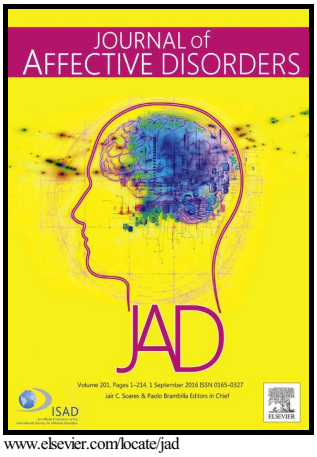

Article:
Birtwistle, J orcid.org/0000-0002-6083-589X, Kelley, R, House, A orcid.org/0000-0001-8721-8026 et al. (1 more author) (2017) Combination of self-harm methods and fatal and non-fatal repetition: a cohort study. Journal of Affective Disorders, 218. pp. 188-194. ISSN 0165-0327

https://doi.org/10.1016/j.jad.2017.04.027



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PII: S0165-0327(16)31953-X
DOI: http://dx.doi.org/10.1016/j.jad.2017.04.027
Reference: JAD8901

To appear in: *Journal of Affective Disorders*

Received date: 24 October 2016
Revised date: 16 February 2017
Accepted date: 19 April 2017

Cite this article as: Jacqueline Birtwistle, Rachael Kelley, Allan House and Davi Owens, Combination of self-harm methods and fatal and non-fatal repetition: cohort study, *Journal of Affective Disorders* http://dx.doi.org/10.1016/j.jad.2017.04.027

Combination of self-harm methods and fatal and non-fatal repetition: a cohort study

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Abstract

Background

Assessment and aftercare for people who self-harm needs to be related to an understanding of risks of adverse outcomes. We aimed to determine whether self-harm by a combination of methods and its early repetition are associated with adverse outcomes – especially non-fatal repetition and suicide.

Method

10 829 consecutive general hospital attendances due to self-harm in one large English city were monitored, through scrutiny of Emergency Department attendances, over three years and followed up to determine the incidence of non-fatal repetition. Subsequent deaths, by any cause and by suicide, were determined from national statistical records.

Results

6155 patients accounted for the 10 829 episodes: 72% by self-poisoning, 21% self-injury, and 746 episodes (7%) due to a combination of methods. After a combined-methods index episode, non-fatal repetition (P = 0.001) and suicide (P=0.002) occurred sooner and more frequently than it did among those who had self-poisoned. Further hospital attendance due to self-harm within a month was associated with a 3.7-fold (95% CI 2.1-6.4) risk of subsequent suicide.

Limitations

The data exclude self-harm episodes that do not result in a hospital attendance. Index episodes in the study are not generally life-time first episodes so follow-up data are based on an arbitrary start-point. Both of these limitations are common to all studies of this kind.

Conclusions

At psychosocial assessment and the making of aftercare arrangements, combined methods of self-harm or another recent episode should be considered 'red-flag' indicators for attention to care.

Keywords:

Self-harm; suicide; cohort study [*or* longitudinal study]

NICE guidance (Nice, 2004) and much empirical evidence (Hawton, 2000; Gunnell et al., 2005; Bergen 2012a, 2012) indicate that clinical staff should undertake psychosocial assessment, and set up aftercare when appropriate, for all patients who come to hospital because of self-harm – regardless of the method of self-harm at that episode. It is, however, a consistent observation that, compared with those who have attended hospital because of self-poisoning, people who attend due to self-injury are much less likely to receive adequate psychosocial assessment and ensuing aftercare. One reason for this state of affairs is almost certainly the widespread but erroneous belief that self-injury is not a suicide risk (Grandclerc et al., 2016) – self-injury is, in fact, associated with higher rates of subsequent non-fatal and fatal repetition of self-harm (Bennewith, 2005; Cooper et al., 2005; Lilley et al., 2008; Bergen et al., 2012a; Hawton et al., 2012; Carroll et al., 2014).

Here we have investigated two fairly common categories of self-harm method that go beyond the simple self-poisoning/self-injury dichotomy: combined self-poisoning and self-injury (usually self-cutting) on the same occasion, and acts that represent rapid repetition of non-fatal self-harm following a recent episode. Our aim is to explore the relation between self-harm method and risk, with the expectation that a better understanding of any associations will help those most in need to receive robust assessment and aftercare.

Monitoring studies in the UK and in Ireland (Lilley et al., 2008; Perry et al., 2012) have found high non-fatal repetition rates among those attending because of combined poisoning and injury, and two studies have pointed to a high long-term risk of suicide (Owens et al., 2005; Bergen et al. 2012b). Non-fatal repetition has been observed too to have an association with suicide (Zahl and Hawton, 2004; Haw et al., 2007; Bergen et al., 2012a). We have used a large consecutive series of episodes at the two general hospitals in one large UK city to determine whether we can confirm, first, that there is a significant excess of non-fatal and fatal repetition of self-harm after an index episode in which self-poisoning and self-injury were undertaken in combination with one another and, second, whether early non-fatal repetition is associated with subsequent suicide.

Method

Setting and sample

The study was undertaken in the two general hospitals in Leeds, one of the UK's largest cities. At the time of the initial sample the two emergency departments, the only ones in the city or surrounding metropolitan area, each functioned as a general emergency department (ED) – one in the city's East and one in the city centre, both subject to high throughput of patients who had self-harmed, and dealing respectively with 55% and 45% of the study sample. Data were collected on all patients aged 12 years or above who presented with self-harm to a Leeds ED for the 3-year period 1st October 2004 to 30th September 2007. The data were collected at a time when Leeds was part of the Multicentre Monitoring project for self-harm in England (Hawton et al., 2007) and procedure was as described in publications about that project (Bergen et al., 2010). Self-harm was defined as intentional self-poisoning or self-injury, irrespective of motivation (Hawton et al., 2003; National Collaborating Centre for Mental Health, 2012). Also included were acts of poisoning with non-ingestible substances, and intentional overdoses of 'recreational' drugs; severe alcohol intoxication was designated self-poisoning on a few occasions when case notes clearly recorded that self-harm was the intention. Self-injury was defined as any injury that was intentionally self-inflicted; it included self-cutting, attempted hanging, jumping from a height, burning, swallowing foreign bodies, gas inhalation, and a few traffic related injuries. Once booked in at the ED reception desk, all patients identified as attending due to self-harm were included, whether or not they stayed to complete their treatment in the ED. The study population and sample therefore included patients who were admitted from the ED to a general or psychiatric hospital, and those discharged directly from the ED. For any index hospital episode in which the person arrived alive but died within the next seven days, we examined the records to check that death was not a direct consequence of the self-harm episode that led to the index admission; one person (who died on the day of admission) was excluded in this way.

Data collection and analysis

To identify all episodes of self-harm and ensure comprehensive data collection, research staff scrutinised ED records, psychiatric referrals, medical records, and other sources soon after each patient had attended the hospital. The ED computer systems were searched using over-inclusive terms, such as "psychiatric", "behaving strangely", "lacerations", or "appears drunk", as well as more specific coding terms related to self-poisoning and self-injury, and the corresponding paper records were then examined. This search resulted in scrutiny of many cases where the presenting problem did not indicate self-harm but, by this method, led to inclusion of cases of self-harm in which there was no referral for a psychosocial assessment – cases often missed in published self-harm research. Identifying self-harm episodes using this system is of proven reliability (Sellar et al., 1990) and its use in our study is described in more detail elsewhere (Horrocks et al., 2004; Hawton et al., 2007). The monitoring of self-harm episodes and later collection of mortality data (see below) was approved by the Local Research Ethical Committee. The monitoring process was fully compliant with the Data Protection Act of 1998 and had approval under Section 251 of the NHS Act 2006 (formerly Section 60, Health and Social Care Act 2001) to collect patient-identifiable information.

Data collected for this study included gender, age, date and time of self-harm, method of self-harm (including drugs used in self-poisoning and type of self-injury), alcohol involvement, previous mental health care and self-harm, admission to the general hospital, and psychosocial assessment. We have

made clear in the analysis (below) when data were unavailable from clinical records, unless the numbers missing were too few to be important: unfortunately, ED records often fail to record information such as the patient's current and past contact with mental health services. Data on various demographic and clinical variables were compared according to which of four broad categories of self-harm method was used: self-poisoning, self-cutting, self-injury other than by cutting, and methods involving combinations of self-poisoning and self-injury.

We defined *combined* self-poisoning and self-injury when the patient reported having done both as part of a single act that led to the index presentation, even when that act might have taken place over several hours or even over two consecutive days. We defined *rapid non-fatal repetition* in two ways, as re-presentation to hospital within one week or four weeks of an index episode.

Mortality data

In a data linkage process the UK's National Health Service (NHS) Information Centre, now NHS Digital, matched the people from the self-harm monitoring study with any registrations of death held by the Office for National Statistics (ONS) in England and Wales, and with an equivalent system in Scotland. Individuals were matched on first name, surname, date of birth, gender, NHS number where available (in around 40% of our sample), and last known postcode where available. Mortality was determined for the sample until the census date of 31 August 2011. Death, from any cause and specifically for probable suicide, was used as a further outcome variable in our analyses. Many deaths of undetermined intent are probably suicides and, as a consequence, in suicide research and suicide prevention policy in the UK it has become conventional to combine suicides with deaths that were of undetermined intent and where an "open" verdict has been assigned by the Coroner; as with usual practice, this category is hereafter called 'suicide' (Linsley et al., 2001; Department of Health, 2002). A few deaths were the subject of coroners' "narrative verdicts", where the coroner sets out the circumstances of the death in a detailed way but does not otherwise categorise the verdict. In our study there were eight such verdicts, each accompanied by a cause-of-death code that was applied by the ONS from the narrative account. Only one of these narrative verdicts was assigned a suicide code; it is included with the suicides in the analysis below. The other seven narrative-verdict deaths are included and analysed in our category of "death other than by suicide".

Analysis

Differences between groups were explored using chi squared tests (when there were more than two groups). The patients were subject to variable length of follow-up: from 1 day to 36 months for non-fatal repetition; and from 1 day to 71 months for fatal repetition. Taking account of the variable time at risk of repeating, we plotted Kaplan-Meier survival curves with hazard ratios (and 95% confidence intervals) and log rank tests, as appropriate, to identify differences in repetition related to methods of self-harm; Cox regression was used to adjust some variables for gender and for age (included in the model as a metric variable, in years) at the index episode. For the analysis we used SPSS version 21.

Results

The 6155 people, 58% female and 42% male, undertook 10829 episodes of self-harm leading to hospital attendance. The present investigation focusses on method of harm, particularly combined methods on the same occasion. During the three years of hospital monitoring, self-poisoning was the commonest form of harm but many episodes (2998/10,829, 28%) involved self-injury, 746 of them (7% of all episodes) using combined methods; Table 1 sets out characteristics of the study episodes according to four categories of self-harm – poisoning, cutting, injury other than by cutting, and combined methods (using more than one method on the same occasion). Two-thirds of the combined methods (492/746, 66%) involved poisoning combined with cutting, 84% when adding in those who combined poisoning with self-injury other than by cutting. Males accounted for 45% (4843/10829) of episodes and slightly more episodes per person than did females. Contrary to popular belief, more self-cutting episodes involved males than females (Table 1: males 848/1678 (50.5%)). The median age was similar (31-33) across the method categories; self-poisoning was, however, particularly a feature of older adults and self-cutting was prominent among working age adults (Table 1).

Table 1 about here

Patients usually arrived by ambulance, particularly when the self-harm was due to combined methods (which generally included poisoning) or to self-poisoning alone (Table 1). The pattern for triage is rather similar: those who had self-poisoned, including those who had used combined methods, were much more likely to be scheduled for clinical care within an hour of arrival – with ambulance arrival itself probably making such a decision more likely (Table 1). Most patients were deemed alert by the time they received clinical care, with rather more drowsiness among those who had poisoned, whether alone or in combination with injury (Table 1).

Many patients had a history of earlier hospital attendance due to self-harm and had previous or current mental health services contact (Table 1) although ED records were not consistent in recording these important clinical characteristics. People who had self-poisoned were less likely than were people who had undertaken any kind of self-injury to have had previous self-harm or current or past mental health contact (Table 1).

Table 1 shows differences in assessment and immediate care according to the method of self-harm. The most obvious feature, described repeatedly in the literature, is that those who self-poisoned are much more likely than those who cut themselves to be assessed and to be admitted to the general hospital. Patients who used combined methods were assessed psychosocially and admitted in patterns similar to those seen for patients who have solely self-poisoned.

Repetition

After cleaning data and identifying multiple episodes by the same person, 6155 people accounted for the 10 829 episodes and were notified to the NHS Information Centre to determine whether they were alive or had died. Of these, 130 were not traced (130/6155, 2.1%) and one person had no method of self-harm recorded, so we examined fatal and non-fatal repetition for 6024 people, taking each person's first episode in the study period as the index episode.

Non-fatal repetition

The duration of hospital monitoring was 3 years, with patients followed up to determine any subsequent non-fatal self-harm from between 1 day (for the patients included on the last day of study) and 1095 days (3 years). The average length of follow-up was therefore 548 days (1.5 years); we found a steady incidence of self-harm across the months of the study. During the monitoring period 24% of patients (1444/6024) returned to a Leeds hospital because of a repeat of self-harm; 19% carried out between one and three repeat episodes and the remaining 5% attended with four or more repeat episodes (range of repeats 1 to 123). There were differences in the proportions repeating according to the method used at index episode: 23% (1074/4671) of those who self-poisoned repeated, compared with 30% (236/798) of those who had cut themselves, and 29% (82/288) of those with combined methods – while repetition in people who had self-injured other than by cutting was lower at 20% (52/267) (chi squared 22.36, df = 3, P < 0.001).

To account for varying length of follow-up we generated survival tables and Kaplan-Meier curves (Figure 1). These curves confirm the findings above and provide estimates for repetition at all time periods up to three years. For example, the one-year repetition rate for all patients is 22%, at two years 28%, and by three years 32% (Figure 1). The curves show a pattern of earlier and higher final levels of repetition for those patients who had cut themselves only and for those who had undertaken combined methods of self-harm. For people who had self-poisoned only and for those who had injured themselves other than by cutting, repetition was less likely and slower to take place (log rank chi squared 29.75, df = 3, P = 0.001).

Suicide and other deaths

To determine the pattern of mortality, the 6024 people were traced for a further 35 months after the end of the hospital data collection, providing data for up to 71 months. Of the 6024 people, 190 (3.2%) were traced but could not be confirmed as alive by the ONS. They included people in the armed forces and some who had left the country but, if they had died, the ONS should have had a record of the death; following normal practice, they are assumed in the analysis to be alive. During the 35-71 month follow-up period (average follow up of 53 months) 339/6024 (6%) people died, 69 (1.1%) by suicide. The suicides were carried out using a variety of methods. Suicides by the category of 'hanging, strangulation and suffocation' were the most numerous (N = 30), with poisonings adding another 19. In 8 cases the death certification did not make clear the cause – citing an 'unspecified' means. The remaining 12 deaths represented, in ones and twos, such events as drowning, jumping or burning. There was a clear relation between suicide and age: for example, over-65s who had self-harmed were more than seven times as likely as young people (aged 10-24) to die by suicide (Table 2). Males were more than twice as likely as females (Table 2) to die from any cause other than suicide (HR 2.2) and almost three times as likely to die from suicide (HR 2.8).

Patients who repeated non-fatal self-harm during our study were more than twice as likely to die by suicide at some later point, and where there were five or more repeat episodes even more likely;

deaths from reasons other than suicide were also more numerous among those who repeated non-fatal self-harm (Table 2). We found that rapid repetition had a strong relation with later suicide. Designating one week (7 days) and one month (30 days) each as a workable definition of rapid repetition, suicide likelihood was in each case almost four times that of the rest of the study sample (hazard ratios of 3.8 and 3.7). Non-fatal repetition within a month or a year was associated too with higher incidence of non-suicide death (Table 2). Adjustment for age at index episode and gender made no appreciable alteration to any of the hazard ratios (or their confidence intervals) related to the risk factor of repeat non-fatal self-harm.

When it comes to method of index self-harm and any relation to subsequent suicide, one of our method-groups stands out: those who harmed themselves using combined methods were around three times as likely to die subsequently by suicide than were those who had self-poisoned (Table 2, Figure 2; log rank chi squared 14.50, df = 3, P= 0.002; hazard ratio 3.2); the hazard ratio for subsequent suicide is altered only slightly (to 3.1, 95% CI 1.6 to 5.9) when adjusted (Cox regression) for gender and age at index episode. Similar adjustment, for age and gender, of the hazard ratios for self-cutting and for non-cutting self-injury (each compared to self-poisoning, Table 2) likewise leads to negligible change in each ratio. Figure 2 shows that much of the suicide excess among patients whose index episode was by a combined method of self-harm occurred within the first year of follow-up. Table 2 indicates that there is no strong relation between method at index self-harm episode and deaths due to causes other than suicide.

Recent work on suicide after self-injury found a relation between the site of cutting or stabbing and the likelihood of subsequent suicide: those who had cut themselves other than to the wrist or arm (for example to the torso) had a higher suicide incidence in follow up (Carroll et al., 2016). Because people who cut themselves often do so at multiple sites, episodes categorised as ‘to arm or wrist only’ were restricted to those where there was no cut to a site other than the arm or wrist. Our findings for subsequent suicides were in the same direction as those of Carroll et al. – although well short of significance; we found, however, some suggestion of an excess of non-suicide deaths among the people who had cut themselves at a site other than their arms (Table 2).

Discussion

Two main findings emerge from our study. First, people who attend hospital as a consequence of non-fatal self-harm and who have on the same occasion used more than one method of harm (such as a combination of self-poisoning and self-injury) have higher than expected incidence of subsequent suicide – our estimate being a three-fold risk when they are compared with those using self-poisoning alone. Second, patients who have self-harmed and return with another non-fatal episode show a similarly raised suicide incidence – particularly if that repeat episode is just days or weeks after an earlier one.

Characteristics of the study sample

The age and sex patterns in the present study are similar to those set out in the Multicentre Monitoring project for England (Bergen et al., 2010). Around ten episodes of self-harm are recorded each day of the year in the EDs of this regional city – representing rates comparable to those reported in the Multicentre Monitoring project (Bergen et al., 2010). The proportions of people that we allocated to our four categories of self-harm method are similar to those we reported previously together with data from Manchester and Oxford (Lilley et al., 2008). In particular, the proportion of people who had self-harmed using combined methods is in keeping with that seen in multicentre monitoring (Lilley et al., 2008; Owens et al., 2015).

The profile of past self-harm and previous and current mental health care suggests that the people who used combined methods were closely similar to the much larger group of those who had attended hospital due to self-cutting only: nearly all had a history of mental health problems, most had previously harmed themselves, and a majority were in current contact with mental health services – with all three of these characteristics evident at lower levels among those who had self-poisoned only. On the other hand, patients in the combined harm group resembled those who had self-poisoned when it came to their immediate hospital care: they were usually admitted from the ED to an in-patient bed in the general hospital and they were far more likely to receive a psychosocial assessment before discharge than were those who had cut themselves as a single self-harm method.

Self-injury and suicide

It is already clear that dangerous methods of self-harm – involving such things as hanging, drowning, firearms, jumping, gassing, and traffic – are indicators of increased risk of subsequent suicide (Runeson et al., 2010; Bergen et al., 2012a). The present study is not large enough to have examined rare lethal events and they have been amalgamated here with a range of non-cutting injuries, many of which are not physically severe. Whether self-cutting is a risk for later suicide is not wholly clear in the literature, although there are recent UK studies that point to such a risk (Cooper et al., 2005; Bergen et al., 2012a; Bergen et al., 2012b). Inconsistent findings concerning suicide after self-cutting may well be tied up with sampling differences (Bergen et al., 2012a), with some follow-up cohorts based on hospital-admitted rather than ED cases, with cutting much less likely than is poisoning, or injuries other than cutting, to have led to admission (Christiansen and Jensen, 2007; Runeson et al., 2010). Our study does not suggest that cutting is a particular risk but adds weight to the growing evidence that it is no less likely to presage suicide than is self-poisoning. These method-related

suicide rates are increasingly important as it seems clear that in England there is an upward trend for the proportion of self-harm that is due to injuries rather than poisoning (Bergen et al., 2010; Hawton et al., 2015).

Combined methods of self-harm and fatal and non-fatal repetition

Patients who used combined methods were very likely to attend hospital due to non-fatal repetition, in a pattern similar to that of those in the self-cutting group – with a striking early likelihood of repetition when compared with those who had self-poisoned or used non-cutting self-injurious methods.

We found that the use of combined self-harm methods at an index episode was associated with a three-fold raising of suicide risk. The suicides had a strong tendency to be soon after the index episode (Figure 2). Few cohort studies of non-fatal self-harm have examined the outcome for people who have undertaken combined methods of self-harm – in part because the proportion is low and numbers thereby too few for robust findings. But there are other reports of combined methods being associated with suicide. A study in Nottingham, England that followed up for 16 years a thousand people who had self-poisoned showed a higher suicide rate among those who had also cut themselves at the same episode (Owens et al., 2005). Multicentre monitoring of thirty thousand people who had self-harmed in three English cities found greater than doubling of suicide risk in people who had combined self-poisoning and self-injury compared with those who had self-poisoned only (Bergen et al., 2012b). Monitoring in Oxford has examined the relation between Suicide Intent Scale (SIS) scores and method of non-fatal self-harm, showing high median SIS scores among patients whose attendance at hospital was due to combined self-poisoning and self-injury – higher median scores than found in those who had self-poisoned only or self-injured only (Haw et al., 2015).

Non-fatal repetition and subsequent suicide

We also found a clear relation between repetition of non-fatal self-harm in follow up and subsequent suicide. Repeating soon after an index episode – whether within a week or within a month – holds a particularly strong risk. Similarly, multiple further episodes within the follow-up period has a strong association with suicide – especially if there are several such episodes. These findings about multiple episodes, although not the relation shown here between suicide and early repetition, have been observed in earlier data from Oxford (Zahl and Hawton, 2004; Haw et al., 2007) and in multicentre UK monitoring (Bergen et al., 2012a).

Methodological considerations

The most prominent limitations of the present study consist of two weaknesses that are common to all research concerning hospital presentation of self-harm. First, the data-capture excludes the many episodes that never reach a hospital. The present data represent, however, the methodical inclusion of all hospital episodes while much self-harm research concerns only those people who receive psychosocial assessment – or may even be restricted to the people who are admitted to a general hospital ward. Our sampling had processes in place to ensure the inclusion of episodes where the person left the ED soon after triage and before medical or psychosocial assessment. Such a method

results in complete inclusion of episodes but can report on only those clinical variables that are routinely recorded in often scanty ED records.

This reliance on clinical contact and clinical records influences our two presentations of interest. Two acts (say self-poisoning followed by self-injury) will be classified as rapid repetition if each leads to a separate hospital attendance but as one combined episode if they occurred very rapidly and presentation was deferred until after the second act. Since repetition very often involves a change of method (Owens et al., 2015) it is not implausible that this overlap between the definitions of the two presentations is matched by some more general overlap between the phenomena (use of more than one method, early repetition), which may account in part for their similar outcomes.

A second failing common to all research of this kind is that many of the index episodes in the study period are not the person's first-ever episode. Consequently, although the analysis takes index episodes as a starting point and refers to subsequent episodes as repetitions, these index episodes are arbitrary start points in what may be a succession of episodes beginning years earlier (Owens et al, 2015). This difficulty cannot adequately be corrected using data about earlier episodes because ED records do not contain reliable past information and patients are too often not asked in the ED (or it is asked about but not recorded) whether the present episode is their first hospital attendance. A similar dictum might, by the same logic, be applied to our focus here on combined self-harm methods at an index episode: earlier, pre-study episodes for some patients will have involved self-harm by another method.

Although it is a third limitation of the present work that the data derive from index episodes of self-harm undertaken some years ago, there are three credible reasons for using such data. First, cohort studies of this kind – featuring a rare but important outcome such as suicide – need lengthy follow-up periods in order to detect any effects. Second, the present data constitute a large sample drawn from a single centre over a short time. Leeds is a substantially larger centre than any of the Multicentre Monitoring centres in England, or any other site that has collected data on mortality after consecutive hospital attendances for self-harm; the city is much larger than Oxford or Derby, and it has a bigger population than does the portion of Greater Manchester that provides data to the multicentre project. A large study sample captured over just three years in one place, with relatively uniform duration of follow-up, provides for findings that can usefully measure up against those from other more heterogeneous samples that are based on amalgamations of several centres, or on single centres and much longer data collection with widely spread duration of follow up. Third, the published evidence concerning services in England for assessment after self-harm show little or no improvement in service provision over a recent ten-year period (Cooper et al., 2013); much of the clinical picture concerning hospital management of self-harm continues to suggest a service that falls short of national guidelines for care.

Conclusions

Suicide after non-fatal self-harm is thankfully uncommon. Although around 60 times greater than the population rate, in the UK the incidence is probably somewhere in the region of one in a hundred patients within the first year (Owens et al., 2002; Carroll et al., 2014). But the risk is far higher in certain subgroups and goes on rising over many years after an index episode of non-fatal

self-harm. A recent systematic review (Carroll et al., 2014) shows a year-on-year climb in suicides much like that shown in a systematic review 12 years earlier (Owens et al., 2002). The best estimate is that 1 of every 25 self-harm patients will die by suicide during the 10 years after an index hospital presentation (Carroll et al., 2014). We confirm here that older age in people who self-harm is a clear risk factor for suicide, as is male gender. The present study, though, points to three important research findings that have been recorded but received little emphasis in earlier published research: subsequent suicide is strongly associated with the combined use of methods (usually self-poisoning and some kind of self-injury), early repetition of non-fatal self-harm, and multiple repeat episodes. When carrying out psychosocial assessment and making aftercare arrangements in the hospital care of people who have self-harmed, combined methods of self-harm or a recent hospital visit for a self-harm episode should be considered 'red-flag' indicators of a need for particular attention to care.

Contributions

AH, RK and DO planned and carried out the self-harm monitoring. JB, DO and RK undertook the follow-up work on mortality. The focus of the present enquiry was conceived and planned by JB, RK and DO; JB carried out the analysis. All authors were involved in drafting and approving the research paper.

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Figure 1: Repetition of self-harm according to method of harm: Kaplan-Meier curves represent time from the first episode during the study period to the first repeat episode (whether a non-fatal or fatal repeat).

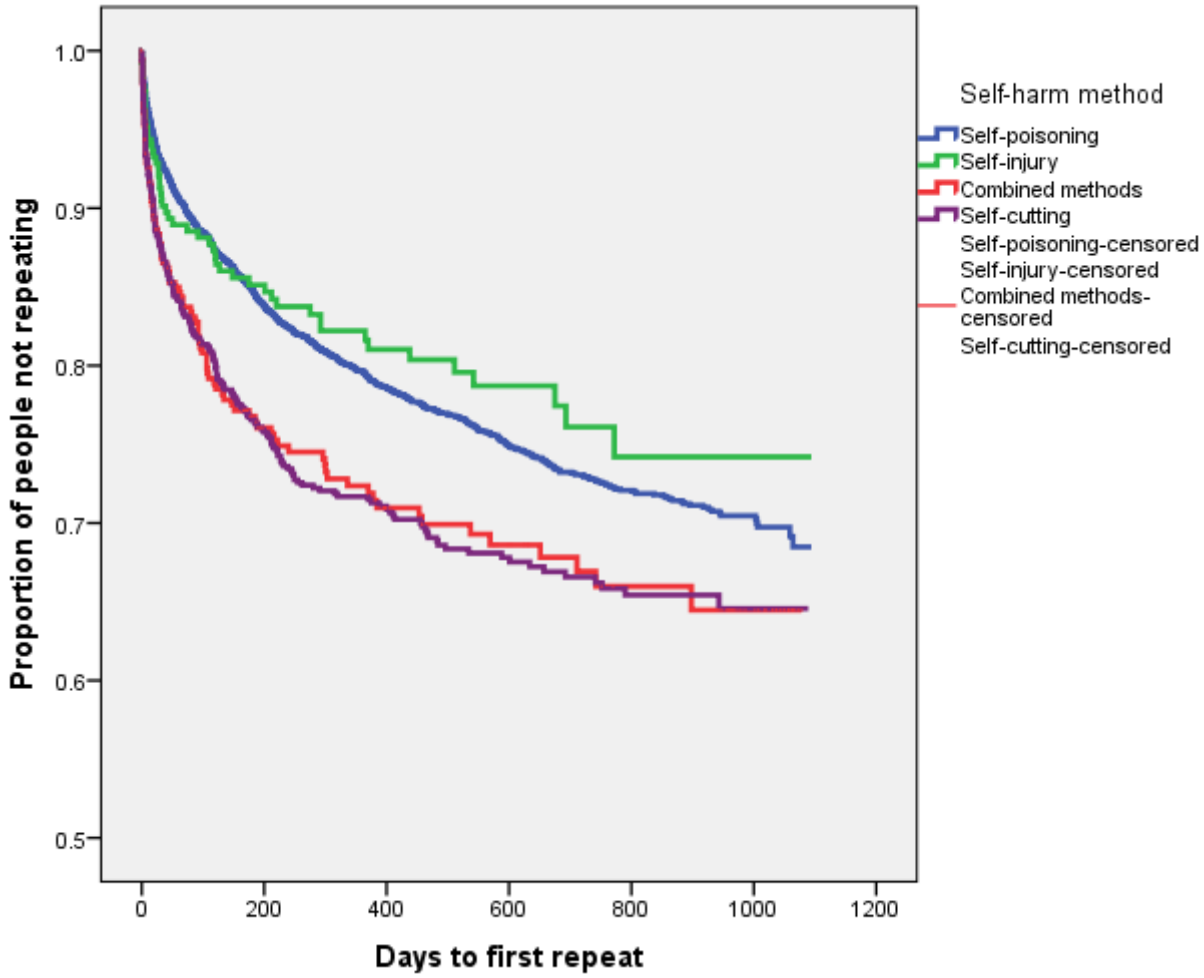

Figure 2: Suicide according to method of harm: Kaplan-Meier curves represent time from the first episode during the study period to death by probable suicide.

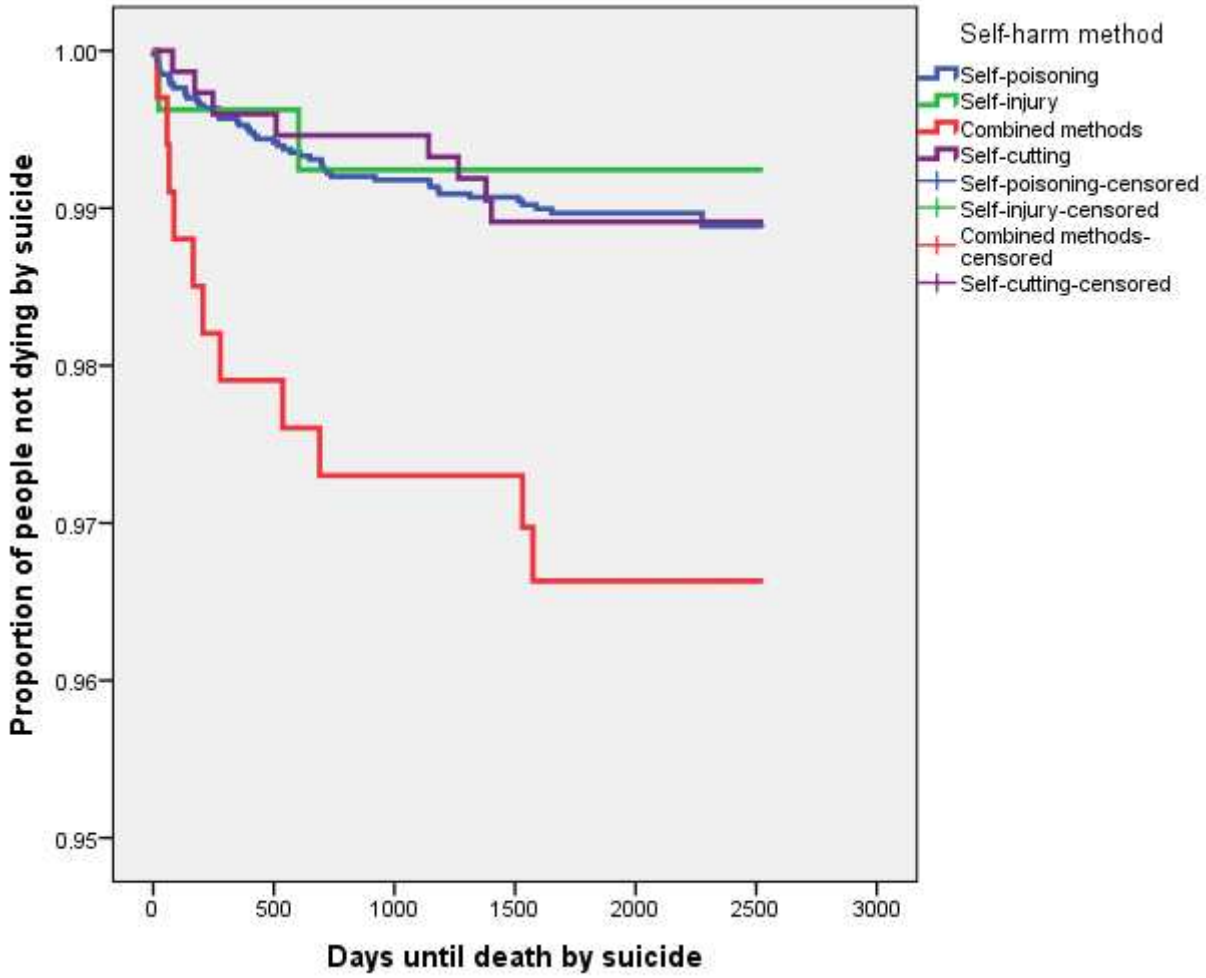

Table 1. Characteristics of the sample according to method of self-harm for all episodes, N = 10 829

		Method of self-harm				
Variable	All methods	Self-poisoning only	Self-cutting only	Self-injury other than by cutting	Combined methods	x^2 (3 d.f.)

All episodes n (% of episodes)	10 829 (100)	7831 (72.3)	1678 (15.5)	574 (5.3)	746 (6.9)	
Gender, age and age-bands						
Median age, years (Interquartile range)	32 (22-42)	32 (22-42)	31 (22-41)	33 (23-40)	31(22-40)	
Male *n* (%)	4843/10829 (44.7)	3304 (42.2)	848 (50.5)	317 (55.2)	374 (50.1)	77.69 P<0.001
Adults (Aged 17 to 64)	10236/10826 (94.5)	7363 (94.0)	1622 (96.7)	537 (93.6)	714 (95.7)	Reference category
Children (Aged 12 to16)	442/10826 (4.1)	339 (4.3)	48 (2.9)	29 (5.1)	26 (3.5)	10.18 P=0.017
Older Adults (Aged 65 & above)	148/10826 (1.4)	127 (1.6)	7 (0.4)	8 (1.4)	6 (0.8)	18.00 P<0.001
Characteristics of hospital attendance						
Arrived by ambulance[a] *n* (%)	6949/8963 (77.5)	5176 (79.5)	941 (69.3)	313 (67.6)	519 (82.1)	101.35 P<0.001
Triage category: within 1 hour[b] *n* (%)	6647/8332 (79.8)	5339 (87.0)	566 (46.4)	266 (66.3)	476 (83.1)	1085.71 P<0.001
Alert (not drowsy or unconscious) *n* (%)	9626/10719 (89.8)	6752 (87.2)	1647 (98.9)	546 (95.8)	681 (92.0)	232.76 P<0.001
Previous history						
Previous self-harm[c] *n* (%)	7840/9659 (81.2)	5391 (77.6)	1404 (90.9)	423 (88.3)	622 (89.9)	201.92 P<0.001
History of mental health problems[d] *n* (%)	9261/9991 (92.7)	6543 (91.3)	1532 (97)	498 (95.4)	688 (95.7)	79.58 P<0.001
Current contact with mental health services[e] *n* (%)	3868/7465 (51.8)	2668 (48.4)	634 (60.3)	263 (67.6)	303 (58.7)	103.97 P<0.001
Assessment and immediate care						

Admitted to general hospital[f] *n* (%)	7683/9228 (83.6)	6240 (91.3)	632 (49.8)	278 (56.5)	534 (83.6)	1587.57 P<0.001
Received psychosocial assessment[g] *n* (%)	6642/9664 (68.7)	5112 (73.0)	759 (51.0)	295 (59.2)	476 (70.5)	299.93 P<0.001

Missing data: a = 1866 (17.2%); b = 2497 (23.1%); c = 1170 (10.8%); d = 838 (7.7%); e = 3364 (31.1%); f = 1601 (14.8%); g = 1165 (10.8%)

Table 2. Suicide and other mortality according to characteristics of the sample, N = 6024

	Death other than by Suicide (N=270) No of deaths/category total (%)	HR	95% CI	**Suicide (N=69)** No of deaths / category total (%)	HR	95% CI
Age						
10 to 24	22/2268 (1.0)	1		9/2268 (0.4)	1	
25 to 44	99/2722 (3.6)	3.8	2.4 to 6.0	43/2722 (1.6)	4.0	2.0 to 8.2
45 to 64	100/913 (11.0)	9.5	7.5 to 19	14/913 (1.5)	4.0	1.7 to 9.2
Over 65	49/119 (41.2)	40	32 to 88	3/119 (2.5)	7.3	2.0 to 27.1
Gender						
Female	106/3511 (3.0)	1		23/3511 (0.7)	1	
Male	164/2513 (6.5)	2.2	1.7 to 2.8	46/2513 (1.8)	2.8	1.7 to 4.7
Repeated during the study						
No	179/4580 (3.9)	1		39/4580 (0.9)	1	
Yes	91/1444 (6.3)	1.5	1.2 to 2.0	30/1444 (2.1)	2.4	1.5 to 3.9
Episodes						
1 only	179/4580 (3.9)	1		39/4580 (0.9)	1	
2 to 4	71/1165 (6.1)	1.6	1.1 to 2.0	23/1165 (2)	2.3	1.4 to 3.9
5 or more	20/279 (7.2)	1.8	1.0 to 2.6	7/279 (2.5)	2.9	1.3 to 6.4
Repeated within 7 days						
No	256/5763 (4.4)			60/5763 (1.0)		
Yes	12/230 (5.2)	1.2	0.7 to 2.1	9/230 (3.9)	3.8	1.9 to 7.7
Repeated within 30 days						
No	229/5449 (5.2)	1		53/5449 (1.0)	1	
Yes	38/458 (11.8)	2.0	1.4 to 2.8	16/458 (3.5)	3.7	2.1 to 6.4
Repeated within a year*						
No	144/3258 (4.4)	1		29/3258 (0.9)	1	
Yes	67/947 (7.1)	1.6	1.2 to 2.1	19/947 (2)	2.3	1.3 to 4.0
Method						
Self-poisoning	214/4671 (4.6)	1		48/4671 (1.0)	1	
Non-cutting self-injury	12/267 (4.5)	1	0.6 to 1.8	2/267 (0.7)	0.7	0.2 to 3.0
Combined methods	14/338 (4.1)	0.9	0.5 to 1.6	11/338 (3.3)	3.2	1.7 to 6.2
Self-cutting#	30/748 (4.0)	0.9	0.6 to 1.2	8/748 (1.1)	1.0	0.5 to 2.2
To arm or wrist only	19/582 (3.3)	0.7	0.4 to 1.1	6/582 (1.0)	1.0	0.4 to 2.3
Other than to arm or wrist	10/155 (6.5)	1.5	0.8 to 2.8	2/155 (1.3)	1.3	0.3 to 5.3

Hazard ratios (HR) are unadjusted.

* Numbers of deaths are reduced because the one year of follow-up to non-fatal repetition does not apply to around one third of the study sample; # Subdivision of self-cutting category into arm or non-arm site (self-stabbings are not included); there are reductions in numbers of deaths and of denominators because body-site of cutting was unrecorded in 11 cases.

Highlights

Suicide after non-fatal self-harm is associated with combined use of self-harm methods

Suicide after non-fatal self-harm is associated with early non-fatal repetition

Suicide after non-fatal self-harm is associated with multiple, repeated self-harm

Combined harm methods and recent self-harm episodes are ‘red-flag’ indicators of suicidal risk