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**Factors, trends and long-term outcomes for stroke patients returning to work:
the South London Stroke Register (SLSR)**

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Background and Purpose: There is limited information on factors, trends and outcomes in return to work (RTW) at different time-points post-stroke; this study aims to identify these in a multi-ethnic urban population.

Methods: Patterns of RTW were identified in individuals in paid work prior to first-ever stroke in the population-based South London Stroke Register (SLSR) between 1995-2014. Multivariable logistic regression examined associations between patient characteristics and RTW at 1 year (1y), 5 years (5y) and 10 years (10y) post-stroke.

Results: Among 5609 patients, 940 (17%) were working prior to their stroke, of whom 177 (19%) were working 3 months post-stroke, declining to 172 (18%) at 1y, 113 (12%) at 5y and 27 (3%) at 10y. Factors associated with RTW within 1y, after logistic regression, included functional independence ($BI \geq 19$; $p < 0.01$) and shorter length of stay ($p < 0.05$). Younger age ($p < 0.01$) was associated with RTW at 5y and 10y post-stroke. Non-manual occupation ($p < 0.05$) was associated with RTW at 10y post-stroke. RTW within 1y increased the likelihood of working at 5y (OR: 13.68; 95% CI 5.03-37.24) and 10y (9.07; 2.07-39.8). Of those who were independent at follow-up ($BI \geq 19$), 48% were working at 1y, 42% at 5y and 28% at 10y. Lower rates of anxiety and depression and higher self-rated health were associated with RTW at 1y ($p < 0.01$).

Conclusion: Although functionally independent stroke survivors are more likely to RTW long-term, a large proportion do not RTW despite functional independence. RTW post-stroke is associated with improved long-term psychological outcomes and quality of life.

Background

Approximately 1 in 4 strokes occur in individuals of working age and subsequent loss of productivity contributes to the economic burden of stroke [1]. A previous South London Stroke Register (SLSR) study [2] estimated the annual cost of stroke in the UK to be approximately £9 billion, of which benefit payments and productivity losses accounted for around 24%. This economic burden is set to triple in the next 20 years [3].

Previous studies on return to work (RTW) after stroke have suggested that it is an important recovery milestone for both survivors and their spousal caregivers, in view of the potential implications of not returning to work (e.g. loss of income and self-efficacy) [4,5,6]. Furthermore, it has been postulated in previous qualitative research that RTW post-stroke is a major factor for subjective well-being and life satisfaction [7]. It has been reported that individuals of working age who have had a stroke are up to three times more likely to be unemployed after 8 years, compared with an age-matched non-stroke population [8].

Accordingly, the Royal College of Physicians National guidelines and UK National Stroke Strategy advocate the commissioning of specialist rehabilitation services capable of meeting the specific vocational needs of people with stroke of all ages [9,10]. RTW post-stroke is a complex process, involving physical, psychological and social factors, many of which (e.g. post-stroke depression) have not previously been widely explored in the context of RTW. Furthermore, little is known about long-term trends in RTW at different time-points after stroke and it has been recommended that future studies should account for the influence of time since stroke [11,12,13]. Knowledge of long-term trends and needs in vocational outcomes would aid in the development of targeted rehabilitation strategies at optimal intervals post-stroke.

This paper aims to identify factors and trends in RTW at different time-points post-stroke, in a multi-ethnic urban population.

Methods

Study subjects

Data for this analysis were derived from the SLSR, an ongoing population-based stroke register that has prospectively recorded first-ever strokes in patients of all age groups living within a geographically defined area of South London since 1995, with follow-up at 3 months, 1 year and then annually. SLSR data collection methods have been described in detail previously [14]. Completeness of case ascertainment has been estimated to range between 75% and 84% [15]. This study used data from individuals of all ages in paid part-time or full-time employment immediately prior to first-ever stroke between 1995 and 2014.

Baseline assessment

Socio-demographic characteristics collected at initial assessment included: cohort year (1995-1998, 1999-2002, 2003-2006, 2007-2010 and 2011-2014); ethnic origin, which was self-defined according to the 1991 UK Census question [14] stratified into white, black (black-Caribbean, black African, and black other), and other ethnic group; socioeconomic status was categorized as non-manual (I, II, and III non-manual) or manual (III manual, IV, and V), according to the patient's current or most recent employment using the UK General Register Office occupational codes [16,17]; and pre-stroke residence, grouped into private, living alone, private with others, sheltered/residential/nursing, hospital and unknown.

Data collected on comorbidities included prior history of hypertension (general practice or hospital records of high blood pressure (>140 mmHg systolic or >90 mmHg diastolic), diabetes mellitus (self reported), atrial fibrillation (general practice or hospital records), coronary heart disease, previous TIA (self reported) and smoking history (current, ex-smoker, never smoked) was recorded.

Activities of daily living prior to stroke were assessed using the Barthel Index [18] and were classified as 0-14 (moderate/severe disability) and 15-20 (mild disability/independent).

Cognition at stroke onset was assessed using the Abbreviated Mental Test (AMT) [19] and Mini-Mental State Examination (MMSE) [20], with cognitively intact as 8-10 AMT and 24+ MMSE and cognitively impaired as 0-7 AMT and <24 MMSE.

Stroke was categorised into ischaemic (Non-lacunar and lacunar infarctions), primary intracerebral haemorrhage (PICH) and subarachnoid haemorrhage (SAH) based on results from brain imaging, cerebrospinal fluid analysis and/or post mortem studies.

Data regarding stroke severity included: dependence at 7 days (defined as Barthel index <19); level of consciousness, which was assessed using the Glasgow Coma Scale (GCS)[21] dichotomised into GCS <13 (impaired consciousness) and GCS \geq 13; urinary incontinence; dysphagia (failed swallow test); dysphasia; and motor deficit (classified as no motor deficit or hemiparesis).

Processes of care were recorded, including: 1) admission to hospital; 2) brain imaging (CT only, MRI only or both CT and MRI); 3) intravenous thrombolysis (in the ischaemic stroke sub-group); 4) stroke unit treatment; 5) length of stay in hospital (days); 6) physician follow-up at 3 months; and 7) therapy input within 3 months (physiotherapy (PT) and occupational therapy (OT), dependent on whether alive or not).

Functional assessments

Functional assessments included: 1) Barthel Index (BI), categorised into functionally independent (\geq 19) and dependent (<19); 2) Hospital Anxiety and Depression Scale (HADS)[22], which was subdivided into 'HADS Anxious' and 'HADS Depressed' (0-10 = normal/mild (non-case) and 11+ = moderate/severe (case)); 3) 12-Item Short Form Survey (SF-12)[23], divided into self-rated mental and physical scores to assess health-related quality of life; 4) Cognition with cognitively intact = 8-10 AMT and 24+ MMSE and cognitively impaired = 0-7 AMT and <24 MMSE.

Outcomes

The primary outcome was return to paid work after stroke, as reported by the patients (at 1, 5 and 10 years post-stroke).

Statistical analysis

Baseline characteristics and service provision within the sample were tabulated for the study population and at 1, 5 and 10 years follow-up. P-values derived from t-tests, chi-square or fishers exact test were used to test the univariable association between each variable and RTW. Separate two-way tables were also created showing the association between each functional assessment (BI, HADS, SF-12 and cognition) and RTW at 1, 5 and 10 years post-stroke.

Multivariable logistic regression models were created with RTW at 1, 5 and 10 years as the outcome, and patient characteristics (with a univariable association of <0.05) as the covariates. Dependency (BI) and cognition at 1,5 and 10 years were also added as they represent important confounders in the RTW post-stroke [11,24]. The odds of RTW at 1, 5 and 10 years are presented along with 95% confidence intervals and p-values derived from the Z-test. An alpha level of 0.05 was used for the analysis.

Patients were missing in follow-up time-points either due to death or loss to follow-up. We examined the potential bias of those with missing follow-up due to either cause using inverse probability weighting [25]. Weights were estimated using time-point and baseline characteristics, and these weights were used to adjust the coefficients and standard errors of the final model. Both complete case analyses and weighted analyses are presented side by side in Table 2.

Results

In this long-term cohort study, 5609 patients (mean age 69.8 years) were registered with first-ever stroke between 1995 and 2014 in the SLSR, of which 940 (17%) were in paid work prior to stroke, forming the focus of the study population. 4158 patients were not in paid employment (182 were currently looking, 291 unable to work due to ill-health, and 3685 retired), 6 were students, 110 were carers for dependents and 395 were unknown.

Table 1 summarises the baseline characteristics of the study population (n = 940). The mean age of the population analysed was 53.4 years (s.d.=12.57). Most (68.2%) were male and 54.1% were of white ethnicity. 42.8% were non-manual workers, compared with 50.4% skilled manual workers. Of those that had ischaemic strokes, 59 (6.3%) received intravenous thrombolysis. 259 patients (32.0%) received physician follow-up, 184 (21.4%) received PT and 115 (13.4%) received OT at 3 months post-stroke. Eleven percent were cognitively impaired at onset of stroke.

Trends in return to work

177 patients (19%) were working at 3 months post-stroke, declining to 172 (18%) at one year, 113 (12%) at 5 years and 27 (3%) at 10 years.

Appendix 1 reports the trends in RTW of the case mix at 1, 5 and 10 years.

Patients who returned to work had a lower mean age (significant at 5 and 10 years post-stroke ($p<0.001$)). There was a trend towards males having higher rates of RTW than females (significant at 1 and 5 years post-stroke ($p<0.05$)). Manual labour was associated with lower rates of RTW (significant at 10 years post-stroke ($p<0.05$)).

In terms of stroke severity, survivors who remained functionally independent ($BI\geq 19$) and continent, with higher conscious levels ($GCS\geq 13$), safe swallow and intact motor function had higher rates of RTW at 1 year post-stroke ($p<0.05$). Functional independence, continence, safe swallow and intact motor function were associated with higher rates of RTW at 5 years ($p<0.01$). At 10 years intact motor function was associated with RTW ($p<0.01$).

Hospital admission was associated with lower rates of RTW at 1 and 5 years post-stroke ($p<0.05$). Stroke unit treatment was associated with lower rates of RTW at 1 year post-stroke ($p<0.05$). Patients returning to work had a lower length of stay in hospital (significant at 1 and 5 years post-stroke ($p<0.01$)). Physician follow-up was associated with higher rates of RTW at 5 years post-stroke ($p<0.05$). PT and OT were associated

with lower rates of RTW at 1 year post-stroke ($p<0.001$). OT was also associated with lower rates of RTW at 5 years ($p<0.05$) post-stroke.

Associated factors in return to work

Table 2 reports the odds of RTW for patient characteristics at 1, 5 and 10 years post-stroke. We present the results for the weighted analyses.

Length of stay was associated with a decreased likelihood of RTW at 1 year post-stroke ($p<0.05$). Functional independence was associated with an increased likelihood of RTW at 1 and 5 years post-stroke ($p<0.01$ and $p=0.02$ respectively). These results have been adjusted for cognition, however cognition itself was not a significant predictor (OR: 0.77, 95% CI: 0.27-2.22; $p=0.63$). Increasing age was a negative predictor for RTW at 5 and 10 years post-stroke ($p<0.01$). Patients who returned to work within 1 year post-stroke were more likely to be in employment at 5 and 10 years post-stroke ($p<0.001$ and $p<0.05$ respectively). Patient in manual occupation were less likely to RTW at 10 years compared to non-manual ($p=0.01$).

Association between functional, emotional and cognitive assessments and return to work

Table 3 reports associations between functional test scores and RTW at 1, 5 and 10 years post stroke.

As above, functionally independent patients ($BI\geq 19$) had higher rates of RTW at 1 and 5 years post-stroke ($p<0.001$). Nonetheless, a large proportion of stroke survivors are not returning to work despite functional independence at all 3 time-points (48% were working at 1 year, 42% at 5 years and 28% at 10 years).

There were lower rates of anxiety in patients working at 1 year post-stroke ($p<0.01$). Similarly, there were lower rates of depression in patients working at 1 and 5 years post-stroke ($p<0.01$).

Patients who returned to work had higher mean SF-12 mental scores at 1 and 5 years post-stroke ($p<0.001$ and $p<0.05$ respectively).

Patients who returned to work also had higher mean SF-12 physical scores at 1, 5 and 10 years post-stroke ($p<0.01$).

Patients who were cognitively intact had higher rates of RTW at 1 and 5 years ($p<0.01$).

Missing data analyses

Death occurred at 1-year follow-up for 95 (10%) of the 940 patients, and 395 (42%) had missing employment status (due to not attending the follow-up interview), for a total of 490 missing outcome at year 1. At year 5, 161 (17%) out of the initial 940 had died and 410 (44%) had missing employment status. At year 10, 227 (24%) out of the initial 940 had died and 592 (63%) had missing employment status. We assessed the impact of death or missing at follow-up on the odds of RTW using inverse probability weighting, and presented the results of the weighted analyses side by side with the complete case analysis in Table 2. The weighted analyses demonstrate that occupational therapy at 3 months is no longer significantly associated with RTW at 1 year, whereas length of stay became significant. Motor deficiency is no longer associated with RTW at 5 years, and manual occupation became associated with decreased odds in RTW (compared with non-manual).

Discussion

This is the largest, multiethnic population-based study to date analyzing long-term (up to 10 years) trends and outcomes in RTW of stroke survivors of all ages. Most previous

studies have assessed factors related to RTW at single time-points since stroke and it has been recommended that future studies should account for the influence of time from stroke [11]. This study addresses this gap in the literature by examining predictors and long-term outcomes of RTW in relation to time since stroke (i.e. at 1, 5 and 10 years). The key findings are that: 1) Although functionally independent stroke survivors are more likely to RTW long-term, a large proportion do not RTW despite functional independence, and 2) RTW after stroke is associated with improved long-term psychological outcomes and health-related quality of life.

In this population, the proportion of patients working post-stroke declined with time. This observed trend may in part be explained by retirement, recurrent illness or death. RTW within one-year post-stroke is associated with subsequent involvement in employment long-term; therefore, supporting patients with RTW at an early stage post-stroke is vital. Although functionally independent patients are more likely to RTW long-term, a large proportion of stroke survivors do not RTW despite functional independence. This finding is in keeping with a previous SLSR study (1-year follow-up) [26], which suggested that outcomes in RTW post-stroke are too complex and multifaceted to be explained by simple disability indices alone (i.e. BI) and that often under-recognised 'invisible' barriers such as cognition and fatigue may also have a pivotal role [11,27,28,29]. Furthermore, previous qualitative research highlights other important factors that need to be considered to facilitate RTW post-stroke, including personal factors (motivation, coping/adaptation skills, anxiety/depression), workplace factors (type of work (manual vs. non-manual), disability management, adaptations) and access to appropriate rehabilitation services [30]. In 2015, only 15% of post-acute stroke services to help people RTW in the UK were commissioned [31], which highlights a need to develop better and timely access to stroke-specific rehabilitation to improve RTW rates.

The literature suggests that survivors may experience psychological impairment post-stroke and a recent systematic review [32] reported that, although there is limited information regarding post-stroke anxiety, a high prevalence of post-stroke depression exists. Previous qualitative data [7] has suggested that RTW post-stroke is a major factor for improved subjective well-being and life satisfaction, however there is limited robust quantitative data regarding the long-term psychological outcomes of RTW post-

stroke and our study addresses this research gap. Given that RTW may be perceived as an important milestone in the stroke recovery process, it is not surprising that, in this study, RTW post-stroke was associated with improved long-term quality of life (QOL) and emotional outcomes; i.e. better self-rated health and lower rates of anxiety and depression. Accordingly, implementing strategies that support stroke survivors returning to work is crucial for improving long-term psychological outcomes and health-related QOL.

Improved knowledge of long-term trends and predictive factors influencing RTW post-stroke are crucial for implementing targeted vocational rehabilitation strategies. Vocational rehabilitation is defined as a process which enables those disadvantaged by disability or illness to access, maintain, or return to employment, or other useful occupation [33]. This study has identified factors associated with RTW at different time points after stroke.

Males had higher rates of RTW than females. This is consistent with current literature, which suggests that this gender disparity may be explained by societal/employer discrimination against females and the fact that males are still commonly the main source of family income [11,34].

This study demonstrates that individuals in manual occupations were less likely to RTW than those with non-manual jobs. This can be explained by the fact that functional dependence and motor deficit post-stroke (both factors that are more likely to affect RTW in manual labour) were associated with poorer vocational outcomes in this study and the existing literature [11].

Although observed trends in this study suggest that patients who RTW are less cognitively impaired than those who do not RTW, cognition was not found to be a significant predictor of RTW in the inverse probability weighted analyses. This may be explained by the fact that cognition post-stroke is a complex and multidimensional measurement and that the instruments of cognitive assessment (i.e. AMT and MMSE) used in this study were too simplistic to encompass this fully. A previous study [24] that did find cognitive severity to be a significant predictor of RTW post-stroke used more comprehensive neuropsychological assessments. In addition to this, cognitive impairment post-stroke may only be a barrier for certain types of occupation, depending on the specific demands of the job [35].

A recent systematic review concluded that older age was associated with negative vocational outcomes after illness [36]. Likewise, this study demonstrates that increasing age is a negative predictor for RTW post-stroke. Not being 'too old' was seen as an advantage for RTW post-stroke in a previous qualitative study looking at perspectives of employer stakeholders [37]. Three previous quantitative studies that studied age as a predictor of vocational outcomes similarly concluded that younger stroke survivors were more likely to RTW [5, 38, 39]. Furthermore, previous research has shown that patients <65 years are more likely to RTW post-stroke than those >65 years [40].

It is not surprising that increased LOS was associated with reduced likelihood of RTW, given that patients with more severe strokes are likely to have longer inpatient admissions [41].

Only one previous other study has addressed the impact of any rehabilitation intervention on RTW post-stroke, demonstrating that a tailored workplace intervention was effective in facilitating RTW post-stroke [42].

This study is the first study to address the impact of standard post-stroke rehabilitation therapy on RTW. Although trends in this study suggest that patients who received therapy input (PT/OT) had lower rates of return to work, therapy input was not found to be a significant predictor of RTW post-stroke in the inverse probability weighted analyses. Therefore, there is no causality between the two variables, but the likelihood of receiving therapy is based upon multiple complex factors and, thus, varies in how it is delivered, where it is delivered, the intensity, expertise and the patient/therapist interactions. There may also be a number of patients with a multitude of 'invisible' impairments such as fatigue or mild cognitive impairment who may not be in receipt of therapy and, therefore, it is important that patients receive a comprehensive standardized assessment in order to gain understanding when patients should RTW. There are a number of intrinsic issues associated with standard post-stroke rehabilitation therapy, which may explain why it was not found to be a significant predictor of RTW in this study: 1) it does not usually involve vocational retraining and there is a growing body of evidence to suggest that stroke specific vocational rehabilitation is needed to optimize return to work amongst stroke survivors [42]; 2) therapists tend to prioritise disability assessments over workability assessments [42]; 3) there is pressure to discharge patients quickly (i.e. as soon as they are functionally able) and, therefore, this becomes the focus of inpatient therapy and long-term goals

such as RTW are neglected [33]; 4) Resultantly, as mentioned above, patients with milder, less disabling strokes often get little in the way of post-acute rehabilitation, in spite of the fact that they may have ‘invisible’ deficits that are barriers to RTW [33].

It is important that the vocational rehabilitation process is a responsive multidisciplinary cross sector service spanning early intervention after stroke and support later in the recovery process with flexibility to adapt to the changing needs of the patient

Future commissioning of stroke-specific vocational rehabilitation services should focus on strategies to support RTW within the first year following stroke, as this is associated with subsequent employment long-term. This would, thereby, help address the declining long-term employment rates demonstrated in this study and improve long-term psychological well-being and quality of life amongst stroke survivors. However, the service should be flexible and responsive in meeting the differing needs of individuals at different time frames. Improved awareness and assessment of ‘invisible’ post-stroke impairments (i.e. fatigue and cognition), personal and workplace factors may facilitate otherwise functionally independent stroke survivors returning to work successfully and, more importantly, staying in work thereafter [29].

The main strengths of this study are the population-based design, prospective case identification, multi-ethnicity and standardized follow-up of all patients. This is the largest population-based study to date (approximately one thousand patients over a 19-year period) analyzing long-term (up to 10 years) trends and outcomes in RTW of stroke survivors of all ages, at different time points. Furthermore, we have a detailed case mix and have collected a number of evidence-based processes (e.g. thrombolysis), which have evolved across these time points.

This study was limited by missing outcome data (over 40%) for follow-up. Presenting weighted analyses side by side against the complete case analyses enabled us to be informed of the bias of the results due to death and loss to follow-up. Further limitations were the lack of data on other factors that have been previously shown to influence RTW post-stroke, such as marital status, fatigue and benefits payments, which therefore could not be included in this study. Living conditions post-stroke may affect RTW outcomes, however the proportion of those who had changed residential status in our

sample was low (24 out of 940), precluding its inclusion in our analyses. Furthermore, the SLSR lacks data on contextual facilitators and barriers to RTW post-stroke, such as patient motivation to RTW or workplace adaptations. The specific time-point of RTW post-stroke for each patient was not known; therefore, it was only possible to study associations at fixed follow-up periods after stroke as opposed to utilizing a time to event analysis. Analysis at fixed time-points has the added advantage in that all available data at each time-point were included and participants who were lost to follow-up at one time-point remained eligible for inclusion in later follow-ups.

RTW in this study was defined as paid employment, however many individuals may consider other roles (i.e. household work and caring for children) as ‘work’ and, therefore, this needs to be considered in interpreting the results.

This study highlights that RTW after stroke is a complex, dynamic process involving a multitude of factors. We have discussed how the findings of this study, along with existing research, can help guide future policies on stroke-specific vocational rehabilitation, thereby reducing the overall economic burden. Furthermore, this study provides important new quantitative evidence to support limited existing qualitative evidence in confirming that RTW post-stroke is associated with improved long-term emotional well-being and life satisfaction. Future research should be directed at further delineating causal factors for the trends and long-term outcomes identified. More specifically, potential barriers to RTW despite good functional recovery ought to be investigated further.

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Table 1: Baseline characteristics of all patients working before stroke

| | |
|------------------------|--------------|
| | n=940 |
| Year cohort (%) | |

| | |
|--|---------------|
| 1995-1998 | 163 (17.3) |
| 1999-2002 | 151 (16.1) |
| 2003-2006 | 236 (25.1) |
| 2007-2010 | 192 (20.4) |
| 2011-2014 | 198 (21.1) |
| Age | |
| (mean (sd)) | 53.35 (12.57) |
| Sex (%) | |
| Male | 641 (68.2) |
| Female | 299 (31.8) |
| Ethnicity (%) | |
| White | 509 (54.1) |
| Black | 345 (36.7) |
| Other | 86 (9.1) |
| Occupational class (%) | |
| Non-manual | 402 (42.8) |
| Manual | 474 (50.4) |
| Pre stroke residence (%) | |
| Private (alone) | 208 (22.1) |
| Private (with others) | 652 (69.4) |
| Sheltered/residential/nursing | 4 (0.4) |
| Comorbidities | |
| Pre-stroke disability (BI <19) (%) | 13 (1.4) |
| Hypertension (%) | 495 (52.7) |
| Diabetes (%) | 132 (14.0) |
| Atrial fibrillation (%) | 40 (4.3) |
| Coronary Heart disease (%) | 53 (5.6) |
| Transient ischaemic attack (%) | 59 (6.3) |
| Current smoker (%) | 249 (26.5) |
| Cognitively impaired at stroke onset (%) | 103 (11.0) |
| Stroke severity | |
| Dependence at 1 week (BI <19) (%) | 363 (38.6) |
| Glasgow Coma scale <13 (%) | 174 (18.5) |
| Urinary incontinence (%) | 226 (24.0) |
| Swallow test (%) | |
| Fail (i.e. dysphagia) | 196 (20.9) |
| Not assessed | 144 (15.3) |
| Dysphasia (%) | 135 (14.4) |
| Motor Deficit (hemiparesis) (%) | 624 (66.4) |
| Stroke Subtype (%) | |
| Non-lacunar infarction | 381 (40.5) |
| Lacunar infarction | 218 (23.2) |
| Primary intracerebral haemorrhage | 155 (16.5) |
| Subarachnoid haemorrhage | 103 (11.0) |
| Processes of stroke care | |
| Hospital admission (%) | 854 (90.9) |
| Brain imaging (%) | |
| CT only | 552 (58.7) |

| | |
|---------------------------|---------------------|
| MRI only | 68 (7.2) |
| CT & MRI | 232 (24.7) |
| Thrombolysis (%)† | 59 (6.3) |
| Stroke unit treatment (%) | 551 (58.6) |
| Length of stay (days) | |
| mean (sd) | 29.20 (47.92) |
| median (IQR) | 10.00 (4.00, 33.00) |
| Physician follow-up (%)* | 259 (32.0) |
| Physiotherapy (%)* | 184 (21.4) |
| Occupational therapy (%)* | 115 (13.4) |

*Based on patients discharged and alive at 3 months

†Ischaemic stroke sub-group only

BI, Barthel Index

Table 2: Odds of returning to work at 1, 5 and 10 years post-stroke

| Variable | Complete case analyses | | Analyses with inverse probability weights | |
|----------------------------|------------------------|-------------|---|--------|
| | OR (95% CI) | OR (95% CI) | OR (95% CI) | p-val |
| 1 year (n=450) | | | | |
| Length of stay (days) | 1 (0.99, 1.01) | 0.4278 | 0.98 (0.96, 0.99) | 0.0122 |
| Occupational therapy (3m) | 0.32 (0.12,0.9) | 0.0303 | 0.92 (0.35, 2.41) | 0.8610 |
| BI at 1 year (≥ 19) | 3.98 (1.68,9.41) | 0.0017 | 2.93 (1.36, 6.31) | 0.0062 |

| | | | | |
|--------------------------------|-----------------------|--------|---------------------|--------|
| 5 years (n=369) | | | | |
| RTW 1 year post-stroke | 11.90 (4.66,30.43) | <0.001 | 13.68 (5.03, 37.24) | <0.001 |
| Age | 0.93 (0.90,0.97) | 0.0010 | 0.94 (0.90, 0.98) | 0.0046 |
| Motor Deficit (hemiparesis) | 0.36 (0.15,0.89) | 0.0269 | 0.53 (0.20, 1.37) | 0.1884 |
| BI at 5 years (≥ 19) | 3.76 (1.34,10.58) | 0.0119 | 3.55 (1.17, 10.75) | 0.0251 |
| 10 years (n=121) | | | | |
| RTW 1 year post-stroke | 8.15 (1.46,45.53) | 0.0169 | 9.07 (2.07, 39.8) | 0.0035 |
| Age | 0.89 (0.81,0.97) | 0.0117 | 0.89 (0.83,0.96) | 0.0038 |
| Occupational class: manual | 0.22 (0.04, 1.13) | 0.0705 | 0.17 (0.04, 0.66) | 0.0104 |

*Odds Ratios were derived from a multivariable logistic regression model adjusting for all variables that were associated with RTW (with a univariate p-value <0.05). This included sex, coronary heart disease, BI 7-days and 1 year post-stroke, cognition at 1 year post-stroke, stroke severity (GCS, incontinence, motor deficit, dysphasia), stroke unit treatment, length of stay, physiotherapy and occupational therapy 3-months post-stroke. Cognition at 5 and 10 years post stroke could not be added into the model due to low counts.

BI, Barthel Index
RTW, Return to work

Table 3: Associations between functional assessment scores and RTW at 1, 5 and 10 years post-stroke
Results given as counts (%) or mean (sd) as specified

| | Year 1 | | p-value | Year 5 | | p-value | Year 10 | | p-value |
|---|-------------|------------|---------|-------------|-------------|---------|-------------|-------------|---------|
| | NRTW | RTW | | NRTW | RTW | | NRTW | RTW | |
| n | 278 | 172 | | 256 | 113 | | 94 | 27 | |
| Barthel Index (%) | | | | | | | | | |
| <19 | 113 (41.2) | 21 (12.4) | <0.001 | 112 (45.7) | 16 (14.4) | <0.001 | 33 (37.5) | 4 (15.4) | 0.055 |
| ≥19 | 161 (58.8) | 148 (87.6) | | 133 (54.3) | 95 (85.6) | | 55 (62.5) | 22 (84.6) | |
| HADS Anxiety (%) | | | | | | | | | |
| 0-10 (Non-case) | 192 (78.4) | 145 (89.0) | 0.007 | 198 (85.0) | 99 (92.5) | 0.055 | 76 (87.4) | 22 (88.0) | 1.00 |
| 11+ (Case) | 53 (21.6) | 18 (11.0) | | 35 (15.0) | 8 (7.5) | | 11 (12.6) | 3 (12.0) | |
| HADS Depression (%) | | | | | | | | | |
| 0-10 (Non-case) | 202 (82.1) | 152 (93.3) | 0.001 | 204 (86.1) | 102 (97.1) | 0.002 | 70 (82.4) | 25 (96.2) | 0.112 |
| 11+ (Case) | 44 (17.9) | 11 (6.7) | | 33 (13.9) | 3 (2.9) | | 15 (17.6) | 1 (3.8) | |
| SF-12 mental score (mean (sd)) | 45.0 (11.9) | 51.1 (9.1) | <0.001 | 47.2 (10.4) | 49.9 (10.3) | 0.030 | 46.1 (10.6) | 48.1 (8.7) | 0.416 |
| SF-12 physical score (mean (sd)) | 36.6 (10.8) | 48.9 (8.8) | <0.001 | 36.9 (11.6) | 48.2 (10.0) | <0.001 | 36.7 (11.0) | 44.8 (10.7) | 0.002 |
| Cognition (%) | | | | | | | | | |
| Cognitively intact | 147 (79.0) | 97 (92.4) | 0.003 | 130 (77.4) | 48 (94.1) | 0.007 | 41 (77.4) | 12 (92.3) | 0.437 |

| | | | | | | | | | |
|----------------------|-----------|---------|--|-----------|---------|--|-----------|---------|--|
| Cognitively impaired | 39 (21.0) | 8 (7.6) | | 38 (22.6) | 3 (5.9) | | 12 (22.6) | 1 (7.7) | |
|----------------------|-----------|---------|--|-----------|---------|--|-----------|---------|--|

HADS, Hospital Anxiety and Depression Scale
SF-12, 12-Item Short Form Health Survey