001 ³
	Asian/Asian British	76 (6.9%)	32 (5.6%)	101 (6.2%)	
	Black/Black British	176 (15.9%)	66 (11.6%)	160 (9.7%)	
	Mixed	30 (2.7%)	20 (3.5%)	53 (3.2%)	
	Other	150 (13.5%)	59 (10.4%)	174 (10.6%)	
Social deprivation	Q1 (least)	411 (37.1%)	181 (31.9%)	520 (31.7%)	10.15, p=0.038 ⁴
	Q2	350 (31.6%)	188 (33.1%)	569 (34.6%)	
	Q3 (most)	347 (31.3%)	199 (35.0%)	554 (33.7%)	
Diagnosis	None	840 (75.8%)	468 (82.4%)	1361 (82.8%)	103.93, p<0.001 ³
	Substance misuse	34 (3.1%)	19 (3.4%)	53 (3.2%)	
	Psychotic disorder	109 (9.8%)	19 (3.4%)	39 (2.4%)	
	Affective disorder	69 (6.2%)	35 (6.2%)	84 (5.1%)	
	Anxiety disorder	32 (2.9%)	20 (3.5%)	59 (3.6%)	
	Personality disorder	9 (0.8%)	3 (0.5%)	38 (2.3%)	
	Other	15 (1.4%)	4 (0.7%)	9 (0.6%)	

1 control ≠ suicidal ideation ≠ self-harm

2 self-harm ≠ control, self-harm ≠ suicidal ideation

3 control ≠ self-harm, control ≠ suicidal ideation

4 self-harm ≠ control

Table 3. Rates of representations with suicidal ideation or self-harm by index presentation

	Events	Follow-up time (person-years)	Rate (95% CI) per 100 person years at risk	Unadjusted (95% CI)	Adjusted* (95% CI)	Fully adjusted** (95% CI)
Control ^a	40	1084.5	3.69 (2.72-4.99)	1 [Reference]	1 [Reference]	1 [Reference]
Suicidal ideation	63	530.7	11.87 (9.41-14.97)	3.18 (2.14-4.73)	3.18 (2.13-4.74)	3.66 (2.44-5.48)
Self-harm	169	1539.4	10.98 (9.52-12.65)	2.98 (2.11-4.20)	3.11 (2.19-4.41)	3.53 (2.47-5.04)

^a Patients who received a psychosocial assessment in the ED but reported no suicidal ideation or self-harm

* Adjusted for sex, age, social deprivation and ethnicity

** Adjusted for sex, age, social deprivation, ethnicity and psychiatric diagnosis within a year of index presentation