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Female Caregivers Ask Questions in the First Year of Caring

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Disciplines

Communication | Neuroscience and Neurobiology

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Methods to Improve Emergency Stroke Response To Post-Cardiac Surgical Stroke Patients.

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Introduction: Primary Stroke Centers often organize "teams" to respond emergently to patients with acute stroke symptoms while hospitalized. This study's aim was to determine accuracy of this process in identifying these patients in our community-based hospital - particularly in high-risk post-cardiac surgical populations. **Methods:** A retrospective review of records yielded a log of Stroke Response Team (SRT) activity from 01/2005 - 12/2006. Medical records were reviewed to confirm stroke diagnosis. This log was compared to our Society of Thoracic Surgeons (STS) database for post-cardiac surgical strokes for the same time period. The data were analyzed to assess the efficacy of the SRT in identifying and responding to these patients. **Results:** The SRT responded to 59 calls in the study period. Of these, 22 of 49 eligible records had confirmed stroke diagnoses, 5 had TIA and 22 had no stroke. Admitting diagnoses for the group were: Non-surgical cardiac - 27; surgical cardiac - 3; neurological - 10; 9-other. The STS data for the same period reflected 58 confirmed strokes in post-cardiac surgical patients alone. Only one patient with stroke diagnosis was common to both logs. **Conclusions:** There is significant need for a SRT response system for hospitalized patients. A total of 80 strokes were confirmed over 2 years. Our process poorly identified post-cardiac surgical strokes. Factors contributing to this problem included: attending surgeon rejection of the SRT process; difficult nursing neurological assessment in ventilated patients and lack of knowledge regarding feasibility of IA tPA administration in these patients. Steps taken to improve SRT access for these patients were: nursing and physician education on safety of IA tPA in the post-operative period and implementation of "sedation vacations" every four hours for ventilator-dependent patients to strengthen nursing neurological assessment. Literature review identified other processes for prevention of post-cardiac surgical stroke including: aggressive peri-operative management of atrial fibrillation and maintenance of peri-operative blood pressure to within 10 mm Hg of baseline to sustain cerebral perfusion. Standardized order sets were modified to reflect these changes and nurses and physicians were educated regarding both practices. As of 7/31/07, of 19 SRT incidences, 5 were initiated on post-cardiac surgical patients. In conclusion, SRT processes provide an opportunity for stroke prevention and intervention, particularly in post-cardiac surgical patients, with education and support of nursing and medical staff.

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Doublet Stimulation Maximizes Force Output in Young and Older Thenar Muscle.

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Introduction: Neuromuscular electrical stimulation (NMES) is an effective and commonly used modality for the recovery of motor function in hemiplegic musculature; however, NMES can impart rapid fatigue and stimulation patterns that maximize force output and delay the onset of fatigue remain unclear. **Hypothesis:** We hypothesized that the use of an increasing stimulation frequency pattern or a stimulation pattern incorporating doublets (two rapid pulses separated by 5 ms) applied midway during a 3-minute fatigue protocol would maximize force output in the thenar muscles and would delay the onset of fatigue when compared to a constant stimulation pattern. **Methods:** Ten young (Avg. age 23.81 ± 2.71 yrs.) and ten older healthy individuals (Avg. age 63.60 ± 12.88 yrs.) were tested with 3 intermittent stimulation patterns applied to the thenar muscle of the right hand on 3 days, each separated by at least 48 hours: 1) A 3-min constant 20 Hz pattern; 2) a 3-min pattern consisting of 90s of 20 Hz followed by 90s of a gradual increase from 20 Hz to 40 Hz; and 3) A 3-min pattern consisting of 90s of 20 Hz followed by 90s of doublets. **Results:** For both groups, significantly higher average forces were recorded during doublet stimulation (young, 7.73 ± 1.32 N; older, 7.80 ± 1.27 N) when compared to the 20 Hz and 20-40 Hz patterns (young, 5.99 ± 0.86, P<0.001 and 6.66 ± 0.93 N, P=0.001 respectively; older, 4.72 ± 0.87, P<0.001 and 5.98 ± 0.52 N, P<0.001 respectively). Force-time integrals (FTIs) were also highest in the doublet pattern (young, 1.37 ± 3.08 kN.s; older 1.41 ± 3.16 kN.s) when compared to the constant and increasing-frequency pattern (young, 1.05 ± 1.72 and 1.17 ± 1.89 kN.s; older, 0.82 ± 1.79 and 1.06 ± 1.15 kN.s respectively). FTI and average force output during the doublet pattern was slightly higher in older participants and may reflect slowing of muscle contractile properties and greater fatigue resistance. **Conclusions:** Variable patterns of electrical stimulation were more effective in maximizing force output over time in both a younger and older healthy population. These results suggest that variable stimulation patterns, rather than constant patterns, may facilitate enhanced motor performance. Because constant stimulation patterns are typically used in clinical regimens for motor recovery following stroke, this practice may warrant reconsideration. Improved force output and more successful motor outcomes following stroke may be attained when variable electrical stimulation patterns are incorporated into clinical practice.

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Predictors of Resuming Therapy Within Four Weeks after Discharge from Inpatient Rehabilitation.

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Objective: Stroke survivors with similar impairments receive widely different types and amounts of outpatient rehabilitation therapy. The purpose of this paper is to 1) identify the

percentage of stroke survivors resuming rehabilitation therapy within four weeks after discharge from inpatient rehabilitation, 2) compare the characteristics of those who did and did not resume therapy, and 3) determine the predictors of the resumption of physical (PT), occupational (OT), and speech (ST) therapies. **Methods:** Socio-demographic, stroke-related, and therapy data were abstracted from rehabilitation charts of 135 stroke survivors discharged home with spousal caregivers. Functional Independence Measure (FIM), Stroke Impact Scale (SIS) and Geriatric Depression Scale-Short Form (GDS-SF) were collected from survivors immediately after discharge. Data on type and amount of therapy received during the first four weeks at home were tracked on special calendars. **Results:** Logistic regression models demonstrated that minority status, the survivor's perception of having poorer physical function (SIS Physical Domain), and neglect/visual-field cut and/or spatial-perceptual loss predicted the resumption of PT and OT. Minorities were 70-75% less likely to resume PT or OT within 4 weeks of discharge from inpatient rehabilitation. Men were 3.3 times more likely to have OT than females (OR = 3.32), and those with comprehensive health insurance were 11.2 times more likely to receive ST than those without comprehensive coverage. **Conclusions:** The benefits of outpatient therapy are not universally available to all stroke survivors. Further research needs to explore the factors that hinder the prompt resumption of therapy for minority and female stroke survivors and to test appropriate interventions.

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Impaired Exercise Cardiac Output and Prolonged Oxygen Uptake Kinetics in Patients with Prior Stroke.

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Introduction: Clinically stable patients with prior stroke (STK) have a peak aerobic capacity (peak $\dot{V}O_2$) that is ~50% lower than healthy individuals. The mechanisms responsible for the impaired peak $\dot{V}O_2$ are not well established. **Hypothesis:** We tested the hypothesis that patients with prior STK will have reduced peak cardiac output and $\dot{V}O_2$, as well as prolonged post-exercise $\dot{V}O_2$ kinetics compared to healthy controls (CTL). **Methods:** Ten clinically stable ambulatory patients with prior STK (mean ± SEM; age: 54 ± 3 years; 6 females; 7.5 ± 2.6 years post-stroke; gait speed: 43 ± 5 m/min) and 10 healthy age- and gender-matched healthy CTL (age: 54 ± 3 years; 6 females) performed recumbent cycle ergometer exercise testing to volitional fatigue. $\dot{V}O_2$ and cardiac output were measured during exercise. Post-exercise $\dot{V}O_2$ kinetics were determined throughout recovery using monoexponential modeling procedures. Data were analyzed using ANOVA and correlation regression. Significance was set at p < 0.05. **Results:** Peak $\dot{V}O_2$ (STK: 16.0 ± 1.2 vs. CTL: 28.1 ± 2.0 mL/kg/min; p < 0.001) and work rate (STK: 85 ± 10 vs. CTL: 173 ± 11 watts; p < 0.001) were lower in STK patients. Peak exercise heart rate (STK: 133 ± 6 vs. CTL: 157 ± 4 beats/min; p = 0.005), stroke volume (STK: 79 ± 3 vs. CTL: 94 ± 2 mL/beat; p = 0.002) and cardiac output (STK: 10.4 ± 0.8 vs. CTL: 14.8 ± 0.6 L/min; p = 0.001) were lower in STK patients compared to CTL. Heart rate reserve (peak - rest; STK: 59 ± 7 vs. CTL: 90 ± 4 beats/min; p = 0.001) and cardiac output reserve (STK: 6.0 ± 0.7 vs. CTL: 10.2 ± 0.5 L/min; p < 0.001), but not stroke volume reserve (STK: 19 ± 2 vs. CTL: 25 ± 3 mL/beat; p = 0.128) were lower in STK patients. Post-exercise $\dot{V}O_2$ kinetics were prolonged in STK patients (77 ± 3 s) compared to CTL (55 ± 3 s; p < 0.001) and was correlated with peak exercise cardiac output (r = -0.75; p < 0.001). **Conclusions:** The severely reduced peak $\dot{V}O_2$ found in patients with prior STK was due to a lower peak exercise heart rate, stroke volume and cardiac output. Further, the lower cardiac output reserve was due to the blunted chronotropic reserve. Finally, the prolonged post-exercise $\dot{V}O_2$ kinetics suggests abnormal metabolic efficiency throughout exercise and is associated with a lower exercise cardiac output.

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Female Caregivers Ask Questions in the First Year of Caring.

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Background and Purpose: Following acute care and rehabilitation after a stroke, families must learn how to manage the survivor in the home. This sudden caring role raises many questions for family members who often feel unprepared and overburdened. The purpose of this secondary analysis was to examine the questions asked by female caregivers who communicated via email in a web-based intervention of education and support. **Methods:** The subjects were six female caregivers of stroke survivors from Ohio or Michigan who were participating in a larger study on the experience of caring and had completed 48 weeks of continuous enrollment in the intervention. Data were gathered from subjects' email messages posted to the discussion group or asked of the online nurse. **Results:** Most subjects were Caucasian. They ranged in age from 47 - 62 years and provided care for a spouse or parent (50%), respectively. Rigorous narrative content analysis of a total of 369 email entries, with 111 questions asked by the subjects during their participation in the web-based intervention, resulted in themes that were drawn to Friedemann's framework of systematic organization. Theme 1, socializing with a group (coherence in Friedemann's terms) emerged from these data, as these females reached out to one another. Questions posed were often stated while sharing

personal experiences. Theme 2 of validating their caregiving efforts (coherence) and Theme 3 of dealing with role change (system maintenance) also emanated. Other questions were more direct, task-oriented, and looked for a specific answer. Consequently, Themes 4 of asking questions about medical care (system maintenance) evolved. **Conclusions:** In conclusion, these female caregivers were doing everything in their power to preserve their lives and family system. There was a sense of togetherness, as they reached out to others to gain information in dealing with stroke. Healthcare professionals can use these themes early in the caring experience as topics for supportive educational interventions with caregivers and should consider providing this information via face-to-face or web-based discussions.

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Establishing the Validity and Reliability of the State Self-Esteem Scale.

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Introduction: Self-esteem is a feeling of self worth. Positive self-esteem can buffer stress by enhancing the implementation of efficacious coping strategies; poor self-esteem can result in diminishing self-appreciation and creating self-defeating attitudes. While self-esteem could be regarded as a stable trait that predicts future behavior, it could be argued that situational and environmental factors will change it. Self-esteem is a major factor determining recovery, rehabilitation and integration for stroke patients, with longitudinal studies showing it to be a significant predictor of physical, social and psychological functioning. Thus, there is a need for a valid and reliable measure of self-esteem. Although the Chinese version of the State Self-Esteem Scale (SSES) has been used in this population, no study has examined its construct validity and reliability. **Methods:** Data from 265 Chinese stroke patients before discharge from two rehabilitation hospitals were factor analysed using principal-components analysis (PCA) with oblique rotation. The Kaiser rule and scree test were used to decide the number of components to be retained. An internal consistency analysis of the SSES was also conducted. Pearson's correlation coefficients were calculated between the SSES and the Geriatric Depression Scale (GDS) to determine convergent validity. **Results:** The final factor solution comprised a three-factor model with correlated constructs, and accounted for 49.5% of the total variance. The eigenvalue of the three factors were 5.07 (performance self-esteem), 2.34 (appearance self-esteem), and 1.99 (social self-esteem) respectively. The factor loadings for the items showed that they were adequate indicators of their respective factors (all >0.3). All items except for Item 7 ("I am dissatisfied with my weight") loaded primarily on one of the factors. Cronbach alphas for the SSES subscales ranged from 0.73–0.81. Significant negative correlations were found between the GDS and the SSES subscale scores ($r = -0.31$ to -0.55 , $p < 0.01$) indicating that the SSES had acceptable convergent validity. **Conclusion:** The SSES appears to be a useful measure for assessing state self-esteem in stroke patients. Since the data were obtained from convenience samples, further studies from randomly selected samples are warranted. A confirmatory factor analysis is needed to further test the underlying factor structure and to determine whether the current factor structure required modification.

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A Factor Analysis of the National Institute of Health Stroke Scale.

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The National Institute of Health Stroke Scale (NIHSS) is a commonly used neurological assessment tool for making treatment decisions and determining outcomes in stroke patients. The purpose of this study was to validate the major subscales of the NIHSS in MRI or CT confirmed stroke patients. The NIHSS scores from 60 patients (25 females and 35 males with a mean age 65.70 years) with MRI or CT confirmed strokes (63% left, 35% right, and 1% bilateral hemispheric) were used in a factor analysis. For the entire scale, the reliability coefficient was .78 for internal consistency. The principal component extraction yielded communalities values .650–.850. Two factors emerged: right and left hemispheric strokes, with 48.8% of the total variance, and eigenvalues = 5.280 and 2.044. The next 3 factors had eigenvalues > 1; all 5 factors = 74.356% of the variance. In the component matrix for left hemispheric strokes, Factor 1, all items except left motor tasks (5a and 6a), and sensory changes (8) had adequate loading with values $\geq .32$. Factor 2, right hemispheric stroke, items with loading values $\geq .32$ included left motor tasks, and visual tracking. Factor 3 identified patients with pure facial palsy; Factor 4 alertness and mentation, and Factor 5 ataxia and sensory changes. All principal components showed robust values except for brainstem and bilateral stroke subtypes perhaps due to a small representation. Loadings for items such as ataxia, facial weakness, and alertness have been weak in other analyses; however, these items had eigenvalues $\geq .32$ in this factor analysis, and reflect a more robust result in a subpopulation of stroke patients with lower NIHSS scores. The mean score was 11.1 ± 6.9 compared with 17 ± 7 reported in the NINDS trial. Analysis of the NIHSS in the NINDS trial clearly delineated right and left hemispheric strokes with cortical and motor components; this factor analysis also identified 3 factors not specific to cortical or motor involvement. Subsequent analysis of this data should include subset analysis of treated and non-treated stroke patients, correlation between right and left hemispheric strokes, and middle cerebral artery distribution. This data could also be further analyzed by NIHSS quartiles to determine validity in small as well as large volume strokes.

Robot-Assisted Gait Training Following Stroke.

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Individuals following a stroke are left with various degrees of functional impairment, especially walking. Recently, robot-assisted gait training (RAGT) has been introduced to assist the recovery of walking ability after a stroke. Most of these approaches to training, however, move the patient's limb passively through a range of motion while walking. A RAGT program developed in our laboratory is directly targeting the abnormal gait pattern by providing constraints on the person's limb movements to correct the pattern towards a more normal and more efficient pattern. Recent pilot studies showed that healthy adults undergoing the novel gait training program on a treadmill could adapt their gait pattern and retain that pattern for a short period even after intervening over ground walking. We have now begun to address the effects of the RAGT on walking ability in people with a stroke. We assessed the hypothesis that individuals following a stroke could change their walking pattern towards normal gait with RAGT. A 72 year-old man with a right hemiparesis volunteered to participate. He underwent a total of five days of training, comprised of eight five-minute blocks of training each day while walking on a treadmill. The RAGT involved various amounts of constraints on the foot trajectory, with virtual elastic walls and visual feedback. Baseline and follow-up evaluations of treadmill walking and over-ground walking and clinical test were performed on separate days. The individual's foot trajectory during treadmill walking changed by 37.2% in the direction of the foot trajectory of a leg-length matched control subject. Hip (13.3 to 17.0°), knee (25.3 to 44.7°), and ankle (12.6 to 16.5°) joint excursions during walking increased following training. Over ground preferred walking speed increased by 32.6% (0.51 to 0.67 m/s) without an ankle foot orthosis while his Timed Up and Go test decreased from 14.7 to 13.25 sec after only five days of training. The results of this pilot study show that our RAGT facilitates functional recovery of walking in individuals with a stroke. This study suggests that the RAGT that directly targets the abnormal gait pattern by providing virtual constraints on the limb movement may be promising direction for gait training in people after a stroke. A future study with a longer period of RAGT, compared to other well-known gait training such as body weight-supported treadmill training, will provide a better understanding of efficacy of the novel RAGT.

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Effects of Study Participation on Cigarette Smoking.

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Background: It has been reported that participants in clinical trials are more aware of risk factors that may result in lifestyle changes. Cigarette smoking is the most modifiable risk factor for the formation and rupture of intracranial aneurysm (IA). This study examined the impact of the participation in the Familial Intracranial Aneurysm (FIA) study on smoking behavior. **Methods:** Upon entry into the FIA study a baseline smoking history was obtained including smoking status, years smoked, and daily number of cigarettes. As part of the annual follow-up subjects were again surveyed concerning their current smoking status and daily number of cigarettes consumed. The study did not dictate what risk reduction information was given out at the time of study entry. Although risk factor reduction was often discussed with subjects, the only consistent messages regarding smoking cessation for reducing the risk of IA were in the annual participant newsletters. **Results:** A significant reduction in the daily amount of cigarettes smoked was seen in the follow-ups for years 1 through 3. The most significant reduction was between the initial visit and the first yearly follow-up (Table 1). In addition, subjects diagnosed with an IA at entry or during the course of the study were significantly more likely to decrease their cigarette consumption than those who were not diagnosed with an IA (9.4 to 5.1 cigs per day) than those who were not diagnosed with an IA (4.9 to 4.3 , $p < .001$). The other factor that was significantly associated with a change in cigarette usage during the course of the study was the subject's age at time of study entry. Subjects over the age of 51 years had a greater reduction in the amounts of cigarette smoked per day compared to 51 years or younger ($p = .005$). **Conclusion:** Subjects who entered into the FIA study had a significant decrease in the amount of cigarettes consumed between study entry and at the end of their 3-year follow-up. Factors associated with decreased usage of cigarettes were diagnosis of IA and older age.

TABLE 1

| Characteristics | Baseline | 1st Yearly F/U | 2nd Yearly F/U | 3rd Yearly F/U | p-value* |
|--|----------|----------------|----------------|----------------|------------|
| Current smokers (all subjects) | 33.0% | 29.9% | 27.8% | 26.7% | $p < .001$ |
| # cigs/day (all subjects) | 6.86 | 5.24 | 4.90 | 4.89 | $p < .001$ |
| #cigs/day (smoker baseline visit) | 17.90 | 12.39 | 11.35 | 11.34 | $p < .001$ |
| Test of Dx IA by time Interaction | | | | | $p < .001$ |
| Diagnosed with IA | 9.4 | 5.5 | 5.3 | 5.1 | $p < .001$ |
| Not Diagnosed with IA | 4.9 | 4.6 | 4.2 | 4.3 | $p = .002$ |
| Test of age at entry by time interaction | | | | | $p = .005$ |
| Age < 51 | 7.2 | 6.1 | 5.6 | 5.6 | $p < .001$ |
| Age ≥ 51 | 6.7 | 4.5 | 4.4 | 4.3 | $p < .001$ |

*significance of change over time.