POSTER PRESENTATIONS

Risk of recurrent intracerebral haemorrhage (ICH): A population-based data-linkage study
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Background: Few population-based estimates of recurrent intracerebral haemorrhage (ICH) have been reported. Australian studies are lacking.
Method: All NSW hospitalisations for adults with an ICH primary diagnosis (ICD-10 I61.x) from 2001 to 2009 were selected. Linkage to subsequent hospitalisations identified re-admissions while linkage within the previous six months enhanced comorbidity ascertainment. Re-admission rates for ICH or subarachnoid haemorrhage (SAH) from discharge were calculated. Cox-regression models identified predictors.
Results: There were 10,777 patients admitted to hospital with ICH; 6,251 (39.5%) were discharged alive. By 30 days, 1% were re-admitted to hospital with an ICH increasing to 3.2% by one-year, and 4.2%, 5.1% and 6.1% by 2-, 3- and 5-years. Liver disease (HR = 1.65, 95% CI = 1.03–2.55) and haematological cancer (HR = 3.36, 95% CI = 1.27–9.98) significantly predicted 12-month re-admission rates while age and sex did not. Significant predictors of re-admission after 12-months included country of birth other than Australia, (HR = 1.38, 95% CI = 1.03–1.85), diabetes with complications (HR = 1.56, 95%CI = 1.11–2.20), seizures (HR = 1.65, 95% CI = 1.08–2.53), cerebral amyloid angiopathy (CAA) (HR = 3.14, 95% CI = 1.40–7.05) and a history of SAH (HR = 12.87, 95% CI = 5.91–28.03). A significant quadratic effect for age and hospital caseload revealed higher and lower risks of re-admission at “middling” ranges of age and caseload categories, respectively. Cerebral lobe ICH (I61.1) was associated with an increased risk of recurrence within and after 12-months.
Conclusion: To our knowledge, this is the first Australian population-based study reporting risk of recurrent ICH and one of the largest internationally. While early recurrence within one-year is low (3.2%), patients with liver disease, haematological cancers and ischaemic heart disease are between 1.65 and 3.5 times at greater risk. Seizures, CAA and diabetes identified patients with an elevated longer-term risk. The effect of caseload suggests that both relative lack of expertise and high demand for services adversely impact on outcomes.

Reliability of alternate step test and its correlation with lower limb motor functions in people with chronic stroke
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Background: Adequate dynamic standing balance is a prerequisite for independent daily functioning, including walking. In order to reflect changes in patients’ performance of dynamic standing balance during the rehabilitation process, a reliable, valid and comprehensive measurement tools is definitely needed. Alternate step test (AST) is one of clinical test assessing dynamic standing balance in elderly population.

Aim: The objectives of this study is to investigate (1) the intra-rater, inter-rater and test-retest reliability of the AST times; (2) its correlation with other stroke-specific impairments; and (3) the cut-off time sensitive enough to differentiate subjects with stroke from the healthy elderly.
Method: This was a cross-sectional study with 45 subjects with chronic stroke and 41 healthy elderly. The AST was administered along with the Fugl-Meyer Assessment for the lower extremities, the Five-times Sit to Stand test, the Berg Balance Scale, limits of stability measurements, activities-specific balance confidence scale, and the Berg Balance Scale.
Results: The AST times demonstrated excellent intra-rater, inter-rater, and test-retest reliability. The AST times were shown to be significantly associated with Fugl-Meyer Assessment results, five-times sit to stand test times, limits of stability in the forward and backward directions and to the affected side, Berg Balance Scale ratings and Berg Balance Scale times. A cut-off time of 8.9 seconds was found to discriminate the healthy elderly from subjects with stroke with a sensitivity of 97.8% and specificity of 95.1%.
Conclusion: AST time is a reliable assessment tool that correlates with different stroke specific impairments in people with chronic stroke.

Better stroke outcomes despite worse baseline stroke severity – The value of a combined clinical and advanced CT selection approach to thrombolysis
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Background: Stroke mortality rates are increasingly applied as hospital performance measures, however, the use of such data to compare stroke centres is misleading if stroke severity and case selection methods for thrombolysis are not considered.
Method: We prospectively studied 378 ischaemic stroke patients who were given intravenous rtPA at the John Hunter Hospital (JHH) using combined clinic radiologic (multimodal CT) selection, and compared their outcomes to the Australian SITS registry with 545 patients given rtPA according to standard guidelines. We compared mortality rate, as well as the rates of excellent, and poor patient outcome at 3 months (mRS 0–1 and 5–6) with rtPA and major neurological improvement (MNI, NIHSS decrease >7 at 24 hours). We also compared the distribution of the acute NIHSS scores in the two datasets, and the relationship between NIHSS and mortality in a pooled analysis.
Results: The JHH median Onset/door-to-needle time was 171/50 min and SITS 142/78 min. The median NIHSS of JHH rtPA patients was 15 and for SITS was 13 (p < 0.001). Only 20% of JHH patients were NIHSS <10, while 35% of SITS patients were NIHSS <10 (p < 0.001), additionally 70% of JHH patients had an NIHSS > 13 compared to 50% for SITS (p < 0.001). Pooled patient analysis indicated that an NIHSS of >19 was associated with 60% 3 month mortality. Mortality at 3 months was lower for JHH (15.8%), compared to the SITS data of 18.7%. JHH patients had a higher rate of MNI (34%) compared to SITS (26%, p < 0.001). JHH patients were more likely to achieve excellent outcome (40% vs SITS 35%, OR 1.23) with lower rates of poor outcome (25% vs SITS 30%, OR 0.79).
Conclusion: Despite higher baseline stroke severity and later onset to treatment time, JHH rtPA treated patients had higher excellent outcomes and lower mortality.
Let’s talk about sex: A randomised controlled trial on sexual rehabilitation after stroke

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Background: Sexual activity is an integral part of life and the importance of addressing sexual health after stroke is well accepted. Despite this, a recent Australian National Stroke Audit Rehabilitation Services Report 2012 showed that of 2789 post-stroke patients audited across 111 Australian public and private hospitals, only 17% of patients received information on sexuality. In addition, although current guidelines recommend the assessment and management of post-stroke sexual dysfunction, little is known about what type of intervention (timing, content, intensity, setting) should be provided and how effective these are.

Aim: To assess the effectiveness of a comprehensive structured sexual rehabilitation program compared with written information alone, on sexual functioning and psychological function (anxiety, depression, stress), in an Australian stroke cohort. The secondary aim is to assess the efficacy of the sexual rehabilitation program on functional independence and quality of life.

Method: A randomised-controlled trial where consecutively admitted stroke patients on the inpatient rehabilitation unit at the Royal Melbourne Hospital will be recruited over a period of 12 months. They will be randomised using a computer-generated sequence with allocation concealment. The treatment group will receive individualized sexual rehabilitation program during their inpatient stay and/or within 3 months of discharge in the outpatient setting according to patient preference in addition to written educational material (fact sheet produced by the National Stroke Foundation) on sexuality after stroke, which both treatment and control groups will receive. Assessment time points will be at admission, 6-weeks and 6-months following intervention. Standardised validated measures will be used to measure sexual and psychological functioning, functional independence and quality of life. The study will be powered based on the primary outcome measuring sexual function and 70 patients will be recruited to ensure a sample of 30 patients in each group.

Results: Preliminary results and conclusions will be presented.

What is usual physiotherapy care in a stroke rehabilitation unit for patients with mobility deficits? An observational study

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Objective: To benchmark the range of physiotherapy activities undertaken by stroke patients during ‘usual care’ in the inpatient rehabilitation setting.

Design: Observational study of individual physiotherapy sessions undertaken by participants with stroke.

Setting: Inpatient neurological rehabilitation unit.

Participants: Consecutive adults admitted that met the inclusion criteria: diagnosis of first stroke with leg weakness, functional ambulation category (FAC) of 3 or greater, mobilising ≥41 metres, able to consent. Physiotherapists providing the intervention ranged in experience from less than 3 months to more than 15 years working in stroke rehabilitation.

Method: A day’s worth of all individual physiotherapy sessions for each participant was observed and timed with a stopwatch. Attendance at other group therapies was recorded. Duration of therapy session and duration of specific exercises was timed.

Results: 20 participants (8 female) with mean age 69 + 19.9 (34–88) and FAC scores of 3–5 were observed. Of the 20 participants, 12 attended a single session of physiotherapy for the day. Sessions lasted 46 minutes on average and 38% of this (17 minutes) was spent resting. All sessions included gait retraining which on average accounted for 10 minutes of the session. Other frequent choices of intervention were lower limb strengthening (in 71% of sessions) and balance training (67% of sessions). One session included sensory retraining. One session addressed cardiovascular fitness.

Conclusion: In ambulant patients with mobility deficits following stroke, inpatient physiotherapy rehabilitation focuses on gait retraining, lower limb strengthening and balance. Intensity of therapy in individual sessions is low due to long rest periods and could be supplemented by group therapy.

The role of the sodium-calcium exchanger (NCX) in response to stroke/cerebral ischaemia

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Overview: Impaired calcium homeostasis across the plasma membrane is one of the major contributors leading to neuronal cell death and eventual brain damage following stroke or cerebral ischaemia. The sodium calcium exchanger (NCX) is a plasma membrane-bound protein channel that can transport calcium ions either into or out of cells, including neurons. The bidirectional nature of NCX provides a potential target to enable neurons to better manage calcium following stroke. In order to investigate the role of NCX in ischaemic brain injury our laboratory has: 1) used NCX3 knockout mice and cortical neuronal cultures derived from these mice in in vivo and in vitro stroke models (i.e. permanent middle cerebral artery occlusion and oxygen glucose deprivation, respectively); and 2) assessed the outcome of NCX over-expression on primary cortical neuronal and HEK293 cell viability following in vitro ischaemia. In addition, we have used a yeast-two hybrid screen to identify peptides that interact with the XIP binding domain (XBD) located in the NCX regulatory cytoplasmic F-loop. Taken together, this work has confirmed the importance of NCX activity in cell survival under ischaemic conditions, and identified a number of novel lead compounds that may enhance NCX activity and be used in the development of a stroke/cerebral ischaemia therapeutic agent.
Effects of nigella sativa (Linn.) seeds extract treatment on the hippocampal MAP2 and GFAP mRNA expressions in the experimental neurodegeneration

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Background: Experimental neurodegeneration can be induced by two-vessel occlusion intervention (2VO). Nigella sativa (Linn.) seeds extract (NSSE) has recently shown to enhance memory and learning task performances in rats with 2VO. Prevention of neuroinflammation and/or of toxic free radical formation are possible mechanisms. The glial fibrillary acidic protein (GFAP) is a vital neuroinflammatory marker in neuroscience researches. GFAP was found to be down-regulated in 2VO rats indicating astrogliosis. Microtubule associated protein type II (MAP2) is an important marker for neuroprotection during and after ischemic brain injury or hypoxia. It was found to be down-regulated in 2VO rats.

Aim: The current study aimed to compare the hippocampal MAP-2 and GFAP mRNA expressions of 2VO (untreated) male rats in the experimental neurodegeneration with other groups of healthy control and NSSE treated rats.

Method: 18 adult male Sprague Dawley rats were randomly divided into 3 groups (n = 6); Healthy Control (HC); 2VO- without treatment (2VO); 2VO + NSSE-treated (NSSE). The NSSE group was pre-treated (2 ml/kg/day, orally) for 10 days prior to 2VO surgery and continued until all animals were sacrificed at the end of 10th postoperative week. Hippocampal samples were then collected; total RNA was extracted, purified and relatively quantified via reverse transcribed cDNA as perΔΔCq of RT-qPCR assay.

Results: There was a significant 3 folds difference of GFAP mRNA expression in both HC and NSSE groups as compared to that of 2VO. However, GFAP mRNA expression difference was not significant (P = 0.52) of for NSSE vs. HC. Hippocampal MAP2 mRNA expression of NSSE group appeared to be insignificantly different from the untreated 2VO group.

Conclusion: Prolonged treatment with NSSE has the potential to prevent hyperperfusion-induced neuroinflammation within the hippocampus. This may be a potential mechanism for neuroprotection against mild cerebral ischemic injuries. However, NSSE was unable to prevent loss of neuronal plasticity.

Stroke self-management rehabilitation trial (SMART-DVD): The methodology of an international, multi-site pilot trial


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Overview: Stroke is a major cause of long-term adult disability.1 Nearly 80% of stroke survivors return home after the acute event, where they usually rely on family members for further care and support.2 However, stroke patients and their caregivers often report inadequate understanding of rehabilitation techniques.3 Self-management observational learning tools delivered via DVD format may improve functional outcomes for stroke survivors and reduce caregiver burden. This presentation describes the methodology of the international, multi-site SMART pilot trial. The aims of this study are to: 1) explore the feasibility of recruitment and likely level of support required to uptake the intervention; 2) identify the most appropriate inclusion criteria and best primary outcome measures for conducting a full-scale randomised controlled trial; 3) inform the power calculation to assess preliminary efficacy of a DVD-based observational learning intervention in stroke survivors for improving their functional outcomes; and 4) determine levels of and barriers to adherence to the trial protocol for informing a full-scale RCT. Recruitment of a minimum of 250 stroke survivors and their informal caregivers is underway across multiple international participating sites. Following a baseline assessment, participants will be randomised into intervention or usual care groups. Participants randomized to intervention will complete a structured DVD observation and practice schedule over an 8-week period. Follow-up assessments will be administered to all participants at 2 months after randomization. The primary outcome measure is a change in Rankin Scale scores at 2 months post-randomization. Secondary outcome
Abstracts


Stroke education . . . The missing chapter!
S Crothers

Background: The VSCN funded Inter-professional Acute Stroke Careway (IASC) was developed in 2007 within the Stroke Intervention Unit at Dandenong Hospital. It was designed to provide comprehensive screening and assessment of a stroke survivor by the full interdisciplinary team, and essentially operationalizes the National Stroke Care (NSF) Guidelines. Since its launch in 2010, evolution has forced adaptation of this tool to occur, with emerging evidence being embedded and identification of new focus areas established. This led to the introduction of the Stroke Education Package (SEP).

Aim: Enhance stroke survivor knowledge and awareness of stroke management and support services. Create sustainable patient centred processes for stroke education. Increase adherence to NSF Guidelines.

Method: Benchmark and review of existing stroke education resources. Development and incorporation of the SEP within IASC. Three month implementation of the SEP with acute stroke survivors. Evaluate effectiveness of the SEP resources and processes.

Results: Development of the SEP resource in line with NSF guidelines. Implementation of the SEP is currently underway. Full results will be available at the time of presentation. Quantitative data will be obtained via file audits of the IASC to determine appropriate use and completion of the SEP and determine degree of adherence to NSF guidelines. Qualitative data will be obtained from consumer and carer questionnaires and one-to-one/group interviews regarding the quality, timeliness and suitability of the SEP.

Conclusion: Introduction of the SEP promotes patient centred education to stroke survivors and their families, allowing for optimal patient outcomes and enhancing adherence to the NSF guidelines.

Are outcomes for clients admitted to the Early Supported Discharge Program at Eastern Health consistent with those reported in the literature?
J Smith

Background: Level A’ Systematic review evidence has shown that Early Supported Discharge (ESD) of clients with mild to moderate stroke into specialist multidisciplinary community rehabilitation is feasible, less costly and as clinically effective as inpatient care1. An ESD pilot program was implemented at Peter James Centre (PJC) Community Rehabilitation Program at Eastern Health in March 2013.

Aim: To determine whether outcomes for stroke survivors who are admitted to the ESD Program at PJC are consistent with those reported in the literature.

Method: 1. Literature review completed a. to determine outcomes for stroke survivors following ESDb. to select ESD program based objective measurements2. Objective measurements completed on admission and discharge from the ESD program at PJC. Evaluation of whether these outcomes are consistent with those reported in the literature.

Results: Results have shown statistically significant improvement in the following: – Function – Burden of care – Balance – Quality of life – Stroke severity – Measure of Disability. Preliminary assessment of mood in these clients is suggestive of post stroke depression on admission and discharge from ESD. Analysis of whether these results are consistent with those reported in the literature to be completed.

Conclusion: ESD has successfully been implemented within the Community Rehabilitation Program at PJC Eastern Health with statistically significant improvements in a number of program based objective measures. Further analysis is required to determine where these results are consistent with those reported in the literature.


A phase III, randomised, open, controlled trial of minimally invasive surgery plus rt-PA in the treatment of intracerebral haemorrhage (MISTIE III):

Progress update
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Background: Intracerebral haemorrhage (ICH) is the most serious and least treatable form of stroke. MISTIE III is an international clinical trial which aims to establish the balance of benefits and risks of minimally invasive surgery (MIS) plus recombinant tissue plasminogen activator (rt-PA) on moderate-large ’stable clot’ ICH patients.

Method: Patients with acute supratentorial ICH (≥50 mL) without a structural aetiology (N = 500), stable clot size over 6 hrs, and capacity for MIS at 12–72 hrs after the diagnostic CT are adaptively randomised 1:1 to MIS+rt-PA catheter flushes (1 mg t.d.s for 9 doses) vs standard care. Vital and disability status are measured by blinded assessors at 30, 90, 180 and 365 days after ICH onset.

Results: The study was launched in November 2013 with the first centres activated in the United States (US). A total of 90–100 centres are planned within the US, Canada, Germany, Hungary, Spain, United Kingdom, Israel, China and Australia. In Australia, 7 centres from New South Wales (3), Victoria (2) and South Australia (2) will be activated by June 2014. As of 21 February 2014, a total of 7 patients have been recruited from 7 centres.

Conclusion: Network expansion indicates high levels of interest in MISTIE III. Site activation and recruitment is on schedule to achieve the study objectives. For more details and participation in this trial contact MISTIEIII@george.org.au.

Bilateral anterior circulation territory infarction in a 45-year-old-male: A case report

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Objective: To present a rare case of bilateral anterior circulation infarction in a 45-year-old Filipino male.
Cardioembolic strokes and haemorrhagic infarct in a young male with patent foramen ovale: A case report

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Setting: Jose Reyes Memorial Medical Center.
Case Report: A 45-year-old-male who presented with magnetic gait, abulia and urinary incontinence. Cranial CT scan revealed an acute infarct, bilateral ACA territory. Large acute ischemic infarction in both medial frontal lobe extending slightly to the posterior parietal area was seen in Cranial MRI. MRA revealed complete obliteration of both right and left internal carotid artery, there was non visualization of the anterior cerebral arteries.
Conclusion: This case report illustrates an extremely rare event, a bilateral anterior cerebral artery territory infarction, which is seen in only 0.27% of stroke patients. Presentations include apathy, abulia, incontinence and bilateral lower extremity weakness.

Implementation of a goal-setting procedure on the Stroke Rehabilitation Unit at Osborne Park Hospital

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Overview: Though there is inadequate data about the long-term prognosis of ischemic stroke in young adults, the detection of factors associated with negative outcomes must be investigated because of its potentially harmful impact among the young population. The presence of patent foramen ovale (PFO) has been increasingly implicated in the etiology of stroke, particularly in young patients with no other identifiable cause (cryptogenic stroke). A case of multiple infarctions on a 26 yo male secondary to thromboembolism from a patent foramen ovale is reported here, diagnosed with the use of transthoracic echocardiogram with bubble test. Test for connective tissue disease, bleeding disorders and syphilis were negative. And because of the increased rates of recurrent strokes, patients with PFO must be placed on antiplatelets and anticoagulants.

This case report illustrates an extremely rare event, a bilateral anterior cerebral artery territory infarction, which is seen in only 0.27% of stroke patients. Presentations include apathy, abulia, incontinence and bilateral lower extremity weakness.

Conclusion: Achieving a rehabilitation service that is effectively guided by the functional goals of the stroke survivor requires ongoing commitment from the MDT. Future initiatives of the OPH stroke unit will include reviewing and developing the goal setting procedure using measures such as patient satisfaction and functional outcomes.


Retrospective case controlled study on stroke patients to assess the utility of stroke thrombolysis service in relation to admission time in Bankstown Hospital, a university affiliated teaching hospital

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Aim: 1. To identify pattern of acute stroke presentations and reasons for late presentation. 2. To analyse timing of acute stroke assessment, investigation and thrombolysis with regards to variables of day and time of presentation.
Method: All patients admitted to Bankstown Hospital stroke unit in 2012 through emergency department, with sudden onset of neurological deficits suggestive of acute stroke, were included. At the time of study period, weekday working hours had a dedicated ‘Stroke Medical Emergency Call’ service with a consultant led stroke team; while Emergency Department staff and the on-call medical registrar were responsible for acute stroke assessment at all other times.
Results: From the total of 205 suspected stroke patients, 111 (54.1%) patients presented during afterhours and 94 (45.9%) during working hours. 142 (69.3%) patients had acute strokes, 52 (25.4%) had TIAs and 11 (5.4%) had other causes for neurological deficit. Of 94 suspected stroke patients who presented during working hours 37 (39%) had stroke team assessment. Four patients were thrombolysed (3.33% of ischemic strokes). There had not been any thrombolysis taken place during after hours. P = 0.028 Time till doctors’ assessment of suspected stroke patients in afterhours and in working hours were 83.64 minutes and 54.88 minutes respectively(p = 0.005). 55.9% of patients presented afterhours were not thrombolysed stating delayed presentation. 36.7% of patients presented during working hours were not thrombolysed due to delay in presentation. P = 0.018 Conclusion: There was a significant increase in time to doctor assessment for suspected stroke patients during afterhours. No acute stroke patients being thrombolysed during afterhours when there were no dedicated stroke team present on site, although only one such potential patient was identified in this study. Providing a dedicated 24-hr acute stroke team has since been instituted, and this study will be repeated to assess for improvements in assessment times and thrombolysis rates.

Frequency and determinants of early return to driving after stroke
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Objectives: To determine the frequency and predictors of early return to driving in younger adults following acute stroke.

Setting: Prospective multicentre cohort study in the Stroke Services New South Wales (SSNSW) clinical network between October 2008 and June 2010.

Participants: Consecutive patients (age 18 to 65 years) with a recent (<28 days) acute stroke.

Main outcome measures: Baseline sociodemographic and clinical variables; reported driving and measures of depression and fatigue during follow-up at 28 days, and six and 12 months.

Results: Among 359 patients who were driving before the onset of stroke, 96 (26.7%) resumed driving within the next month. Compared to those without an early return to driving (n = 263), drivers were more often male, the main income earner, in paid work, and without symptoms of depression or fatigue at 28 days. Independent in activities of daily living (odds ratio [OR] = 3.05, 95% confidence interval [CI] 3.85–234.45), not recalling receiving advice on driving cessation (OR = 5.55, 95% CI 2.86–11.11), and having returned to paid work (OR = 3.93, 95% CI 1.94–7.96) were independent predictors of early return to driving after stroke.

Conclusions: One in four adults resumed driving within one month of acute stroke, contrary to guideline recommendations. Driving restrictions are challenging in those with minimal disability and fit to return to work.

Registration: Australian New Zealand Clinical Trials Registry ANZCTR 12608000459325.

The effect of financial incentives on improving stroke unit access across Queensland
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Abstract not published.

Promoting physical activity after stroke via self-management: Protocol for a feasibility study
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Background: Many risk factors for stroke are modifiable with physical activity, yet physical activity levels are low in stroke survivors. In Australia, 45% of stroke survivors go directly home from acute services, yet ongoing exercise programs are not routinely available. Self-management has been beneficial in getting people to manage their own health across various chronic health diseases and is beginning to attract attention in stroke.

Methods and design: Forty stroke survivors being discharged directly home will be recruited from acute stroke units. Participants will have no contraindications to exercise, and will be cognitively and physically able to complete the assessments and self-management program. The self-management program will be implemented in 5 sessions over 3 months. It will incorporate i) education about physical activity ii) negotiation of a physical activity plan, taking into account goals and preferences; iii) problem solving, support and encouragement, and iv) monitoring and support of behaviour change. The primary outcome measures will be physical activity. Secondary outcome measures will be health indicators, mobility, quality of life and exercise self-efficacy.

Discussion: If self-management is found to be feasible, it will be investigated in a large scale randomised trial of stroke sufferers. If feasible, self-management also has the potential to be implemented within the existing Medicare extended care package scheme.

Energy expenditure after stroke: A systematic review
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Background: Stroke survivors often experience muscle weakness, spasticity, sensory and cognitive impairment, all of which can contribute to physical inactivity and decline in cardiorespiratory fitness. Residual symptoms after stroke might lead to higher levels of energy expenditure when performing daily tasks, further limiting physical activity. We aimed to synthesise the literature in this field by comprehensively reviewing the evidence.

Objective: To investigate levels of energy expenditure in stroke survivors when performing activities of daily living and to determine whether there is change over time.

Method: We searched EMBASE, Medline and CENTRAL on 01/11/2013 using a variety of search terms for energy expenditure and stroke. Two reviewers independently screened the title and abstract and full text of potentially eligible studies against the pre-defined inclusion criteria. Two independent reviewers extracted data from eligible studies using pre-defined data-collection forms. Any disagreements were solved by a third reviewer.

Results: The search identified 1,809 records. Of these, we included 47 studies that included over 850 participants in total. In the majority of studies, energy expenditure was assessed during walking (n = 27). The studies included participants with stroke onset <1 month (n = 2), 1–6 months (n = 5), >6 months (n = 25) and a mixed sample (n = 11). In 4 studies it was not clear what the time since onset was. Twelve studies compared energy expenditure of stroke survivors (n = 185) to healthy controls (n = 205). Twelve energy expenditure outcomes were reported 8 showed higher energy expenditure in stroke, 4 in healthy controls and 2 studies did not directly compare energy expenditure between groups. It is unclear if these differences were clinically relevant.

Conclusion: There is limited evidence on energy expenditure in stroke compared to healthy controls particularly early after stroke. Better understanding of energy expenditure and fitness has important implications for selecting the dose of physical rehabilitation.

Using the Functional Independence Measure score on admission as a predictor of discharge destination for stroke patients admitted to tertiary rehabilitation settings
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Objective: Investigate predictability of admission FIM score to determine discharge destination in patients undergoing stroke rehabilitation.
Background: Stroke remains a primary cause of morbidity throughout the world. Inpatient rehabilitation is associated with improved functional independence. However, many patients require ongoing care and resource utilisation after rehabilitation. Early identification of patients and prediction of ongoing needs will improve patient selection for rehabilitation and transition to ongoing care, potentially reducing length of stay in rehabilitation and burden on the healthcare system.

Method: A retrospective audit was conducted using data from patients admitted to the Osborne Park Hospital Stroke Rehabilitation Unit from 2007–2013. Forty-seven patients with a total FIM <40 were selected from the database for analysis. Outcomes assessed were age, gender, admission domicile, motor FIM and total FIM on admission and discharge, length of stay, and discharge destination.

Results: A Pearson Chi Square measured association between admission FIM categories (<40 and >40) and discharge destination, of 41.08 p < 0.01 determined that patients with a <40 admission FIM were functionally more dependent, and hence utilised more resources and had lower likelihood of returning home. The majority of patients with admission FIM <40 were most likely to be discharged to nursing home or slow-stream rehabilitation. During rehabilitation, improvement in FIM differed between the groups, favouring those with admission FIM >40, by 34.64 points (95%CI, 29.00, 40.28) p-value < 0.001. Length of stay in rehabilitation differed between the groups, with longer stay in the <40 admission FIM group, by 4.17 days (95%CI, 0.89, 7.46) p-value = 0.013.

Conclusion: Results indicate that planning for ongoing care early after admission to rehabilitation in patients with baseline FIM <40 will likely reduce length of stay, without changing discharge outcome. Results can also guide the team in selecting patients who are most likely to benefit from rehabilitation and return to community living.
Conclusion: The completion of this project has improved awareness of sexuality post stroke and engaged staff to implement changes with the aim to improving compliance with the NSF guideline 8.5.

How much activity-related upper limb training do stroke survivors undertake during therapy? A systematic review
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Aim: To determine the dose of activity-related upper limb training provided per session by either physiotherapy or occupational therapy to stroke survivors during acute hospitalisation and inpatient rehabilitation.
Method: A systematic review of PubMed, CINAHL and EMBASE up to December 2013 was conducted. Eligible studies defined the dose (minutes or repetitions) of upper limb activity-related training provided per therapy session using observational methods for a cohort of adult stroke survivors receiving acute hospital or inpatient rehabilitation. Study quality was rated using a published appraisal checklist for observational designs. The dose (minutes or repetitions) of training observed by therapy discipline (occupational therapy or physiotherapy) and environment (acute hospitalisation or inpatient rehabilitation) was extracted.
Results: Ten studies performed across Australia, Europe and Northern America were included. Study quality was moderate, with an average score of 6 out of 9 points. Two studies observed stroke survivors during acute hospitalisation, while eight observed stroke survivors during inpatient rehabilitation. During acute hospitalisation, one study reported 2.8 minutes per session was spent on upper limb activities across physiotherapy and occupational therapy, while another study reported 5.7 minutes per session across physiotherapy only. During inpatient rehabilitation, a mean of 4 (range 0.9 to 7.9, n = 4 studies) minutes during physiotherapy and 17 (range 9.3 to 28.9, n = 3 studies) minutes during occupational therapy was spent on upper limb activities per session. Two studies reported repetitions per session during inpatient rehabilitation. One study described 12 repetitions per session during physiotherapy and 41 during occupational therapy, while another described 32 repetitions per session across both disciplines.
Conclusion: The dose of activity-related upper limb training performed during acute hospitalisation and inpatient rehabilitation is limited. While the optimal dose remains unknown, based on evidence of neuroplasticity in animal models it is likely that the current dose is insufficient to maximise recovery.

Hippocampal connectivity in ischaemic stroke patients and age matched controls
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Introduction: Memory function after stroke is often impaired, but this impairment typically reflects retrieval and attentional problems rather than axial memory dysfunction. Because the effects of stroke are not confined to the site of damage, resting state MRI (rsfMRI) is well suited to examine changes to known large-scale functional networks including those associated with memory and attention.
Method: We studied 15 patients (mean age 68, SD 11; 9 right hemispheric, 9 subcortical) 3 months after ischaemic stroke and 15 age-matched controls (mean age 67, SD 8). Participants completed a battery of tests including the Hopkins Verbal Learning Test-Revised (HVLT-R) for memory function. Seven minutes of whole brain T2* echoplanar images were acquired on a Siemens 3T scanner.

Results: Mean HVLT immediate recall z-score was 0.04 in patients and 0.72 in controls and mean HVLT delay z-score was −0.12 in patients and 0.55 in controls. rsfMRI revealed no significant differences in hippocampal connectivity within the medial temporal lobe between patients and controls.
Conclusion: We demonstrated preserved hippocampal connectivity 3 months after stroke. A larger cohort and longitudinal data will be analysed to examine changes in connectivity in known functional networks across time.

Lesions were manually traced on a high resolution FLAIR image. To improve normalisation of the lesioned brains, cost function masking during unified segmentation and normalisation was employed with an age appropriate template brain (mean 65 years). Component based noise correction removed covariates associated with head motion and retained signal within 0.01 and 0.1 Hz in grey matter voxels.
The average time course in anatomically defined hippocampal regions of interest served as seeds from which bivariate correlations were carried out on a voxel-wise basis. Participant data were entered into a random effects analysis to examine differences in connectivity between patients and controls.

Results: Mean HVLT immediate recall z-score was 0.04 in patients and 0.72 in controls and mean HVLT delay z-score was −0.12 in patients and 0.55 in controls. rsfMRI revealed no significant differences in hippocampal connectivity within the medial temporal lobe between patients and controls.
Conclusion: We demonstrated preserved hippocampal connectivity 3 months after stroke. A larger cohort and longitudinal data will be analysed to examine changes in connectivity in known functional networks across time.

The risk of aneurysmal re-bleeding during CT angiography in patients with acute subarachnoid haemorrhage
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Purpose: It is commonly believed that CT angiography (CTA) cannot cause re-bleeding; however we have recently come across four cases in which active bleeding was observed during CTA. We have retrospectively reviewed aneurysmal subarachnoid haemorrhage (SAH) cases in which CTA was carried out within 24 hours after the onset, and evaluate the risk of re-bleeding being caused by the CTA procedure.
Method: We had employed a strategy in which CTA was carried out soon after admission in all but comatose patients (WFNS grade 5). We analysed 109 cases with a ruptured berry aneurysm.
Results: Active contrast extravasation during CTA was visualized in four cases. The intervals between onset and CTA were all within one and a half hours: 35, 50, 55, and 90 minutes, respectively. The pre-CTA neurological status had not been bad, with a WFNS grade of 2 for all four patients. Re-bleeding preceded poor outcomes in all cases. The total number of patients in which CTA was performed within 1.5 hours following the onset of haemorrhage was 41; the incidence of extravasation was 9.7% (4/41) in this group. In the group of 68 cases in which CTA was carried out more than 1.5 hours after the ictus, no extravasation was observed. The incidence of extravasation was significantly different between these two groups.
Conclusion: Bearing in mind that comatose cases (WFNS grade 5) were excluded from this study, and that CTA takes only a few minutes to perform, we cannot rule out the possibility that CTA may elevate the risk of aneurysmal re-bleeding in a hyperacute stage.

“Home is where the heart is”: An evaluation of the stroke detours program
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Background: Early supported discharge programs for clients who have suffered a stroke have demonstrated a reduced long-term dependency and a reduced length of hospital stay. However, there has been limited translation of this research into clinical practice. The Stroke Detours Program (SDP) has provided early rehabilitation to suitable clients from acute and sub-acute services. It aimed to reduce length of stay and improve func-
tional outcomes, whilst not increasing carer stress by the provision of a multi-disciplinary community based therapy program.

Method: The SDP was developed based on available evidence and in consultation with key stakeholders. Eligible clients were admitted to SDP from acute and sub-acute services and outcome data collected at admission and discharge. Measures included length of stay, Functional Independence Measure (FIM), Timed Up and Go (TUGT), the SF-36, and the Caregiver Strain Index (CSI). Written consumer satisfaction feedback was also obtained.

Results: Since implementation, 86 clients have been admitted to the SDP. An average monthly bed day saving of 5.1 days in acute has occurred when compared with those awaiting inpatient rehabilitation. A Wilcoxon signed-rank test showed that the SDP program did elicit a statistically significant change in FIM scores ($Z = -7.574, p < 0.001$), TUGT ($Z = -6.548, p < 0.001$) and SF-36 ($Z = -4.608, p < 0.001$). While Caregiver strain was initially present, the CSI significantly reduced ($Z = 2.744, p = 0.006$). All families and clients reported satisfaction with therapy provided within the home.

Discussion: Further comparison of similar cohorts within the bed-based population would be needed to compare natural recovery and dose response. While some impact on carers was identified during the pre and post measures, the overall decreased score must be considered. Significant physical and psycho-social changes have been demonstrated by clients entering the SDP.

The Early Supported Discharge Program for Stroke – The way of the future for stroke rehab

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Background: The Early Supported Discharge (ESD) Model in the community for stroke clients is accepted to be a feasible, less costly and as clinically effective as inpatient rehabilitation for mild to moderate strokes. A key aspect of the ESD Program is the specialised inter-disciplinary team, in which Occupational Therapists are an integral part of. The purpose of this presentation is to describe the ESD Program in detail with the Occupational Therapy role at the centre of this discussion.

Aim: The aim is to discuss: – The ESD Model of Care – Development of the OT role within the ESD Program – Outcome measures from an OT and interdisciplinary perspective within ESD – Where to from here with the OT role within the ESD Program?

Method: The ESD Program has been implemented since March 2013 and clients with mild to moderate strokes have been referred to this model. Prior to establishment of the ESD Program, the typical pathway for stroke clients requiring rehabilitation was through IPR.

Conclusion: The Early Supported Discharge Program is a favourable means of providing intensive rehabilitation in the community environment with promising results seen with clients from mild to moderate strokes.

Fearon P, Langhorne, P, Early Supported Trialists. Services for reducing strokes.

Prior to establishment of the ESD Program, the typical pathway for stroke clients with mild to moderate strokes have been referred to this model. An online survey was used to collect information regarding the demographics, mobility status, physical activity, emotional well-being and participation status of Australian adult stroke survivors living in the community. Information was also sought regarding perceived barriers to physical activity and self-efficacy in regards to overcoming these barriers. In addition, willingness to participate in an internet self-management program was assessed.

Results: Forty stroke survivors from around Australia participated in an online survey. Nearly all participants reported being able to walk outside (94.9%) and are able to use stairs (89.5%), however over 76% of participants were not satisfied with their current level of mobility. Emotional distress levels were generally high, with over 25% of participants deemed likely to have a moderate-severe mental health disorder. Nearly two thirds (64.9%) of participants stated they were not satisfied with their ability to be physically active. The most common barriers to physical activity were that it was “too tiring” (22.5%), “caused pain or discomfort” (22.5%) or that participants were “fearful of performing physical activity” (20.0%). Over 76% of participants stated they would be interested in undertaking a variety of activities, physical activity and self-efficacy in regards to overcoming these barriers. In addition, willingness to participate in an internet self-management program was assessed.

Conclusion: The Early Supported Discharge Program is a favourable means of providing intensive rehabilitation in the community environment with promising results seen with clients from mild to moderate strokes.

Fearon P, Langhorne, P, Early Supported Trialists. Services for reducing strokes.

The way of the future for stroke rehab

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Abstracts

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The efficacy of early exercise engagement as a secondary prevention strategy for stroke and TIA: Study protocol and recruitment feasibility

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Background: Stroke is the third leading cause of death in New Zealand, and is a prominent cause of chronic disability, causing significant physical and cognitive impairments. This study will assess the efficacy of implementing either an early or delayed exercise intervention on cardiovascular and cerebrovascular health for newly diagnosed stroke and high-risk transient ischaemic attack (TIA) patients.

Method: This study is a randomized, parallel group trial whereby 45 patients will be recruited within 2 to 4 days of stroke or TIA diagnosis from the local hospital. Participants will attend a baseline assessment whereby the following primary outcome measures will be examined; vascular risk factors, arterial stiffness of the carotid artery, blood velocity of the carotid artery and middle cerebral artery, and physical fitness. Outcome measures will be measured at some or all of the following: rest, during a postural challenge, and/or during an incremental exercise test. Participants will be randomized to either a 12-week aerobic exercise program which will commence within 7 days (early) or 28 days (delayed) of stroke/TIA diagnosis, or to a usual care control group. Identical outcome measures will be assessed post-intervention.

Results: Of the 20 eligible patients referred to the study to date (21/02/14), 75% (n = 15) have attended the baseline assessment and been randomized. The primary reasons for non-participation included: i) lack of time (n = 2), ii) distance to travel for the assessment session (n = 2) and iii) the individual expressing no concerns with their health status (n = 1).

Conclusion: Current recruitment appears encouraging with regards to the feasibility of the study. Participant recruitment and provisional study findings will be reported and discussed in light of the practical implications and clinical significance of early or delayed exercise engagement. This study will provide much needed objective data concerning the physiological effect of regular exercise participation for stroke and TIA patients.

Poly-arginine peptides are potent stroke neuroprotective agents

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Background and aim: We have recently demonstrated for the first time that poly-arginine peptides containing 8 or more arginine residues have potent neuroprotective properties in in vitro and in vivo stroke models.

Method: In vitro: Rat primary cortical neurons were subjected to 5 min of glutamate excitotoxicity (100 μM). Poly-arginine peptides R1, R3, R6–R15 and R18 (R refers to the number of arginine residues), were added to cortical neuronal cultures 15 min prior to glutamic acid exposure (0.05–10 μM). Neuronal cell survival was measured using the MTS assay 24 h post-injury. In vivo: Sprague Dawley rats were subjected to permanent intraluminal thread middle cerebral artery occlusion (MCAO). Treatment consisted of an intravenous bolus dose of R9 (1000 nmol/kg) or vehicle (normal saline) administered 30 min after occlusion. Infarct volume was measured 24 h after occlusion. Animal treatments were randomized and all procedures were performed blinded to treatment.

Results: Intriguingly, our in vitro data show that neuroprotective potency increases with increasing poly-arginine length; neuroprotection is first evident with R8 and peaks at R15 (IC50: 0.2 μM). Furthermore, R9 significantly reduced infarct volume in the permanent MCAO stroke model.

Conclusion: These findings highlight the potential usefulness of poly-arginine peptides as neuroprotective agents for stroke/cerebral ischaemia, and possibly other neurodegenerative disorders.

After QASC: International uptake of the QASC fever, sugar, swallowing protocols

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Background: Following publication of The Quality in Acute Stroke Care (QASC) trial1, the QASC resources (fever, sugar and swallowing protocols; implementation strategy and education packages) were available for download at www.acu.edu.au/qasc.

Aim: To identify successful international implementation of the FeSS protocols; to examine barriers to implementation; and to determine predictors of successful implementation.

Method: An email cross-sectional survey was administered to those who had downloaded any of the QASC resources between October 2011 and August 2013.

Results: A total of 309 people from 21 countries had downloaded a QASC resource, with 159 survey respondents (56%). The majority (n = 97, 64%) downloaded the resources to support their clinical practice. Of the 50 who were personally involved in implementation, 54% (n = 27) reported successful uptake. Less than half (n = 13, 48%) reported using our proven implementation strategy, and only 33% (n = 9) confirmed successful uptake by audit. Most highly reported barriers included: potential increase in nursing workload (n = 28, 56%); and lack of medical staff engagement (n = 27, 54%). A higher level of self-reported job autonomy was associated with implementation of all three clinical protocols (fully or partly, p = 0.038).

Conclusion: Dissemination of results does not guarantee successful implementation. Barriers identified matched those reported during the QASC trial with lack of medical staff engagement of note. Those who did not use the implementation strategy failed to understand the evidence from the trial. Only a third of participants who reported successful implementation based this on audit data which is of concern, as rigorous evaluation of implementation initiatives locally is essential. Dedicated site champions and use of proven implementation strategies support clinical practice change.

Increasing tonic currents via δ-containing GABA\(\alpha\)\(\alpha\) receptors mediates neuroprotection following focal cerebral ischemia

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Overview: Tonic inhibitory currents, mediated by extrasynaptic GABA\(\alpha\)\(\alpha\) receptors, are elevated following stroke, but only at a delay, indicating compounds that potentiate tonic inhibition early could afford neuroprotection. Flavonoids modulate inflammation and minimise the extent of cellular damage following stroke but little is known about their mode of action. We demonstrate for the first time that the flavonoid, 2’-methoxy-6-methylflavone (0.1–10 \(\mu\)M; 2’MeO6MF), increases δ-containing GABA\(\alpha\)\(\alpha\) receptor tonic currents. Treatment with 2’MeO6MF 1 hr post focal ischemia, dose-dependently decreases infarct volume and improves functional recovery, an effect also observed with the δ-ligands, THIP and AA29504. The effect of 2’MeO6MF was attenuated in δ⁻ mice, indicating that the flavonoid’s effects were via δ-containing GABA\(\alpha\)\(\alpha\) receptors. The level of protection mediated by these receptors was greater than enhancing phasic inhibitory currents as exemplified using zolpidem, and is partly mediated by decreasing circulating pro-inflammatory cytokines. These studies support further development of δ-containing GABA\(\alpha\)\(\alpha\) receptor modulators for the treatment of stroke.

Understanding activity and occupational participation after stroke

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Overview: The concept of participation is complex and still evolving. There is a need to increase the understanding of participation within health care from clients’ perspectives.

Purpose: to investigate why stroke survivors participate in the activities they do and if the reasons behind their participation have changed since their stroke.

Method: In this mixed methodologies study 30 mild stroke survivors were interviewed at 3 months post-stroke following the administration of the Activity Card Sort-Australia (ACS-Aus). Descriptive statistics were used to analyse the quantitative data and the qualitative data was analysed using spiral content analysis.

Results: The participants mean age was 69 years and eight participants were female. The mean National Institute of Health Stroke Scale score for participants was 1.4 and 28 had returned home after their stroke. The mean percentage of retained activity participation was 86%. Qualitative analysis revealed that at 3 months post stroke, stroke survivors’ reasons for activity and occupational participation involved participants orchestrating an interrelated mixture of fulfilling their wants and needs within their social and physical environments and incorporated temporal considerations. Further participants wanted and expected to be able to return to their pre-stroke activities and occupations. Thirteen participants described a change in their reasons for their participation. Three categories explained this change: “Change in function: I can’t”; “Change in environment”, and “I need time to recover”.

Conclusion: The ACS-Aus, a quantitative measure of activity participation, showed a high percentage of retained participation in mild stroke survivors 3 months after stroke. Qualitative methods revealed in-depth the reasons and adaptations that underpinned activity and occupational participation.

Evidence supports emerging need to consider old and new vision defects in the most effective care of patients diagnosed with recent onset stroke

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Aim: To disclose the steps taken in the development of a tool to be used by stroke clinicians in the absence of a specialised visual assessment. y taken to move from vision specialist assessment of patients with a recent onset stroke to Stroke Clinician screening for vision defects.

Method: Concentrating on the assessment of vision for in-patients with a recent onset stroke the following methods will be presented: a review of literature describing the findings from initial vision assessments; a summary of the incidence of vision defects found in three different hospital settings; an overview of the development of a tool to assess the vision of patent for use by Stroke clinicians; some preliminary data aimed to validate the tool.

Results: Evidence supports that: • Vision defects in stroke patients are both related to the stroke occurrence and pre existing eye conditions. • Detection of the vision defects can occur in the in-patient setting Stroke clinicians fail to demonstrate the presence and impact of vision defects. • Vision experts can develop a tool for use by stroke clinicians that will increase the detection of vision defects.

Conclusion: In the field of vision defect detection, evidence can identify an area of practice that needs improving and lead to the successful development of a detection tool.

Feasibility of creating an enriched environment and subsequent impact on activity levels for stroke patients in an acute stroke unit: A study protocol

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Background: Stroke survivors who are in an Acute Stroke Unit (ASU) have been found to spend the majority of their day inactive and alone. Growing evidence recommends that stroke survivors should retrain activities of daily living and ambulatory function as early and frequently as possible. One approach found to increase activity levels during inpatient rehabilitation is the use of an Enriched Environment (EE) whereby physical, cognitive and social activity is enhanced by creating a stimulating environment. The effect of an EE in an ASU has yet not been explored.

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Aim: The primary aim is to determine if an EE in an ASU can increase activity levels compared to usual care. The secondary aims are to determine if fewer secondary complications and improved functional outcomes occur with an EE compared to usual care.

Methods: The study involves a prospective non-randomized block design with 30 people with stroke recruited to the usual care group and subsequently 30 to the EE group. Activity levels will be measured through behavioural mapping on two weekdays and one weekend day for 12 hours until discharge from the ASU. Secondary outcome measures will be collected on admission and discharge. These include adverse events, nutritional intake, Hospital Anxiety and Depression Scale, Modified Rankin Scale, Modified Barthel Index, Mobility Scale for Acute Stroke and the 10-meter walk test. Stroke survivors, carers and clinical staff will complete a survey to explore their experience. No changes to staffing levels will occur during the trial.

Discussion: The study will determine if an EE can increase activity levels in people with stroke in an ASU within existing staffing levels. We hypothesize that activity levels will increase and that there will be a corresponding trend towards fewer secondary complications and improved functional outcomes for stroke survivors.

The Head Position in Acute Stroke Trial (HeadPoST): Background and rationale

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Background and objectives: Positioning a patient ‘lying flat’ in the acute phase of ischaemic stroke may improve recovery and reduce disability, but such a possibility has not been formally tested in a randomised trial. HeadPoST will determine the effects of lying flat (0°) head position compared to sitting up (≥30°) head positioning in the first 24 hours of hospital admission for patients with either acute ischaemic or haemorrhagic stroke.

Method: An international, cluster randomised, crossover, open, blinded outcome assessment clinical trial. 140 study hospitals with established acute stroke care programs will be randomly assigned to sequential policies of lying flat (0°) or sitting up (≥30°) head position as a ‘business as usual’ stroke care policy. Each site is required to recruit 70 consecutive stroke cases in the first randomised head position policy before immediately crossing over to the second head position policy. After in-hospital clinical and management data, and 7-day outcomes are collected, a 90-day outcome assessment is conducted by central trained blinded assessors for the measurement of the primary outcome of shift (‘improvement’) in death or disability according to the modified Rankin scale. For a cluster size of 70 and an assumed intra-cluster correlation coefficient (ICC) of 0.03, a sample size of 9,800 from 140 centres provides 90% power (α 0.05) to detect ≥16% relative improvement (shift) in primary outcome after ischaemic stroke in the ordinal logistic regression analysis. The treatment effect will also be assessed in all cases of intracerebral haemorrhage recruited during the study periods.

Results: The study will commence across hospitals in Australia, Brazil, China, Chile, France, Germany, and the UK during 2014.

Conclusion: The HeadPoST study will provide reliable evidence on the optimal head positioning to inform policy in the management of patients with acute stroke.

Safety of prophylactic heparin in acute intracerebral haemorrhage: Post-hoc analysis of the INTERACT2 study

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Background and aim: Patients with acute intracerebral haemorrhage (ICH) are at high risk of venous thromboembolism (VT), but there is uncertainty over the safety of prophylactic subcutaneous (sc) heparin. We assessed use of heparin on clinical outcomes among INTERACT2 study participants.

Method: INTERACT2 was an international, multicentre, prospective, open, blinded endpoint, randomised controlled trial of 2839 patients with ICH and elevated systolic BP (SBP) randomly assigned to intensive (target SBP <140 mmHg) or guideline-based (SBP <180 mmHg) BP management.1 Propensity score (PS) analysis was used to account for baseline covariates that may have influenced decisions over heparin use. Association of heparin on poor outcome, defined by death or major disability (scores >3) on the modified Rankin score (mRS) at 90-days, were assessed in logistic regression models.

Results: Among 2,525 patients with complete data, 465 (22.5%) received sc heparin in the week after randomisation. In adjusted analysis, risk of poor outcome was higher in heparin-treated patients (OR 1.66, 95%CI 1.29–2.15; p < 0.01). In PS matched analysis (n = 2431), poor outcome was also higher 247/371 (66.6%) in heparin-treated patients compared to 195/371 (52.6%) non-heparin patients (OR 1.80, 95%CI 1.33–2.43; p < 0.01). In PS matched analysis separately for death and major disability, risk of death was borderline significantly lower 49/371 (8.6%) in heparin-treated patients compared to 32/371 (13.2%) non-heparin patients (OR 0.62, 95%CI 0.38–1.00; p = 0.05); but higher for major disability 192/316 (60.8%) in heparin-treated patients compared to 139/316 (44.0%) non-heparin patients (OR 1.97, 95%CI 1.45–2.69; p < 0.01).

Conclusion: Use of prophylactic heparin in ICH was associated with a significantly higher risk of poor outcome, although the relation was different for mortality and long-term dependency. These results should encourage the use of alternatives to heparin for VT prophylaxis, such as pneumatic compression, in haemorrhagic as well as ischemic stroke patients, as shown in the CLOTS-3 study.7


The Australian Aphasia Rehabilitation Pathway

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Overview: A national collaborative effort spearheaded by the NHMRC CCRE in Aphasia Rehabilitation has been undertaken to enhance the quality and consistency of aphasia rehabilitation through the develop-
ment of the Australian Aphasia Rehabilitation Pathway (AARP). The AARP aims to improve the overall patient journey for people with aphasia through establishing evidence-based and expert-endorsed care standards. A systematic review of stroke and speech pathology clinical practice guidelines was undertaken. Aphasia rehabilitation evidence gaps were identified and additional literature reviews undertaken. A community of practice (COP) approach was then used to collaboratively develop the AARP. The COP for the CCRE (12 investigators, 24 research assistants, 33 doctoral students and 200 clinical affiliates) provided feedback on the developing recommendations through face-to-face meetings and web-based forums. Finally, an expert panel used the RAND/UCLA Appropriateness Method (RAM) to rate and validate the final set of standards for aphasia care. The majority of quality stroke guidelines were found to contain limited information on aphasia rehabilitation for inclusion in the AARP. The additional review of literature resulted in a list of aphasia care standards across eight domains (from receiving the right referrals to discharge planning). Feedback was received from the COP. Quality ratings (RAM) were completed. These finalized recommendations have been incorporated into a web-based evidence-based practice tool with accompanying resources. Through a systematic, collaborative approach, the AARP provides an important step towards increasing consistency and enhancing the quality of care for people with aphasia.

**Towards improvement of patient rehabilitation after stroke using a novel system for on-site assessment, early mobilisation and personalised training controlled at distance**

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**Overview:** While exercise rehabilitation after stroke typically begins a few weeks post-stroke, there is a consensus between the health professionals that patients should be mobilised as early and frequently as possible. It was shown that extensive immobilisation in the early phase after stroke is associated with poor functional outcomes. However, getting weak patients out of bed and training them on a regular basis may present a significant logistical and cost barrier, causing underutilisation of the full potential of exercise rehabilitation. In order to facilitate patient mobilisation after stroke, we have developed the first ever bilateral training system for the lower limbs MedExercize® ST. This unique equipment can be installed in the hospital bed or chair to allow active leg movements even if one leg is weaker than the other. Here, we report new modifications of the device, which allow quantitative measurement of several parameters from each lower limb. The parameters, which are expected to be inferior in the weak leg after stroke, include the foot pressure on the pedal and pedal acceleration. We have also designed a quantitative 5–15 minute recurrent ‘walking’ test performed at a steady-state heart rate of the participants (e.g. 100 beats per minute). It allows the measurement of average cadence (pace), step length and ‘walking’ distance as well as the intensity of training (e.g. 100 beats per minute). It allows the measurement of average cadence (pace), step length and walking distance as well as the intensity of training (e.g. 100 beats per minute).

**Survey of stroke rehabilitation in New Zealand**

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**Aim:** We conducted a survey to provide an up to date account of stroke rehabilitation services in all District Health Boards in New Zealand.

**Method:** An online survey was developed and completed at 38 hospitals in New Zealand providing rehabilitation services following acute stroke.

**Results:** There was evidence of increased stroke rehabilitation specialisation in New Zealand stroke rehabilitation services. Most District Health Boards appear to have satisfactory capacity (68% can accommodate all stroke rehabilitation patients). Guidelines for the management of common problems following stroke are being used more commonly, with a few notable exceptions. Community rehabilitation services are available but access to these services can be slow, and true early supportive discharge services remain uncommon. Actual physical therapy contact time in inpatient units remain suboptimal in some rehabilitation centres (only 50% of rehabilitation units achieved one hour per weekday). A similar survey of stroke rehabilitation services in Australia was reported in 2012 by the National Stroke Foundation and some comparisons can be made.

**Conclusion:** As a result of this survey a clearer picture of current stroke rehabilitation in NZ has been established and the following recommendations are made: 1. The intensity of rehabilitation should be increased. 2. Large District Health Boards should work towards dedicated stroke rehabilitation units rather than mixed units. 3. Routine screening of common disorders following stroke could be improved as well as the implementation of guidelines managing these conditions. 4. There are workforce gaps which need to be addressed, particularly in relation to lower levels of access to clinical psychologists. 5. Access to early supportive discharge teams needs to be enhanced Geoff Green.

**Early motivational interviewing on post-stroke depressive symptoms: Pilot randomised controlled trial of the good mood intervention program**

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**Background:** Depression is a frequent consequence of stroke that affects recovery adversely and can lead to greater mortality; however, it is often undetected or treated inadequately. While antidepressants can be used to treat post-stroke depression (PSD), they increase the risk of side-effects which complicate recovery. This randomised controlled trial (RCT) evaluates a new brief and early intervention, the Good Mood Intervention Program (G-MIP) during acute hospitalisation improves patients’ mood post-stroke.

**Method:** This is a single-blinded, prospective, RCT. Eligible participants (>18 years of age, acute ischaemic/haemorrhage stroke) are recruited during acute hospital admission. Participants are randomised to intervention or control groups. Intervention group patients receive early MI, provided by trained nurses and social workers during the acute in-patient hospitalisation. MI comprises of three, 30-minute individual sessions: 1) Setting agenda and encouraging patient to talk about how they are feeling after having a stroke; 2) Eliciting concerns about recovery, and adjusting to stroke; and 3) Identifying patient’s mood, optimism and self-efficacy, and identifying solutions to problems. Data is collected at baseline, 4-week and 12-week follow-up. Primary outcome measures include anxiety and depression (Hospital Anxiety and Depression Scale) and quality of life.
(Quality of Life Index). Acceptability of the MI technique will be explored through semi-structured interviews at the 3-month follow-up period with intervention group participants.

Results: Preliminary results will be presented. Twenty-five participants have been recruited since September 2013: 14 men and 11 women, average age 69 years. Twelve participants have received the intervention and thirteen have received standard care.

Discussion: This study aims to demonstrate that early motivational interviewing can improve patients’ mood after stroke. MI can be incorporated readily into usual care within the acute setting by health professionals, with minimal training in the technique.

**Treatment costs for stroke patients admitted to a stroke unit in Ho Chi Minh City, Vietnam**

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Background: Data are limited on the costs of stroke in Vietnam. Hospital care in Vietnam is mostly paid by patients, unless the patient has insurance where a co-payment is required. We aimed to estimate the cost of in-hospital management for patients admitted to a Stroke Unit in a teaching major hospital in Ho Chi Minh City, Vietnam.

Method: Use of a consecutive sample of patients with ischemic stroke or intracerebral haemorrhage admitted to a stroke unit between June and September 2012. Itemised hospital costs were extracted from electronic administration records. Socio-demographic factors and markers of stroke severity were also collected. In addition to calculating total costs, we examined cost differences between subgroups using analysis of variance and linear regression techniques.

Results: Cost data were available for 441/454 patients (48% female, mean [SD] age 62.5 years [14.0], 76% ischaemic stroke; 54% had health insurance). Mean length of stay was 6.4 (median 5.0) days (SD 4.2). Mean (SD) total cost in hospital was VND $6.40,000 (SD VND $7.22,000) equivalent to Australian dollars (AUS) $939. Mean cost per day was VND $916,000 (SD VND $845,000; AUS $152.5). Stroke unit treatment costs accounted for 76% of total costs. Mean ‘out-of-pocket’ costs for patients with health insurance was VND $2,410,000 (46% of total treatment costs). Treatment costs were similar by age and gender, but were greater for those with severe stroke (NIHSS ≥27) and severe disability (mRS ≥3) (p < 0.001) attributed to longer lengths of stay. Diagnostic imaging and bed-day fees explained nearly half of total hospital costs, and about 60% of ‘out-of-pocket’ patient costs.

Conclusion: This information provides an understanding of the costs of stroke in Vietnam. Hospital costs for stroke in a stroke unit is 1.7 times greater than the monthly average income per capita of HCM city residents in 2012 (VND $3,241,000). Greater efforts to prevent stroke in Vietnam are needed.

**Linking the “FAST Track” stroke alert with the medical emergency team paging system reduces door to needle time**

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Background: The outcome benefit of stroke thrombolysis has been shown to be time dependent and international guidelines recommend that time from hospital arrival to intravenous tissue-type plasminogen activator (tPA) (Door-To-Needle time, DTN) should be ≤60 minutes. In February 2013 we implemented the “FAST Track” stroke alert utilizing the same notification system as the medical emergency team. Stroke consultant, registrar and stroke nurse are alerted by linked pagers as soon as Emergency Department (ED) staff are aware of a patient, in the ED or being transported by ambulance, that has likely had a stroke (FAST positive) within the last four hours.

Aim: To improve the median DTN time and the proportion of patients treated within 60 minutes.

Method: Prospective study of consecutive patients, before and after study, presenting to the Emergency Department with acute ischemic stroke who received intravenous tPA between August 2011 to February 2014 at a single 300-bed hospital. We analysed the patient demographics, time of presentation, time frame between ED presentation and neuroimaging (DtCT) and DTN time. The two groups were those treated prior to February 2013 with routine notification (hereafter ‘Routine’) and those treated after implementation of the ‘FAST Track’ stroke alert (hereafter ‘FAST Track’). The patients were then further divided into in-hours and after-hours based on time of presentation.

Results: There were 30 ‘Routine’ and 31 ‘FAST Track’ patients. Eight exclusions were due to incomplete data or non-ED tPA administration. Median DTN time reduced from 67 to 42 min for ‘FAST Track’ patients. More ‘FAST Track’ patients were treated within 60 min, 40% vs. 71.9%, χ²(1,N = 61) = 6.40, p = 0.01. The biggest improvement was after-hours: ‘Routine’ 17.6% vs ‘FAST Track’ 61.1% treated within 60 min, χ²(1,N = 35) = 6.88, p = 0.009.

Conclusion: The “FAST Track” stroke alert system reduced median DTN and significantly improved the percentage of patients treated within guideline recommended timeframes.

**Rehabilitation outcomes following thrombolysis: A study of four cases**

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Background: Thrombolysis with recombinant tissue plasminogen activator (rtPA) is used routinely in acute stroke management throughout the world. The majority of rtPA research has focused on safety and efficacy using general outcome measures, such as the National Institutes of Health Stroke Scale or modified Rankin Scale. The effect of rtPA on specific rehabilitation outcomes, such as communication and motor recovery, and its effect on rehabilitation service usage, is unknown.

Objective: To evaluate the effect of rtPA on communication and motor recovery during the first three months post-rtPA and rehabilitation service usage.

Method: Four individuals who received thrombolysis with rtPA for a single left hemisphere ischaemic stroke completed an assessment battery (comprising the Western Aphasia Battery and Motor Assessment Scale) two weeks and three months post-stroke. Information about length of stay and allied health service usage (including inpatient and outpatient services required) and discharge destination were collected. Data were analysed using reliable change indices and descriptive analyses.

Results: Reliable changes in assessment scores occurred for lower limb function in participants with severe functional limitations. No reliable change was observed in lower limb function for participants with milder functional limitations, or for any participants in upper limb or language function. Service usage varied between participants, both in terms of the extent of inpatient rehabilitation and outpatient services. Two participants...
with severe functional limitations required extensive inpatient rehabilitation. Three participants required outpatient or community rehabilitation. Conclusion: Tailoring of the service delivery approach may be required for individuals who receive rtPA based on functional limitations post-rtPA. Future research into the impact of rtPA on motor, cognitive and communication recovery after stroke is vital to identify individuals who are most likely to benefit from rtPA, and promote the development of optimal rehabilitation programs to maximise functional outcomes and quality of life post-stroke.

The Victorian Stroke Telemedicine (VST) program: Clinician survey
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Background: Telemedicine can increase use of stroke thrombolysis in rural hospitals but is not widely used in Australia. The VST program commenced in one hospital in 2011, and is now expanding to 16 hospitals. Aim: To describe the VST program and our experience to date. Method: A virtual network of urban-based neurologists provide 24/7 on-call support to regional/rural hospitals without access to local stroke specialists. VST consultations are undertaken for patients with suspected stroke who arrive within 4.5 hours of symptom onset. Pre and post clinician surveys and patient data are collected. Descriptive analysis of the responses is presented. Results: The VST program has a staggered recruitment of rural and regional hospitals over 5 years across Victoria. The first sites to be initiated were in the Loddon Mallee region, where an additional two hospitals were activated onto the program in early 2014. Twenty-two pre-VST surveys were completed, with 90% from Emergency Department staff, with 56% nurses. Ninety-one percent agreed that stroke is an emergency. Almost half (45%) identified barriers to providing evidence-based stroke care at their hospital including: technology issues; limited access to radiology and pathology outside business hours; lack of clinical buy-in and availability of staff; and unawareness of protocols. All respondents agreed that using stroke telemedicine could improve diagnosis and treatment for acute stroke. Conclusion: Implementing evidenced-based care is complex and challenging. VST is the largest, funded multi-centre stroke telemedicine project in Australia. The VST model addresses important clinical practice gaps related to equity of access to specialists. Data on progress to date can assist in understanding how VST can serve as a template for acute care telemedicine nationally.

Ongoing Trial of Very Early Rehabilitation (AVERT)
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Background: Very early rehabilitation may be an important component of effective stroke unit care, but this requires testing. We hypothesise that, within a multicentre, single blind, randomised controlled trial, intensive mobilisation commencing within 24 hours will reduce deaths and disability and be cost effective. Aim: To achieve high data quality with ≥90% data completion targets for primary outcomes, and secondary outcomes ≥90%, with cognitive and mood tests ≥80%. Method: Patients within 24 hrs of stroke, whose physiological parameters fall within set limits are included. Patients with severe premorbid disability, severe comorbidities or requiring palliative care are excluded. Randomisation is concealed, with stratification by site and stroke severity.

Early rehabilitation delivered by a nurse/physiotherapy team starts within 24 hours, for a maximum of 14 days. Control group patients receive standard care. A blinded assessor evaluates 3 and 12 month outcomes. Primary outcome: 3 month modified Rankin Scale. Secondary outcomes include complication rates, quality of life, time to walking (days) and cost effectiveness. Sample size is 2104 patients (n = 1052 per group). Analyses will be intention to treat.

Results: 56 hospitals are participating in 5 countries. At March 2014, 39,341 patients have been screened with 1862 patients recruited. Recruited patients: mean (SD) age: 70.5(12.9) years; male: 61.8%; first stroke: 81.7%; infarct 87.8%; mean (SD) NIHSS: 8.8(6.4); rtPA: 23.2%. 1768 patients have completed 3 month follow up, with 141 deaths (8.3%) and 9 (0.5%) dropouts. Primary outcome completion 99.5%. Secondary outcome completion 91.7–99.7%; cognitive 80.3% and mood 80.6%.

Discussion: The trial data quality is high and meeting data completion targets. The Data Monitoring Committee has met 14 times and no safety issues have been identified. We aim to complete recruitment by December 2014.

Exploration of ethological issues in Animal Assisted Interventions (AAI) for stroke sufferers: Recommendations for action
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Overview: AAI is provided to promote improvement in human physical, social, emotional and cognitive functioning. Previous research has shown some benefits in aiding client recovery and rehabilitation in a range of disorders, including stroke. However some findings are contradictory and the research has been critiqued for validity. Our aim was to review the literature to identify gaps in AAI assessment. We searched the major medical, scientific, social science and veterinary literature reported previously [1] to identify and analyse gaps and develop recommendations for future action. Primary and secondary literature informed our analysis of content. We identified a range of AAI treatment and assessment tools in multiple disease groups, including stroke. With respect to the animals central to the interventions, there is little reference to their welfare. Moreover, with few AAI practitioners having training in animal behaviour and welfare, judging the value of an interaction to an animal may be difficult and consequently easy to overlook. Careful selection of the animals for intervention may, however, minimise potential for detriment. Many questions in AAI remain unanswered and require further research. Animals involved in AAI may be impacted by the medical, psychological, physical and other issues that clients may have, as well as by environmental (e.g., organizational) issues. With no specific legislation for management of AAI in Australia, development of a Model Code of Practice could provide a useful framework for establishing an ethically enhanced AAI service. Objective assessment of humans and intervention animals, using a salivary biomarker panel, has been proposed [1]. However carefully controlled clinical AAI trials including assessment of practitioner training in animal behaviour and welfare, are necessary to demonstrate not only efficacy and validity of AAI, but also the benefits for both humans and animals central to the interventions.

Let’s talk about sex? Sexuality after stroke: Implementing guideline 8.5 at Caulfield Hospital
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Background: The National Stroke Foundation Clinical Guidelines for Stroke Management states that patients and their partners should be provided with written information addressing sexuality after stroke, and the opportunity to discuss sex and sexual issues with an appropriate health professional (Guideline 8.5).

Aim: This research project aimed to achieve an improved and more consistent approach to discussing sexuality with patients and partners at the Caulfield Hospital Neurological Rehabilitation Unit.

Method: A multi-disciplinary working party attended a series of workshops run by La Trobe University’s Australian Research Centre in Sex, Health & Society. Patient interviews, organisational audits and a staff survey were performed. These were designed to explore current unit practices, knowledge and attitudes regarding sexuality post-stroke in both staff and patients.

Results: All surveyed clinicians recognised that changes to sexuality may be an issue after stroke. The majority (95%) believed that providing patients with information about changes to sexuality after stroke is important, but 60% did not feel confident in their ability to do so. All stroke patients who were interviewed expressed an absolute need for sexuality to be addressed during rehabilitation.

Discussion: Both staff and patients involved in the project clearly felt that sexuality should be discussed during a stroke patient’s rehabilitation. Staff members appear to lack the confidence to raise or discuss this topic with patients. An action plan will be implemented to facilitate sustainable improvements in processes and practice, to ensure that Caulfield Hospital provides a service which supports our patients with issues relating to sexuality after stroke into the future.

"Surviving Carer Stress” Group: Supporting carers & families of neurological rehabilitation inpatients at Caulfield Hospital
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Introduction: Admission to hospital can be a stressful time for carers and families. Education, stress management and counselling support are all important interventions during the subacute rehabilitation phase. With this in mind, a carer support group was created for carers and families of inpatients on the Caulfield Hospital Neurological Rehabilitation ward.

Aim: To improve the formal support structures available to carers and families during admission rather than on discharge, as is the current model. Provide a supportive environment to help better prepare participants for the uncertainties they may face post neurological injury of a family member.

Method: Education was provided on: – Brain function and the effect of neurological events on behaviour, emotions and thinking; – Consequences of behavioural changes for carers and family; – Stress and stress management strategies; – Changes in relationships and the role of carer; – External support services.

Facilitators allowed ample time for questions, sharing and discussion. Each participant completed a pre and post questionnaire which was analysed by facilitators.

Results: Good attendance by carers and family members. Questionnaire respondents reported enjoying the peer support aspect, and also described a desire for more practical skills. All sessions ran overtime, and respondents felt they would like more time to explore pertinent issues.

Discussion: Overall, there was a strong feeling from participants that the group was worthwhile. Content and format must be reviewed to remain within session time limitations and allow for maximum gains for participants. It is hoped this group will create sustainable change to support carers and families at Caulfield Hospital in future.

Usefulness of clinical grading scales in intracerebral haemorrhage: INTERACT2 experience
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Background: Several simple clinical grading scores exist for the prediction of outcome, primarily 30-day mortality, in acute intracerebral haemorrhage (ICH). We determined the predictive ability of three popular scores (original ICH score, modified ICH score, and ICH grading scale) on death and major disability during 90 days of follow-up of participants of the INTERACT2 study.

Method: INTERACT2 was an international, open, randomised controlled trial of 2839 patients with CT-confirmed ICH, elevated systolic BP (150 to 220 mmHg), and capacity to start BP-lowering treatment within 6 hours of onset. Patients were assigned to an intensive (target systolic BP <140 mmHg) or guideline-recommended BP (<180 mmHg) management. Functional outcome was measured using the modified Rankin Scale at 28 and 90 days.

Results: ICH characteristics and functional outcome data were available in 2556 patients. The modified ICH score had the greatest discrimination (0.75, area under the ROC curve) at predicting good outcome (mRS 0–2) at 90 days. In the 897 (35%) of the participants who had 24 hour CT scans analysed, discrimination increased if the modified ICH score was calculated using the clinical information at 24 hours after stroke onset for both mortality at 30 days (0.85 at 24 h vs 0.76 at baseline, P < 0.001) and good outcome at 90 days (0.80 vs 0.75, P < 0.001).

Conclusions: The ICH scores have limited ability to predict prognosis in the hyperacute phase (<6 h from stroke onset), although a later assessment (ie 24 hours) improves their accuracy. Decisions over acute treatments, such as early intensive BP lowering, should not be based on the use of these scores.

Acute stroke unit nurses’ perspectives on communicating with patients with aphasia
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Overview: Changing the communication environment has been challenging in the acute healthcare setting (Simmons-Mackie, Kagan, O’Neill Christie, Hijibregts, McEwen & Willems, 2007). Further, perspectives of nurses on communication with patients who have aphasia has not been thoroughly investigated. Three registered nurses working in an acute stroke unit were surveyed and interviewed about their perspectives on aphasia, as well as the facilitators and barriers they perceived toward communication with patients who have aphasia. Participants were trained in a modified version of Supported Conversation for Adults with Aphasia (Kagan 1998).
Qualitative content analysis (e.g. Graneheim & Lundman, 2004; Worrall, Sherratt, Rogers, Howe, Hersh, Ferguson, & Davidson, 2011) was used to determine relevant themes identified by participants prior to and following training. Participants noted several previously identified barriers and facilitators such as time and availability of AAC. Perspectives on communication and patient competence were also shown to influence nurses’ communication with patients with aphasia. Clinical implications include increasing the emphasis on patient competence in communication partner training programs and ensuring that, in addition to health professionals, ancillary staff such as ward receptionists receive supported conversation training to help make the acute hospital environment more aphasia friendly. Suggestions for possible future research are discussed.

Targeted peptide quantification of candidate plasma proteins to diagnose Transient Ischaemic Attack (TIA)

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Overview: Transient Ischaemic Attack (TIA) is a difficult clinical diagnosis. The current tissue-based diagnosis requires an MRI to exclude minor stroke. In coronary artery disease the use of troponin is of considerable value and we suggest that a similar biomarker should be investigated for TIA. We have previously presented a 2-dimensional differential in-gel electrophoresis (2D-DIGE) method used in a pilot study that sought plasma protein markers for TIA in 3 cohorts: TIA patients, TIA mimics and healthy controls [1]. We identified several highly biologically plausible biomarkers. In this study we aim to quantify these TIA-specific biomarkers to further validate our previous preliminary findings. Targeted peptide quantification of candidate plasma proteins using multiple reaction monitoring (MRM) was performed with a Triple time-of-flight (TOF)™ 5600 mass spectrometry system using MRMpilot™ software (AB SCIX). Mass spectrometry successfully identified peptide sequences that corresponded with known proteins in the Universal Protein Resource (UniProt database). Proteins identified with ≥2 unique peptides were considered to have sufficient coverage of amino acid sequence to provide conclusive identification. From the proteins differentially expressed and quantitated in the 6 TIA patients, but not the 6 TIA mimics or 6 healthy controls, using highly accurate TripleTOF™ mass spectrometry, we have modified our former protein biomarker panel. We are now confident to propose a large Australian TIA biomarker study to further test these candidate proteins. A rapid, simple and relatively inexpensive enzyme-linked immunosorbent assay (ELISA) will be developed by our team so this may be used on a large scale providing the opportunity for the first study of this nature to our knowledge.


Feasibility of an international telesstroke service: Pilot phase

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Background: Telestroke services help to improve stroke thrombolysis access at hospitals where 24/7 on-site expert coverage is challenging. However, regional telesstroke can still leave services underserved especially during difficult to cover night-time hours. In an effort to improve service access we explored the feasibility of a cost neutral reciprocal international arrangement between a Scottish and a New Zealand stroke service providing telesstroke to each others’ patients during the night-time period taking advantage of international time zone differences.

Methods: Following a complex implementation phase related to anticipated medico-legal issues we conducted a sixteen week non-randomised observational feasibility pilot weekdays 9 pm–9 am. Patients were recruited prospectively and both patients and medical staff were interviewed following assessment. Time frames and outcomes were captured. Results: From 20 September 2013–10 January 2014 five patients were assessed by an overseas consultant utilising telesroke. Two of these were treated and experienced excellent recovery. Three patients were not treated: one because of spontaneous symptom resolution, one due to intracerebral haemorrhage, and one because symptoms appeared non-organic. All five decisions were deemed appropriate by the local clinicians upon full face-to-face assessment the following day. Both patient and staff feedback have been positive and supportive without any significant concerns raised. No significant technical issues occurred. Referral to treatment times were 63 and 50 minutes; these time frames are similar when patients are assessed locally and the delays relate primarily to obtaining brain imaging after hours as a technician has to drive in from home.

Conclusion: Preliminary findings indicate that an International Telesstroke Service is feasible. A much larger study is planned to more comprehensively assess treatment delays, patient outcomes, and service costs.
Predicting poststroke depression from structural brain connectivity

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Overview: Depression is a common neuropsychological consequence of stroke. The ability to predict patients at high risk of developing depressive disorders using non-invasive neuroimaging strategies has the potential to enable early intervention. We hypothesize that modelling the disconnection of key cortical and subcortical brain networks due to ischemic brain injury may be used to predict post-stroke depression (PSD). We conducted an automated analysis of diffusion MRI tractography data to detect brain regions associated with PSD. The loss in structural connectivity was measured using diffusion MRI and white matter fibre tracking for 25 stroke patients (12 months post-stroke) and 41 age-matched controls. Two connectivity matrices were generated for each control participant, one with and one without the use of a manually delineated stroke lesion of a patient as an exclusion mask. A paired t-test using network-based statistics (NBS) was then performed on these connectivity matrices to determine the neural networks affected by the ischemic injury. This procedure was repeated for all stroke patients, in an independent fashion, to generate 25 connectivity matrices that were subsequently used in a regression forest to provide a probabilistic prediction of depression. The probabilistic scores obtained from regression forests (in a leave-one-out manner) and the clinical depression scores for 25 patients achieved a high positive Pearson’s correlation with r = 0.78 (p < 0.00001). This methodology shows promise as a predictive tool of PSD that maybe useful for identifying stroke patients at high risk of developing depression, enabling early intervention to improve long term outcome.

Implementation of a tele-thrombolysis service for acute stroke patients of the Manning Rural Referral Hospital: A quasi-experimental study

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Background: Thrombolysis is the most effective treatment for acute ischemic stroke but strict guidelines around patient assessment and treatment time frames mean patients in rural areas often miss out. Telemedicine is recommended for increasing access to stroke thrombolysis in rural areas.

Aim: To design, implement and evaluate tele-thrombolysis service with the aim of increasing thrombolysis rates.

Method: A tele-thrombolysis service was implemented, linking a rural (spoke) and tertiary (hub) hospital in NSW. After 4 months the service was evaluated for feasibility and preliminary efficacy, safety and efficiency. Consecutive suspected stroke patients presenting to the spoke hospital were compared to a historical cohort identified via retrospective chart audit for matched time epochs. Thrombolysis rates for ischemic stroke patients in the spoke catchment for the pre and post implementation periods were compared. Rates of symptomatic intracranial haemorrhage, 30 day modified Rankin scale scores, door-CT, door-needle and onset-needle times were compared to published tele-thrombolysis and face-to-face thrombolysis results.

Results: 10 patients were assessed via tele-consultation and 2 subsequently received thrombolysis equating to an increase in thrombolysis rates from 3.2% to 8% (Fisher’s exact p = 0.581) for the pilot period. Of the patients treated neither suffered a sICH and both achieved a 30 day mRS of 2. The median Door – CT time was 48 mins (range 1–211) and Door – Treatment times were 88 and 152 mins.

Conclusion: The tele-thrombolysis service, the first of its kind in NSW, successfully increased thrombolysis rates in the Manning area without any adverse effects. Continued recruitment and evaluation is needed to truly assess the effect of the service on thrombolysis rates and its safety and efficacy.

Royal Brisbane and Women’s Hospital (RBWH) Acute Stroke Unit – A change from neurorehabilitation focus to an acute care unit

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Setting: The RBWH Acute Stroke Unit provides quaternary level stroke services to Queensland. The unit has 10 funded beds and is staffed with a full multi-disciplinary team (MDT).

Aims: To improve patient access to and quality of acute stroke care by aligning with current evidence.

Method: In May 2013 we changed focus from a hybrid acute/neurorehabilitation model to an acute stroke unit with the introduction of the RBWH Acute Stroke Model of Care. The changes included direct transfer of patients from emergency to the stroke unit, bi-weekly geriatrician led rehabilitation liaison ward rounds, clearly defined arrangements for transfer of patients in and out of the stroke unit, strengthening of links with patient flow and bed managers as well as clinician driven daily MDT meetings.

Results: Over the last 10 months we have observed reduced length of stay, increased access to specialist stroke care and eliminated the practice of outlying stroke unit patients. These changes have had a significant impact on the roles played by each member of the MDT.

Discussion: We will discuss the challenges faced during the development and implementation of the model of care, focusing on the impact on the MDT, including, timely assessment, prompt discharge planning and the importance of team communication.

Feasibility of long term follow-up of quality in acute stroke care trial participants: An evaluation of data linkage from state and national death registers

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Background: Quality in Acute Stroke Care (QASC) trial participants were recruited from acute stroke units across NSW from 2005–2010. A
Baseline peri-infarct n-acetylaspartic acid correlates with regional white matter atrophy after ischaemic stroke

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Objectives: Longitudinal changes in cerebral volume have been described after ischaemic stroke and may correlate with long-term outcome. We tested the hypothesis that baseline peri-infarct concentration of the neuronal metabolite N-Acetylaspartic Acid (NAA) correlates with cerebral volume change after stroke.

Method: Fifteen patients with supratentorial ischaemic stroke underwent 3T-MRI within 1-week of onset and at 1 and 3-months. Structural imaging involved a T1-weighted axial-MPRAGE (1 mm slices, TR1.9 s, TE2.82 ms). NAA estimation was performed at the baseline scan using single-voxel spectroscopy (TE30 msec, voxel dimensions 3 x 3 x 3 cm) with the voxel placed in the peri-infarct region as determined by visual assessment of the diffusion-weighted image. Quantitative spectroscopic analysis was performed using LCmodel. Longitudinal cerebral volume change was determined between 1 and 3 months due to anticipated effects of oedema on volume at the baseline scan. Total grey and white-matter volume, normalised for subject head size, was determined using SIENAX (part of FSL). The result was validated and the contribution of stroke hemisphere versus contralateral hemisphere with not white-matter volume. Lower concentrations of peri-infarct NAA were significantly associated with white-matter volume loss between 1 and 3-months (r = 0.69, p < 0.005) but not with grey-matter volume change. There was a similar trend detected using freesurfer (r = 0.51, p = 0.06) and this was driven by changes in the stroke hemisphere (r = 0.69, p = 0.007).

Conclusion: Estimation of peri-infarct NAA may signify varying degrees of neuronal damage after stroke which may correlate with the severity of axonal degeneration and subsequent white-matter volume changes. Correlation with clinical outcomes is required.

Health-related quality of life of care-givers of stroke patients in Vietnam

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Background: Little is known about the welfare of carers of stroke survivors in Vietnam. This study assessed their health-related quality of life (HRQoL) after 3 months of caring for a stroke patient.

Method: The main carers of first-ever stroke patients admitted to the stroke unit of a major hospital in HoChiMinh City from June to September 2012 were interviewed 3 months post stroke. HRQoL was assessed using the Duke Health Profile (DHP, 10 domains, range 0–100) and the EQSD (5 domains, range −0.269 to −0.010) which reflects health status above full health. Stroke severity was determined using the National Institutes of Health Stroke Scale and the modified Rankin Scale.

Results: The study included 108 carers of mean age 45.9 (SD 14.1) years (69.4% female). Most carers were children (50%) or spouses (37%) who lived in the same house as the stroke patient. The mean DHP scores of the carers were generally higher than population reference values, and higher than those of the stroke patients. The mean DHP scores of carers declined with age and were higher for males than females, was inversely associated with severity of stroke at three months of the stroke suffered by their patient they cared for, and were correlated with their own EQSD scores on dimensions that measured similar constructs.

Conclusion: Carers of the most severely-affected stroke survivors had poorest HRQoL, but overall their DHP scores were higher than population reference values. This may reflect the wider family context of caring in Vietnam, with responsibilities assigned to healthy members best able to cope.

Development of consensus amongst a group of Western Australian therapists on early upper limb rehabilitation post stroke

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Background: National Stroke Foundation (NSF) audit data suggest that less than 15% of stroke survivors recover full upper limb (UL) function. The NSF 2011 audit of acute stroke services in Western Australia reported that 60% of patients were unable to use their upper limb in functional activities at discharge from acute care.
Monitoring of clinical indicators utilising AuSCR enables early response to declining performance in quality of stroke care

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Background: The Australian Stroke Clinical Register (AuSCR) enables continual collection of four key process indicators to monitor quality of care in acute stroke. Queensland hospitals collect a further four indicators on a Qld specific spine, including dysphagia screening prior to oral intake. Local AuSCR administrators have immediate access to both local and comparator data. Although this “real time” data is unverified, it enables rapid identification and response to changes in performance.

Aim: To demonstrate the value of AuSCR based monitoring of clinical indicators combined with quality improvement interventions to identify and rapidly respond to deterioration in performance.

Method: Nambour General Hospital commenced submission of data to AuSCR in September 2012. Routine monitoring of online reports revealed an unexpected decline in dysphagia screening rates in mid 2013. The stroke unit multi-disciplinary team devised a multifaceted quality improvement intervention including: feedback of results and targeted education to relevant clinical teams; use of documentation prompts and reminders; and review of training methods and increased focus on the numbers of accredited swallow screeners. Local key opinions leaders were engaged to support the interventions.

Results: Dysphagia screening prior to oral intake declined progressively from 67% in February to a nadir of 38% in June 2013. Following commencement of improvement activity in June, performance improved progressively to a peak of 74% in November and was maintained at a mean of 69.5% for the subsequent 3 months.

Conclusion: Use of AuSCR for monitoring enables early recognition of deterioration in performance in quality indicators. Linked to evidence based quality improvement activities, this can result in rapid correction of performance.

The stroke-IMPACT trial (Improving Physical Activity via Treadmill Training): A single blinded randomised controlled trial protocol

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Background: Stroke is a leading cause of disability amongst Australians. After stroke, activity levels are low, with few people able to exercise at an intensity that will reduce the risk of future cardiovascular events.

Aim: To determine if high intensity treadmill training embedded in a self-management approach will result in increased levels of physical activity at 8 and 26 weeks compared to usual physiotherapy in stroke survivors undergoing rehabilitation. A secondary aim is to determine if this intervention will also improve mobility, cardiorespiratory fitness, cardiovascular risk profile, quality of life and reduce burden of care.

Method: We will employ a multi-site, single-blinded randomised controlled trial (RCT) design with a target sample of 128 people with stroke. Participants will be randomly allocated to either (a) an experimental group that over an 8-week period will complete 12-hours of high intensity treadmill training at 60% of heart rate reserve combined with individualized chronic disease self management sessions centred on physical activity, or (b) usual physiotherapy rehabilitation. The experimental group will also receive usual rehabilitation, with time spent participating in the study intervention replacing the same volume of gait training. The primary outcome measure will be physical activity level (steps per day) measured over four days using an accelerometer at week 8 and week 26. Secondary outcome measures include walking ability (speed and endurance), cardiorespiratory fitness measured using portable breath by breath analysis, lipid profile and inflammatory markers, self efficacy of walking, health related quality of life, participation and burden of care.

Discussion: The strengths of this protocol are that it uses an RCT design to test a comprehensive, patient-centred, goal-oriented approach to lifestyle modification early in rehabilitation that addresses both impairments limiting activity and behavioural modification; it will measure actual activity and cardiovascular risk profile; and it has a 6-month follow-up.

EXtending the time for Thrombolysis in Emergency Neurological Deficits – Intra-Arterial:

The EXTEND-IA Trial

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Background: The proven benefits of tPA within 4.5 hours of stroke onset are limited by modest reperfusion rates in patients with major vessel occlusion. Endovascular mechanical clot retrieval may increase reperfusion rates in these patients.
Objective: EXTEND-IA will test the hypothesis that dual target vessel occlusion and penumbral mismatch can select patients with favourable response to reperfusion using mechanical clot retrieval after standard IV tPA <4.5 hrs from stroke onset. EXTEND-IA will provide much needed randomized evidence about the effectiveness of clot retrieval in a responder population defined by CT or MR mismatch.

Design: Investigator-initiated, prospective, randomised, open-label, blinded-endpoint (PROBE) phase 2 trial.

Population studied: Patients with ischemic stroke <4.5 hours from onset who are receiving tPA. Eligibility for the trial requires vessel occlusion of the ICA or MCA (M1/M2) and CT or MR"mismatch" using a perfusion threshold of Tmax<6 sec and a perfusion : ischemic core lesion volume ratio of >1.2. Ischemic core volume, assessed using MR-DWI or CT-relative cerebral blood flow, must be <70 mL. This is assessed using a fully automated software package (RAPID, Stanford University).

Intervention: Mechanical clot retrieval (Solitaire FR device, Covidien) after IV tPA vs tPA alone.

Outcome measures: The co-primary endpoint is reperfusion at 24 hr and favourable clinical response (28 point reduction in National Institutes of Health Stroke Scale or reaching 0–1) at 3 days with secondary endpoints including recanalization, symptomatic hemorrhage and functional outcome (modified Rankin score at 90 days).

Analysis: Intention to treat.

Trial status: Recruitment commenced in August 2012 with 12 centres now open in Australia and New Zealand and a further 2 sites planned to open in 2014.

Trial Registry Number: ClinicalTrials.gov NCT01492725 registered 20/11/11.

Has the implementation of the New South Wales reperfusion project increased the rate of stroke thrombolysis in the Murrumbidgee Local Health District?

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Background: Thrombolytic therapy is the most effective hyper acute intervention to reduce death and disability for ischaemic stroke patients. However, its utilization in rural New South Wales is low compared to metropolitan hospitals, primarily due to insufficient and inaccessible rural stroke units. The NSW Ministry of Health in January 2013, implemented the NSW Stroke Reperfusion Program, the program aims to reduce the time from stroke symptom onset to definitive treatment by diverting patients with stroke symptoms to the nearest thrombolysis service.

Method: Data was collected by the Wagga Wagga Acute Stroke unit for 12 months pre and post the implementation of the NSW Stroke Reperfusion Program. The data collection identified rates of thrombolysis pre and post implementation of the NSW Reperfusion Program for patients admitted to Wagga Wagga Base Hospital (WWBH).

Results: The thrombolysis rate for the 12 month period prior to the implementation of the NSW Stroke reperfusion program was 3.75%; the thrombolysis rate for the 12 month post implementation rate was 8.9%. These figures indicate that the NSW Stroke reperfusion program has assisted with a significant increase in thrombolysis rates in the Murrumbidgee Local Health District. Thrombolysis rates could further improve by addressing identified barriers such as patients failing to recognise the signs of stroke, patients not diverted by ambulance to a thrombolysis centre and the Emergency Departments not recognising the signs of stroke or not acting with appropriate urgency.

Conclusions: With the introduction of the NSW Stroke Reperfusion Program, thrombolysis rates have increased in the Murrumbidgee Local Health District. A lack of patient awareness of the signs of stroke and seeking urgent medical assistance continues to be a consistent barrier for patients not receiving thrombolysis.

Extending the time for Thrombolysis in Emergency Neurological Deficits – The EXTEND Trial

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Background: Current clinical application of thrombolysis in stroke is limited by the 4.5 hour time window and not applicable to patients with wake up stroke (WUS). Patient selection using advanced penumbral imaging criteria may allow extension of the therapeutic window.

Objective: To test the hypothesis that perfusion-core mismatch can be used to select patients with favourable response to thrombolysis beyond conventional time windows.

Design: EXTEND is an investigator initiated, randomised, double-blind, placebo controlled phase 3 trial of intravenous alteplase vs placebo in patients with ischemic stroke 4.5–9 hours from stroke onset and WUS.

Methods: Patients with ischemic stroke within 4.5–9 hours from stroke onset and WUS patients, (WUS defined as the midpoint between time to sleep and awakening with the stroke symptoms <9 hours), are eligible for recruitment (n = 200). Criteria for entry into the trial include perfusion-core mismatch using a perfusion threshold of Tmax<6 sec and a perfusion : core lesion volume ratio of >1.2. Core lesion volume must be <70 mL. This will be assessed using a fully automated software package (RAPID, Stanford University). Reperfusion/recanalization will be assessed at 24 hours.

Outcome measures: The primary endpoint is mRS 0–1 at 90 days. Secondary endpoints will include mRS shift analysis, reperfusion, recanalization, quality of life and depression scales.

Trial status: Recruitment commenced in June 2010 with 70 randomised patients recruited up-to-date. There are 26 sites internationally and more sites to be initiated in 2014. A pooled analysis (n = 400) will be performed with data from ECASS4 with similar protocol.

TIA diagnosis in the emergency department: Persistent symptoms and final diagnosis

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Background and aim: The emergency department (ED) diagnosis of transient ischaemic attack (TIA) likely includes patients with minor stroke or other medical conditions. We sought to ascertain the final diagnosis in patients admitted to the ED with a diagnosis of TIA, with particular attention to duration and persistence of symptoms or signs.

Method: We reviewed medical records of consecutive patients given an ED diagnosis of TIA. We extracted demographics, presentation details, neurologist assessments and MRI results, including diffusion-weighted imaging (DWI). DWI results or neurologist assessment was used to confirm the presence of brain infarction.

Results: There were 105 patients. Seventeen (16%) had residual deficits in the ED. Thirty-five patients (33%) retained their ED diagnosis of TIA at hospital discharge, and 27 (26%) were given a final diagnosis of ischemic stroke. Two (2%) were classified as TIA followed by stroke. A non-cerebrovascular diagnosis was concluded in 34 (32%), and in 7 (7%) the
diagnosis was undetermined. The revision of the diagnosis from TIA to stroke occurred due to neurologist detection of signs, the DWI MRI findings, or both. In 12 patients the persistence of symptoms or signs at first assessment was not appreciated as a likely indicator of established stroke. Three patients were acknowledged to have a deficit in the ED and the implication for the diagnosis of stroke was realised, but they remained coded as TIA at admission.

Conclusion: Residual symptoms or signs are commonly reported in patients given an ED diagnosis of TIA, and are more indicative of established infarcts. Attention to subtle residual signs and symptoms at first assessment may improve the diagnostic accuracy of first assessment of TIA and minor stroke, with important implications for prevention of acute stroke complications, and for urgent secondary prevention treatments.

Missed Opportunities: Communicative interactions in early stroke recovery

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Abstract: The notion of an enriched communicative environment to enhance early aphasia recovery has been raised, however, little is known about communicative behaviours in early stroke recovery.

Aim: This study aimed to document the frequency and type of communicative interactions for people with and without aphasia in the acute hospital setting during early stroke recovery.

Method: Ten participants with aphasia (PWA) and ten participants without aphasia (PWoA) were video recorded in hospital for 7.5 hours. One-minute, observational snapshots were recorded at 10 minute intervals (45 observations over the 7.5 hours). Communication activities observed in the first minute of each 10 minute interval were recorded. Data were coded to reflect communicaiton partners, type of communication activity and interaction exchanges within each interaction.

Results: Nine-hundred one-minute snapshots are presented. The mean NIHSS for the cohort was 11, with no difference in stroke severity at admission for PWA (M = 11.10, SE = .194) and PWoA (M = 10.90, SE = .275), t(898) = −.595, p = .552. PWA spent significantly less time engaged in communication than PWoA, X²(1) = 9.414, p = 0.002. The odds ratio indicated that PWA were 1.5 times less likely to be engaged in communication throughout the day than PWoA. Family and friends and nursing staff were the most frequent communication partners.

Conclusion: Early communicative interactions for stroke survivors with and without aphasia are different and people with aphasia are marginalised in the acute hospital environment. Strategies to enhance communicative interactions could address this issue.