

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

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

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20 **Abstract**

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

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

35 **Results:** Across the whole sample 32.0 % of patients repeated SH within one year, which
36 rose to 54.1% at completion of follow-up. Repetition rates were considerably higher in non-
37 first timers than first timers after one year (47.9% vs 19.6%) and by the end of follow-up
38 (73.8% vs 39.4%) ($p < .001$). Of 411 with self-reported first presentations, 45.2% repeated
39 over the study period. In terms of predictive validity 65.2% of those with previous SRSH
40 repeated vs 73.8% with previous HVSH ($p < .001$). There was low agreement between SRSH
41 and HVSH (Kappa = 0.353, 95% CI 0.287 -0.419, low).

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

47

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

50

51 **Introduction**

52 Self-harm (SH) is the intentional act of self-poisoning or injury and is one of the
53 leading causes of acute medical admissions for both men and woman (Hawton and Fagg,
54 1992, Hawton et al., 1982, O'Loughlin and Sherwood, 2005).^{1 2 3} Repeated self-harm not
55 only contributes to significantly greater health care costs (Sinclair et al., 2011),⁴ but is also
56 associated with an increased risk of suicide (Cumming et al., 2006).⁵ The relative risk of
57 suicide increases greatly with every act of SH (Leon et al., 1990, Zahl and Hawton, 2004).^{6 7}
58 In older adults who report to hospital following SH 1.5% die by suicide within 12 months
59 (Murphy et al., 2012).⁸ Furthermore, approximately 40- 60% of people who die by suicide
60 will have presented with at least one episode of SH making it a strong predictor of suicidal
61 intentions (Hawton and Fagg, 1988).⁹

62 The prevalence of SH has increased in recent times and statistics demonstrate that the
63 UK has one of the highest rates of self-harm across Europe, with annual rate incidences of
64 approximately 400 per 100 000 of the population (Horrocks and House, 2002).¹⁰ Research
65 has identified a number of risk factors are associated with the incidence and repetition of SH
66 including adverse social problems, problematic drug use (Haw and Hawton, 2011)¹¹ and
67 psychiatric disorders (Moller et al., 2013)¹² (Gunnell et al., 2008).¹³ Females are also
68 generally more likely to SH than males (Hawton et al., 1997).¹⁴ The strongest predictor of
69 repeated SH is a previous attempt at SH (Beghi et al., 2013),¹⁵ however previous studies
70 report that of patients who SH, only 10-20% attend hospital following an attempt (Ystgaard
71 et al., 2003)¹⁶ therefore making it difficult to identify those highest at risk of repetition.

72 Repetition of self harm is a relatively common occurrence. Risk of repeated self-harm
73 is highest within the first few months of an index presentation of SH, with median repetition
74 times ranging from 73 to 115 days (Carter et al., 2002, Kapur et al., 2006).^{17 18} A systematic

75 review of self-harm recurrence estimates rates around 15 % within the first year, which rises
76 to approximately 20-25% over the following years in the UK (Owens et al., 2002, Horrocks
77 and House, 2002).^{19,20} However, these estimates are estimates as genuine first time self-harm
78 could not be reliably defined. A more recent meta-analyses found a pooled estimate of
79 repeated self-harm within one year was 16.3%, in keeping with earlier estimates (Carroll et
80 al., 2014).²¹ In the samples included within this meta-analysis, cohorts with a higher
81 proportion of patients with a history of self-harm were associated with an increased 1 year
82 repetition rate of 19.6%, compared to cohorts with low incidence of previous history of
83 15.2%. Within the studies, the method of recording self harm explained significant variability
84 in repeated self harm estimates that is estimates were significantly larger when interpreted
85 through patients' self reporting compared to repeats defined by hospital administration
86 records.

87 A further limitation in the literature is that studies of repetitions usually examine short
88 term not long term risk with typical follow up over one to three years (Haw et al., 2007).²²
89 Furthermore, estimates are likely to be conservative given that repeaters may not present to
90 hospital, choose not to wait for treatment or move areas (Guthrie et al., 2001, Johnston et al.,
91 2006).^{23 24} Here we present a prospective study which investigates repeated SH attendances
92 to a UK hospital covering a large population area. We collected data on self-reported self
93 harm (SRSH) as well as hospital verified self harm (HVSH). An extensive follow-up was
94 conducted to examine rates of SH repetition over a long period of time.

95

96 **Methods**

97 **Study sample and setting**

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

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

123 remainder of cases that were not part of the SH10 study, patients received usual care by their
124 clinician.

125 **Self harm definition**

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

133 **Data collection**

134 The SH10 forms were collected as part of the diagnostic and treatment process, and
135 formed the basis for the initial assessment of the index episode of self-harm. We were able to
136 cross-reference additional data for the index episode data extracted electronically from the
137 Emergency Department Information System (EDIS) and cross checked against the completed
138 data on the paper SH10 form. Data was also collected on whether patients had presented with
139 self-harm prior to the index episode, attendances following the (first) index presentation for
140 both self harm and non-psychiatric attendances and the nature of these self harm attendances
141 through EDIS. EDIS contains codes for self-harm, self-injury, hanging, and self-poisoning
142 entered contemporaneously by staff in ER. Patient records were identified through the
143 electronic database by using patient initials, the hospital number and date of birth. As
144 individual patients may have multiple hospital numbers, each attendance record was
145 manually cross checked with the patient’s address, name and date of birth to ensure it was the
146 same patient. In addition to the electronic data, previous self-harm as reported by the patient

147 to their clinician at the time of index presentation was also recorded (SRSH). This allowed us
148 to check on the accuracy of patient reporting of their self-harm and also the influence of self-
149 reported prior harm on future repetition, that is predictive validity. A previous self harm
150 episode was defined as attendance to the A&E department for any act of self harm taken
151 before the index episode, regardless of outcome.

152 **Follow up**

153 Data collection took place for patients who presented with an episode of SH from 28th
154 April 2004 to 19th September 2008, with a follow up for final outcome in September 2013.
155 The mean follow up period was 7.4 years. Complete follow-up was attained up until year
156 five but not all subjects had longer scrutiny. 728 subjects had follow up at year 6 (5.9%
157 missing), 520 had follow up at year 7 (32.8% missing) and 261 had a final follow-up at year 8
158 (66.3% missing). Data attrition occurred mainly when patients presented towards the end of
159 the recruitment period reducing the length of time for follow-up. A total of 774 (43.5 % male)
160 unique attendees were included in the sample, with a mean patient age of 36.49 years (SD =
161 13.92, range 16-88) at first attendance. According to emergency department information
162 systems the index presentation was the first known SH attempt for 429 patients.

163 **Results**

164 **1. Overall SH Repetition**

165 Repetition of SH was measured at 8 time points (3, 6 and 12 months then 2, 3, 4, 5 and 7.4
166 years) and presented in Figure 1. At the first follow-up of 3 months 19.1% of patients had
167 presented to A&E with a repeated SH attempt, this increased to 32.0% by one year and
168 54.1% over 5 years of follow-up. The average (mean) time to repeat was 528 (SD = 687)
169 days and the median was 222 days. Overall 357 (45.9%) patients did present to A&E with

170 repeated SH in our sample. In patients who presented with a repeated episode of SH within
171 the study time period, the mean number of recurring incidences of SH was 7.12 (SD = 13.43,
172 range 1 – 156, median = 3). In males the mean was 5.34 (SD = 8.29, range 1-67, median =
173 2), in females the average was 8.72 (SD = 16.45, range 1 - 156, median = 3).

174 **2. HVSH First timers vs non-first timers**

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

187 Figure 2 presents repetition data from first timers and non-first timers respectively.
188 First timers had lower repetition rates at each time point and were less likely to have repeated
189 SH by the end of follow up compared to those who were not first timers.

190

191 **3. SRSH First timers vs non-first timers**

192 Data was divided into patients based on self reporting to the ED physician during the
 193 initial assessment at the index episode; those who self reported previous attempts of SH (self-
 194 report first time) and who did not (self-report non-first time) to examine relationship between
 195 this and the EDIS entry. The EDIS entries were then checked to see if patients had correctly
 196 reported previous attendances. Descriptive data for the two subgroups are presented in table
 197 2. Repetition rates for both subgroups are presented in Figure 3. As with EDIS entry those
 198 who self-reported first time SH were less likely to repeat SH at all time points than those who
 199 self-reported previous self harm attempts. Of 411 with self-reported first self-harm, 45.2%
 200 repeated over the studies period of 5.6 years vs 65.2% in those who said this was not their
 201 first time (Chi squared: 30.87 $p < 0.0001$). Comparing outcomes, 65.2% repeated following
 202 SRS vs 73.8% in HVSH (risk difference = 8.6%, 95% confidence interval 2.0% to 15.1%, P
 203 = 0.01).

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

206 432 patients had no previous self harm according to EDIS but of these only 134 had
 207 no previous self-harm according to their own self-report at the time of presentation (31.0%).
 208 340 patients had previous self harm according to EDIS but only 113 had previous self-harm
 209 according to their own self-report at the time of presentation (33.2%). The weighted Cohen's
 210 Kappa agreement between the two methods was low (Kappa = 0.353 CI 0.287 to 0.419, SE of
 211 kappa = 0.034 $P = ns$). A 2x 2 contingency table of agreement is shown in table 3.

212 **Table 3**

	Self-Report Self-Harm	No Self-Report Self-Harm	
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Database Self-Harm	113	227	340
No Database Self-Harm	298	134	432
	411	361	

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214 **Discussion**

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

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

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

234 was 54.7% (411/751). Conversely the proportion of all self harm events which were present on
235 hospital database was 45.3% (340/638).

236 There could be a few possible reasons for these discrepancies. Hospital records will
237 not reveal self-harm episodes at home or those where the presentation was out of area. Self-
238 recall for a variety of medical area particularly mental health may be accurate or patients may
239 be unwilling to give personal information of this kind. Nevertheless in this study, both self-
240 reported and hospital verified records of self-harm strongly predicted repetition. The effect
241 was strongest in hospital verified non-first timers than first timers (39.4 % vs 73.8 %) than in
242 self-reported first presentations (45.2% vs 65.2%) in those who said this was not their first
243 time. Other issues which may complicate the reporting and quantification of self-harm
244 include embarrassment, denial and secrecy, particularly in younger people (Hawton and
245 James, 2005).²⁶

246 **Rates of repetition**

247 This study found high rates of repetition of SH. Across the overall sample the rates of
248 repetition appeared to be higher than previously published estimates at both one year (~15%
249 vs 32.0%) and two-year follow-ups (~25% vs 40.8%) (Owens et al., 2002).²⁷ A recent meta-
250 analysis suggested a pooled estimated of repeat non-fatal self-harm was 16.3% at 1 year;
251 16.8% at 2 years and 22.4% at 5 years (Caroll et al, 2014).²¹ Our larger estimates may be
252 due, in part to the sampling location or how SH is coded. The study site was the only A&E
253 department within the county and thus had a greater chance of recapture of repeated SH. This
254 is important, as with most studies examining SH estimates are limited to individuals reporting
255 to the same hospital (Oh et al., 2011),²⁸ or presenting at all (Zahl and Hawton, 2004).²⁹
256 Furthermore, research suggests that there are large variations in practice between services and
257 regions on how SH is assessed, coded and ultimately treated. A recent review demonstrated

258 marked variability in service provision and specialist assessment across 32 hospitals in
259 England and that these statistics have remained static over the past decade, despite
260 recommendations from NICE (Cooper et al., 2013).³⁰ Furthermore, evidence suggests that
261 SH encountered within emergency departments is likely to be coded as ‘undefined’ leading to
262 large underestimations (Bethell and Rhodes, 2009).³¹ Therefore, the consistent codes of
263 practice within the same hospital lead to a richer more reliable data set in this case.

264 **Strengths, Limitations and future directions**

265 This study had several strengths, first the relatively large sample size and length of
266 follow up, both of which are substantially larger than medians reported for SH repetition
267 studies of this type (Carroll et al., 2014).²¹ Also the sampling in Leicestershire was likely to
268 be more complete because there is only one A&E in the county and it is a relatively long
269 distance to travel out of area. Also the SH10 may provide a rich measure of self-harm and
270 attributable factors which may allow better capture who are the individuals who are more
271 likely to repeat self-harm. Our limitations are that we relied on completed assessments by
272 A&E doctors who despite the provision of training and supervision had different levels of
273 skills and competence. Where patients left or absconded before a risk assessment was
274 complete then the self-reported data would be lost. We also had no data on patients who were
275 clinically risk assessed without using the recommended SH10 form and no data on actions of
276 nursing staff performing triage. Together these factors account for many cases that presented
277 during this period but were not part of this study. In this study we did not distinguish between
278 suicidal and non-suicidal self-harm based on the presenting intent of the patient at the time of
279 presentation. Another limitation is that we did not collect mortality data and we had no
280 information on self-harm occurring out of the hospital, at home or in the community. In the
281 SH10 study we aimed to sample a representative selection of 30% of all patients attending
282 with self-harm however we did not collect data on the remaining 70% who received usual

283 care. Although we are confident that our sample is typical of those presenting during this
284 period it is impossible to fully rule out selection bias without data from those who received
285 usual care. Finally, we acknowledge that in some cases accidental injury can be mistaken as
286 self-harm, however we attempted to remove such cases by manually reviewing the medical
287 records.

288 **Clinical implications**

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

296 **Conclusions**

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

306 study is greater than in previously published studies, therefore further allowing for a complete
307 dataset and analyses.

308 **Declaration of interest**

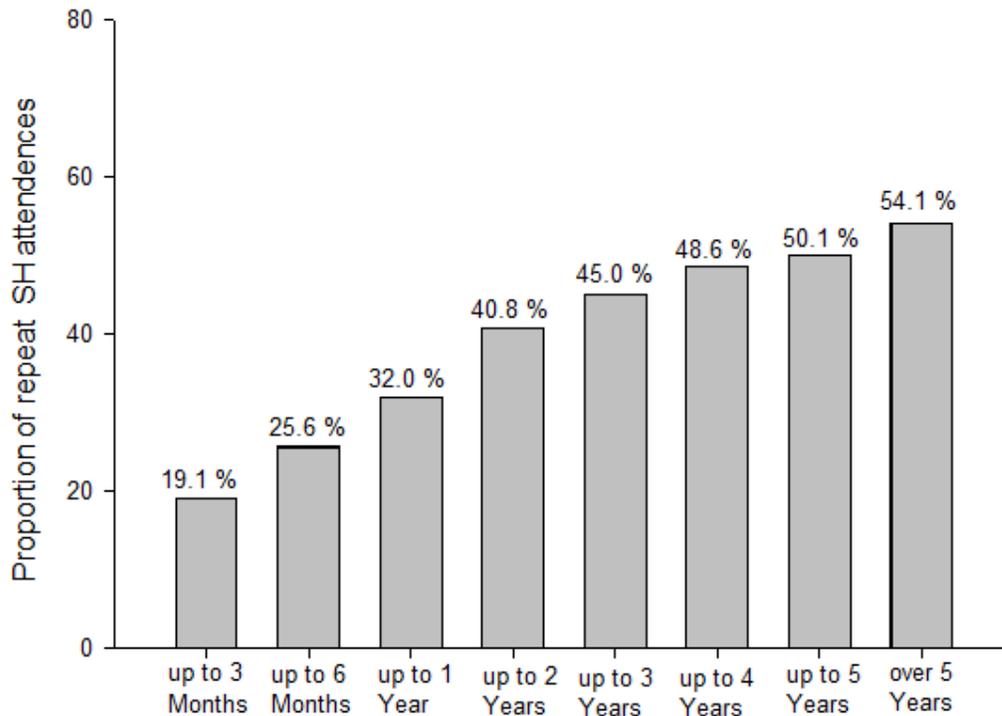
309 All authors declare no conflicts of interest.

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312 commercial, or not-for-profit sectors

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314 **Figure 1:** Proportion of repeat SH attendances in 774 individuals with an average 5.6
315 years follow up.



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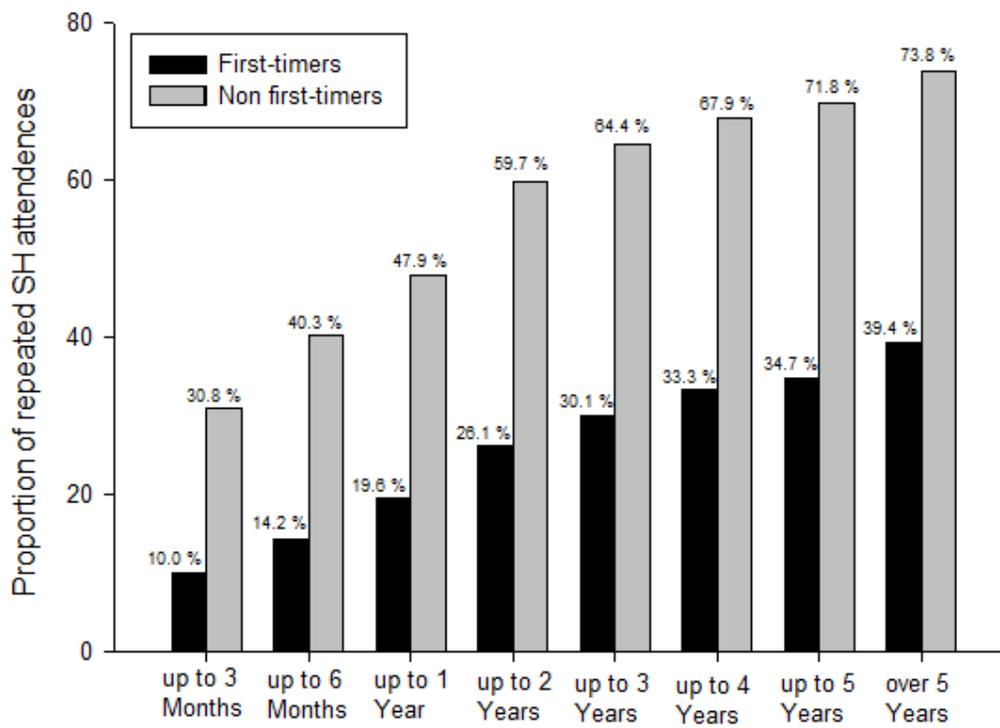
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329 **Figure 2:** Proportion of repeat SH attendances in individuals who presented with SH
330 at index according to the EDIS database.

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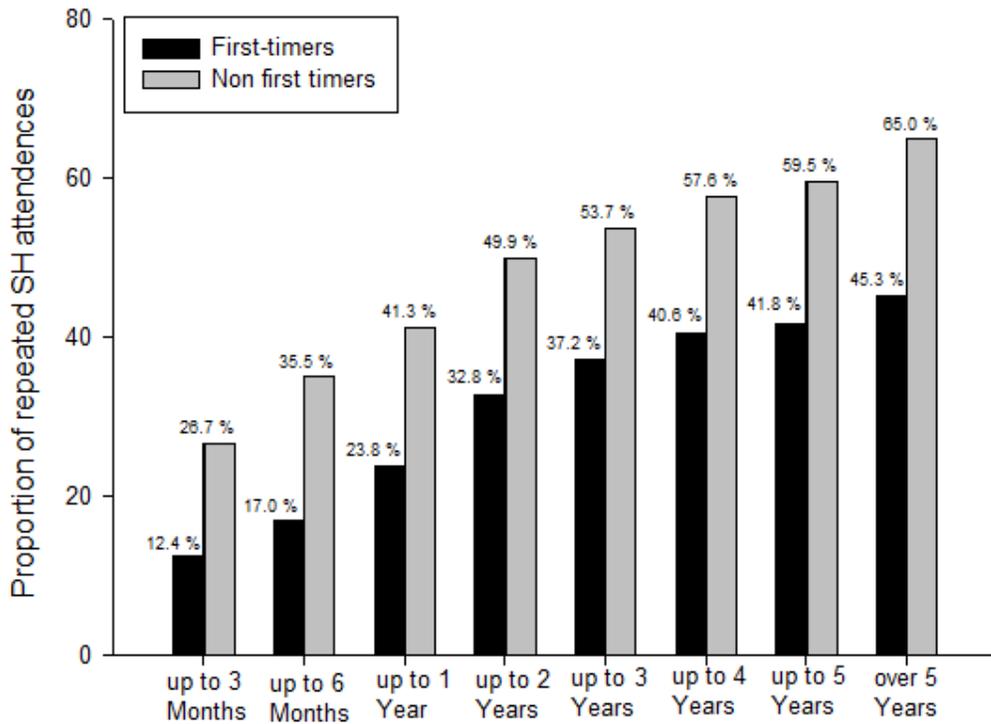
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344 **Figure 3:** Proportion of repeat SH attendances in individuals who presented with SH
345 at index according to the SH-10.

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350 **Table 1:** Descriptive data on first time and non-first time presenters (defined by hospital
351 database)

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

352 *5 cases had missing data in EDIS entry and were excluded from subgroup analyses.

353

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

	<u>SRSH First time presenters</u>	<u>SRSH Non-First time presenters</u>	<u>Chi Square / P Value</u>
Number of Cases	411	363	
Proportion repeated	45.2%	65.2%	31.2 P < 0.001
Female Gender	55.7%	42.4%	13.6 P < 0.001
Age (SD, range)	38.2 (15.44, 16-88)	34.6 (11.75, 16-74)	
Mean follow up period (years)	7.51 (0.81)	7.34 (0.93)	
Median time to repeat (days)	320.5	143.5	

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