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ORIGINAL RESEARCH

Psychiatric and psycho-social characteristics of suicide completers: a comprehensive evaluation of psychiatric case records and postmortem findings

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Objectives. To explore the demographic, psychosocial and clinical characteristics of individuals known to the mental health services, who died by probable suicide in the West of Ireland.

Methods. Postmortem reports between January 2006 and May 2012 detailed 153 individuals who died by probable suicide, 58 of whom attended the mental health services. Relevant socio-demographic and clinical data was extracted from individuals' lifetime case notes.

Results. Recurrent depressive disorder (44%) was the most common diagnosis and hanging the most common method of death (58%). Of individuals who died by hanging, 79% previously attempted suicide by the same method. For individuals with a documented history of depression, only 32% had antidepressants detected in their toxicology reports. Similarly, only one individual (20%) with schizophrenia had antipsychotics detected in their toxicology report.

Conclusions. Individuals who died by probable suicide, most commonly died by hanging and drowning; with previous attempts of hanging particularly prevalent in the group who subsequently died by hanging. At the time of death, less than one-third of individuals according to toxicology reports were taking the medication that was last prescribed to them by the mental health services suggesting a high rate of treatment non-concordance in individuals who died by probable suicide.

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Introduction

In Ireland, ~500 people (475–554) have died by suicide on an annual basis between 2001 and 2013, resulting in a suicide rate of 10.3–13.5 per 100 000 (http://www.nsrf.ie/statistics/suicide/; Central Statistics Office 2013), with ~4.5 times as many men dying by suicide over this time period, compared with women (http://www.nsrf.ie/statistics/suicide/). Internationally, Ireland has the eighth lowest rate of death by suicide out of 26 countries examined, based on 2013 data extracted from the World Health Organisation's Statistical Information System (http://www.who.int/whosis/en) for both males and females. However, within the 15–24-year age group, Ireland has the fourth highest rate of suicide with an average suicide rate of 15.4 per 100 000 (Health Service Executive 2012).

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Ascertaining putative causes for death by suicide have revealed a large array of potential risk factors. Psychological autopsy studies, on completed suicides have found that 60–90% of individuals, have suffered from a psychiatric illness before their death (Cavanagh *et al.* 2003), with mood disorders particularly prevalent (Bertolote *et al.* 2004; Fleischmann *et al.* 2005), although this is not a universal finding (Burgess *et al.* 2000). The abuse or dependence of alcohol and/or psycho-active substances (Rossow & Amundsen 1995; Johnsson & Fridell 1997; Bertolote *et al.* 2004; Schneider *et al.* 2005) and the presence of a personality disorder (particularly borderline personality disorder; Isomesta *et al.* 1996; Park *et al.* 2013) have also previously been highlighted as other putative diagnostic risk factors for suicide. A multitude of psychosocial factors have also been implicated in increasing the risk of suicide. Childhood traumas such as exposure to family violence (Reinhertz *et al.* 1995), the loss of a parent or separation of parental figures (Grossi & Violato 1992) and childhood sexual abuse (CSA; Dube *et al.* 2001), have been especially

implicated in this increased risk of suicide. However, caution is required with interpretation of this data, as several confounding factors including an increased risk of recurrent depressive disorder (Liu *et al.* 2012) and alcohol and psycho-active substance abuse (Maniglio 2011) may also be present in individuals who have experienced childhood trauma, which independently have been associated with an increased risk of suicide. In addition, epidemiological studies have suggested that genetic factors are a significant risk factor for suicide, independent of the presence of mental illness (Qin *et al.* 2002; Mann 2003).

Other commonly reported findings associated with completed suicide, include previous contact with mental health services and previous suicide attempts. Of individuals who die by suicide, 39–63% have had some contact with the mental health services previously (Luoma *et al.* 2002) with 24–32% of individuals having had contact in the year before their death (Evans 1994; Appleby *et al.* 1999).The period of time shortly after discharge from an acute in-patient mental health unit has also been identified on several occasions as a risk factor for suicide (Geddes *et al.* 1997; Hoyer *et al.* 2004) with the first 2 weeks following discharge identified as the period of greatest risk (Swinson *et al.* 2007). Studies evaluating self-harm in individuals who subsequently die by suicide, have demonstrated that 52–63% of individuals have had one or more episodes of self-harm (Boardman *et al.* 1999; Houston *et al.* 2001).

For individuals who die by suicide, death by hanging has consistently been demonstrated as the most common method use (Burgess *et al.* 2000). Gender differences have been demonstrated, with hanging (Hunt *et al.* 2010) and use of firearms (Callanan & Davis 2012) more prevalent in men and self-poisoning more prevalent in women (Shen *et al.* 2006; Health Service Executive 2010).

In this study, we comprehensively investigate the demographic, psychosocial– and clinical characteristics of individuals who have died by probable suicide in the West of Ireland using in-depth postmortem reports and their entire psychiatric case records. We want to explore in particular, the individuals' diagnoses, methods employed leading to their death, their previous rates of self-harm and suicidal ideation, their interaction with the mental health services, their toxicology status at the time of their death and any documented stressors in their life, particularly in their childhood.

Methods

We included all postmortem reports carried out in University College Hospital Galway (UCHG) between 1 January 2006 and 31 May 2012 (n = 1991). These postmortem reports were undertaken on individuals who died in three Health Service Executive (HSE) West regions [West Galway (including Galway city), East Galway and Roscommon]. The population of this region in 2011 was 314 718 (www.cso.ie). Approximately 10% of postmortem examinations from the East Galway region since January 2011 have not been carried out in UCHG. A senior psychiatrist (M.D./B.H.) and an advanced nurse practitioner (A.v.L.) jointly determined based on post-mortem records if individuals had died by 'probable suicide'. Postmortem reports included in-depth reports from the consultant pathologist, witness and police (garda) summaries and toxicology screens on all individuals. If uncertainty was present in relation to determining if an individual had died by suicide, a third senior clinician was consulted (M.D./B.H.) and consensus was attained. If doubt was present in relation to the possible cause of death (suicide/accidental death), a decision of accidental death was determined. Important considerations in determining if an individual had died by probable suicide included the method of death, the presence of a suicide note or other final acts, the toxicology screen (drug levels in the toxic range) and witness and police reports.

One hundred and eighty-one individuals were determined to have died by probable suicide based on the above screening mechanisms, with 153 individuals having resided in the HSE West region. We cross-checked each of these 153 individuals against the computer records of attendees (both in-patient and out-patient) of the three associated mental health services (West Galway Mental Health Services, East Galway Mental Health Services and Roscommon Mental Health Services) and ascertained that 58 individuals (38%) had previously had contact with the mental health services in at least one of these regions. The clinical case notes (all mental health records) were available for 57 of these individuals. All clinical notes were examined by both J.K. and B.H.

Recorded data from the postmortem reports included the method of death, the presence of a suicide note or any other 'final acts' and blood toxicology for alcohol, psycho-active substances and medication levels. Demographic and clinical data were attained from a comprehensive clinical note review. Demographic data collected included information in relation to gender, age, marital status, education level attained, socio-economic status, employment status, family structure and nationality. As demographic data could potentially change over time, we detail from the clinical notes the most recent employment status, socio-economic status and marital status. Clinical data recorded included the number of hospital admissions to the mental health services, psychiatric diagnoses, the date (where applicable) of most recent discharge from hospital and last attendance with the mental health services, the status of psychiatric admissions (formal/informal) and treatments received. Information in relation

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to any previous episodes of self-harm and suicidal ideation was carefully recorded. This included ascertaining the number of previous episodes of deliberate self-harm (DSH), the methods of self-harm, the perceived lethality of these episodes and any documented reports of suicidal ideation.

Other clinical data recorded included any known psycho-social stressors, childhood trauma, medical illnesses including chronic pain conditions, history of forensic difficulties and family history of psychiatric illness or suicide. Where possible, psychiatric diagnoses were based according to the International Classification of Mental and Behavioural Disorders 10 (ICD-10) diagnostic criteria from clinical note review and a diagnosis of personality disorder was only given if this was clearly reported with accompanying supportive symptomatology evident in the clinical notes. The treating consultant psychiatrist was contacted for clarification where uncertainty was present in relation to any clinical or demographic data, including ICD-10 diagnoses.

Ethical approval was attained before the commencement of this study from the Clinical Research Ethics Committee for Galway University Hospitals, and the ethics committees at St Brigid's Hospital, Ballinasloe, and Roscommon County Hospital, Roscommon.

Statistical analysis was performed using the Statistical Package for Social Sciences 20.0 for Windows (SPSS Inc., IBM, USA). We utilised the student *t*-test for parametric data and the χ^2-test or where there was a small sample size Fishers exact test for non-parametric data.

Results

The demographic and clinical characteristics of the 57 included individuals who died by probable suicide and who attended the mental health services in the HSE west regions of West Galway, East Galway and Roscommon are detailed in Table 1. In brief, the ratio of males to females was 4.2:1, the most common marital status was 'single' (47%), the most common employment status was 'unemployed' (58%). The lowest socio-economic class (SEC) SEC-V was most common (54%). The most common psychiatric diagnosis noted in the clinical records was recurrent depressive disorder or a major depressive episode (44%), followed by alcohol dependence syndrome or harmful use of alcohol (35%). Eight individuals (32%) with depression had comorbid alcohol dependence or harmful use of alcohol. Thirteen individuals (23%) suffered with chronic pain, with six of these individuals also describing a chronic medical illness. A history of childhood adversity was described in the case notes in 25 individuals (44%), with a history of CSA documented in 13 individuals (23%). Individuals with chronic pain (23%) had higher rates of childhood adversity compared with those without such a history (77% *v.* 34%, *df = 1, $p = 0.010$). Seventeen individuals (30%) had a past forensic history (either arrested by Gardai and/or prosecuted in court for a criminal offence).

Table 1. *Demographic and clinical characteristics of patients while attending the mental health services*

	n	%
Gender		
Male	46	80.7
Female	11	19.3
Marital status		
Single	27	47.4
Married	15	26.3
Divorced/separated	11	19.3
Widowed	3	5.3
Unknown	1	1.7
Employment status		
Unemployed	33	57.9
Employed	14	24.6
Retired	9	15.8
Unknown	1	1.7
Socio-economic status		
I	0	0.0
II	2	3.5
III	8	14.0
IV	15	26.3
V	31	54.4
Unknown	1	1.8
Medical health		
Chronic medical illness	15	26.3
Chronic pain	13	22.7
Principal axis I psychiatric diagnosis[a]		
Depressive illness	25	43.9
Anxiety disorder	6	10.5
Schizophrenia spectrum disorders	5	8.8
Bipolar disorder	3	5.3
Other[c]	3	5.3
No formal diagnosis	15	26.3
Psycho-active substance misuse		
Alcohol dependence or harmful use	20	35.1
Drug dependence	2	3.5
Personality disorders		
Borderine personality disorder	4	7.0
Antisocial personality disorder	2	3.5
Dependent personality disorder	2	3.5
Adverse childhood experiences[b]		
Occurrence of adverse experiences	25	43.9
Child sexual abuse	13	22.8
Parental loss or separation	10	17.5
Child physical abuse	7	12.3
Child verbal abuse	5	8.8

[a] Excludes alcohol or drug dependence or harmful use.

[b] Considerable co-morbidity between these groups.

[c] Includes one individual with anorexia nervosa, one individual with substance-induced psychosis and one individual with a diagnosis of an organic induced psychosis.

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Table 2. *Demographical and clinical factors at time of death*

	n	%
Age[a]		
18–34	17	29.8
34–55	22	38.6
55 +	18	31.6
Patient status		
Inpatient	1	1.8
Outpatient	32	56.1
Discharged	24	42.1
Duration before death since inpatient discharge (n = 40)		
<4weeks	8	20.0
4 weeks–3 months	5	12.5
3–12 months	4	10.0
1–5 years	12	30.0
5 years +	10	25.0
Inpatient	1	2.5
Duration before death of last psychiatric contact		
<2 weeks	15	26.3
2–4 weeks	5	8.8
4 weeks–3 months	7	12.3
3–6 months	5	8.8
6–12 months	3	5.2
> 12 months	14	24.6
>5 years	8	14.0
Method of death		
Hanging	33	58.0
Drowning	13	22.8
Overdose	7	12.3
Other[a]	4	6.9

[a] Other methods of death included gunshot and road traffic accident.

Demographic and clinical data attainable at the time of the individuals' death are detailed in Table 2. The mean age of individuals was 46.8 years (S.D. ± 17.4; range 18–85 years). Thirty-three (58%) individuals who died by probable suicide were still registered (actively attending) with one of the three mental health services at the time of their death. Twenty individuals (35% of the entire cohort and 61% of individuals actively attending the mental health services) had been in contact with the mental health services in the month before their death, with 15 of these individuals having had contact with the mental health services in the previous 2 weeks. Forty individuals (70%) had previously been admitted to a psychiatric unit. Of these, eight individuals (20%) had been discharged from an in-patient psychiatric unit within a month of their death.

The most commonly employed method of death was by hanging with 33 individuals (58%) dying by this method. The other methods employed in order of frequency were drowning, overdose, self-inflicted gunshot and crashing a vehicle at high speed (Table 3).

Table 3. *Previous suicide attempts and deliberate self-harm in patients who died by suicide*

Method of death	History of DSH		History of previous suicide attempt(s)		Method of death same as a previous method employed in a suicide attempt		Previous suicide attempts				
							Attempted hanging	Attempted drowning	Attempted overdose	Attempted cutting	Attempted poisoning	None
	n	%	*n*	%	*n*	%	*n* (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)
Hanging (n = 33)	8	24.2	23	69.7	11	33.3	11 (33.3)	3 (9.0)	14 (42.4)	3 (9.0)	5 (15.2)	10 (30.3)
Drowning (n = 13)	3	23.1	6	46.2	2	15.3	1 (7.7)	2 (15.3)	6 (46.2)	1 (7.7)	0 (0.0)	7 (53.8)
Overdose (n = 7)	1	14.3	6	85.7	5	14.3	1 (14.3)	1(14.3)	5 (71.4)	1 (14.3)	1 (14.3)	1 (14.3)
Other[a] (n = 4)	2	50.0	2	50.0	0	0.0	1 (25.0)	1 (25.0)	1 (25.0)	1 (25.0)	0 (0.0)	2 (50.0)
Total	14	24.6	37	64.9	18	31.6	14	7	26	6	6	20

DSH, deliberate self-harm.
[a] Three individuals died by gunshot and one by crashing a vehicle at high speed.

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Table 4. *Toxicology data obtained from postmortem reports*

	n	%
Alcohol level (mMol/l)		
0	34	60.7
1–79	9	16.1
80–199	7	12.5
> 200	6	10.7
Positive toxicology[a]		
Antidepressants	19	33.9
Benzodiazepines	16	28.6
Analgesics	9	16.1
Antipsychotics	7	12.5
Opiates	4	7.1
Mood stabilisers	4	7.1
Hypnotics	4	7.1
Cocaine	2	3.6
None	25	44.6

Toxicology data available for 56 individuals.

[a] Several individuals had positive toxicology for several substances.

At least one previous suicide attempt had been undertaken by 37 individuals (65%), with 11 individuals (19%) having three or more previous suicide attempts. Attempted overdose was the most common previous method of attempted suicide employed by individuals ($n = 26$, 46%), followed by attempted hanging ($n = 14$, 25%). Fourteen individuals had a previous documented attempted hanging, with 11 (79%) of these individuals subsequently dying by the same method. All individuals who had a documented history of chronic pain ($n = 13$) had at least one previous suicide attempt.

When we compared individuals who had three or more previous suicide attempts ($n = 11$) to those with two or less previous suicide attempts, adverse childhood experiences [$n = 8$ (73%) *v.* $n = 17$ (37%), df = 1, $p = 0.04$] and a forensic history [$n = 7$ (64%) *v.* $n = 10$ (22%), df = 1, $p = 0.01$] were more prevalent. No other demographic differences were evident between individuals with three or more previous suicide attempts compared with individuals with less than three attempts.

A history of DSH (without intent to end life) was present in 14 individuals (25%). Forty-three individuals (75%) had either a history of a suicide attempt or DSH. A documented history of suicidal ideation or 'suicide talk' was present in 40 individuals (70%). Eleven individuals (19%) had no previous documented history of suicidal ideation, DSH or suicide attempts.

The toxicology reports accompanying the postmortems are outlined in Table 4 and were available for 56 individuals. Thirty-four of these individuals (61%) had no ethanol detected in their blood at the time of postmortem. Antidepressants (34%) and benzodiazepines (29%) were the most prevalent medications detected on toxicology screening. For individuals with a documented history of depression ($n = 28$), only nine individuals had antidepressants (32%) detectable with toxicology screening. Only one of the five individuals with a diagnosis of schizophrenia had antipsychotic agents detectable on toxicology screening.

Discussion

In this study, we comprehensively evaluated the detailed lifelong clinical and psycho-social data available from the psychiatric case records and postmortem reports of 57 individuals who died by probable suicide who previously attended the mental health services. While several previous studies have examined data in the year before the date of an individuals' death (King *et al.* 2001; Deisenhammer *et al.* 2007), our data based on a comprehensive examination of the entirety of an individuals' psychiatric contact enabled us to identify several clinical characteristics throughout their lifetime of contact, which were potential risk factors for their later death by probable suicide.

Twenty-three per cent of individuals who died by probable suicide had contact with the mental health services in the year before their death (35 of the 153 individuals in the HSE-West region), which is consistent with some previous findings (Appleby *et al.* 1999; Ho 2003; Hunt *et al.* 2011), but lower than that found in a number of other European studies (Barraclough *et al.* 1974; Deisenhammer *et al.* 2007). Overall, 38% of individuals (58 of the 153 individuals in the HSE-West region) had some contact with the mental health services in their lifetime, which represents an identical figure to that ascertained by Luoma *et al.* (2002) in their review of 40 studies; however, they ascertained in their review a wide range of lifetime contact (39–63%) with more elderly individuals who died by suicide having less lifetime contact with the mental health services. We did not ascertain any association between the rates of lifetime contact with the mental health services and age in this study. One potential reason for the relatively low rate of lifetime contact with mental health services in this cohort is that many individuals with mental illness and particularly those suffering from affective or neurotic disorders in Ireland are treated in primary care and are consequently not referred to the mental health services. Thus, although individuals may not have had contact with a mental health service, many will have had contact with primary care services for mental health difficulties.

Our finding of a 4.2:1 male to female ratio of death by probable suicide is largely in line with previous research findings (Shen *et al.* 2006; Hepp *et al.* 2010), except for studies in China where some studies have

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demonstrated a greater preponderance of females dying by suicide (Ping QinMortensen 2001; Rebholz *et al.* 2011). Other socio-demographic features that were over-represented in individuals who died by probable suicide in this study, such as been single, unemployed and living alone are also consistent with previous research findings (Boardman *et al.* 1999; Burgess *et al.* 2000; Qin *et al.* 2003; Lee *et al.* 2008; Law *et al.* 2010).

A previous diagnosis of depression was present in almost half of the individuals that died by probable suicide according to their case records, which is in line with several European studies (Arsenault-Lapierre *et al.* 2004; Bertolote *et al.* 2004; Hunt *et al.* 2006; Hirokawa *et al.* 2012) but is in contrast to a number of Asian studies (Thong *et al.* 2008; Law *et al.* 2010) and a study in Australia (Burgess *et al.* 2000) that found psychotic disorders, such as schizophrenia the most prevalent diagnosis in individuals who died by suicide. Only five individuals (9%) in this study had a schizophrenia spectrum disorder. Alcohol or substance abuse disorders were the second most frequent diagnosis in this study, a finding, which is also consistent with a number of previous findings (Berglund & Ojehagen 1998; Pirkola *et al.* 2000). Thirty-two per cent of individuals with a diagnosis of depression in this study had a comorbid diagnosis of harmful use or dependence on alcohol. Previous studies have demonstrated that the co-occurrence of alcohol dependence or harmful use and major depressive episode is associated with an increased risk of suicide (Bartels *et al.* 2002; Dumais *et al.* 2005; Sher *et al.* 2005).

The commonest methods of death were hanging followed by drowning, which is consistent with several previous studies (Fushimi *et al.* 2005; Chen *et al.* 2009; Holmgren & Jones 2010; Huisman *et al.* 2010; Lin *et al.* 2010) including an Irish study (Casey *et al.* 2012). However, jumping from a height, noted in some previous studies as the most common method of death among individuals with mental illness (Gunnell & Nowers 1997; Beautrais 2007), was not a method employed in this study, and perhaps this reflects the geographical variation of method and corresponding perceived availability of such methods. A history of past suicide attempts has been long established as one of the strongest risk factors for eventual death by suicide (Gunnell & Frankel 1994; Harris & Barraclough 1997; Neeleman 2001). Similarly, 65% of our cohort had a past suicide attempt (and 75% had a history of either a suicide attempt or DSH) with overdose the most common method employed, accounting for almost half of all previous attempts, followed by hanging. Of the 14 individuals with a previous attempt of hanging; 11 subsequently died by this method; whereas individuals who subsequently died by other methods, rarely had a previous attempt of hanging. This suggests that a previous attempt of hanging may be an independent risk factor for death by hanging in the future, whereas attempted overdose was less associated with a subsequent similar method of death. This finding is consistent with a large Swedish cohort study, which evaluated if the method of attempted suicide predicted successful suicide during a follow-up period of 21–31 years (Runeson *et al.* 2010), with over 90% of individuals who used hanging in the 'index attempt' died by the same method. However, our numbers are relatively modest in relation to deaths by drug overdose, to draw any firm conclusions in relation to this hypothesis.

Individuals with three or more previous suicide attempts, were more likely to have a forensic history and a history of family disharmony; however, our numbers are too modest ($n = 11$) and so we are unable to infer any direct associations. In particular, although we did not ascertain an increased rate of individuals with a personality disorder in those who had three or more previous suicide attempts or who had a forensic history, no formal psychometric measures of personality disorder or impulsivity were routinely undertaken in this cohort.

A history of DSH, including self-harm with no intent to end one's life, is a well-recognised risk factor for future death by suicide (Boardman *et al.* 1999; Jenkins *et al.* 2002), with one-quarter of the cohort in this study having a history of DSH (with no intent to end their life). Previous studies have demonstrated that individuals with both a past history of a suicide attempt and a past history of DSH demonstrate more severe psychopathology (Guertin *et al.* 2001; Stanley *et al.* 2001; Muehlenkamp & Gutierrez 2007) and greater suicidal ideation (Stanley *et al.* 2001; Muehlenkamp & Gutierrez 2007) than those with a history of a suicide attempt alone.

Eight of the forty individuals (20%) who had a previous in-patient admission to a psychiatric unit, died by probable suicide within 4 weeks of discharge. This finding is consistent (albeit slightly lower) with other studies (Roy 1982; Yim *et al.* 2004; Sinclair *et al.* 2005; Thong *et al.* 2008). Over 40% of the in-patient cohort died by suicide within 1 year of discharge, which is again consistent but slightly lower than previous reports (Roy 1982; Hunt *et al.* 2006). The period after psychiatric in-patient discharge has consistently been demonstrated to be a period of increased risk of suicide (Geddes *et al.* 1997; Holley *et al.* 1998; King *et al.* 2001; Hoyer *et al.* 2004; Skeem *et al.* 2006; Karvonen *et al.* 2009), a finding corroborated by this study.

The presence of childhood adversity and in particular CSA (Dube *et al.* 2001) has previously been associated with increased rates of suicide. Here, 23% of individuals had a documented history of CSA. Given that individuals who attend mental health services are often not asked about CSA or are either reluctant or refuse to

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inform their treating clinician about previous childhood trauma or CSA (Read *et al.* 2006), it is very likely that 23% is an under-estimate of the actual rate of CSA in this group and tentatively supports previous reports of an association between CSA and completed suicide (Dube *et al.* 2001). Consistent with previous findings (Jones *et al.* 2009; Gonzalez *et al.* 2012), higher rates of childhood adversity were noted in individuals with chronic pain in adulthood.

Three quarters of this cohort had either no alcohol detectable or low levels of alcohol (<80 mmol/l) detectable by toxicology. Our figures of alcohol use prior to an individuals' death by probable suicide (39%) are similar to some previous studies which have noted that approximately one-third of individuals who died by suicide had alcohol consumed prior to their death (Cherpitel *et al.* 2004; Boenisch *et al.* 2010; Holmgren & Jones 2010). Only 11% of individuals in this study had high levels of alcohol (>200 mmol/l) detectable by toxicology. Thus, although alcohol can have a disinhibiting effect and increase the risk of someone attempting suicide (Borges & Rosovsky 1996), in this study the association between probable suicide and alcohol intoxication was not demonstrated.

According to the toxicology reports, one third of individuals with a diagnosis of depression had antidepressants detectable on postmortem. However, it is possible that some individuals had their treatment stopped by a health professional outside the mental health services rather than discontinuing their medication themselves. In relation to the cohort with schizophrenia, where it would be less likely that their medication would be discontinued by a health professional outside the mental health services (none had their medication discontinued by their treating mental health professional), only one individual (out of 5) had antipsychotic medication detectable at toxicology. It is thus likely that a large proportion of individuals with previous mental illness were non-concordant with their treatment prior to their death. There have been multiple studies demonstrating high rates of treatment non-concordance in individuals with mental health difficulties (Melartin *et al.* 2005; Cantrell *et al.* 2006; Akincigil *et al.* 2007; Sawada *et al.* 2009), with particularly high rates of treatment non-concordance in individuals suffering from schizophrenia (Hunt *et al.* 2006), with the Clinical Antipsychotic Trials of Intervention Effectiveness study outlining that only one-quarter of individuals after 18 months of treatment were concordant with their medication (Manschreck & Boshes 2007). Treatment non-concordance has previously been demonstrated to be associated with both increased rates of suicidal ideation (Qurashi *et al.* 2006) and suicide (Hawton *et al.* 2005; Ward *et al.* 2006). Our study tentatively supports these findings.

Limitations

There are a number of limitations with this study. First, our numbers are relatively modest, and thus caution is required with interpreting some of our findings. For example, only seven individuals died by drug overdose and thus determining if there is an association between death by overdose and previous methods of attempted suicide is not feasible. Second, almost 40% of the sample had no contact with the mental health services in the year before their death, and thus it is possible that they had mental health difficulties that either were unaddressed or were addressed by their general practitioner alone (without referral to the local mental health services). Third, no formal psychometric instruments were routinely administered to study participants. However, all diagnoses were based on ICD-10 diagnostic criteria, as documented in the clinical case notes, and were corroborated by the presence of documented symptoms of that diagnosis. The notes were comprehensively evaluated over several hours by two individuals including one experienced clinician (B.H.) and where uncertainty was present (no obvious diagnosis, multiple diagnoses present), the diagnosis or diagnoses was confirmed from their treating psychiatrist. A treating consultant psychiatrist who knew the individual who died by probable suicide was available for all individuals in this study. Fourth, although we distinguish between suicide attempts and DSH without an attempt to end one's life, caution is required with such a distinction on the basis of clinical notes alone. Finally, although we report that there were high rates of treatment non-concordance, it is possible that health professionals outside the mental health services discontinued individuals' medications, particularly if they had neurotic or affective disorders.

Conclusion

In this study, we comprehensively evaluated the detailed lifelong clinical and demographic data available from the psychiatric case records and postmortem reports of 57 individuals who died by probable suicide who previously attended the mental health services. Individuals who died by probable suicide, most commonly died by hanging and drowning; with previous attempts of hanging particularly prevalent in the group who subsequently died by hanging. The high rates of suicide attempts and/or DSH in this cohort emphasise the importance of the National clinical programme for the management of self-harm among individuals presenting to hospital emergency departments. High rates of childhood adversity were documented in the case notes of individuals who died by probable suicide. At the time of death, less than one-third of individuals according to toxicology reports were taking the

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medication that was last prescribed to them by the mental health services suggesting a high rate of treatment non-concordance in individuals who died by probable suicide.

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References

Akincigil A, Bowblis JR, Levin C, Walkup JT, Jan S, Crystal S (2007). Adherence to antidepressant treatment among privately insured patients diagnosed with depression. *Medical Care* **45**, 363–369.

Appleby L, Shaw J, Amos T, McDonnell R, Harris C, McCann K, Kiernan K, Davies S, Bickley H, Parsons R (1999). Suicide within 12 months of contact with mental health services: national clinical survey. *British Medical Journal* **318**, 1235–1239.

Arsenault-Lapierre G, Kim C, Turecki G (2004). Psychiatric diagnoses in 3275 suicides: a meta-analysis. *BMC Psychiatry* **4**, 37.

Barraclough B, Bunch J, Nelson B, Sainsbury P (1974). A hundred cases of suicide: clinical aspects. *The British Journal of Psychiatry* **125**, 355–373.

Bartels SJ, Coakley E, Oxman TE, Constantino G, Oslin D, Chen H, Zubritsky C, Cheal K, Durai UN, Gallo JJ, Llorente M, Sanchez H (2002). Suicidal and death ideation in older primary care patients with depression, anxiety, and at-risk alcohol use. *The American Journal of Geriatric Psychiatry* **10**, 417–427.

Beautrais A (2007). Suicide by jumping. *Crisis: The Journal of Crisis Intervention and Suicide Prevention* **28**, 58–63.

Berglund M, Ojehagen A (1998). The influence of alcohol drinking and alcohol use disorders on psychiatric disorders and suicidal behavior. *Alcoholism: Clinical and Experimental Research* **22** (Suppl. 7): 333S–345S.

Bertolote JM, Fleischmann A, De Leo D, Wasserman D (2004). Psychiatric diagnoses and suicide: revisiting the evidence. *Crisis* **25**, 147–155.

Boardman AP, Grimbaldeston AH, Handley C, Jones PW, Willmott S (1999). The North Staffordshire suicide study: a case-control study of suicide in one health district. *Psychological Medicine* **29**, 27–33.

Boenisch S, Bramesfeld A, Mergl R, Havers I, Althaus D, Lehfeld H, Niklewski G, Hegerl U (2010). The role of alcohol use disorder and alcohol consumption in suicide attempts – a secondary analysis of 1921 suicide attempts. *European Psychiatry* **25**, 414–420.

Borges G, Rosovsky H (1996). Suicide attempts and alcohol consumption in an emergency room sample. *Journal of Studies on Alcohol and Drugs* **57**, 543–548.

Burgess P, Pirkis J, Morton J, Croke E (2000). Lessons from a comprehensive clinical audit of users of psychiatric services who committed suicide. *Psychiatric Services* **51**, 1555–1560.

Callanan V, Davis M (2012). Gender differences in suicide methods. *Social Psychiatry and Psychiatric Epidemiology* **47**, 857–869.

Cantrell CR, Eaddy MT, Shah MB, Regan TS, Sokol MC (2006). Methods for evaluating patient adherence to antidepressant therapy: a real-world comparison of adherence and economic outcomes. *Medical Care* **44**, 300–303.

Casey P, Gemmell I, Hiroeh U, Fulwood C (2012). Seasonal and socio-demographic predictors of suicide in Ireland: a 22 year study. *Journal of Affective Disorders* **136**, 862–867.

Cavanagh JT, Carson AJ, Sharpe M, Lawrie SM (2003). Psychological autopsy studies of suicide: a systematic review. *Psychological Medicine* **33**, 395–405.

Central Statistics Office (2013). Vital statistics – Fourth Quarter and Yearly Summary, Central Statistics Office, Cork, 53.

Chen YY, Lee MB, Chang CM, Liao SC (2009). Methods of suicide in different psychiatric diagnostic groups. *Journal of Affective Disorders* **118**, 196–200.

Cherpitel CJ, Borges GL, Wilcox HC (2004). Acute alcohol use and suicidal behavior: a review of the literature. *Alcoholism: Clinical and Experimental Research* **28** (Suppl. 5): 18S–28S.

Deisenhammer EA, Huber M, Kemmler G, Weiss EM, Hinterhuber H (2007). Suicide victims' contacts with physicians during the year before death. *European Archives of Psychiatry and Clinical Neuroscience* **257**, 480–485.

Dube SR, Anda RF, Felitti VJ, Chapman DP, Williamson DF, Giles WH (2001). Childhood abuse, household dysfunction, and the risk of attempted suicide throughout the life span: findings from the adverse childhood experiences study. *Journal of the American Medical Association* **286**, 3089–3096.

Dumais A, Lesage AD, Lalovic A, Seguin M, Tousignant M, Chawky N, Turecki G (2005). Is violent method of suicide a behavioral marker of lifetime aggression? *The American Journal of Psychiatry* **162**, 1375–1378.

Evans J (1994). The health service contacts of 87 suicides. *Psychiatric Bulletin* **18**, 548–550.

Fleischmann A, Bertolote JM, Belfer M, Beautrais A (2005). Completed suicide and psychiatric diagnoses in young people: a critical examination of the evidence. *American Journal of Orthopsychiatry* **75**, 676–683.

Fushimi M, Sugawara J, Shimizu T (2005). Suicide patterns and characteristics in Akita, Japan. *Psychiatry and Clinical Neurosciences* **59**, 296–302.

Geddes JR, Juszczak E, O'Brien F, Kendrick S (1997). Suicide in the 12 months after discharge from psychiatric inpatient care, Scotland 1968–92. *Journal of Epidemiology and Community Health* **51**, 430–434.

Gonzalez A, Boyle MH, Kyu HH, Georgiades K, Duncan L, MacMillan HL (2012). Childhood and family influences on depression, chronic physical conditions, and their co-morbidity: findings from the Ontario child health study. *Journal of Psychiatric Research* **46**, 1475–1482.

Grossi V, Violato C (1992). Attempted suicide among adolescents: a stepwise discriminant analysis. *Canadian Journal of Behavioral Science* **24**, 410–413.

Guertin T, Lloyd-Richardson E, Spirito A, Donaldson D, Boergers J (2001). Self-mutilative behavior in adolescents who attempt suicide by overdose. *Journal of the American Academy of Child & Adolescent Psychiatry* **40**, 1062–1069.

Gunnell D, Frankel S (1994). Prevention of suicide: aspirations and evidence. *British Medical Joural* **308**, 1227–1233.

Gunnell D, Nowers M (1997). Suicide by jumping. *Acta Psychiatrica Scandinavica* **96**, 1–6.

Harris EC, Barraclough B (1997). Suicide as an outcome for mental disorders: a meta-analysis. *The British Journal of Psychiatry* **170**, 205–228.

Hawton K, Sutton L, Haw C, Sinclair J, Deeks JJ (2005). Schizophrenia and suicide: systematic review of risk factors. *The British Journal of Psychiatry* **187**, 9–20.

Hepp U, Ring M, Frei A, Rössler W, Schnyder U, Ajdacic-Gross V (2010). Suicide trends diverge by method: Swiss suicide rates 1969–2005. *European Psychiatry* **25**, 129–135.

Health Service Executive (2010). National Office for Suicide Prevention: Annual Report, 2010, Dublin.

Health Service Executive (2012). National Office for Suicide Prevention: Annual Report, 2012, Dublin.

Hirokawa S, Matsumoto T, Katsumata Y, Kitani M, Akazawa M, Takahashi Y, Kawakami N, Watanabe N, Hirayama M, Kameyama A, Takeshima T (2012). Psychosocial and psychiatric characteristics of suicide completers with psychiatric treatment before death: a psychological autopsy study of 76 cases. *Psychiatry and Clinical Neurosciences* **66**, 292–302.

Ho TP (2003). Psychiatric care of suicides in Hong Kong. *Journal of Affective Disorders* **76**, 137–142.

Holley HL, Fick G, Love EJ (1998). Suicide following an inpatient hospitalization for a suicide attempt: a Canadian follow-up study. *Social Psychiatry and Psychiatric Epidemiology* **33**, 543–551.

Holmgren A, Jones AW (2010). Demographics of suicide victims in Sweden in relation to their blood–alcohol concentration and the circumstances and manner of death. *Forensic Science International* **198**, 17–22.

Houston K, Hawton K, Shepperd R (2001). Suicide in young people aged 15–24: a psychological autopsy study. *Journal of Affective Disorders* **63**, 159–170.

Hoyer EH, Olesen AV, Mortensen PB (2004). Suicide risk in patients hospitalised because of an affective disorder: a follow-up study, 1973–1993. *Journal of Affective Disorders* **78**, 209–217.

Huisman A, van Houwelingen CAJ, Kerkhof AJFM (2010). Psychopathology and suicide method in mental health care. *Journal of Affective Disorders* **121**, 94–99.

Hunt IM, Kapur N, Robinson J, Shaw J, Flynn S, Bailey H, Meehan J, Bickley H, Burns J, Appleby L, Parsons R (2006). Suicide within 12 months of mental health service contact in different age and diagnostic groups: national clinical survey. *The British Journal of Psychiatry* **188**, 135–142.

Hunt IM, Swinson N, Palmer B, Turnbull P, Cooper J, While D, Windfuhr K, Shaw J, Appleby L, Kapur N (2010). Method of suicide in the mentally ill: a national clinical survey. *Suicide And Life Threatening Behaviour* **40**, 22–34.

Hunt IM, Windfuhr K, Swinson N, Shaw J, Appleby L, Kapur N (2011). Electroconvulsive therapy and suicide among the mentally ill in England: a national clinical survey. *Psychiatry Research* **187**, 145–149.

Isomesta ET, Henriksson MM, Heikkinen ME, Aro HM, Marttunen MJ, Kuoppasalmi KI, Lonnqvist JK (1996). Suicide among subjects with personality disorders. *The American Journal of Psychiatry* **153**, 667–673.

Jenkins GR, Hale R, Papanastassiou M, Crawford MJ, Tyrer P (2002). Suicide rate 22 years after parasuicide: cohort study. *British Medical Journal* **325**, 1155.

Johnsson E, Fridell M (1997). Suicide attempts in a cohort of drug abusers: a 5-year follow-up study. *Acta Psychiatrica Scandinavica* **96**, 362–366.

Jones GT, Power C, Macfarlane GJ (2009). Adverse events in childood and chronic widespread pain in adult life: results from the 1957 british birth cohort study. *Pain* **143**, 92–96.

Karvonen K, Hakko H, Koponen H, Meyer-Rochow VB, Rasanen P (2009). Suicides among older persons in Finland and time since hospitalization discharge. *Psychiatric Services* **60**, 390–393.

King EA, Baldwin DS, Sinclair JM, Baker NG, Campbell MJ, Thompson C (2001). The Wessex Recent In-Patient Suicide Study, 1. Case-control study of 234 recently discharged psychiatric patient suicides. *The British Journal of Psychiatry* **178**, 531–536.

Law YW, Wong PW, Yip PS (2010). Suicide with psychiatric diagnosis and without utilization of psychiatric service. *BMC Public Health* **10**, 431.

Lee HC, Lin HC, Liu TC, Lin SY (2008). Contact of mental and nonmental health care providers prior to suicide in Taiwan: a population-based study. *The Canadian Journal of Psychiatry* **536**, 377–383.

Lin JJ, Chang SS, Lu TH (2010). The leading methods of suicide in Taiwan, 2002-2008. *BMC Public Health* **10**, 480.

Liu RT, Jager-Hyman S, Wagner CA, Alloy LB, Gibb BE (2012). Number of childhood abuse perpetrators and the occurrence of depressive episodes in adulthood. *Child Abuse and Neglect* **36**, 323–332.

Luoma JB, Martin CE, Pearson JL (2002). Contact with mental health and primary care providers before suicide: a review of the evidence. *The American Journal of Psychiatry* **159**, 909–916.

Maniglio R (2011). The role of child sexual abuse in the etiology of suicide and non-suicidal self-injury. *Acta Psychiatrica Scandinavica* **124**, 30–41.

Mann JJ (2003). Neurobiology of suicidal behaviour. *Nature Reviews of Neuroscience* **4**, 819–828.

Manschreck TC, Boshes RA (2007). The CATIE schizophrenia trial: results, impact, controversy. *Harvard Review of Psychiatry* **15**, 245–258.

Melartin TK, Rytsala HJ, Leskela US, Lestela-Mielonen PS, Sokero TP, Isometsa ET (2005). Continuity is the main challenge in treating major depressive disorder in psychiatric care. *Journal of Clinical Psychiatry* **66**, 220–227.

Muehlenkamp JJ, Gutierrez PM (2007). Risk for suicide attempts among adolescents who engage in non-suicidal self-injury. *Archives of Suicide Research* **11**, 69–82.

https://doi.org/10.1017/ipm.2014.47 Published online by Cambridge University Press

Neeleman J (2001). A continuum of premature death. Meta-analysis of competing mortality in the psychosocially vulnerable. *International Journal of Epidemiology* **30**, 154–162.

Park S, Kim CY, Hong JP (2013). Unnatural causes of death and suicide among former adolescent psychiatric patients. *Journal of Adolescent Health* **52**, 207–211.

Ping QinMortensen PB (2001). Specific characteristics of suicide in China. *Acta Psychiatrica Scandinavica* **103**, 117–121.

Pirkola SP, Isometsa ET, Heikkinen ME, Lonnqvist JK (2000). Suicides of alcohol misusers and non-misusers in a nationwide population. *Alcohol and Alcoholism* **35**, 70–75.

Qin P, Agerbo E, Mortensen PB (2002). Suicide risk in relation to family history of completed suicide and psychiatric disorders: a nested case-control study based on longitudinal registers. *Lancet* **360**, 1126–1130.

Qin P, Agerbo E, Mortensen PB (2003). Suicide risk in relation to socioeconomic, demographic, psychiatric, and familial factors: a national register-based study of all suicides in Denmark, 1981-1997. *The American Journal of Psychiatry* **160**, 765–772.

Qurashi I, Kapur N, Appleby L (2006). A prospective study of noncompliance with medication, suicidal ideation, and suicidal behavior in recently discharged psychiatric inpatients. *Archives of Suicide Research* **10**, 61–67.

Read J, McGregor K, Coggan C, Thomas DR (2006). Mental health services and sexual abuse: the need for staff training. *Journal of Trauma Dissociation* **7**, 33–50.

Rebholz CM, Dongfeng G, Wenjie Y, Jing C, Xigui W, Jian-feng H, Ji-chun C, Chung-Shiuan C, Kelly TN, Xiufang D, Bazzano LA, Jiang H (2011). Mortality from suicide and other external cause injuries in China: a prospective cohort study. *BMC Public Health* **11**, 56–65.

Reinhertz HZ, Giaconia RM, Silverman AB, Friedman A, Pakiz B, Frost AK (1995). Early psychosocial risks for adolescent suicidal ideation and attempts. *Journal of the American Academy of Child and Adolescent Psychiatry* **34**, 599–611.

Rossow I, Amundsen A (1995). Alcohol abuse and suicide: a 40-year prospective study of Norwegian conscripts. *Addiction* **90**, 685–691.

Roy A (1982). Risk factors for suicide in psychiatric patients. *Archives of General Psychiatry* **39**, 1089–1095.

Runeson B, Tidemalm D, Dahlin M, Lichenstein P, Langstrom N (2010). Method of attempted suicide as predictor of subsequent successful suicide: national long term cohort study. *British Medical Journal* **340**, 3222.

Sawada N, Uchida H, Suzuki T, Watanabe K, Kikuchi T, Handa T, Kashima H (2009). Persistence and compliance to antidepressant treatment in patients with depression: a chart review. *BMC Psychiatry* **9**, 38.

Schneider B, Schnabel A, Sargk D, Maurer K, Weber B, Wetterling T (2005). Detection of alcohol consumption in suicides. *European Archives of Psychiatry and Clinical Neuroscience* **255**, 1–5.

Shen X, Hackworth J, McCabe H, Lovett L, Aumage J, O'Neil J, Bull M (2006). Characteristics of suicide from 1998-2001 in metropolitan area. *Death Studies* **30**, 859–871.

Sher L, Oquendo MA, Galfalvy HC, Grunebaum MF, Burke AK, Zalsman G, Mann JJ (2005). The relationship of aggression to suicidal behavior in depressed patients with a history of alcoholism. *Addictive Behaviours* **30**, 1144–1153.

Sinclair JMA, Harriss L, Baldwin DS, King EA (2005). Suicide in depressive disorders: a retrospective case-control study of 127 suicides. *Journal of Affective Disorders* **87**, 107–113.

Skeem JL, Silver E, Aippelbaum PS, Tiemann J (2006). Suicide-related behavior after psychiatric hospital discharge: implications for risk assessment and management. *Behavioral Sciences and the Law* **24**, 731–746.

Stanley B, Gameroff MJ, Michalsen V, Mann JJ (2001). Are suicide attempters who self-mutilate a unique population? *The American Journal of Psychiatry* **158**, 427–432.

Swinson N, Ashim B, Windfuhr K, Kapur N, Appleby L, Shaw J (2007). National Confidential Inquiry into Suicide and Homicide by People with Mental Illness: new directions. *Psychiatric Bulletin* **31**, 161–163.

Thong JY, Su AH, Chan YH, Chia BH (2008). Suicide in psychiatric patients: case-control study in Singapore. *Australian New Zealand Journal of Psychiatry* **42**, 509–519.

Ward A, Ishak K, Proskorovsky I, Caro J (2006). Compliance with refilling prescriptions for atypical antipsychotic agents and its association with the risks for hospitalization, suicide, and death in patients with schizophrenia in Quebec and Saskatchewan: a retrospective database study. *Clinical Therapeutics* **28**, 1912–1921.

Yim PH, Yip PS, Li RH, Dunn EL, Yeung WS, Miao YK (2004). Suicide after discharge from psychiatric inpatient care: a case-control study in Hong Kong. *Australian and New Zealand Journal of Psychiatry* **38**, 65–72.

https://doi.org/10.1017/ipm.2014.47 Published online by Cambridge University Press