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Running head: Neglect & Spasticity

**Patients with hemi-spatial neglect are more prone to limb spasticity, but this does not prolong their hospital stay**

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2 **Patients with hemi-spatial neglect are more prone to limb**

3 **spasticity, but this does not prolong their hospital stay**

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26 **Abstract**

27 **Objective:** To determine whether stroke patients who suffer from hemi-spatial  
28 neglect tend to stay in hospital longer because they are prone to limb spasticity.

29 **Design:** Retrospective analysis of in-patient medical notes.

30 **Setting:** In-patient neuro-rehabilitation unit of a regional UK teaching hospital

31 **Participants:** All 106 patients admitted to the neuro-rehabilitation unit between  
32 2008-2010 who had suffered a stroke, as confirmed by CT or MRI.

33 **Intervention:** Not applicable.

34 **Main Outcome Measures:** Statistical coincidence of hemi-spatial neglect and  
35 spasticity; Length of hospital stay.

36 **Results:** Chi-square analyses indicated that individuals with left neglect were nearly a  
37 third more likely to develop spasticity than those without neglect (87% vs. 57%),  
38 while nearly one half of those with left-sided spasticity showed neglect (44% vs.  
39 13%). Individuals with neglect stayed in hospital 45 days longer than those without  
40 neglect, but the presence/absence of spasticity did not affect length of stay.

41 **Conclusions:** The results provide the first statistical evidence that neglect and limb  
42 spasticity tend to co-occur post-stroke, though it is only the former that significantly  
43 prolongs stay. Diagnostic value aside, these results are important because they tell us  
44 that the treatment of neglect should not be overshadowed by efforts to reduce co-  
45 morbid spasticity. Despite its poor prognosis, hemi-spatial neglect continues to  
46 receive little targeted therapy in some units.

47

48 **Key words:** inattention; hemiplegia; stroke; outcome.

49

50

51 **List of Abbreviations**

52 LOS: Length of stay

53 UK FIM+FAM: United Kingdom version of The Functional Independence Measure

54 and Functional Assessment Measure

55 NPDS: Northwick Park Dependency Scale

56 MAS: Modified Ashworth Scale

57 NIHSS: National Institutes of Health Stroke Scale

58 ADLs: Activities of Daily Living

59

60 Hemi-spatial neglect is a debilitating, attentional disorder that can occur in the  
61 absence of primary sensory or motor loss<sup>1</sup>. Individuals with ‘neglect’ fail to  
62 acknowledge or respond to visual information presented on the side of space opposite  
63 their brain lesion, and as such struggle with many daily routines, often bumping into  
64 obstacles, becoming lost, and failing to notice people on the affected side. Prevalence  
65 is hard to estimate because diagnostic criteria differ, but the most conservative  
66 estimate indicates that over half of those who suffer a cerebral stroke will show  
67 moderate to severe hemi-spatial neglect in the acute phase, with over 20% continuing  
68 to show stable impairment beyond three months<sup>1</sup>. The condition is over twice as  
69 common following a right hemispheric versus left hemispheric stroke so tends to  
70 present on the left-side of space<sup>2</sup>.

71

72 Unfortunately, the presence of neglect is strongly associated with poor general  
73 functional outcome from stroke. Individuals with neglect (regardless of severity)  
74 typically require additional weeks in hospital (118days vs. 78days)<sup>3</sup> needing nearly  
75 twice as many hours of physiotherapy and occupational therapy, and are more prone  
76 to falls and persistent urinary incontinence<sup>4</sup>. Patients with neglect at hospital  
77 admission score significantly lower on measures of functional independence both  
78 during hospital stay and 12-18 months after leaving<sup>5-7</sup>. Those who still show neglect  
79 on simple bedside tests two months after admission have a higher risk of functional  
80 worsening at 1year follow-up.

81

82 The aim of the present study was to further investigate the poor prognosis associated  
83 with hemi-spatial neglect. Unsystematic observations made during our routine  
84 assessment indicate that neglect often co-occurs with unilateral limb spasticity.

85 Controversy remains over the precise definition of spasticity<sup>8</sup>, though a relatively  
86 broad, practical characterization has been forwarded by members of the SPASM  
87 consortium who describe it as disordered sensorimotor control, resulting from an  
88 upper motor neuron lesion, presenting as intermittent or sustained involuntary  
89 activation of muscles<sup>9</sup>. As far as we are aware, the concurrence of neglect and  
90 spasticity has yet to be formally estimated. However, if there is a strong association  
91 then it is possible that the especially poor outcomes associated with neglect are partly  
92 attributable to the co-presence of spasticity. On the other hand, although it is known  
93 that motor impairment can increase length of stay and reduce functional  
94 independence<sup>10</sup>, few studies have looked specifically at spasticity. Of those that did, it  
95 was not established whether the extended stay could instead be attributed to co-  
96 morbid neglect.

97

98 In the following sections we report the effects of hemi-spatial neglect and spasticity  
99 on the length of time patients remained within the in-patient stroke service of a  
100 regional, UK teaching hospital. We chose length of stay as the main study variable  
101 because this has been taken as an accurate marker of general functional outcome, has  
102 widely understood implications for both hospital and post-discharge resource  
103 utilization, and can be obtained accurately and easily. In the first instance, we wanted  
104 to confirm our informal observation that the co-incidence of spasticity and neglect is  
105 positively associated. In the second instance, we sought to determine whether the  
106 detrimental effect of neglect on length of stay increases when spasticity is co-present.  
107 To help clarify any significant relationship between these two impairments, a variety  
108 of other factors that have also been shown to impair outcome were examined. These

109 were motor flaccidity<sup>11</sup>, age<sup>5</sup>, gender<sup>12</sup>, hemianopia<sup>10</sup>, depression<sup>13</sup> and neuro-  
110 anatomical lesion site<sup>14</sup>.

111

## 112 **Methods**

### 113 *Participants*

114 Data were collected retrospectively from the medical records of 106 stroke patients  
115 admitted between 2008-2010 to the East Kent Hospitals in-patient neuro-  
116 rehabilitation unit, UK. The unit admits patients directly from the acute stroke wards  
117 of three nearby hospitals, and has a catchment population of approximately 800,000.  
118 Most patients admitted have few pre-morbid complications, significant psychological  
119 issues and difficult familial circumstances that do not allow their rehabilitation goals  
120 to be met via early, supported discharge.

121

122 All cases of strokes were confirmed via radiological report (CT and/or MRI). With  
123 the exception of those who presented with only subarachnoid hemorrhage or who  
124 either died before discharge (n=4) or self-discharged prematurely (n=4), every stroke  
125 patient admitted to the neuro-rehabilitation unit and whose medical record was  
126 available was included in the study. The demographic and clinical characteristics of  
127 the sample are presented in Table 1. The mean LOS was 100 days (s.d = 70),  
128 considerably longer than that in most US units. The mean UK FIM+FAM<sup>15</sup> score, a  
129 measure of global disability and more specific cognitive and psychosocial  
130 independence (see below), was 118/210 at admission and 158/210 at discharge. The  
131 mean NPDS score<sup>16</sup>, a measure of nursing support (see below) was 30 (high  
132 dependency: 2 helpers needed for most care activities) at admission and 17 (medium  
133 dependency: 1 helper needed for most care activities) at discharge.



134

135 The study received approval from the local research ethics committee before  
136 proceeding.

137 Table 1 about here

138

139 *Assessments*

140 (1) Initial assessment of hemi-spatial neglect was attempted within 7 days of acute  
141 admission and was based on the NIH stroke scale<sup>17</sup>. Following transfer from the acute  
142 stroke ward to the neuro-rehabilitation unit, all patients (regardless of whether neglect  
143 was suspected) received a more thorough attentional evaluation via the Rivermead  
144 Perceptual Assessment Battery<sup>18</sup>. The results of the Rivermead assessment were used  
145 to confirm the presence/absence and laterality of visual neglect. Specific scores from  
146 the Rivermead were not always documented in patients' notes, so only the  
147 presence/absence and laterality of neglect were recorded for study purposes. Patients  
148 diagnosed with neglect received no targeted therapy, however, they were made  
149 continually aware of their impairment via frequent prompting by the occupational  
150 therapists and nurses during activities of daily living and mobility training.

151 (2) Muscle tone was assessed using the MAS<sup>19</sup> with a score of 1 denoting spasticity  
152 and 0 (together with muscle floppiness) denoting flaccidity. Specific MAS scores  
153 were not always available so only the presence/absence of spasticity, rather than  
154 severity, was recorded. Assessment was frequently carried out by neuro-  
155 physiotherapists and the consulting physician, and for study purposes, patients were  
156 classified as spastic irrespective of when, during their stay, symptoms developed.  
157 Recordings were made of which side of the body was affected, along with whether the

158 upper or lower limbs (or both) were implicated. The condition was comprehensively  
159 managed using Botulinum injection or intra-thecal Baclofen pump.

160 (3) Hemianopia was assessed via the NIHSS using visual confrontation testing.

161 (4) Depression was assessed via the Beck Depression Inventory<sup>20</sup>, and indicated if the  
162 individual scored 14 or more.

163 (5) Lesion laterality and lobular distribution was confirmed by either CT (65 patients),  
164 or MRI (11 patients) or both (28 patients) and classified according to hemisphere and  
165 cortical lobe(s).

166 (6) ADLs were measured using the NPDS and UK version of the FIM+FAM  
167 administered within the neurorehabilitation unit at admission and discharge. The  
168 NPDS is a 4 to 6 point 23 item composite measure of nursing dependency,  
169 specifically designed for use with in-patient neurological rehabilitation. Patients can  
170 score a minimum of 0 and maximum of 100. The UK version of the FIM+FAM was  
171 developed specifically for use in brain injury, and compared to the NPDS focuses less  
172 explicitly on nursing need and time and more on the ability to carry out certain  
173 activities of daily living. The measure has two components, the FIM, a 7 point 18  
174 item scale, which focuses on physical and cognitive disability, and the FAM, a 7 point  
175 12 item scale, which focuses on psychosocial issues. Patients can score a minimum of  
176 30 and maximum of 210.

177

### 178 *Statistical Analyses*

179 Pearson's Chi-square ( $\chi^2$ ) was applied to test for significant associations between  
180 hemi-spatial neglect and other observed co-morbidities. Multiple linear regression  
181 analysis was then used to determine significant predictors of LOS. LOS was defined

182 as the period between initial admission to the acute stroke ward and subsequent  
183 discharge from the specialist in-patient neurorehabilitation unit. Prior to this analysis,  
184 a natural log transformation was applied to the LOS data to reduce positive skew.  
185 Separate univariate analyses were then carried out for each predictor variable; left  
186 neglect, spasticity, spastic side (left vs. right), age (<60years vs. >60years), flaccidity,  
187 hemianopia, depression, lesion site (occipital, temporal, parietal, frontal), and gender.  
188 Given the a priori hypotheses, neglect and spasticity were automatically carried  
189 forward into the multiple linear regression while only those other variables that were  
190 statistically significant ( $\alpha=0.05$ ) when interrogated individually were added. Only age  
191 met this criterion.

192 Initial inspection of the data indicated that there were twice as many cases of  
193 left neglect (31 cases) than right neglect (15 cases). Given this uneven weighting, it  
194 made little sense to analyze both forms of neglect as a single variable. This was  
195 because any significant effect could reflect trends within the left neglect group alone.  
196 Cases of right neglect were therefore excluded from analyses, though summary data  
197 of the entire sample (n=106) are presented in both Table 1 and Table 3b.

198

## 199 **Results**

200 Missing data are summarized in Table 2.

201 Table 2 about here

202

### 203 *Factors associated with the presence of left neglect*

204 In line with the hypothesis, chi-square analysis indicated that the presence of left  
205 neglect and spasticity was positively associated ( $\chi^2 = 8.6(1)$ ,  $\phi$ -coefficient = .307,  
206  $p < 0.01$ ) (see Table 3a). 87% (27/31 patients) of patients with left neglect had

207 spasticity, compared to only 57% (34/60) of patients who did not have neglect.  
208 Further interrogation revealed that all those with left neglect who showed spasticity  
209 suffered from left, as opposed to right, spasticity. In those who did not have neglect,  
210 11 showed left spasticity, 19 showed right spasticity and 4 showed both. In those  
211 patients with spasticity, 44% (27/61) showed left neglect. All 27 of these patients  
212 presented with left-sided spasticity. Only 13% (4/30) of patients without spasticity  
213 showed left neglect.

214 Left neglect was also significantly associated with several other factors. 37%  
215 of patients with neglect suffered from hemianopia, compared to 9% of patients  
216 without neglect ( $\chi^2=8.1(1)$ ,  $\phi$ -coefficient =.326,  $p<0.01$ ). At an anatomical level, 71%  
217 of patients with left neglect showed damage to the right parietal lobe compared to  
218 only 38% of those without neglect ( $\chi^2=6.8(1)$ ,  $\phi$ -coefficient =.313,  $p<0.01$ ). Right  
219 frontal lobe damage was also more prominent in the neglect sample ( $\chi^2=7.6(1)$ ,  $\phi$ -  
220 coefficient =.332,  $p<0.01$ ); 71% of patients with neglect suffered frontal damage  
221 compared to 35% of those without neglect. Finally, 38% of neglect patients showed  
222 right temporal lobe damage, compared to 15% of those without neglect ( $\chi^2=4.8(1)$ ,  $\phi$ -  
223 coefficient =.262,  $p<0.05$ ).

224 The statistical association between neglect and depression was borderline  
225 significant ( $\chi^2=3.9(1)$ ,  $\phi$ -coefficient =.205,  $p=0.05$ ), whereby 45% of patients with  
226 neglect were classified as depressed compared to 25% of those without neglect.

227 Tables 3a and 3b about here

228

### 229 *Predictors of Length of Stay*

230 The regression analysis indicated that the presence of hemi-spatial neglect and age  
231 independently predicted LOS (see Table 4). Patients with neglect stayed 45 days

232 longer than those without neglect (130 days vs. 85 days). Patients younger than 60  
233 years stayed an average of 39 days longer than those above 60 years (126 days vs. 87  
234 days). Importantly, the presence/absence of spasticity did not predict LOS (105 days  
235 vs. 108 days). The explanatory power of the model was unaffected when the  
236 interaction between neglect and spasticity was added, accounting for only an extra  
237 0.5% of the variance ( $p=0.43$ ).

238 Table 4 about here

239

#### 240 *Activities of Daily Living (ADL)*

241 Although patients with left neglect and spasticity did not stay any longer than patients  
242 with only neglect, it is possible that the former were nevertheless discharged with a  
243 lower ADL score. We therefore compared FIM+FAM and NPDS scores between the  
244 two groups at discharge. An independent samples  $t$ -test showed no difference in  
245 FIM+FAM discharge scores between those only with neglect (140/210) versus those  
246 with neglect and spasticity (145/210) ( $t=0.13$  (d.f.=12),  $p>0.05$ ). We also found no  
247 statistical difference in NPDS score (neglect =19.0, neglect+spasticity =20.0) ( $t=0.2$   
248 (d.f.=22),  $p>0.05$ ). Both scores fall within the ‘medium dependency’ range,  
249 characterized by the need for one person to assist with most care activities.

250

#### 251 **Discussion**

252 This study was motivated by two aims; (1) to validate our informal observation that  
253 neglect patients have a higher likelihood of showing limb spasticity, and (2) to  
254 determine whether co-morbid spasticity partly explains why neglect patients tend to  
255 stay longer in hospital<sup>1-7</sup>. The data confirmed a significant association between left  
256 neglect and spasticity; over three quarters of patients with left-sided neglect had a left

257 spastic limb, while only one half of those without left neglect showed spasticity.  
258 Patients with left neglect stayed in hospital for an average of 45 days longer than  
259 those who did not have neglect. However, the co-presence of spasticity did not  
260 prolong the stay of neglect patients. Spasticity also failed to affect LOS in patients  
261 without neglect.

262

263 From a diagnostic perspective, the high coincidence of neglect and spasticity is  
264 important because in some units neglect diagnosis relies heavily on the visual tests  
265 performed as part of the NIHSS. While these tests usually catch severe cases of  
266 inattention, more mild cases can be overlooked if the patient is immobile or situated  
267 within a structured environment. Mild to moderate neglect can also be masked by  
268 hemianopia or simply given less priority than more grossly observable or manageable  
269 deficits such as hemiplegia and speech and language impairment. Yet even those mild  
270 cases of neglect that manifest in relatively subtle ways, such as when the individual is  
271 confronted with a novel or challenging situation or when salient stimuli appear in the  
272 ipsilesional field, significantly impair general functional recovery<sup>3</sup>. Given our finding  
273 that approximately one in two patients with left-sided spasticity will show neglect, it  
274 would therefore seem sensible to conduct a mandatory, detailed screen for neglect in  
275 all who present with left limb spasticity post-stroke.

276

277 Why do neglect and spasticity co-occur? One clue may arise from the cortical  
278 proximity of processes associated with lateralized visual attention and motor control.  
279 Many of these regions are perfused by the middle cerebral artery, so would be jointly  
280 affected by infarcts within its lower sections. Against this explanation is our failure to  
281 find a common lesion site in those with neglect and spasticity. That said, neglect and

282 spasticity can each arise from a variety of lesion distributions so it is possible that the  
283 two conditions do share a common anatomical pathology but that this is masked by  
284 the many ways in which it can manifest. A more speculative explanation is that  
285 neglect and spasticity can co-occur following dysfunction within the subcortical  
286 reticular activating system. Mesulum and others have strongly linked attentional  
287 arousal with elevated activity within the ascending pathways of the system and  
288 proposed that neglect may arise when this activity becomes chronically depressed<sup>21</sup>.  
289 By contrast, descending projections from other nuclei within the reticular formation  
290 are known to modulate muscle tonus and activity<sup>22</sup> and have been associated with  
291 increased muscle rigidity when damaged<sup>23</sup>. Theoretically, reticular dysfunction could  
292 therefore contribute to both neglect and spasticity.

293

294 Regarding length of stay, the failure of spasticity to exert an effect in those either with  
295 or without neglect is perhaps surprising because spasticity reduces the ability to  
296 perform various ADLs<sup>24</sup>. However, very few studies have actually examined the  
297 effect of spasticity on LOS. Most have instead examined the more generic effects of  
298 ‘hemiparesis’, ‘hemiplegia’ or ‘motor disability’<sup>5,10,25</sup> that not only encompass  
299 spasticity but other motor impairments such as self-reported muscle stiffness,  
300 hyperreflexia and clonic beats. For example, of the 77 patients described in one study  
301 as hemiparetic, only 20 were classified as spastic<sup>24</sup>. In those LOS studies that have  
302 employed more specific measures of motor impairment, it was unclear whether the  
303 patients also had a neglect that could instead account for their prolonged stay. A  
304 further consideration is that stroke patients with severe physical disability but intact  
305 cognitive function can participate actively in rehabilitation and benefit from an  
306 intense and relatively short programme. Post-discharge, while the spastic patient may

307 lack the ability to physically interact with the environment, there is much provision to  
308 help bypass his/her loss; prosthetic aids are available and homes can be adapted to  
309 support essential activity. By contrast, such adaptations have proved less effective in  
310 compensating for neglect, most likely because the patient lacks the spatial ability,  
311 insight and motivation to use them. These differences may partly explain why neglect  
312 but not spasticity impacted LOS.

313

#### 314 *Study Limitations*

315 Several important shortcomings limit the generalizability of our results. The  
316 retrospective nature of the study meant that certain outcome measures were not as  
317 well-defined as we would have liked. In particular, the severity of neglect and  
318 spasticity was not consistently recorded, so it remains unclear whether more severe  
319 cases remained in hospital for longer. Although all incidences of spasticity were  
320 recorded, other forms of motor impairment that might have contributed to hospital  
321 stay were rarely documented in patients' notes. Likewise, although the cortical lobes  
322 affected by stroke were clearly reported, the extent and nature of sub-cortical damage  
323 was often unreported. Speech and language deficits were also overlooked. To be  
324 discharged from the neuro-rehabilitation unit a safe discharge destination must be  
325 secured, the patient must have reached a plateau in his/her rate of rehabilitation  
326 improvement, and there must be access to community stroke services that can support  
327 on-going rehabilitation. These criteria are not only affected by clinical factors, and  
328 other indices of clinical progress and patient wellbeing must therefore be sought to  
329 corroborate our findings.

330



331 We conclude that although individuals with hemi-spatial neglect are especially prone  
332 to limb spasticity, it may be the presence of neglect rather than spasticity that keeps  
333 them in hospital. This finding underlines the need to carefully assess the attentional  
334 capacities of new stroke admissions and develop rehabilitation programmes that are  
335 specifically targeted towards neglect. In terms of hospital resource allocation, a  
336 sensible next step would be to determine, potentially by means of the Rehabilitation  
337 Complexity Scale<sup>26</sup>, whether the shorter stay of spasticity patients is offset by more  
338 intensive use of hospital services. Such an investigation would inform the debate as to  
339 whether the focus on spasticity within stroke management is out of step with its  
340 impact on patient wellbeing<sup>25,27</sup>.

341

342

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Clinical Characteristics	Incidence	LOS (s.d.)
Gender: male/female	62/44 (58%/41%)	97/104 (61/82)
Age: <60yrs/>60yrs	49/57 (46%/54%)	126/87 (69/69)
Handedness: left/right	96/10 (91%/9%)	102/88 (72/58)
Neglect	46 (43%)	120 (79)
<b>left-side</b>	<b>31 (29%)</b>	<b>130 (85)</b>
right-side	15 (14%)	99 (56)
Spasticity	73 (68%)	105 (78)
<b>left-side</b>	<b>38 (36%)</b>	<b>116 (84)</b>
right-side	31 (29%)	83 (63)
bilateral	4 (4%)	151 (86)
lower limb	4 (4%)	48 (16)
upper limb	39 (36%)	103 (78)
upper and lower limb	29 (27%)	112 (81)
Flaccidity	13 (12%)	119 (47)
Depression	34 (32%)	94 (48)
Hemianopia	17 (16%)	105 (61)
Stroke Type		
ischemic	75 (70%)	94 (67)
hemorrhagic	28 (26%)	115 (80)
ischemic and hemorrhagic	2 (2%)	105 (96)
Hemispheric lesion site		
left hemisphere	42 (40%)	87 (60)
right hemisphere	54 (51%)	102 (69)
bilateral	7 (7%)	129 (86)
Intra-hemispheric lesion site		
frontal	34 (32%)	117 (85)
temporal	20 (19%)	106 (70)
parietal	36 (34%)	111(81)
occipital	2 (2%)	36 (23)

Table 1. Incidence of specific clinical characteristics and associated mean length of stay across the entire sample (n=106). LOS = length of stay; s.d. = standard deviation.

Clinical Characteristics	No. missing cases
Upper/lower spastic limb	1
Flaccidity	9
Hemianopia	15
Intra-hemispheric lesion site	22

Table 2. Clinical characteristics for which data were missing from those cases statistically analysed (n=91).

Clinical Characteristics	Left Neglect	
	Present	Absent
<b>Spasticity*</b>	<b>27/31 (87%)</b>	<b>34/60 (57%)</b>
Flaccidity	4/31 (13%)	8/51 (16%)
Hemianopia*	8/22 (37%)	5/54 (9%)
Age*		
<60years	13/31 (42%)	33/60 (55%)
>60 years	18/31 (58%)	27/60 (45%)
Depression*	14/31 (45%)	15/60 (25%)
Right hemisphere lesion site		
Frontal*	15/21 (71%)	17/48 (35%)
Temporal*	8/21 (38%)	7/48 (15%)
Parietal*	15/21 (71%)	18/48 (38%)
Occipital	0/21 (0%)	2/48 (4%)

Table 3a. Frequency of clinical characteristics in patients with and without left neglect. Asterisk (\*) denotes a statistically significant association (Pearson Chi-square) with the presence/absence of left neglect.



Clinical Characteristics	Left and Right Neglect Combined	
	Present	Absent
Spasticity*	39/46 (85%)	34/60 (57%)
Flaccidity	5/46 (11%)	8/51 (16%)
Hemianopia*	12/33 (36%)	5/54 (9%)
Age*		
<60years	16/46 (35%)	33/60(55%)
>60 years	30/46 (65%)	27/60 (45%)
Depression	19/46 (41%)	15/60 (25%)
Intra-hemispheric lesion site		
Frontal	17/32 (53%)	17/48 (35%)
Temporal*	13/32 (40%)	7/48 (15%)
Parietal	18/32 (56%)	18/48 (38%)
Occipital	0/0 (0%)	2/48 (4%)

Table 3b. Frequency of clinical characteristics in patients as function of the presence/absence of hemi-spatial neglect (irrespective of whether the neglect was left- or right-sided). Asterisk (\*) denotes a statistically significant association (Pearson Chi-square) with the presence/absence of neglect.

Clinical Characteristics	$\beta$	$t$	Sig.	95% lower/upper confidence interval
Neglect	0.514	3.1	0.002	.187 / .841
Age	0.574	3.8	0.001	.274 / .874
Spasticity	0.098	0.6	0.56	-.234 / .431

*R squared = .21*

Table 4. Final regression model for predicting Length of Stay