Is there a difference between hospital verified and self-reported self-harm? Agreement and implications for repetition

Running Head: hospital verified vs self-reported self-harm

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Abstract

Objective: Repeated intentional self-harm (SH) is associated with economic costs and increased risk of suicide. Estimates of repetition vary and are limited to short follow-ups. In addition some sources use hospital records and others self-reported self-harm. Our aim was to examine the relationship between self-reported self-harm (SRSH) and hospital verified self-harm (HVSH) and later repetition of SH (predictive validity). We also aimed to examine whether rates of SH repetition differ between first time presenters and non-first time presenters using either definition of self-harm.

Method: We conducted a large prospective study tracking SH attempts through an Accident and Emergency (A & E) department within the UK. We took a representative sample of 774 patients (30% of total whom reported self-harm) and followed them for 5.6 years on average. The index episode of self-harm was recorded at the time of referral to staff in A&E. Prior episodes of self-harm were determined from an electronic search of A&E patient database and in addition recollection of prior self-harm as reported by the patient to their clinician at the time of index presentation was recorded.

Results: Across the whole sample 32.0 % of patients repeated SH within one year, which rose to 54.1% at completion of follow-up. Repetition rates were considerably higher in non-first timers than first timers after one year (47.9% vs 19.6%) and by the end of follow-up (73.8% vs 39.4%) (p<.001). Of 411 with self-reported first presentations, 45.2% repeated over the study period. In terms of predictive validity 65.2% of those with previous SRSH repeated vs 73.8% with previous HVSH (p<.001). There was low agreement between SRSH and HVSH (Kappa = 0.353, 95% CI 0.287 -0.419, low).

Conclusions: We found relatively poor agreement between hospital defined and self-reported self-harm. 62.8% of those who denied self-harm actually had a hospital verified previous episode. Patients with recorded prior self-harm and those who recall previous self-harm have significantly higher rates of repetition but the two samples imprecisely overlap and predictive validity is stronger for HVSH.

Key Words: Accident and Emergency; Self-Harm; Self-reporting; Self-poisoning; Repetition; Prediction; suicide.
Introduction

Self-harm (SH) is the intentional act of self-poisoning or injury and is one of the leading causes of acute medical admissions for both men and woman (Hawton and Fagg, 1992, Hawton et al., 1982, O'Loughlin and Sherwood, 2005). Repeated self-harm not only contributes to significantly greater health care costs (Sinclair et al., 2011), but is also associated with an increased risk of suicide (Cumming et al., 2006). The relative risk of suicide increases greatly with every act of SH (Leon et al., 1990, Zahl and Hawton, 2004). In older adults who report to hospital following SH 1.5% die by suicide within 12 months (Murphy et al., 2012). Furthermore, approximately 40-60% of people who die by suicide will have presented with at least one episode of SH making it a strong predictor of suicidal intentions (Hawton and Fagg, 1988).

The prevalence of SH has increased in recent times and statistics demonstrate that the UK has one of the highest rates of self-harm across Europe, with annual rate incidences of approximately 400 per 100 000 of the population (Horrocks and House, 2002). Research has identified a number of risk factors are associated with the incidence and repetition of SH including adverse social problems, problematic drug use (Haw and Hawton, 2011) and psychiatric disorders (Moller et al., 2013) (Gunnell et al., 2008). Females are also generally more likely to SH than males (Hawton et al., 1997). The strongest predictor of repeated SH is a previous attempt at SH (Beghi et al., 2013), however previous studies report that of patients who SH, only 10-20% attend hospital following an attempt (Ystgaard et al., 2003) therefore making it difficult to identify those highest at risk of repetition.

Repetition of self harm is a relatively common occurrence. Risk of repeated self-harm is highest within the first few months of an index presentation of SH, with median repetition times ranging from 73 to 115 days (Carter et al., 2002, Kapur et al., 2006). A systematic
review of self-harm recurrence estimates rates around 15% within the first year, which rises
to approximately 20-25% over the following years in the UK (Owens et al., 2002, Horrocks
and House, 2002). However, these estimates are estimates as genuine first time self-harm
could not be reliably defined. A more recent meta-analyses found a pooled estimate of
repeated self-harm within one year was 16.3%, in keeping with earlier estimates (Carroll et
al., 2014). In the samples included within this meta-analysis, cohorts with a higher
proportion of patients with a history of self-harm were associated with an increased 1 year
repetition rate of 19.6%, compared to cohorts with low incidence of previous history of
15.2%. Within the studies, the method of recording self harm explained significant variability
in repeated self harm estimates that is estimates were significantly larger when interpreted
through patients’ self reporting compared to repeats defined by hospital administration
records.

A further limitation in the literature is that studies of repetitions usually examine short
term not long term risk with typical follow up over one to three years (Haw et al., 2007).22
Furthermore, estimates are likely to be conservative given that repeaters may not present to
hospital, choose not to wait for treatment or move areas (Guthrie et al., 2001, Johnston et al.,
2006).23 24 Here we present a prospective study which investigates repeated SH attendances
to a UK hospital covering a large population area. We collected data on self-reported self
harm (SRSH) as well as hospital verified self harm (HVSH). An extensive follow-up was
conducted to examine rates of SH repetition over a long period of time.

Methods

Study sample and setting
The sample was drawn from a large Accident and Emergency (A&E) department at the Leicester Royal Infirmary (LRI), United Kingdom. The LRI is unusual as it is the only major A&E department within a large county with a catchment area of over 1 million patients and thus has the advantage of a high likelihood of local re-attendance and thus more extensive data capture compared to previous reports. The study was approved by the department of A&E medicine ethics board, University Hospitals of Leicester as an audit of clinical practice.

We sampled a selection of adult patients aged 16 and over attending the Leicester A&E department with self-harm. Patients were included if they were risk assessed using the SH10 form (that is the form was completed and data returned for collection). We aimed to obtain a 30% sample of all patients attending with SH which was clinically representative and without known bias. However we excluded patients with accidental injury and accidental overdose. In these cases the attending A&E physician/clinician would undertake a routine history on arrival, but also complete a locally developed self-harm risk assessment form for all patients presenting with self harm, regardless of level of intervention needed. This form, the Leicestershire SH10 self harm form is available from http://www.slideshare.net/ajmitchell/leicestershire-sh10-selfharm-assessment-form. The SH10 was developed to provide not only risk assessment but also needs assessment and clinical feedback as per the NICE guidelines on self-harm which suggests a broad based evaluation of patients with self-harm.25 It is a one page form which asks for narrative and categorical responses with a checklist of 32 factors that may be important clinically. The SH10 form includes data on patient demographics, medical intervention required, recent stresses and social circumstances, previous clinical history, psychiatric signs and symptoms, mental state examination, patient’s subjective outlook and outcome of the assessment. We defined predictive validity as the ability of that method to identify further self-harm. In the
remainder of cases that were not part of the SH10 study, patients received usual care by their clinician.

Self harm definition

We used the World Health Organisation definition of self-harm which is ‘an act with non-fatal outcome, in which an individual deliberately initiates a non-habitual behaviour that, without intervention from others, will cause self-harm, or deliberately ingests a substance in excess of the prescribed or generally recognised therapeutic dosage, and which is aimed at realising changes which the subject desired via the actual or expected physical consequences’. We included self-harm acts as those of self-poisoning and physical harm (eg self-laceration) of different types.

Data collection

The SH10 forms were collected as part of the diagnostic and treatment process, and formed the basis for the initial assessment of the index episode of self-harm. We were able to cross-reference additional data for the index episode data extracted electronically from the Emergency Department Information System (EDIS) and cross checked against the completed data on the paper SH10 form. Data was also collected on whether patients had presented with self-harm prior to the index episode, attendances following the (first) index presentation for both self harm and non-psychiatric attendances and the nature of these self harm attendances through EDIS. EDIS contains codes for self-harm, self-injury, hanging, and self-poisoning entered contemporaneously by staff in ER. Patient records were identified through the electronic database by using patient initials, the hospital number and date of birth. As individual patients may have multiple hospital numbers, each attendance record was manually cross checked with the patient’s address, name and date of birth to ensure it was the same patient. In addition to the electronic data, previous self-harm as reported by the patient
to their clinician at the time of index presentation was also recorded (SRSH). This allowed us
to check on the accuracy of patient reporting of their self-harm and also the influence of self-
reported prior harm on future repetition, that is predictive validity. A previous self harm
episode was defined as attendance to the A&E department for any act of self harm taken
before the index episode, regardless of outcome.

Follow up

Data collection took place for patients who presented with an episode of SH from 28th
April 2004 to 19th September 2008, with a follow up for final outcome in September 2013.
The mean follow up period was 7.4 years. Complete follow-up was attained up until year
five but not all subjects had longer scrutiny. 728 subjects had follow up at year 6 (5.9%
missing), 520 had follow up at year 7 (32.8% missing) and 261 had a final follow-up at year 8
(66.3% missing). Data attrition occurred mainly when patients presented towards the end of
the recruitment period reducing the length of time for follow-up. A total of 774 (43.5 % male)
unique attendees were included in the sample, with a mean patient age of 36.49 years (SD =
13.92, range 16-88) at first attendance. According to emergency department information
systems the index presentation was the first known SH attempt for 429 patients.

Results

1. Overall SH Repetition

Repetition of SH was measured at 8 time points (3, 6 and 12 months then 2, 3, 4, 5 and 7.4
years) and presented in Figure 1. At the first follow-up of 3 months 19.1% of patients had
presented to A&E with a repeated SH attempt, this increased to 32.0% by one year and
54.1% over 5 years of follow-up. The average (mean) time to repeat was 528 (SD = 687)
days and the median was 222 days. Overall 357 (45.9%) patients did present to A&E with
repeated SH in our sample. In patients who presented with a repeated episode of SH within
the study time period, the mean number of recurring incidences of SH was 7.12 (SD = 13.43,
range 1 – 156, median = 3). In males the mean was 5.34 (SD = 8.29, range 1-67, median =
2), in females the average was 8.72 (SD = 16.45, range 1 - 156, median = 3).

2. HVSH First timers vs non-first timers

Data was divided into two categories of patients, based on whether the index
presentation was identified to be a known first time presentation of SH and those who had
been identified as having a previous SH attendance according to EDIS, to create two
subgroups (first time presenters and non-first time presenters), which were mutually
exclusive. Data was not restricted by SH10 status. Patients allocated into first timers vs non-
first timers then remained in these subcategories for the remainder of the study, data was
analysed to define time to first presentation since index episode, frequency and the nature of
further repeat attendances and other patient factors as detailed in the SH10 form. Descriptive
data for the two subgroups is presented in table 1. We compared 429 patients presenting for
the first time with 340 patients presenting with prior episodes. 39.4% of first time presenters
repeated self-harm compared with 73.8% of non-first timers (Chi squared 90.71 p<0.0001).
The median time to repeat was 368 days vs 141 days, respectively.

Figure 2 presents repetition data from first timers and non-first timers respectively.

First timers had lower repetition rates at each time point and were less likely to have repeated
SH by the end of follow up compared to those who were not first timers.

3. SRSH First timers vs non-first timers
Data was divided into patients based on self reporting to the ED physician during the initial assessment at the index episode; those who self reported previous attempts of SH (self-report first time) and who did not (self-report non-first time) to examine relationship between this and the EDIS entry. The EDIS entries were then checked to see if patients had correctly reported previous attendances. Descriptive data for the two subgroups are presented in table 2. Repetition rates for both subgroups are presented in Figure 3. As with EDIS entry those who self-reported first time SH were less likely to repeat SH at all time points than those who self-reported previous self harm attempts. Of 411 with self-reported first self-harm, 45.2% repeated over the studies period of 5.6 years vs 65.2% in those who said this was not their first time (Chi squared: 30.87 p<0.0001). Comparing outcomes, 65.2% repeated following SRSH vs 73.8% in HVSH (risk difference = 8.6%, 95% confidence interval 2.0% to 15.1%, P = 0.01).

4. Concordance of Self-Reported Self Harm vs Hospital Verified Self-Harm

432 patients had no previous self harm according to EDIS but of these only 134 had no previous self-harm according to their own self-report at the time of presentation (31.0%). 340 patients had previous self harm according to EDIS but only 113 had previous self-harm according to their own self-report at the time of presentation (33.2%). The weighted Cohen’s Kappa agreement between the two methods was low (Kappa = 0.353 CI 0.287 to 0.419, SE of kappa = 0.034 P =ns). A 2x2 contingency table of agreement is shown in table 3.

Table 3

<table>
<thead>
<tr>
<th>Database Self-Harm</th>
<th>113</th>
<th>227</th>
<th>340</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Database Self-</td>
<td>298</td>
<td>134</td>
<td>432</td>
</tr>
<tr>
<td>Harm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>411</td>
<td>361</td>
<td></td>
</tr>
</tbody>
</table>

**Discussion**

The present descriptive study was an examination of repetition rates of SH in patients presenting at a large A&E department in the UK. Our findings demonstrate that SH repetition rates may be much higher than many previous estimates. To our knowledge this is the first study to examine SH attempts in repeaters and non-repeaters as defined by their index episode and also via individual’s self-report data. We found that there was weak agreement between the two measures and there could be several explanations. Patients may be reticent to discuss their own self-harm history or patients may have genuinely forgotten some self-harm events.

**Accuracy of patient-reported self-harm recollection**

This is the first study to our knowledge to examine the accuracy and consistency of patient reported self-harm against hospital held data. Of 340 patients with definite previous self-harm by hospital records, only 113 (33.2%) of patients correctly confirmed this at the time of their assessment. Of equal interest there were 432 with no hospital record of previous self-harm who told their clinician they had in fact self-harmed. Altogether of 411 patients who said they had self-harmed previously only 113 of these episodes were recorded in the hospital database. Thus the Cohen’s Kappa agreement between the two methods was 0.353 (low). This suggests that whilst neither HVSH or SRSH is entirely accurate, in clinical practice it is important to clarify that patients appear to under-report their own prior self-harm behaviour by about 45% as the proportion of all self harm events which were self reported.
was 54.7% (411/751). Conversely the proportion of all self harm events which were present on hospital database was 45.3% (340/638).

There could be a few possible reasons for these discrepancies. Hospital records will not reveal self-harm episodes at home or those where the presentation was out of area. Self-recall for a variety of medical area particularly mental health may be accurate or patients may be unwilling to give personal information of this kind. Nevertheless in this study, both self-reported and hospital verified records of self-harm strongly predicted repetition. The effect was strongest in hospital verified non-first timers than first timers (39.4 % vs 73.8 %) than in self-reported first presentations (45.2% vs 65.2%) in those who said this was not their first time. Other issues which may complicate the reporting and quantification of self-harm include embarrassment, denial and secrecy, particularly in younger people (Hawton and James, 2005).

**Rates of repetition**

This study found high rates of repetition of SH. Across the overall sample the rates of repetition appeared to be higher than previously published estimates at both one year (~15% vs 32.0% ) and two-year follow-ups (~25% vs 40.8%) (Owens et al., 2002). A recent meta-analysis suggested a pooled estimated of repeat non-fatal self-harm was 16.3% at 1 year; 16.8% at 2 years and 22.4% at 5 years (Caroll et al, 2014). Our larger estimates may be due, in part to the sampling location or how SH is coded. The study site was the only A&E department within the county and thus had a greater chance of recapture of repeated SH. This is important, as with most studies examining SH estimates are limited to individuals reporting to the same hospital (Oh et al., 2011), or presenting at all (Zahl and Hawton, 2004). Furthermore, research suggests that there are large variations in practice between services and regions on how SH is assessed, coded and ultimately treated. A recent review demonstrated
marked variability in service provision and specialist assessment across 32 hospitals in England and that these statistics have remained static over the past decade, despite recommendations from NICE (Cooper et al., 2013). Furthermore, evidence suggests that SH encountered within emergency departments is likely to be coded as ‘undefined’ leading to large underestimations (Bethell and Rhodes, 2009). Therefore, the consistent codes of practice within the same hospital lead to a richer more reliable data set in this case.

Strengths, Limitations and future directions

This study had several strengths, first the relatively large sample size and length of follow up, both of which are substantially larger than medians reported for SH repetition studies of this type (Carroll et al., 2014). Also the sampling in Leicestershire was likely to be more complete because there is only one A&E in the county and it is a relatively long distance to travel out of area. Also the SH10 may provide a rich measure of self-harm and attributable factors which may allow better capture who are the individuals who are more likely to repeat self-harm. Our limitations are that we relied on completed assessments by A&E doctors who despite the provision of training and supervision had different levels of skills and competence. Where patients left or absconded before a risk assessment was complete then the self-reported data would be lost. We also had no data on patients who were clinically risk assessed without using the recommended SH10 form and no data on actions of nursing staff performing triage. Together these factors account for many cases that presented during this period but were not part of this study. In this study we did not distinguish between suicidal and non-suicidal self-harm based on the presenting intent of the patient at the time of presentation. Another limitation is that we did not collect mortality data and we had no information on self-harm occurring out of the hospital, at home or in the community. In the SH10 study we aimed to sample a representative selection of 30% of all patients attending with self-harm however we did not collect data on the remaining 70% who received usual
care. Although we are confident that our sample is typical of those presenting during this period it is impossible to fully rule out selection bias without data from those who received usual care. Finally, we acknowledge that in some cases accidental injury can be mistaken as self-harm, however we attempted to remove such cases by manually reviewing the medical records.

**Clinical implications**

Patients appear to under-report their own prior self-harm behaviour by about 36%. In those with a positive self-harm history we found 65.2% repeated following SRSH which was lower than 73.8% in HVSH suggesting that HRSH might be a superior measure. Nevertheless in those patients who denied self harm (n=361) 227 (62.8%) actually had a hospital verified previous episode. Which suggests that at least in the Emergency Department clinicians should double check the hospital records for all patients who present with self-harm but deny a past history.

**Conclusions**

This study suggests that different systems of gathering data on self-harm result in different estimates. Indeed we found little agreement between HVSH and SRSH. Both offer some predictive validity but they are significantly different and it is not clear which one is more accurate. Missing a history of self-harm will prejudice the accuracy of any risk assessment and lead to an underestimation of risk. We also found rates of repeated SH are higher than many previous studies for two main reasons. Firstly due to the high rate of recapture of repeat SH events within the population due to the geographical advantage of one large A&E department for the entire county hence a more complete and accurate picture of self harm attendances and readmissions. Secondly, the length of the follow up period in this
study is greater than in previously published studies, therefore further allowing for a complete dataset and analyses.

Declaration of interest

All authors declare no conflicts of interest.

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Figure 1: Proportion of repeat SH attendances in 774 individuals with an average 5.6 years follow up.
Figure 2: Proportion of repeat SH attendances in individuals who presented with SH at index according to the EDIS database.
Figure 3: Proportion of repeat SH attendances in individuals who presented with SH at index according to the SH-10.
Table 1: Descriptive data on first time and non-first time presenters (defined by hospital database)

<table>
<thead>
<tr>
<th></th>
<th>HVSH First time presenters</th>
<th>HVSH Non-First time presenters</th>
<th>Chi Square / P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Cases*</td>
<td>429</td>
<td>340</td>
<td></td>
</tr>
<tr>
<td>Proportion repeated</td>
<td>39.4%</td>
<td>73.8%</td>
<td>90.7 P &lt; 0.001</td>
</tr>
<tr>
<td>Female Gender</td>
<td>58.3%</td>
<td>50.8%</td>
<td>4.2 P = 0.04</td>
</tr>
<tr>
<td>Age (SD, range)</td>
<td>37.21 (15.36, 16-88)</td>
<td>33.50 (11.82, 16-80)</td>
<td></td>
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<tr>
<td>Mean follow up period (years)</td>
<td>7.52 (0.81)</td>
<td>7.34 (0.93)</td>
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</tr>
<tr>
<td>Median time to repeat (days)</td>
<td>368</td>
<td>141</td>
<td></td>
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</table>

*5 cases had missing data in EDIS entry and were excluded from subgroup analyses.

Table 2: Descriptive data on first time and non-first time presenters (defined by patient self-report)

<table>
<thead>
<tr>
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<th>SRSH First time presenters</th>
<th>SRSH Non-First time presenters</th>
<th>Chi Square / P Value</th>
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<td>Number of Cases</td>
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<tr>
<td>Proportion repeated</td>
<td>45.2%</td>
<td>65.2%</td>
<td>31.2 P &lt; 0.001</td>
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<td>Female Gender</td>
<td>55.7%</td>
<td>42.4%</td>
<td>13.6 P &lt; 0.001</td>
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<td>Age (SD, range)</td>
<td>38.2 (15.44, 16-88)</td>
<td>34.6 (11.75, 16-74)</td>
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<td>Mean follow up period (years)</td>
<td>7.51 (0.81)</td>
<td>7.34 (0.93)</td>
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<td>Median time to repeat (days)</td>
<td>320.5</td>
<td>143.5</td>
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References


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