13 Acute stroke: reorganization and recovery

REHABILITATION OF WALKING IN PATIENTS WITH AN ACUTE STROKE WITH ASSISTANCE OF A ROBOTIC DEVICE GAIT TRAINER

Russian State Medical University, Moscow, Russian Federation

Background: According to the modern concept “task-specific rehabilitation”, complex training of gait cycles is more preferable than training of separate muscles to walking restoration. However in severe disabled patients in the acute stroke period it often cannot be achieved only by traditional physiotherapy exercises.

Purpose: To assess the efficiency of use of robotic device Gait Trainer in rehabilitation of walking in patients with an acute stroke.

Method: 23 patients were randomized into 2 groups: 50 in GT-group and 23 in non-GT-group. All patients received ontogenetic caused kinesitherapy within 3 weeks. In addition GT-group patients were trained to walk on a robotic device Gait Trainer within 2 weeks. Main outcome measures: the neurologic status, including muscular strength and muscular tone, sensation and coordination, Berg balance test, functional ambulation categories (FAC), 5-metre walk test, Bartel index (BI).

Results: In both groups by the end of 3rd week muscular force, data of Berg balance test, FAC and BI have significantly increased (p < 0.05). In comparison with non-GT-group the best indicators of restoration were in GT-group (p < 0.001), in this group abnormalities of proprioceptive sensation and ataxia significantly regressed (p < 0.001), speed of walking was above average (30.4 ± 10.4 m/min vs 15.4 ± 7.4 m/min, p < 0.05), patients used an additional support less often (p < 0.05).

Conclusions: Both application of robotic device Gait Trainer and ontogenetic caused kinesitherapy lead to significant improvement of muscular force and functionality of acute stroke patients. However trainings on Gait Trainer promote more complex rehabilitation, including regress of proprioceptive sensation abnormalities and ataxia, that, finally, leads to the best functional results.

14 Acute stroke: reorganization and recovery

VIRTUAL REALITY SYSTEM FOR UPPER LIMB REHABILITATION IN THE ACUTE PHASE OF STROKE

E. Duarte, M.S. Cameiro, S. Bermudez, P. Verschure, A. Morales, F. Escalada
Hospitales del Mar i L’Esperança, IMAS, Barcelona, Spain

Background: Benefits of virtual reality (VR) for the early rehabilitation of upper limb motor deficits following stroke are explored. The Rehabilitation gaming System (RGS) is a multi-level adaptive system that provides a task oriented and graded training.

Method: The treatment duration is 12 weeks with 3 weekly sessions of 20 minutes. The evaluation is performed at baseline, at the 5th week, at week 12 and month 6. 17 Patients are randomly assigned to one of three groups: the RGS group and two control conditions. All receive the conventional therapy and an additional training condition. Assessment include: FIM (Functional Independence Measure), Barthel Index, Motricity Index, Fugl-Meyer Assessment Test for the upper extremity and Chedoke Arm and Hand Activity Inventory (CAHAI).

Results: CAHAI improvement from baseline to week 5 is bigger for the RGS group (35.7, 24.7, 26.7). From week 5 to week 12 the RGS group show a higher difference of 21.7, 15.8, 17.3. CAHAI (29, 13.5, 8.3).

Conclusion: The system induces a sustained improvement in the performance of activities of daily living in the early stage of stroke rehabilitation.

15 Acute stroke: reorganization and recovery

DYNAMIC CEREBRAL AUTOREGULATION IS IMPAIRED ACUTELY FOLLOWING ISCHAEMIC STROKE BUT DEMONSTRATES EARLY RECOVERY

F.G. Brodie1, R.B. Panerai2, T.G. Robinson1
1Aging and Stroke Medicine, Dept of Cardiovascular Sciences, University of Leicester, Leicester, United Kingdom; 2Medical Physics Group, Dept of Cardiovascular Sciences, University of Leicester, Leicester, United Kingdom

Introduction: Dynamic cerebral autoregulation (dCA) has previously been shown to be impaired following ischaemic stroke. However it is unclear how long this impairment persists or whether recovery occurs. This study examines the effects of minor ischaemic stroke on dCA acutely and following early recovery, compared to healthy controls.

Methods: Patients with minor ischaemic stroke who were <48 hours from symptom onset were recruited from consecutive admissions. Bilateral middle cerebral artery blood flow velocity was recorded using transcranial Doppler, with simultaneous recording of heat-to-heat blood pressure and heart rate. Data were analysed using transfer function analysis and the impulse response was derived, from which the autoregulatory index (ARI) was determined. Recordings were performed as soon as possible after admission, and again 2 weeks later. Healthy controls were studied once using the same protocol.

Results: 29 patients with acute ischaemic stroke (mean age 69 years, 26 male) underwent recordings a median of 42 hours from ictus and again a fortnight later (5 were lost to follow up), along with 22 healthy controls. Patients and controls were balanced for age, gender, BMI and incidence of diabetes.

ARI was significantly lower in the ischaemic stroke affected hemisphere acutely compared to controls (4.4 ± 1.6 vs 5.7 ± 1.3, mean diff 1.3, p < 0.001), this remained significant after adjustment for potential covariates. No significant difference was seen between the unaffected hemisphere and control acutely. At 2 week follow-up ARI remained slightly lower in the affected hemisphere but this was no longer statistically significant, the unaffected hemisphere remained unchanged.

Conclusion: dCA was reduced in the affected hemisphere acutely following minor ischaemic stroke, but after 2 weeks was no longer significantly different from control, suggesting that this homeostatic mechanism is impaired acutely after minor ischaemic stroke but demonstrates early recovery.

16 Acute stroke: reorganization and recovery

SELF-TRIGGERED TRANSCUTANEOUS ELECTRICAL MYOSTIMULATION SUPPORTED SWALLOWING AND VOCALIZATION EXERCISES IN ACUTE STROKE PATIENTS WITH DYSPHAGIA

A.N. Starzic, N.V. Borisova, G.E. Ivanova, O.M. Samsingina
Russian State Medical University, Moscow, Russian Federation

Background: Vocalization impairment is registered in 16-36% patients post-stroke, impaired swallowing is documented in 25-50%, complicating acute stroke and leading to pneumonia and secondary changes of larynx.

Aim: to establish adequate afferentation of larynx, to restore speech and phonation emgram, to restore tonicity of muscles with impaired function, to prevent degeneration in corico-arytenoid articulations, to restore and maintain regulatory function of CNS.

Methods: A study included 7 patients with hemispheric ischemic large-artery atherosclerosis stroke subtype with diagnosed dysphagia on day 2-3 post-stroke. All patients underwent clinical test for swallowing using 0-5 grade scale, phonation test using 0-4 grade original scale, manual testing of hyoid and laryngeal mobility, manual muscle testing of neck muscles, neurologic assessment of gag reflex using 0-3 grade scale, and laryngeal muscles accommodation quotient, using Vocastim device, 100 mm VAS of difficulties with swallowing. All patients were comparable in age and degree of swallowing impairment. Treatment protocol included 7 daily sessions, lasting 20 minutes each. Each session included selective stimulation of a/bpino dynamic muscles with stimuli of increasing intensity, when stimuli are releases by a manual key at a certain point of guided swallowing and vocalization exercises. Marked improvement was reported in patients to a level of 3-5.4 grade of clinical swallowing test, to a level of 3.5 grade in phonation test. Restoration of gag reflex and normal mobility of hyoid bone, larynx and neck muscle strength was also reported. From week 5 to swallowing dropped from 86 to 27 mm of VAS. Efficacy of treatment was proven with fibroptic endoscopic evaluation of swallowing.

17 Acute stroke: reorganization and recovery

ERYTHROPOIETIN SERUM LEVEL AS A MARKER OF EARLY RECOVERY AFTER ISCHEMIC STROKE

H.A. Aref, R.M. Shelhatta, E.E. Din Islam, R.M. Botros
Ain Shams University, Cairo, Egypt

Background: Erythropoietin (EPO) is a hormone released by the kidney in response to hypoxia. EPO was found to protect a wide variety of tissues from diverse injuries. The neuroprotective effect of EPO was demonstrated in various studies. In this study we investigated the relation between the level of serum EPO in ischemic stroke patients and the degree of early recovery.

Methods: We conducted this study on 30 acute ischemic stroke patients admitted to Ain Shams university hospital and 10 healthy control group. We included patients with acute ischemic stroke within 24 hours with NIHSS of 4-15. EPO level was measured initially and after 10 days. We correlated the EPO level with the NIHSS initially and after 10 days.

Results: The EPO level in patients on admission ranged between 3.82-11 mL/L. (Mean 22.4) in comparison to control which ranged between 2.17-11 mL/L.
Acute stroke; reorganization and recovery

INITIAL EXPERIENCE OF COMMUNITY-BASED INTRAVENOUS THROMBOLYTIC TREATMENT OF ACUTE ISCHAEMIC STROKE WITH INTEGRATED ACUTE STROKE NETWORK IN THAILAND


Thammasat University, Pathum Thani, Thailand

Background: A few literatures encourage use of intravenous thrombolytic therapy for acute ischaemic stroke (AIS) in no prior experience centres. The benefit of acute stroke network to intravenous thrombolytic therapy remains controversial. We present initial experience of intravenous thrombolytic therapy of AIS with integrated acute stroke network at an institution with no prior experience in stroke thrombolysis and compare results to published literatures.

Methods: 351 patients with AIS and TIA (referred from outside hospitals of acute stroke network or walk-in) admitted to a stroke unit of Thammasat Hospital from Oct. 2007 to Sept. 2008 were prospectively assessed. Main outcome measures were intravenous thrombolytic treatment rate, exclusion rate, door to needle time, serial NIHSS, onset to treatment time (OTT), intracerebral haemorrhage, morbidity and mortality at 3 months.

Results: 68 (36 from outside hospitals) patients received i.v. rt-PA (19% of admissions with AIS and TIA). 57% of patients referred from outside hospitals of acute stroke network received i.v. rt-PA. Mean door-to-needle time was 53 minutes (15–90). Over 90% of patients with no any exclusion criteria received thrombolysis. Mean NIHSS before thrombolysis was 13 (3–24). Mean OTT was 154 (60–205) minutes. There were nine (13%) asymptomatic intracerebral haemorrhage and one (1.5%) fatal symptomatic intracerebral haemorrhage. At 3 months, 36 (52%) had achieved excellent recovery (mRS 0–1) and six (9%) had died. The outcomes were comparable to the results of the NINDS and previously reported i.v. rt-PA use in Thailand.

Conclusions: Integration of Acute Stroke Network into intravenous thrombolytic therapy of AIS is found in approximately 5% of acute stroke network. Little is known about the Health-Related Quality of Life (HRQOL). We aimed to investigate HRQOL and to identify associated factors in CSPS patients as well as to compare these data with a general German population with acute or chronic diseases.

Methods: In 31 CSPS-patients screened for a randomized clinical trial (LESS) physical (PCS) and mental (MCS) HRQOL, using the short-form health survey (SF-12), modified Rankin Score (mRS), the Beck Depression Inventory (BDI) and pain intensity (Likert numeric rating-scale) were assessed. Factors associated with HRQOL were investigated by multivariate linear regression.

Results: Mean age was 62.5y, 32% were female, median interval of CPSP was 4 years. Mean SF-12 was lower for physical (40.7+5.9) and mental scores (44.6+8.0) compared to the general German population with acute or chronic diseases (PCS: 46.3+10.1; MCS: 51.2+8.8). Female sex showed an independent association with increased BDI (p=0.01) but not with mRS. Age, depression, and severity of pain showed no correlation with HRQOL in our study cohort.

Conclusions: CSPS patients might have lower HRQOL compared to the general German population with acute or chronic diseases. We were not able to demonstrate any impact of age, depression or severity of CSPS on HRQOL. The association observed between physical HRQOL and gender needs further investigation.
the affected and non-affected hemispheres respectively. Data suggest applicability of video-therapy in stroke patients. Its clinical effectiveness needs further confirmation. Indication of rehabilitation methods based on stimulation of the MNS should be defined and clinical effects documented to optimize rehabilitation on an individual basis.

References:

4 Chronic conditions and rehabilitation

**“SITTING-UNSUPPORTED” BALANCE SCORE AS AN EARLY PREDICTOR OF FUNCTIONAL PROGNOSIS IN PATIENTS WITH BRAIN LESIONS**

**G.V. Park, J.H. Park, S. Im, Y.A. Ko**

Holy Family Hospital, College of Medicine, The Catholic University of Korea, Bucheon-si, South Korea

**Background:** To assess the relationship between early sitting balance and functional status in patients with brain lesions.

**Methods:** We assessed the Berg Balance Scale (BBS) in 23 patients (mean age=56.4±12.6) with brain lesions (cerebral hemorrhage/infectious-16/7). We classified the patients into two groups by severity of “sitting-unsupported” by the initial BBS scores; into Group I (score<27) and Group II (score≥3). Patients’ functional statuses were assessed using the Functional Independence Measure (FIM) and the Modified Barthel Index (MBI). All these scores were assessed twice; in the early acute stages before therapy, and 6 months after the first initial assessment. We compared the “sitting unsupported” BBS scores, FIM and MBI before and after treatment and assessed their relationship.

**Results:** Fifteen patients belonged to group I while 8 patients belonged to group II. Initial BBS/FIM/MBI scores (mean ± standard deviation) of group I and II were 0.07±0.26/25.8±7.16/42.2±16.42 ±4.67±10.78 and 10.13±1.19/19.54±22.35/29.5±17.32, respectively. Both groups showed improvement after 6 months with follow-up BBS scores of 11.93±15.43 and 43.88±7.64, respectively. Follow-up FIM/MBI scores of group I and II were 48.6±26.6/48.73±27.91 and 93.88±16.33/75.88±17.72, respectively. BBS, FIM, MBI scores of the 2 groups at 6 months after initial assessment were statistically different (p<0.05). Initial BBS “sitting unsupported” Scores, showed high correlations with BBS, FIM and MBI scores at 6 months after initial assessment (r=0.666, 0.573, 0.562, respectively, p<0.05).

**Conclusion:** These results indicate that initial sitting balance as assessed by the “unsupported sitting” BBS scores reflects future functional prognosis. This scoring system may be used as a useful tool to predict future functional gain in subjects with brain lesions.

5 Chronic conditions and rehabilitation

**COMPROMISED BONE STRENGTH INDEX IN THE HEMIPARETIC DISTAL TIBIA EPiphYSIS AMONG CHRONIC STROKE PATIENTS: RELATIONSHIP TO CARDIOVASCULAR FITNESS, MUSCLE ATROPHY, MOBILITY, AND SPASTICITY**

**M.Y.C. Pang1, M.C. Ash2, J.J. Eng2**

1Hong Kong Polytechnic University, Kowloon, Hong-kong; 2University of British Columbia, Vancouver, Canada

**Background:** Individuals with stroke sustain an increased risk of fragility fractures. Besides reduction in bone mineral content, alterations in bone geometry in the hemiparetic extremities may also exert important influence on bone strength, and hence, fracture risk. The objectives of this study were to examine the side-to-side difference in bone mineral density and bone geometry of the distal tibia epiphysis, and to identify the determinants of the bone strength index (BSI) at the distal tibia epiphysis in chronic stroke patients.

**Methods:** Forty-five chronic stroke survivors underwent scanning of the distal tibia at the 4% site (proximal to the distal medial edge) using peripheral quantitative computed tomography. The primary outcomes were trabecular bone mineral density (BMD) (mg/cm²), total BMD (mg/cm²), total bone area (mm²), and BSI (g/cm²). Cardiovascular fitness (peak oxygen consumption in ml/min), leg lean mass (in grams), gait velocity (in meters per second), and spasticity level (Modified Ashworth Scale) were also evaluated.

**Results:** Independent t-tests revealed that the paretic side had significantly lower trabecular BMD, total BMD, and BSI than the non-paretic side (p<0.05). In contrast, the total bone area demonstrated no significant side-to-side difference (p>0.05). In multiple regression analysis, after adjusting for relevant biological factors, peak VO2, leg muscle mass, gait velocity, and spasticity remained significantly associated with tibial BSI, accounting for 10.7%, 8.2%, 14.2%, 4.8% of the variance, respectively.

Conclusion: Cardiovascular function, muscle atrophy, mobility, and spasticity significant determinants of BSI measured at the distal tibia epiphysis. As these factors are modifiable, the results point to the potential importance of active exercise training and proper spasticity management in improving bone health in the chronic stroke population.

6 Chronic conditions and rehabilitation

**LONG-TERM EFFECTS OF SIMULATOR TRAINING ON DRIVING AFTER STROKE: A 5 YEAR FOLLOW-UP OF A RANDOMIZED CLINICAL TRIAL**

**H. Devos1, A.E. Akinwuntan2, A. Nieuwboer1, M.T. Antar3, C. Kieken4, W. De Weerdt5**

1Katholieke Universiteit Leuven, Herstelcentrum, Belgium; 2Medical College of Georgia, Augusta, USA; 3Belgian Road Safety Institute, Brussels, Belgium; 4University Hospitals Leuven, Pellenberg, Belgium

**Background:** Several studies have investigated the effect of rehabilitation programs for driving ability in stroke patients, with follow-ups at a maximum of 6 months. The aim of this study was to determine the effect of simulator-based training on driving ability at 5 years post-stroke. A second aim was to investigate the impact of driving cessation on depression 5 years after stroke.

**Methods:** Eighty-three consecutive stroke subjects were randomly allocated to a 15-hour driving training program that consisted either of simulator or cognitive therapy. Off-road and on-road assessments were made before and after intervention, and at 6 months post-stroke. In this study, 61 patients were reassessed at 5 years post-stroke. Driving status (currently driving – stopped driving) and the outcome on an official driving evaluation were used as primary outcome measures.

**Results:** Overall, both groups improved significantly in most of the evaluations from pre-training till 6 months follow-up and remained stable afterwards. Five years after the event, 85% of the simulator group who completed all assessments passed the official fitness to drive assessment compared to 52% of the cognitive group (p=0.08). At 5 years post-stroke, 34 (56%) subjects were still driving. Subjects who resumed driving were less severely depressed than subjects who gave up driving following the event (p=0.04).

**Conclusions:** Simulator-based training speeds up the process of improving driving ability in the first 6 months after stroke and the benefit remains several years after stroke. Driving cessation is associated with severity of depression 5 years after stroke.

7 Chronic conditions and rehabilitation

**EFFECTS OF BOTULINUM TOXIN TYPE A INJECTION IN HEMIPLEGIC CHILDREN EVALUATED WITH A ROBOTIC DEVICE**

**G.D.R. Di Rosa1, F.F. Frascarelli1, L.M. Massa2, M.A. Armando1, M.P. Petraca1, P.C. Cappa1, E.C. Castelli1**

1Children’s Hospital Bambino Gesù, Fiumicino-Roma, Italy; 2Italian Institute of Technology, Genova, Italy; 3“Sapienza” University of Rome, Rome, Italy

**Background:** In the last few years the use of botulinum toxin type A (BoNT-A) has widely spread in the management of spasticity in children with acquired or congenital brain injury because it reduces hypertonicity and improves functional outcomes enhancing motor skill development. Several studies assess the upper limb function changes after BoNT-A injection by using conventional clinical scales that, however, may be insufficient to quantify the improvement. The goal of our study was to examine changes in impairment, function, and spasticity on the upper limbs of children with acquired or congenital hemiparesis following BoNT-A intervention using standard clinical scales and a robotic device.

**Methods:** Eight hemiparetic children, aging from 7 to 16, were enrolled in this pilot study. BoNT-A injections were administered to the elbow, wrist and forearm muscles of the involved upper limb. We employed the Melbourne Scale, the Modified Ashworth Scale, the Passive Range of Motion to evaluate outcomes before and 1 month after the injection. To quantify the efficacy of BoNT-A on upper limb spasticity we employed a robotic device (InMotion2, Interactive Motion Technology, Cambridge, MA, USA) as an evaluation tool.

**Results:** Clinical and robot-mediated evaluation showed statistically significant improvements following BoNT-A intervention.

**Conclusions:** The results show a good correlation between clinical scales and robotic evaluation. Hence the robot-mediated assessment may be used as an additional tool to quantify the degree of motor improvement after BoNT-A injection.
Background and purpose: Social functioning is impaired in about two third of stroke patients in vocational age, even several months after a first-ever mild to moderate stroke. The known predictors of social functioning were initial stroke severity, anxiety and depression and the Mini Mental State Evaluation, suggesting that cognitive deficits contribute to post-stroke social dysfunctioning. Our aim was to evaluate whether cognitive domains correlated with social functioning and to determine the cognitive predictors of social dysfunctioning. Methods: We prospectively included 74 patients, 6 months after a first-ever stroke. NIHSS, modified Rankin scale, depression and anxiety were recorded. Social functioning was recorded using the Work and Social Adjustment Scale (WSAS). An extensive neuropsychological tests battery explored general cognitive functioning, episodic memory, instrumental functions, executive functions and working memory. Univariate comparisons assessed the relationships between the neuropsychological tests and the WSAS. Predicting factors of WSAS were determined using ordinal logistic regression. Results: Fifty two patients (70%; 95% CI 58–80%) complained of significant perturbation of functioning. In univariate comparisons, general cognitive functioning, memory, instrumental functions, executive functions and working memory significantly correlated with social functioning. Executive functions and working memory were the most affected domains. With multivariate modelling, the NIHSS, admission, Hospital Anxiety-Depression scale and Owen Spatial Working Memory test were independent predictors of WSAS. Conclusions: All cognitive domains were associated with social functioning. Working memory being the main cognitive determinant. Our results suggest that cognitive impairment interfere with social dysfunctioning, resulting in alteration in quality of life.

Background: The aims of most post-stroke therapeutic rehabilitation programmes include recovery of lost function, improving activities of daily living and gait restoration. However, rehabilitation has been described as a process which aims to restore those aspects of life which are most relevant to the stroke survivor. Despite this, the possible impact of chronic upper limb dysfunction following stroke upon social participation is often overlooked in rehabilitation. Therefore the factors influencing and impacting upon participation warrant further investigation. Methods: Semi-structured interviews exploring perceptions and the effects of long term upper limb dysfunction following stroke upon social participation were often overlooked in rehabilitation. Therefore the factors influencing and impacting upon participation warrant further investigation. Results: Thematic analysis of the data allowed nine themes to be easily identified which were subsequently able to be linked to two conceptual frameworks of “loss of self” and “the disjunction between the expert stroke survivor and the expert stroke clinician”. Despite an initial belief that chronic upper limb dysfunction following stroke may impact negatively upon social participation, the results obtained suggest that stroke survivors find it difficult to describe the specific impact of upper limb dysfunction upon their return to social participation and instead focus on the stroke event in its totality and the impact that this has had on their lives. Conclusions: This study has demonstrated that a variety of factors influence social participation and re-integration following stroke. However, it has also shown commonality of these various factors amongst the stroke survivors interviewed.

Introduction: Depression is one of the most common complications in stroke survivors. We aimed to analyse 1) temporal evolution of post-stroke depression at 6 and 12 months after stroke, and 2) the relationship between post-stroke depression and other neuropsychiatric and neuropsychological disturbances. Methods: Consecutive acute (<7 days) stroke (ischaemia/baematoma) patients without severe aphasia or consciousness disturbances were included, and followed during 1 year. Depression was diagnosed if patient fulfilled DSM-IV-TR criteria for Mood Disorder due to a Stroke and if they scored >7 points in the MADRS. A neuropsychiatric and neuropsychological evaluation assessing apathy (Apathy Evaluation Scale-Clinic), cognition (MMSE) and dementia (NINDS-AIREN Criteria), and executive functions (Verbal (Proverbs) and non-verbal (Raven Ab) reasoning; Trail Making Test A and B; verbal, motor and graphomotor initiative) was performed. Results: We included 98 patients (median age 62 years). Depression was present in 25/98 (22%) in the acute phase, in 18/72 (25%) at 6 months, and in 16/73 (22%) at 1 year. Of the 25 patients presenting acute depression 18 were reassessed and 4 remained depressive at 6 months and 7 remained depressive at 1 year. However, at 6 months 14 (19%) new cases of depression were diagnosed and at 1 year 9 (12%) new cases. There was an association between the presence of depression in acute stroke and the presence of depression at the 1 year (Chi-square=4.8, p=0.05). There were no differences in mean ranks (Friedman Chi-square=1.08, p=58) among the three MADRS scores. Depression at 1 year was associated with apathy and with low motor execution at 1 year (p<0.05). No other associations were statistically significant. Conclusion: Depression in acute stroke indicates that more than a third of the patients with acute depression will report depression one year after stroke. At 1 year, patients with depression have higher risk of apathy and present slowness in motor activity.

Background: The aim of our research was to evaluate the efficacy and safety of early mobilization of patients applying tilt table “Erigo”.

Methods: Forty-eight patients with hemiparesis in acute stroke period were examined and divided into two groups: the 1st one included 29 patients had standard course of rehabilitation therapy and trained with the help of “Erigo”. 18 patients of the 2nd control group had only standard rehabilitation program. We used 6 marks paresis degree scale, Barthel ADL Index and Rehabilitation activities profile scale to estimate the efficiency of rehabilitation. Hemodynamics monitoring was performed with the help of impedance cardiography and transcranial Doppler ultrasonography of damaged middle cerebral artery. Neurological inspection and hemodynamics control was spent to all patients at base line, in the end of the course and during the training procedure on “Erigo”.

Results: For the time of rehabilitation measures the middle mean of muscle’s strength in damaged inferior extremity increased in the 1st group patients on 1.2 marks, in the 2nd group patients on 0.5 marks. More significant dynamics in Barthel ADL Index and Rehabilitation activities profile scale was represented in the 1st group patients. After rehabilitation course there was no meaningful changes of central and cerebral blood flow indexes in both groups patients. Moderate elevation of cerebral blood flow rate and decreasing of peripheral vascular resistance i.e. magnification of cerebral perfusion was fixed during the training procedure on “Erigo”.

Conclusions: Early mobilization with tilt table “Erigo” provides restoration of motor functions in larger volume, than use only standard program of rehabilitation. Arterial blood pressure and cerebral blood flow indexes remained within standard that proves the safety of the method. Application of tilt table “Erigo” has positive influence on the cerebral blood flow.
Apart from direct and evident neurological deficiencies specifically

**Introduction:** We evaluated process indicators and on management of stroke patients admitted to ward 15 in AT&R ward before (Jan to Mar 2006) and after (Sept to Oct 2007) designated stroke rehabilitation beds within the ward.

**Methods:** The evaluation included all patients discharged with a primary diagnosis of stroke based on WHO criteria. Patients were prospectively reviewed in 2007 and retrospectively in 2006. Data was collected on the Royal College of Physicians (RCP) UK - audit tool and twenty patients reviewed for each time periods and compared to the RCP-UK norms. Simple frequency statistics and proportions have been calculated.

**Results:** The comparison of ward 15 patients for the two time periods with the RCP audit revealed the following:

- The Average Age in 2006 was 79.8, in 2007 was 80.1 & UK audit was 75 years.
- Rehab goals by MDT were completed in 30% in 2006, 100% in 2007 & UK audit average was 76%.
- By discharge:
  - In 2006 Mood Assessment was 60%, 100% in 2007 & UK audit average was 63%.
  - Cognitive assessments were completed in 75% in 2006, 100% in 2007 & UK audit average was 71%.
  - Communicated diagnosis to patient & Caregivers in 85% in 2006, 100% in 2007 & UK audit average was 64-65%.
  - Career needs were assessed in 35% in 2006, 100% in 2007 & UK audit average was 50%.
- Skills for carer needs was taught was nil in 2006, 100% in 2007, & UK audit average was 23%.

**Conclusions:** Stroke units have clearly shown to improve outcome after stroke, & dedicated beds at WDHB in AT&R ward has shown to improve rehabilitation indicators with mood assessments, rehabilitation goals, home visits and by discharge cognitive assessments, communications to patients & carers, caregiver needs and skills. Designated beds in AT&R have thus improved stroke care in many parameters for those needing rehabilitation in WDHB.

---

**13 Chronic conditions and rehabilitation**

**CHRONIC HEADACHE AS A CONSEQUENCE OF A STROKE**

N. Milovanovic-Kovacevic, N. Zaric, T. Stricicvic, M. Savic
St Sava Hospital for Cerebrovascular Diseases, Belgrade, Serbia

**Background:** Apart from direct and evident neurological deficiencies specifically related to localisation of lesion, stroke patients, both in acute and later stages, develop numerous functional disorders and complications. Headache is a common symptom in pre-stroke and on-going stroke patients and is not uncommon as a consequence of a stroke.

**Method:** During the year 2007, 5,476 stroke patients were treated in St. Sava Hospital, 4,005 patients survived. Out of them, 3610 were ischemic stroke patients and 385 were hemorrhagic stroke patients. The aim of our study is to determine whether the percentage of the stroke patients with a chronic headache as ist consequence, treated in our hospital during 2007, differs from the data in similar centres in the EU and the US.

Our data have been obtained based on the regular monthly check-ups of the patients. The patients came for these check-ups with questionnaires and calendars where they circled each day with a headache. The criterion for the diagnostics of chronic headaches has been set up according to the criteria defined by HIS, which means that the patients have suffered from headaches for 15 days or more over a period of six months.

**Result:** Our study shows that 761 patients have had chronic headache as a consequence of a stroke, which makes 19.1% of the total number of patients.

**Conclusion:** Having compared these results to those in studies conducted in the EU and the US, which show 16-20% of the patients, we have not established a significant difference in the percentages of stroke patients with a chronic headache as ist consequence.

**Key words:** stroke, chronic headache

---

**14 Chronic conditions and rehabilitation**

**FACTORS AFFECTING DRIVING IN PATIENTS WITH STROKE: A STUDY FROM NORTHWEST INDIA**

J.D. Pandian, B. Shiti, R. Bhanot, S. Kaur
Department of Neurology, Christian Medical College, Ludhiana, India

**Background:** Stroke causes physical, cognitive, and psychomotor dysfunction that decreases the driving ability of patients. There is no information from India and other developing countries regarding post-stroke driving and also the factors that influence the driving ability of the patients. We aimed to study the factors influencing post-stroke driving.

**Methods:** In the stroke and neurology clinics of Christian Medical College, Ludhiana from May to August, 2008, 93 patients who had completed 1 month or more follow-up were interviewed with a questionnaire. Demography, stroke characteristics, stroke severity (National Institutes of Health Stroke scale [NIHSS]), neurological deficits, comorbidities, and details related to driving (any type of mode of conveyance - ie, car, motorcycle, bicycle, tractor, etc) were collected by a medical student and trained research officers. Education was classified as lower (illiteracy and primary school) and upper (secondary, college, and professional).

**Results:** Age was grouped into older (≥60 years) and younger (<60 years). Functional outcome was assessed with modified Rankin scale (good recovery mRs 0-2 and poor recovery mRs 3-6). Statistical analysis was done with SPSS version 16. We used chi-squared tests for binary variables, independent t-test for means of continuous variables, and logistic regression.

**Results:**

- Mean age was 60 years (SD 12.26), 62 patients (67%) were men.
- The mean duration of follow-up was 15.7 months (SD 23.4; range 1–132). 60 patients (65%) used to drive before the stroke and only 24 (26%) continued driving after the ictus. The mean NIHSS score at follow-up was 2.58 (SD 3.21; range 0–15).

In univariate analysis, patients who didn’t drive after stroke were more likely to have the following characteristics:

- Women (p<0.0001), older age (p=0.02), lower education (p=0.01), poor recovery (p=0.005) and visual deficit (p=0.03).

Multivariate analysis showed poor recovery (mRs 3-6, p=0.05) as the only factor that influenced post-stroke driving.

**Conclusions:** In this study a three fourths of patients stopped driving after the stroke. Poor recovery was the only factor associated with inability to drive. A large multicentre study is underway to confirm these preliminary findings.

---

**15 Chronic conditions and rehabilitation**

**VERB-NOUS DISSOCIATION: EVIDENCE FROM BROCA’S APHASIA CASES**

Y.M. Zhang1, C.X. Wang1, X.Q. Zhao1, H.X. Sun1, Y. Zhou1, H.Y. Chen2, Y.J. Wang1
1Department of Neurology of Beijing Tiantan Hospital, Capital Medical University, China, Beijing, China; 2Department of Neuroimaging of Beijing Neurosurgery Institute, affiliated with Capital Medical University, Beijing, China

**Objective:** Noun and verb play an important role in the structure and function of the language, and disproportionate impairment of nouns versus verbs and the opposite pattern have been reported in brain damaged cases, indicating processing of nouns and verbs may rely on different brain regions.

**Methods and results:** Ten cases suffered from stroke, admitted by our hospital from May, 2007 to May, 2008. They were Broca’s aphasia and we also found maybe there was a verb-noun dissociation in these cases, therefore, we used cognitive psychological tests (visual-figure match, visual naming and reading test) studied on them. On visual-figure match test, we showed two pictures depicting objects (such as dog and lion) and one noun in written (such as lion), asked them pick up the right object according the word meaning. Alternatively, we showed them two pictures depicting actions (such as ride and row) and one verb in written (such as row). They performed relatively well on visual-figure match test. On visual naming test, we gave them pictures showing the meaning of noun or verb, then asked them write down each corresponding picture’s name. They performed poor in writing name of objects, especially for verbs. There is significant difference of correct rate on visual naming between verb and noun. On reading test, they were asked read the written words used in visual naming test. No obvious verb-noun difference occurred in their oral reading and visual word/picture matching. However, in written picture naming task, they showed significantly higher correct ratio of nouns (54%) than that of verbs (23%) (z=10.17, p<0.001). Furthermore, after some important confounding factors were controlled, their written picture naming remained higher accurately in noun items (34.42%) than verb ones (15%, p<0.001).

**Conclusion:** The brain-damaged cases suggest noun and verb can be spared or impaired selectively and separate regions of the brain are essential for verb and noun.
BIOMECHANICAL MOTION ANALYSIS AMONG STROKE PATIENTS IN HUNGARY
M. Jaromi1, A. Toth1, J. Bettelem2, A. Siket1
1Faculty of Health Sciences, University of Pecs, Pecs, Hungary; 2School of Nursing, Nyíregyháza Campus, University of Debrecen, Nyíregyháza, Hungary

Background: The balance of the body plays an important role in everyday functions. After the rehabilitation, the balance of stroke patient may show disturbances influencing the patients’ quality of life. The purpose of our study was to analyze static and dynamic standing balance among rehabilitated stroke patients whose “balance-organ” was not damaged.

Methods: In an experimental study 6 male post-stroke patients and 6 male healthy persons as control group were compared. The measurement was carried out in a biomechanical laboratory of Pécs University with WinBalance 2.6 programme. Two tests were used for data collecting: Stance and Unterberger tests. Head and shoulder markers were recorded and the movements were evaluated. For the data analysis Chi-square tests were used by SPSS 11.0.

Results: In the studied group the mean age was 58.3 and in the control group 55.2. During dynamic and static tests the post-stroke patients could hold their body balance but differed from the control group significantly (p < 0.01). In the static test the balancing reactions of post-stroke patients showed wider magnitudes than in the control group. With the dynamic test people in the studied group produced highly significant contractions around their axis compared to the other group. For stroke patients the measurement time was less during the dynamic test.

Discussion: The differences between the studied and the control group in tests refer to increased imbalance of the former hemiparetic patients. The prolonged coaching of balance of former stroke patients should be recommended in the rehabilitation process. Important to note that the affected side of the patient should be strengthened and the activity of the other side lessen with hippotherapy and stability trainer.

CONCLUSION: Stroke patients should be strengthened and the activity of the other side lessen with hippotherapy and stability trainer.

THE EFFECTS OF MOBILIZATION AND TACTILE STIMULATION (MTS) ON CHRONIC UPPER LIMB SENSORIMOTOR DYSFUNCTION FOLLOWING STROKE
J.M. Winter1, S.M. Hunter1, J. Sim1, P. Cromie2
1School of Health and Rehabilitation, Keele University, Staffordshire, United Kingdom; 2School of Medicine, Keele University, Staffordshire, United Kingdom

Background: Upper limb (UL) dysfunction following stroke impacts on many aspects of activity and participation. Despite routine therapy, most severe UL dysfunction at 6 weeks remains severe at 6 months. Evidence suggests that an additional 6-week programme of a hands-on therapy known as Mobilization and Tactile Stimulation (MTS) applied to the paretic UL at 3 months may improve motor impairment and activity. However, the effects of MTS on chronic UL paresis have not yet been explored.

Methods: Eight single system experiments involving patients with chronic upper limb dysfunction following stroke were completed. The experiments were of an ABA design with randomization of the commencement of the intervention (B) phase. Participants were assessed daily using the Motricity Index (MI) (arm section) and the Action Research Arm Test (ARAT). During the six week intervention (B) phase, outcomes continued to be recorded whilst the participant received daily treatment with MTS to the paretic upper limb. Finally, outcomes continued to be recorded during the final baseline (A2) phase. Data analysis was performed by visual inspection of data plots of the MI and ARAT results. This visual inspection was supported by statistical analysis.

Results: Visual analysis of the data in this study demonstrated positive changes in all four areas inspected (Trend, Slope, Variability and Level) suggestive of a positive impact of the intervention upon both the ARAT and MI scores obtained. The positive improvement in results seen on visual inspection was also evident in the randomization tests performed however this was not at a level of statistical significance.

Conclusions: The results suggest that MTS may have a positive benefit when applied to the paretic upper limb following stroke. Furthermore, the results have important clinical messages to add to the body of rehabilitation literature as they suggest that improvements in motor activity can still occur more than twelve months after stroke onset; that two weeks intervention may be insufficient and that patterns of periods of improvement followed by plateaus with no recovery is not uncommon.
APATHY IN POST STROKE PATIENTS: A LONGITUDINAL STUDY

Introduction: Apathy is a common behavioural dysfunction in stroke survivors. We aimed to analyse 1) the temporal evolution of post-stroke apathy 6 and 12 months after stroke, and 2) the relationship between post-stroke apathy and executive dysfunction.

Methods: Consecutive acute (<7 days) stroke (ischemia/haematoma) patients without severe aphasia or consciousness disturbances were included, and followed during 1 year. We assessed apathy with the 18-item clinical version of the Apathy Evaluation Scale (AES-C). A neuropsychiatric/neuropsychological evaluation assessing depression diagnosed if patient fulfilled DSM-IV-TR criteria for Mood Disorder due to a Stroke and MADRS score of >7, cognition (MMSE) and dementia (NINDS-AIREN Criteria), and executive functions (Verbal (Proverbs) and non-verbal (Raven Ab) reasoning; Trail Making Test A/B, verbal and graphomotor initiative) was performed.

Results: We included 98 patients (median age 62 years). Apathy was present in 22/98 (22%) in the acute phase, in 13/74 (18%) at 6 months, and in 21/73 (29%) at 1 year. Of the 22 patients presenting acute apathy, 16 were reassessed at 6 months and 6 remained apathetic, and 18 were reassessed at one year and 9 remained depressive. At 6 months 7 new cases of apathy were diagnosed, and at 1 year 12 new cases. Apathy in acute stroke was associated with apathy at 6 months (Chi-square=6.6, p<0.02) and 1 year (Chi-square=5.3, p<0.02). There were no differences in mean ranks (Friedman Chi-square=3.2, p=0.20) among the three AES-C scores. Apathy at 6 months was associated with dementia and with verbal reasoning, verbal fluency, and Trail Making Test B at 1 year. Apathy at 1 year was associated with dementia and depression at 1 year.

Conclusion: apathy in acute stroke indicates that patients may present post-stroke apathy. In a third apathy will remained stable. Patients presenting post-stroke apathy have higher risk of dementia or of executive dysfunction and of depressive symptoms, 1 year after stroke.

THE EFFECT OF COMPLICATIONS ON REHABILITATION OUTCOME IN FIRST-EVER ISCHEMIC STROKE PATIENTS

A. Atatür1, G. Mete2, N. Tuhar3
1Uskudar Kızılay Medical Center, Istanbul, Turkey; 2Baskent University, Faculty of Medicine, Department of Physical Medicine and Rehabilitation, Ankara, Turkey

Background: It has been suggested that the medical complications are common and also related to poor outcome in stroke patients. We aimed to analyze the potential medical, neurologic, infectious and psychiatric complications during rehabilitation and their effect on outcome.

Methods: A total of 81 consecutive first-ever ischemic stroke patients who had admitted within 4 weeks of stroke onset to Yaprakci Geriatric Rehabilitation unit were included in this study. We used Oxfordshire Community Stroke Project (OCSP) classification for clinical subtypes and Charlson comorbidity index for comorbidity. The Functional Independence Measure (FIM) scores were noted on admission and at discharge. The laboratory data was noted on admission. Successful functional level was defined as a total FIM score greater than 80 at discharge.

Results: The patients had an average age of 66.5±10.27 years; 41 (50.6%) were male, 40 (49.4%) were female. Onset admission interval (OAI) was 15.8±7 days and mean comorbidity score was 3.06. According to OCSP classification 26 patients (32.1%) had total anterior circulation infarct (TACI), 21 patients (25.9%) had partial anterior circulation infarct (PACI), 13 patients (16%) had posterior circulation infarct (POCI) and 21 patients (25.9%) had lacunar infarct (LACI).

OCSP type TACI, OAI later than 20 days, lower FIM scores on admission, high comorbidity and age older than 65 years has been demonstrated to result in unsuccessful functional outcome. The rehabilitation outcome was adversely affected by the presence of decubitus ulcer (P=0.032), presence of liver function test abnormality (P=0.009), urinary tract infection (P=0.001), hypoalbuminemia (P=0.001) and delirium (P=0.028). However all of the above mentioned complications except delirium were correlated with the TACI subtype of OCSP.

Conclusion: The study emphasizes the importance of TACI subtype of stroke on outcome in terms of complications.

THE RELATIONSHIP BETWEEN PERCEIVED PARTICIPATION AND DIFFERENT ASPECTS OF FUNCTIONING, CONTEXTUAL FACTORS AND HEALTH CONDITIONS AMONG A SAMPLE OF PERSONS WITH STROKE IN IRAN

M. Fallahpour1, K. Tham2, M.T. Joghataei3, H. Jonsson4
1Karolinska Institutet (Sweden), Department of Neurobiology, Care Sciences and Society, Division of Occupational Therapy, Stockholm, Sweden; 2Iran University of Medical and Health Sciences, Department of Anatomy, Tehran, Iran

Background: Stroke is one of the most common causes of disability and the most common neurological diagnosis among clients treated by occupational therapists. The concept of participation, defined as “involvement in a life situation”, is often described as a goal of rehabilitation when the International Classification of Functioning, Disability and Health (ICF) is used as a conceptual framework in rehabilitation. Participation can be affected due to disabilities after stroke. The consequences resulting from stroke can lead to participation restrictions and dependency in clients, which in turn can directly affect on their life satisfaction.

The purpose of this study was to identify different aspects of functioning, contextual factors, and health conditions associated with participation after stroke.

Methods: A total of 102 persons with first-ever stroke with the age range 27 to 75 years were assessed in different aspects of functioning, contextual factors, and health conditions. Participation was assessed using the Persian version of Impact on participation and Autonomy questionnaire (IPA-P).

Results: The findings of this study showed that physical function was found to be the most important variable associated with performance-based participation whereas mood state was the most important variable associated with social-based participation.

Implications for occupational therapy practice: Findings of this study will document how patients with stroke perceive their participation after stroke. This information will be helpful in predicting their needs for OT interventions to help them improve their participation in valued life situations.
groups improved in these variables from T0 to the 6-month follow-up (T4). No changes in heart rate and blood pressure were seen in experimental group patient from first to last treadmill session.

Conclusion: Treadmill training with BWS early after stroke is a comparable choice to walking training on the ground.

Vascular degeneration and dementia

1 Vascular degeneration and dementia

THE CORRELATIONS BETWEEN TYPE 2 DIABETES MELLITUS, CEREBRAL STROKE, CORONARY HEART DISEASE AND COGNITIVE STATUS
S.M. Deme 1, C.D. Jianu 2, P.D. Nana 1, St. Kory-Calomfirescu 3
1 West Vasile Goldis University of Arad, Romania, Arad, Romania; 2 Victor Babes University of Medicine and Pharmacy, Timisoara, Timisoara, Romania; 1 Iuliu Hatieganu University of Medicine and Pharmacy, Cluj Napoca, Cluj Napoca, Romania

Background: Diabetes Mellitus Type 2, cerebral ischemic stroke and coronary heart disease are three pathological common linked entities. The changes in the cognitive status and the incidence of acute vascular events in these subjects are a matter of further research.

Purpose: To evaluate the cognitive status in subjects with Diabetes Mellitus Type 2 (DMT2) and monitor the occurrence of acute vascular events such as cerebral ischemic strokes and myocardial infarctions.

Material and Method: There were included 215 subjects with known Diabetes Mellitus Type 2 for at least 10 years at inclusion, mean age of 48 ± 6.8 years, male:female ratio of 1:1.6. The subjects were followed for 5 years, evaluated yearly, using a complete neurological exam, CT scan, Mini Mental State Examination (MMSE), EKG, ankle-brachial index (ABI), blood pressure control and blood glucose levels curves.

Results: At baseline, 12.1% of the subjects had a MMSE score between 24–28 suggestive of mild cognitive impairment (MCI), 54%/had hypertension, 9.76% had an ABI less than 0.9 and 20.46% had ischemic lesions on CT (lacunar infarctions and leukoaraiosis). In 5 years, silent strokes were met in 69.76% of the subjects, and were associated to poor glycemic control (p < 0.001). Cognitive status deteriorated in the subjects with poor glycemic control and atrial fibrillation (p = 0.001). The type 2 diabetes mellitus subjects are prone to develop cognitive status impairments and are at high risk for cerebral strokes and myocardial infarctions.

2 Vascular degeneration and dementia

STATUS OF AMPA RECEPTOR IN VASCULAR DEMENTIA (VaD) AND MIXED DEMENTIA (MIX)
N.E. Mohamed 1, J. Lee 1, M.M. Esmir 2, C.P. Chen 1, M. Lai 3
1 National University of Singapore, Singapore, Singapore; 2 University of Oxford, United Kingdom, United Kingdom; 3 National University of Singapore, Singapore General Hospital, Singapore, Singapore

Background: The alpha-amino-3-hydroxy-5-methyl-4-isoxazolepropionic acid receptor (AMPA receptor) is of potential significance in dementia because of its role in fast excitatory neurotransmission. A reduction in AMPAR has been shown in Alzheimer’s Disease (AD), but the status of AMPAR on pure Vascular Dementia (VaD) and Mixed dementia (MIX), a condition where AD and VaD occur concurrently, has not been investigated. Hence we aim to further characterize the AMPAR in the neocortex of a cohort of pure VaD and MIX patients and age-matched controls.

Methods: Immunoblotting of the GluR2,3,4 subunit of AMPAR was performed on post-mortem brain tissue homogenates from the temporal cortex of 16 pure VaD, 10 MIX and 16 age-matched subjects obtained from established longitudinal studies with clinical data on cognition. Immunoblot densities were analyzed using one-way ANOVA with post-hoc Bonferroni correction. Spearman correlation tests were used for comparisons and correlations involving immunoblot densities and dementia severity. Results were considered statistically significant if p < 0.05.

Results: We found a significant increase (p = 0.014) of the GluR2 subunit in pure VaD (0.88 ± 0.089), but not MIX (0.71 ± 0.103) compared to controls (0.52 ± 0.079). Dementia severity is negatively correlated with immunoreactivity of AMPAR GluR2,3,4 in pure VaD and MIX (p = 0.001).

Conclusion: The mechanism for significant increase of the GluR2 subunit in pure VaD, compared to controls requires further investigation including measurement of the status of AMPAR editing in pure VaD. Nevertheless, AMPAR may be a therapeutic target for pure VaD patients. These findings confirm the utility of investigating the glutamatergic and other neurotransmitter systems in pure VaD and MIX.

3 Vascular degeneration and dementia

INTERLEUKIN 12 (IL-12) IS AN INDEPENDENT PREDICTOR OF COGNITIVE DECLINE IN A POST STROKE POPULATION
Y.L. Leong 1, K. Narasimhalu 1, M.K. Lai 1, D.A. De Silva 1, M.C. Wong 1, H.M. Chang 1, C.L.H. Chen 1
1 Singapore General Hospital, Singapore, Singapore; 2 Duke-National University of Singapore Graduate Medical School, Singapore, Singapore; 3 Department of Pharmacology, National University of Singapore, Department of Clinical Research, Singapore General Hospital, Singapore, Singapore; 4 National Cancer Centre, Singapore, Singapore; 5 Department of Pharmacology, National University of Singapore, Singapore, Singapore

Background: Interleukin 12 (IL-12) has been previously shown to predict the risk of cerebrovascular events. However, its role in post stroke prognosis, particularly post stroke cognitive function has not been investigated. Therefore we aimed to determine the prognostic utility of IL-12 in post stroke cognitive decline.

Methods: Convalescent blood samples were drawn from patients 3 months after index ischemic stroke. The Bio-Plex multiplex system was used to assay baseline interleukin 12. Patients were administered the Mini-Mental State Examination (MMSE) at baseline and annually for up to 5 years. Cognitive decline was defined as a 3-point or more drop in MMSE. Univariate and multivariable logistic regression analysis was used to determine predictors of cognitive decline.

Results: 294 patients were followed for a mean of 3.2 years. Of these 294, 87 had cognitive decline over the follow up period. In univariate analysis, only age (OR=1.04, p<0.001) and IL-12 (OR=1.49, p=0.048) were significant predictors of cognitive decline. In multivariable analysis, both age (OR=1.03, p=0.005) and IL-12 (OR=3.63, p=0.039) remained significant predictors of cognitive decline.

Conclusions: IL-12 is an independent predictor of post-stroke cognitive decline. Larger studies are needed to confirm the effect of IL-12 and explore associations with other cytokines.

4 Vascular degeneration and dementia

CORRELATION BETWEEN COGNITIVE IMPAIRMENT AND CEREBRAL HEMODYNAMIC DISTURBANCES ON PERFUSION MRI IN EUROPEAN ADULTS WITH MOYAMOYA DISEASE
L. Calviere 1, I. Catala 2, F. Marlin 1, F. Bonneville 1, A. Viguier 1, C. Cognard 1, V. Larrue 1
1 Department of Neurology, University of Toulouse, Rangueil Hospital, Toulouse, France, Toulouse, France; 2 Department of Neuroradiology, University of Toulouse, Rangueil Hospital, Toulouse, France, Toulouse, France

Background and purpose: Cognitive impairment in European, non-Asian adults with Moyamoya disease and its relationship with cerebral hemodynamic disturbances have not been well described. We report our findings in a prospective case-series of ten patients.

Methods: We used an extensive and standardized neuropsychological assessment test battery and perfusion MRI in adult patients with Moyamoya disease before any surgical treatment. The bi-hemispheric frontal mean transit time and cerebral blood volume (CBV) ratios were calculated using the cerebellum as a control region. The relative cerebrovascular reserve (CVR) was calculated with the CBV ratio before and after intravenous acetazolamide. We considered that CVR < 0.7.

Results: Ten patients, 8 women and 2 men, (mean age 40.5 years; range 29 to 73 years) were included. Six patients presented a dysexecutive syndrome defined as an impairment of three or more executive functioning tests. The Trail Making Test part B (TMT B) was the only test impaired in all these patients. Frontal CVR was reduced in all patients with dysexecutive syndrome, whereas it was unimpaired in patients without dysexecutive syndrome. There was a significant correlation between the magnitude of TMT B impairment and reduced CVR (p = 0.033, Mann-Whitney test).

Conclusion: We found a high rate of dysexecutive cognitive syndrome in adult
patients with Moyamoya disease. Cognitive impairment correlated to reduced CVR in the frontal areas. Our findings suggest that the TMT B could be used as a clinical marker of compromised cerebral perfusion in these patients.

5 Vascular degeneration and dementia

PREDICTORS OF POST-STROKE DEMENTIA: A QUANTITATIVE SYSTEMATIC REVIEW AND META-ANALYSIS
S.T. Pendlebury, P.M. Rothwell
Stroke Prevention Research Unit, University Department of Clinical Neurology, John Radcliffe Hospital, Oxford, United Kingdom

Background: Previous studies of the prevalence and risk factors for post-stroke dementia (PSD) have been conflicting. Differences in prevalence partly reflect methodology, the pooled prevalence of PSD within 1 year after stroke being about 17% in hospital-based studies after exclusion of pre-stroke dementia versus 9% in population-based studies. However, inconsistency between studies in predictors of PSD might simply be due to small sample sizes. We therefore performed the first quantitative systematic review and meta-analysis of the predictors of PSD.

Methods: All cohort studies of PSD were identified from MEDLINE, EMBASE (to November 2008), relevant reference lists and reviews. Pooled odds ratios for demographic variables, vascular risk factors and stroke characteristics were calculated for demented versus non demented patients post stroke.

Results: PSD was associated with older age in all studies (p<0.0001). Other predictors were low education (OR 2.6, 95%CI 2.3-2.9, p<0.0001), diabetes (1.4,1.1-1.6 p<0.0001), atrial fibrillation (1.9,1.5-2.4, p=0.003), previous stroke (1.9,1.5-2.3 p<0.0001), left hemisphere stroke (1.7,1.4-2.0, p<0.0001), and presence of white matter lesions (2.4,1.8-3.3 p<0.0001), multiple infarcts (2.5,1.9-3.3 p<0.0001) or silent infarcts (1.7,1.2-2.5 p=0.005) on imaging. Consumption of alcohol was protective (0.8,0.6-1.0, p=0.04). Female sex, hypertension, cholesterol, current smoking, prior TIA or prior MI were not associated with PSD. Most analyses did not show significant heterogeneity.

Conclusion: There are several strong and consistent risk factors for PSD, including some modifiable factors such as diabetes, atrial fibrillation and recent stroke. Large cohort studies are required to determine to what extent these risk factors are independently predictive and whether simple and reliable prognostic scores for PSD can be developed.

6 Vascular degeneration and dementia

CHANGES IN COGNITIVE FUNCTION IN ASYMPTOMATIC PATIENTS UNDERGOING CAROTID ENDARTERECTOMY
I. Rico1, M.A. Font2, A. Carvajal2, J. Juncadella3, J. Krupinski1
1Hospital Universitari Mutua de Terrassa, Idiibell, Institut d’Investigació Mèdica de Bellvitge., Terrassa, Spain; 2Hospital Universitari de Bellvitge, Hospital de Llobregat, Spain; 3Idiibell, Institut d’Investigació Mèdica de Bellvitge., Hospital de Llobregat, Spain

Background: Carotid endarterectomy (CEA) reduces the risk of subsequent stroke in patients with severe carotid stenosis, but the role of revascularization in cognition remains still unresolved. Cognitive improvement has been found frequently in earlier studies although no differences or decline has been reported as well. The aim of the present study was to examine the effect of CEA on cognitive function in a selected group of asymptomatic patients.

Methods: Twenty-four patients (67±7 yrs old) undergoing CEA for asymptomatic high-grade unilateral or bilateral carotid stenosis were assessed with a set of neuropsychological tests one day prior to CEA and 3 or 6 months after intervention in several domains: attention and executive function, psychomotor and speed of information processing, language, verbal and visual memory, and visuospatial function. All patients scored 24 or greater on Mini-Mental State Examination.

Results: The effects of CEA on cognitive function were analysed using ANOVA for repeated measures. Two main results were found: patients showed a significant decline in Forward and Backward Digits tests (P=0.012; P=0.01) as measures of attention and working memory function, respectively, at follow-up independently of assessed timing. None of the tests scores showed significant improvement between the first and follow-up test.

Conclusion: A decreased performance in attention and working memory in patients after CEA may be associated with chronic hyperperfusion or changes of hemispheric perfusion, which has been described to lead an executive or frontal disfunction. Although few studies have been addressed cognitive function in selected patients and have been suggested a deterioration of cognition after CEA, decline in cognitive function is being increasingly recognised as an important outcome measure in carotid surgery.

7 Vascular degeneration and dementia

INSULIN RESISTANCE WITH AN INFLAMMATION RESPONSE AS A PRECURSOR OF POORER COGNITIVE FUNCTIONS AMONG PATIENTS WITH PRE-EXISTING VASCULAR DISEASE
G. Weinstein1, U. Goldbourt2, T. Phillips1, D. Tanne2
1Sackler Faculty of Medicine, Tel Aviv University, Tel Aviv, Israel; 2Neuroscience Center and Department of Neurology, Sheba Medical Center and Sackler Faculty of Medicine, Tel Aviv University, Tel Hashomer, Israel

Background: Diabetes, a risk factor for dementia, is associated with an enhanced inflammatory state. We hypothesized that Inflammation is likely to play an important role in the link between insulin resistance (IR) and poorer cognitive function.

Methods: A subgroup of CHD patients who previously participated in a secondary prevention trial (BIP) was assessed. Baseline CRP levels were measured by a high-sensitivity assay and an inflammatory response defined as CRP ≥ 3.6mg/L (top tertile). Baseline insulin levels were measured by Immulite 2000 analyzer, HOMA-IR calculated according to the homeostasis model of assessment and IR defined as >1.54 (>75%). Cognitive scores were assessed ~15 years later, using a validated set of computerized cognitive tests (Mindstreams Computerized Cognitive Battery; computing index scores summarizing performance in each cognitive domain and a global cognitive score). We compared means of cognitive scores normalized to age and education, among patients categorized into 4 groups: no IR/no inflammatory response, only IR, only inflammatory response and both inflammatory response.

Results: Among 346 patients (mean age 72.6 yrs, 95% males, a quarter with IR and 8% diabetes at baseline), global cognitive scores were 96±11, 95±11, 94±11 and 89±13 respectively (p=0.02). Executive functions were 98±12, 98±13, 96±11 and 89±12 (p=0.003) and memory 90±15, 87±13, 87±15 and 81±17 respectively (p=0.02). Replacing IR with diabetes within the 4 categories yielded global cognitive scores of 95±11, 95±14, 92±12 and 87±16 respectively (p=0.003), with similar associations for executive function and memory domains.

Conclusions: Global cognitive function and particularly executive function and memory domains, are subsequently poorer in patients with IR and an enhanced inflammatory response at baseline. These results support the hypothesis that chronic low-grade inflammation is likely to play an important role in the link between IR and vascular cognitive impairment.

8 Vascular degeneration and dementia

FEASIBILITY AND VALIDITY OF COMPUTERIZED AMBULATORY MONITORING IN STROKE PATIENTS
E. Johnson1, E. Sibon2, P. Renou2, F. Rouanet2, M. Allard1, J. Swendsen1
1National Center for Scientific Research (CNRS 5231), 146 rue Léo Saignat, 33076 Bordeaux, Bordeaux, France; 2CHU Bordeaux, Pôle de Neurosciences Cliniques, Hôpital Pellegrin, 33076 Bordeaux, France, Bordeaux, France

Background: Computerized ambulatory monitoring provides real-time assessments of clinical outcomes in natural contexts, and it has been increasingly applied in recent years to investigate symptom expression in a wide range of disorders. This study provides the first empirical examination of the feasibility and validity of ambulatory data collection with adult stroke patients.

Methods: 48 patients (75% of the contacted sample) agreed to participate in the current study and were instructed to complete electronic interviews five times per day over a 1-week period using a PDA.

Results: Over 80% of programmed assessments were completed by the sample, resulting in 1140 valid observations collected across daily life contexts. No evidence was found for fatigue effects induced by the repeated ambulatory assessments. Expected patterns of associations were observed among daily life variables for which positive or negative correlations are observed among standard assessments of similar constructs. Clinical depression and anxiety scores were respectively associated with daily life depression (γ=0.06, p<0.05) or anxious mood (γ=-0.10, p<0.05), and the MMSE was significantly associated with scores from memory tests administered at random moments by the PDA (γ=0.38, p<0.05).

Conclusion: Support was found for the feasibility and validity of computerized ambulatory monitoring with stroke patients. These novel methods of data collection provide complementary information that is inaccessible to standard hospital-based assessments and they permit increased understanding of the clinical significance and ecological validity of standard instruments or tests.
Vascular degeneration and dementia

**CEREBROLYSIN IN VASCULAR DEMENTIA: IMPROVEMENT OF CLINICAL OUTCOME IN A RANDOMIZED, DOUBLE-BLIND, PLACEBO-CONTROLLED, Multicentric clinical trial**

E. Doppler, H. Moessler, E.I. Gusev

**Introduction:** Cerebrolysin is a peptide preparation acting like endogenous neurotrophic factors. The aim of this study was to compare Cerebrolysin with placebo in patients suffering from vascular dementia and to confirm and extend the findings of earlier clinical trials in a larger patient cohort.

**Methods:** The primary efficacy criterion was defined as the combined outcome of the ADAS-cog+ and CIBIC+. 24 weeks after baseline. Patients received a dose of 20ml Cerebrolysin administered in two treatment-cycles as add-on therapy to basic treatment with acetylsalicylic acid.

**Results:** Of 242 patients randomized, a total of 217 (89.7%) completed the study. Therapy with Cerebrolysin resulted in significant improvement of both primary parameters with -10.628 points in the ADAS-cog+ from baseline (p<0.001). Response rates were higher in the Cerebrolysin group in the ADAS-cog+ (82.1% vs. 52.2% for placebo; odds ratio 4.190 for Cerebrolysin) and in the CIBIC+ (75.2% vs. 37.4% for placebo; odds ratio 5.081 for Cerebrolysin). Also in the MMSE, ADCS-ADL and executive functions Cerebrolysin was significantly superior over placebo at week 24. Cerebrolysin in a dose of 20ml was safe and well tolerated. The incidence of treatment-emergent AEs was very low with 32 cases (9.1%) in 11 Cerebrolysin treated patients and 9 cases (5.9%) in 7 placebo treated patients. The most common AEs were headache, asthenia and dizziness. Three cases of SAEs were reported, all considered as unrelated to study drug. No cases of death were reported. Study discontinuations due to AEs were similar for both treatment groups with 3 (2.5%) patients in the Cerebrolysin group and 2 (1.7%) patients in the placebo group.

**Conclusion:** The study demonstrated that Cerebrolysin improves the clinical outcome of patients suffering from mild to moderately severe vascular dementia significantly by improving both the cognition and the overall clinical functioning and these benefits were shown to extend for at least 6 months.

---

**NEUROPSYCHOLOGICAL DIFFERENCES BETWEEN SUBCORTICAL FORMS OF VAD AND AD**

D. Kuljic, Obradovic, S. Medic

**Background:** Vascular dementia (VaD) is a heterogeneous clinical entity based on various subtypes of cerebrovascular disease. Most of the diagnostic difficulties occur with the subacute, slowly progressive forms of VaD that could be confused with Alzheimer Disease (AD). The neuropsychological differences between VaD and AD are sensitive for the diagnosis.

**Methods:** We included 20 patients with subcortical forms of VaD and 15 AD patients. The diagnosis of VaD was made using the NINDS-AIREN criteria and NINCDS-ADRDA criteria for AD. The following neuropsychological test were administered: Mini Mental State Examination (MMSE), Wechsler Adult Intelligence Scale-Revised (WAIS-R), Wechsler Memory Scale-Revised (WMS-R), Trail Making Test (TMT), Rey Auditory-Verbal Learning Test (RAVLT), Rey-Osterrieth Complex Figure Test (ROCFT), Wisconsin Card Sorting Test (WCST), Category and Verbal Fluency tests, Boston Diagnostic Aphasia Examination (BDAE), Boston Naming test (BNT), Hooper Visual Organisation Test (HVOT), Clinical Tests for Proxim. Gnosis and Manim Dexterity.

**Results:** No significant differences in sex, age, education and duration of the illness were found between VaD and AD patients. VaD patients had more severe dysexecutive syndrome (p<0.001), difficulty sustaining attention (p<0.05), impaired verbal fluency (p<0.05). Perseveration were more frequent in VaD (p<0.05). Verbal long-term memory disturbances were less severe in VaD (p<0.05), with spontaneous recall that improve with clues (p<0.05), relatively intact recognition (p>0.05). Language was rarely impaired in VaD (p<0.001).

**Conclusion:** The most prominent neuropsychological differences between VaD and AD were more severe frontal lobe dysfunction in patients with subcortical forms VaD). The need to change the definition of dementia towards dysexecutive syndrome has been confirmed.

---

**FEW INCIDENTAL CORTICAL INFARTS IN HEALTHY ELDERLY, MILD COGNITIVE IMPAIRMENT AND EARLY ALZHEIMER DISEASE**


Unispital Basel, Basel, Switzerland

In elderly patients with early Alzheimer disease (AD), mild cognitive impairment (MCI), and even in healthy aging one finds commonly MRI indicators of microangiopathy and brain atrophy. The pathophysiological overlap of these changes is not clear and in particular the incidence and relevance of cortical stroke as a contributing factor to cognitive changes in these populations is not entirely clear. We investigated the frequency of incidental chronic cortical infarcts as part of an elaborate MRI protocol including FLAIR, DWI and MR-angiography.

**Methods:** As part of a large monocentric biomarker study we investigated a cohort (n=284, 161m 123f, mean age 72 years 50-89 years) of healthy elderly (n=141), subjects with MCI (n=65) and early AD (n=78). All subjects underwent comprehensive neuropsychological assessment and MRI. Follow-up MRI after 1 year was obtained in 82 healthy elderly, 43 MCI, 57 AD. White matter abnormalities were graded quantitatively according to the Wahlund and Scheltens score. We analysed the presence of cortical infarcts along with other MR readouts (lacunar infarcts, brain atrophy).

**Results:** On FLAIR small cortical incidental infarcts were seen in 1/141 (0.7%) normal controls and in 1/143 (0.7%) MCI and AD patients. Subcortical lacunar stroke lesions were seen in 5/141 (3.5%) normal controls and in 2/143 (1.4%) patients. Significant WML indicating microangiopathy (Wahlund score ≥ 5, and Scheltens score ≥ 15) were noted in 8 controls and 46 MCI/AD patients. No new infarcts were identified on follow-up MRI.

**Discussion/Conclusion:** While small amounts of subcortical T2 hyperintense WML show a high prevalence, incidental infarcts were a rare phenomenon in elderly patients with MCI or early AD and normal controls. Subcortical lacunar lesions and high scores of WM abnormality were also not highly prevalent in our cohort. This may be influenced by the vascular risk factor profile, which given our results is important to considered when comparing cohorts from different centers.
220 Cerebrovasc Dis 2009;27(suppl 6):1–241

18th European Stroke Conference

13 Vascular degeneration and dementia

MORPHOLOGICAL ALTERATIONS OF BRAIN CAPILLARIES IN ALZHEIMER DISEASE: A GOLGI AND ELECTRON MICROSCOPE STUDY
S.J. Bolyanantis, J. Mavroudis, J.S. Bolyanantis
Aristotelian University, Thessaloniki, Greece

Background: Alzheimer’s disease is an heterogeneous neurodegenerative disorder of presenium and senium, characterized by decline of intellectual faculties, loss of professional skills, impairment of behaviour and social performance, impairment of communication and speech eloquence and various neurological manifestations. The several structural, vascular, neurochemical, molecular alterations that ultimately result in Alzheimer’s disease are based on closely interacted pathogenetic mechanisms, which contribute substantially in plotting the clinical and the pathological profile of the disease.

Methods: We attempted to figure out the vascular alterations at the level of the brain capillaries in the cortex of the brain hemispheres and the cerebellum in early cases of Alzheimer’s disease. The morphological analysis is based on examination of twelve brains obtained at autopsy 2 hours after death. Samples from the prefrontal area, the hippocampus, the parietal lobe, the occipital lobe and the cerebellum were processed for Golgi technique and electron microscopy.

Results: The morphological and morphometric analysis revealed substantial neuronal loss, numerous neuritic plaques and neurofibrillary tangles in the hippocampus and the cortex of the cerebral hemispheres. Synaptic alterations and loss of dendritic spines were seen in the hippocampus, the brain and the cerebellar cortices. Mitochondrial alterations and fragmentation of Golgi apparatus were also seen in neurons of the hippocampus, the brain cortex and the Purkinje cells of the cerebellum. Brain capillaries in Golgi staining demonstrated dilatations, varicosities and microaneurysms. Electron microscope revealed dilatations of the tight junctions, proliferation of pericytes and perivascular astrocytosis.

Conclusions: The morphological alterations of the capillaries in early cases of Alzheimer’s disease plead in favour of the contribution of the vascular factor in the pathogenetic mechanism of Alzheimer’s disease.

Very old age (>80 years) and stroke

1 Very old age (>80 years) and stroke

STROKE IN THE VERY ELDERLY
J. McManus, T. Adeyemi, M. Bhargava, B. Affley, S. Banerjee, R. Perry, D. Ames
St Mary’s Hospital, London, United Kingdom

Introduction: Presently, there is limited information on stroke care in the very old (80 years and older). The aim of this study was to evaluate vascular risk factors, stroke subtypes and clinical outcomes in very old patients admitted to our hospital with acute stroke.

Methods: Since August 2003, the clinical details of all stroke patients admitted to the Acute Stroke Unit at St. Mary’s Hospital have been entered into a detailed database. This was interrogated looking at consecutive stroke admissions from August 2003 to June 2008, to assess if there were any significant differences between younger patients (under 80 years of age) compared with older patients (80 years and older), with regard to vascular risk factors, stroke type and clinical outcome.

Results: Of 1004 patients, 720 patients were less than 80 years, 284 were 80 years and older. 432(59.8%) of younger patients were male, compared with 110(38.5%) of older patients(p=0.001). Younger patients were more likely to have diabetes(36.6% versus 16.2%, p<0.001). Older patients were more likely to have ischaemic heart disease(38% versus 30.1%, p=0.02) or atrial fibrillation(34.5% versus 15.2%, p<0.001). Older patients were more likely to have Total Anterior Circulation Infarcts (TACI) strokes(17.6% versus 11.1%, p=0.009) or Partial Anterior Circulation Infarct strokes(PACI) strokes(30.1% versus 23.5%, p=0.04).

Outcome data, which was available for 91% patients, showed that older patients stayed longer in hospital/median length of stay 23 days versus 18 days, p=0.008) and had a higher inpatient mortality(38 deaths(14%) versus 26 deaths(3.7%), p<0.001). Younger patients were more likely to go directly home from the stroke unit(56.3% versus 40.7%, p<0.001).

Conclusion: Very elderly patients have a different risk profile, have more anterior circulation infarcts and have a worse prognosis-with increased mortality and increased length of stay in hospital. Older patients are less likely to be discharged directly home. The provision of stroke beds in the future needs to allow for an ageing population.

2 Very old age (>80 years) and stroke

ACUTE STROKE UNIT IMPROVES LONG-TERM SURVIVAL IN VERY OLD STROKE PATIENTS
T. Pappa1, K. Sengo2, M. Skoul2, I. Zafirov3, Z. Barbaressou1, A. Peppa1, K.N. Vemmos1
1Acute Stroke Unit, Department of Clinical Therapeutics, Alexandra Hospital University of Athens, Athens, Greece; 2Department of Neurology, Eginition Hospital University of Athens, Athens, Greece

Background: There is strong evidence that organised stroke care appears to reduce the risk of death and morbidity after stroke. However, there is only limited evidence concerning the long-term effect of the treatment of older stroke patients in an Acute Stroke Unit (ASU). We present survival data for patients over 80 years of age after treatment in ASU compared to patients treated in General Medical Wards (GMW).

Methods: For a period of 12 years 608 acute stroke patients aged over 80 years were included in our prospective stroke data bank. Based on the bed availability, 344 patients treated in a 5-bed ASU and 264 in GMW. Patients followed-up for a period of 5-years. To evaluate which factors contribute to 5-year mortality, a Cox’s proportional hazards model was used. The Kaplan-Meier product limit method and log rank test were used to estimate the probability of survival at 5 years.

Results: Mean age of the patients was similar. 84.4±3.7 for the ASU patients and 84.4±3.9 for the GMW patients. Neurological severity estimated on admission by NIHSS score (13.6±6.9 and 13.7±9.4 respectively) and stroke risk factors were not different between the two groups. In the Cox-regression analysis independent prognostic factors for the 10-year mortality were: age (HR 1.05, 95%CI 1.02-1.08, p=0.001) per 1 year increase, NIHSS score (HR 1.08, 95%CI 1.07-1.10, p=0.001) per 1 point increase and ASU vs. GMW (HR 1.27, 95%CI 1.04-1.56, p=0.018). The 5-year survival for ASU patients was 24.8% (95%CI 18.9-30.1) versus 18.6% (95%CI 12.7-24.5) for GMW patients. (log rank test 4.71, p=0.03).

Conclusion: The study confirms the beneficial effect of ASU treatment in the clinical practice for aged stroke patients and extends it for a long period of time.

3 Very old age (>80 years) and stroke

EFFECT OF PRETREATMENT WITH ANTITHROMBOTIC AGENTS IN OCTOGENARIANS WITH INTRACEREBRAL HEMORRHAGE
P. Martinez-Sanchez, J. Fernandez-Dominguez, B. Fuentes, R. Cazorla, M. Martinez-Martinez, L.A. Rodriguez de Antonio, E. Diez-Tejedor Stroke Unit, Department of Neurology. La Paz University Hospital. Autonoma de Madrid University., Madrid, Spain

Background: Previous studies showed that anticoagulant therapy, not antiplatelet, was independent predictor of poor outcome after intracerebral hemorrhage (ICH). However, it is unknown if this effect is different in octogenarians. The aim of this study was to assess if the influence of antiplatelet or anticoagulant treatment on clinical outcome at hospital discharge in ICH patients aged ≥ 80 is different than in those aged 65-79 years.

Methods: Observational study with inclusion of consecutive patients with ICH during an 8-year period (2000-2007). Variables: prehospital status (according to the modified Rankin Scale, mRS), vascular risk factors, previous treatment with antiplatelet or anticoagulant drugs, in-hospital mortality, functional status at discharge by the mRS (disabling stroke ≥ 3). Differences between patients aged ≥ 80 (octogenarians) and 65-79 years (elderly) were calculated. Results: 347 patients with ICH: 156 (45%) were octogenarians and 191 (55%) elderly. Mean age: octogenarians: 85±3.9 years, elderly: 73.6±4. (p<0.0001). The 27% and 23.1% of octogenarians were under antiplatelet or anticoagulant treatment at the ICH onset respectively, compared with 25% and 12% in the elderly group (p NS). Antiplatelet treatment was not associated to unfavourable outcome in any group, whereas anticoagulant drugs were associated to worse outcome (OR=3.64;95%CI: 1.022-12.982) and higher in-hospital mortality (OR=6.15; 95%CI: 2.22-17.01) in octogenarians. The multivariate analysis showed that pretreatment with anticoagulants was an independent predictor of in-hospital mortality in octogenarians (OR= 6.02; 95% CI: 2.17-16.67) adjusted by age and previous mRS. Conclusions: pretreatment with antiplatelet agents is not associated to unfavourable outcome in ICH patients aged ≥ 65 years. However, anticoagulant drugs are independent predictors of in-hospital mortality in octogenarians. Anticoagulation should be carefully used in very old patients.
Very old age (>80 years) and stroke

STROKE IN ELDERLY: RISK FACTORS PROFILE AND OUTCOME
J. Fernández-Domínguez1, P. Martínez-Sánchez2, B. Fuentes2, E. Díez-Tejedor2
1Stroke Unit. Department of Neurology. University Hospital La Paz. UAM. Madrid, Spain; 2Stroke Unit. Department of Neurology. University Hospital La Paz. UAM. Madrid, Spain

Background: The influence of several co-morbid conditions as arterial hypertension, diabetes, atrial fibrillation, hypercholesterolemia and coronary arterial disease on stroke risk is well known. Guidelines for stroke prevention are mostly based in studies done in population <75 years old. The aim of our study was to identify differences in pre-morbid stroke conditions and in stroke outcome in people over 75 and between 65-75 years old.

Methods: Observational study with inclusion of consecutive acute ischemic stroke patients aged ≥65 between 2000 and 2007. Previous functional status by modified Rankin scale (mRS), cardiovascular risk factors, previous treatments, stroke severity, etiological stroke subtype, length of stay, in-hospital complications and outcome at discharge were analyzed, comparing patients aged between 65-74 and ≥75.

Results: 1516 patients fulfill the inclusion criteria. Mean age was 75.4±9.5; 54% were men. Univariate analysis showed that patients aged ≥75 were more frequently women (p < 0.0001), had worse previous mRS (p = 0.004), worse stroke severity on admission, higher frequency of atrial fibrillation and cardioembolic strokes, more in-hospital complications, longer length of stay and worse outcome at discharge (p<0.0001). Multivariate analysis showed that pre-stroke functional status, conversion from transitory ischemic attack to stroke (OR: 4.44 (95% CI: 5.8-33.2)), stroke severity (OR: 8.7; 95% CI: 15.1-14.9), previous coronary arterial disease (OR: 1.8; 95% CI: 1.0-3.1) and in-hospital complications (OR: 2.2; 95% CI: 1.290-4.018) were independent predictors of poor outcome at discharge in ≥75, whereas in < 75 coronary arterial disease is not related with poor prognosis.

Conclusions: Stroke patients aged ≥75, as compared with those aged 65-75, have higher frequency of heart disease, more severe strokes and worse stroke outcome, being coronary arterial disease an independent predictor of poor outcome.

Gender imbalances induced by age limits in stroke trials
C. Foerch1, D. Czapo2, B. Misselwitz3, H. Steinmetz1, J. Fernández-Dominguez1, T. Neumann-Haefelin1
1Department of Neurology, Goethe-University, Frankfurt am Main, Germany; 2Department of Neurology, Krankenhaus Nordwest, Frankfurt am Main, Frankfurt am Main, Germany; 3Gesellschaftstelle Qualitätsicherung Hessen, Eschborn, Germany

Background: Gender differences in life expectancy result in a higher proportion of women in the older population. This causes a female preponderance among elderly patients with ischemic stroke. On the other hand, upper age limits are frequently used in clinical trials, in part due to safety reasons and logistical concerns. In this study, we model how applying upper age limits will lead to a gender disparity in patients with acute ischemic stroke.

Methods: We analysed a prospective hospital-based stroke registry covering the entire Federal State of Hesse, Germany. All cases with admission between 2003 and 2005 and a final diagnosis of ischemic stroke (ICD10: I63) were selected. Eighteen years was chosen as the lower age limit. For various upper age limits (70, 75, 80, 85 and 90 years), we calculated the proportion of men and women excluded based on their age when applying the respective age span to the study population.

Results: A total of 34,754 patients were analysed, and 17,748 (51%) were women. Mean age was 73.6±12.1 years. Women were older than men (76.8±11.7 years vs. 70.2±11.7 years; p<0.001). All upper age limits provoked a significant gender disparity by leaving more female than male patients outside the admissible range. In particular, selecting 80 years as the upper age cut-off excluded 19% of all male patients but 44% of all female patients (p<0.001).

Conclusion: Setting an upper age limit for ischemic stroke trials is likely to be not gender neutral, but withholds a higher proportion of female than male patients from study participation. Investigators should be aware of such gender imbalances, which may involuntary be transferred into routine clinical practice.

Very old age (>80 years) and stroke

THROMBOLYSIS AFTER THE 80S: IS IT WORTH?
P. Castro, M. Gago, T. Mendonça, L. Fonseca, G. Gama, G. Moreira, E. Azevedo
Unidade de AVC, Hospital São João, Porto, Portugal

Background: Although stroke is more common in elderly, alteplase was licensed up to 80 years old. There is some evidence of its safe use after this age, but a more favourable outcome is a matter of debate. We looked at outcome in stroke patients older than 80, comparing groups treated and not treated with alteplase (rtPA).

Methods: In the cohort of ischaemic stroke patients aged more than 80 admitted to our stroke unit in a 2-year period, we compared groups treated (A) and not treated (B) with rtPA. We characterised the groups according to gender, age, previous independence (mRS 0-2), vascular risk factors and baseline NIHSS, glycaemia and systolic/diastolic blood pressure (SBP/DBP). Outcomes measured were mortality, independence (mRS 0-2) and excellent recovery (mRS 0-1) at 3 months.

Results: Data included 19 patients in group A and 33 in group B. Groups A and B did not significantly differ in gender (42 vs 33% male), median age (83 vs 88), previous independence (84 vs 82%) and vascular risk factors. Group A had significantly higher median NIHSS (17 vs 10, p=0.007) and lower median SBP (143 vs 166 mmHg, p=0.024). Group A recorded non significant higher mortality: 19% (3/16) vs 14% (4/29) (OR 1.44 [95% CI 0.28-7.44], p=0.69), lower independency: 12% (2/16) vs 24% (7/29) (OR 0.45 [95% CI 0.08-2.48], p=0.46) and higher excellent recovery: 12% (2/16) vs 10% (3/29) (OR 1.24 [95% CI 0.18-8.31], p=1.00). Adjusted analysis for baseline NIHSS and SBP seemed to inverted the relationship concerning mortality (adjusted OR 0.57 [95% CI 0.09-3.76], p=0.56) and independency (adjusted OR 1.41 [95% CI 0.17-11.52], p=0.75).

Conclusion: Taking into account baseline characteristics, rtPA may have improved outcome in our stroke patients older than 80, although differences were not significant in this one centre sample. Selecting patients for rtPA treatment with higher baseline NIHSS and lower systolic blood pressure seemed to be worthwhile, when comparing with the natural evolution of the disease.

Failure of thrombolytic therapy in a case of acute ischemic stroke complicating ipsilateral carotid sinus massage in the absence of carotid artery disease
R. Curró Dossi, G. Roscia, E. Turri, E. Dall’Ora, S. Sansone, I. Stockner, C.J. Wiedermann
Central Hospital of Bolzano, Bolzano, Italy

Background: Carotid sinus massage (CSM) is a tool used to disclose carotid sinus syndrome in patients with syncope. Neurological complications of CSM were reported to occur with an incidence ranging from 0.17 to 0.45 percent [1]. Therefore, CSM should be avoided in patients with previous transient ischemic attacks or strokes within the past 3 months or in patients with carotid bruits except if carotid Doppler studies excluded significant stenosis [2].

Case report: A 84-year-old woman being routinely investigated after syncope suffered a partial right middle cerebral artery ischemic stroke within 65 min after a positive (bradycardia, hypotension, syncope) right CSM was performed in an attempt to test for carotid sinus hypersensitivity in the absence of bruits and stenosis by sonography. The patient was given i.v. thrombolytic therapy with alteplase, however, with little clinical improvement in the following hours. Subsequently, MR-angiography and transcranial Doppler study did not show overt intracranial vascular disease.

Conclusions: In the elderly, CSM may lead to acute ischemic stroke with both, hemodynamic and/or atheroembolic mechanisms, and systemic thrombolytic therapy may fail to be effective.

References:
Very old age (>80 years) and stroke

AN OUTCOME ANALYSIS OF ACUTE CEREBRAL INFARCT SENILE PATIENTS OVER THE AGE OF 90 YEARS

W.W. Zhang
Beijing Military General Hospital, Beijing, China

Objective: To investigate the association between the risk factors and the cerebral infarctions of the age of 90 years or older.

Methods: A retrospective survey of clinical data on 46 senile cerebral infarction patients of the age of 90 years or older was carried out. Logistic regression analysis methods were used to analyze the association among clinical prognosis, lung infection and risk factors included high blood pressure, coronary heart disease, diabetes and other factors.

Results: The most common risk factor of cerebral infarction patients aged 90 years or older is hypertension. Smoking and alcohol taking had low rate in this senile group. The lung infection or pneumonia had a significant association with the worse clinical outcome while diabetes mellitus was correlated to the lung infection.

Conclusion: 1) It was more than 63% of the cerebral infarction cases with hypertension or coronary heart disease can survive longer than 90 years or older. 2) Stop smoking and alcohol taking can make senile had a longer life. 3) Lung infection or pneumonia was the leading cause of death in very old patients with cerebral infarction. Hyperglycemia may also be the risk fact to increase the cause of death.

Key words: aged; cerebral infarction; risk factors; lung infection

Etiology of stroke

1 Etiology of stroke

STUDY ON ASSOCIATION OF CEREBRAL INFARCTION AND GENE ALOX5AP

X. Chen, L.M. Cao
Department of Neurology Shanghai No. 8 People’s Hospital, Shanghai, China

Objectives: In a linkage analysis of genome and a following linkage disequilibrium analysis, researchers in Iceland discovered a gene, ALOX5AP, which is independent of common risk factors and related to cerebral infarction. Both positional information and gene function indicated that this gene was a risk factor of cerebral infarction, but this finding needs to be verified among different populations. This study aimed to verify whether ALOX5AP is a risk factor of cerebral infarction for the Chinese population.

Methods: From Shanghai area, 474 senile patients with cerebral infarction were enrolled as the case group, with a control group of 794 healthy elderly people who were not related to the case group and had no history of cerebral infarction or transient ischemic attack. Regarding the single nucleotide polymorphism (SNP) selection and genotyping of ALOX5AP, we selected four SNP loci (SG13S25, SG13S114, SG13S32 and SG13S332) and determined allele frequencies of the four loci. Genotyping of SG13S114 and SG13S32 adopted a method of combining real-time quantitative PCR and allele-specific PCR. And also we conducted a linkage disequilibrium analysis on ALOX5AP.

Results: We found that the smaller allele frequencies of SG13S25 and SG13S89 were below 5%, and only those of SG13S114 and SG13S332 above 5%. We did not find any differences between the case and control groups on allele, allele types and haplotype gene frequencies of the two SNP loci.

Conclusion: The results demonstrate that among the Chinese population, the two genetic polymorphisms of SG13S114 and SG13S32 on ALOX5AP are not associated with cerebral infarction.

18th European Stroke Conference
has emerged as a novel biomarker for cardiovascular diseases. We investigated Lp-PLA2 among first-ever transient ischemic attack (TIA) or stroke patients with intracranial atherosclerotic disease (ICAD); its relationship with clinical onset and severity, response to secondary prevention treatments and risk of further ischemic events.

Methods: Ninety-nine consecutive patients were studied. Blood levels of Lp-PLA2 were measured 3 months after TIA or stroke by means of the PLAC Test on an automated Olympus analyzer (diaDexus). MRI including diffusion-weighted sequences was performed and long-term clinical and transcranial Doppler ultrasonography follow-up conducted.

Results: Several non-significant trends indicate that patients of higher risk have higher level of Lp-PLA2 [i.e. those with several brain lesions in the MRI vs those with a single lesion (p=0.2)]; patients with several TIAVs vs those with a single TIA (p=0.2) or those with the stroke preceded by TIA (p=0.3)]. The only risk factor associated with higher Lp-PLA2 was a pathologic ankle-brachial index (p=0.05). Patients with leukoaraiosis tended to have higher level of Lp-PLA2 (p=0.1). Those receiving statins after stroke had lower Lp-PLA2 (p=0.02) and those receiving antitplatelet agents had lower Lp-PLA2 than those receiving antiocoagulants (p=0.03). That was especially significant for those taking clopidogrel (p=0.001). During a median follow-up of 20 months, we found no differences in the level of Lp-PLA2 among patients that developed a new cardiovascular event (n=19, p=0.8).

Conclusion: This preliminary data suggests for the first time that high risk TIA or stroke patients with intracranial stenosis might have higher Lp-PLA2 and that this marker is lower among those patients taking statins and/or clopidogrel. Lp-PLA2 measured three months after the qualifying event was not useful to predict a second stroke in this stroke subtype.

5 Etiology of stroke

CARDIOGENIC AND AORTIC ENMBOLISM MAY BE DIFFERENTIATED BY THE RADIOLOGICAL CHARACTERISTICS: COMPARISON OF CARDIOEMBOLISM AND AORTIC ARCH ATHEROSCLEROSIS

Asian Medical Center, Seoul, South Korea

Background: The embolization of the thrombi would be affected by these several etiologies.

Methods: The study retrospectively reviewed consecutive patients who had an acute neurological symptoms (headaches and/or confusion and/or focal sign, acute symptomatic stroke and performed a transesophageal echocardiography. Inclusion criteria were: (1) concomitant large artery disease; (2) concurrent cause of CE and AA; and (3) undetermined cause. First, the side of the index lesions and the lesion patterns were compared. Second, we performed contrast transcranial Doppler ultrasound (TCD) in patients with right-to-left shunt. The dominance and the number of the high intensity transient signal (HITS) between the bilateral temporal windows were explored.

Results: Of 186 patients, CE was diagnosed in 123 patients and AA in 63. The age, presence of diabetes mellitus and hypercholesterolemia was significantly higher in the AA than the CE group. CE patients had significantly more right side index lesion in 67/123 (54.5%), whereas, AA patients had more presented left side index lesion in 37/63 (58.7%, p=0.016). The number of HITS in the right side window was significantly higher compared to the left-side window (median 3 vs. 2.5; p < 0.001).

Conclusion: The cardioembolism and the aortic arch atherosclerosis showed different radiological characteristics. These data emphasize the importance of evaluating and determining of stroke mechanism when the potential embolic infarct with unknown etiology.

6 Etiology of stroke

USEFULNESS OF HAPTOGLOBIN AND SERUM AMYLOID-A PROTEINS AS BIOMARKERS FOR ISCHEMIC STROKE SUBTYPE CLASSIFICATION

D. Brea1, T. Sobrino1, M. Blancou1, J. Aguilla1, M. Rodríque-Yañez1, M. Millán2, N. Perez de la Ossa1, R. Leira1, A. Davalos1, J. Castillo1
1Clinical Neuroscience Research Laboratory, Department of Neurology, Hospital Clínico Universitario, University of Santiago de Compostela, Santiago de Compostela, Spain; 2Acute Stroke Unit, Department of Neurosciences, Hospital Universitari Germans Trias i Pujol, Santiago de Compostela, Spain

Background: Accurate classification of ischemic stroke subtype is crucial since secondary prevention is subtype-dependent. Available classifications, purely based on clinical variables, have some limitations and 30-40% of strokes remain as stroke of undetermined etiology. Our objective is to identify protein biomarkers to allow us to classify ischemic stroke subtypes, using proteomic analysis and immunoenzymatic tools as mean of clinical validation.

Methods: We have used proteomic tools based on two dimensional electrophoresis and mass spectrometry, to identify potential biomarkers of ischemic stroke subtype using serum samples from 12 atherothrombotic stroke patients, and 12 cardioembolic stroke patients. Validity of these potential biomarkers has been tested in a large series of patients (n=262) by ELISA techniques, and in symptomatic and asymptomatic carotid atherosclerotic plaques by immunohistochemistry.

Results: We have found four spots in the 2D gels, whose expression was at least four times stronger in atherothrombotic patients than in cardioembolic patients. These spots were identified as haptoglobin related protein, serum amyloid-A (two spots) and haptoglobin-alpha chain. Haptoglobin levels >1040 μg/ml identify atherothrombotic patients with 95% sensitivity and 88% specificity, whereas Serum Amyloid-A levels >160 μg/ml identify atherothrombotic patients with 91% sensitivity and 83% specificity. Furthermore, expression of haptoglobin and serum amyloid-A proteins was observed in symptomatic carotid atherosclerotic plaques, while it was not observed in the asymptomatic ones.

Conclusions: Haptoglobin and Serum Amyloid-A are useful biomarkers for classification of ischemic stroke subtype.

7 Etiology of stroke

REVERSIBLE CEREBRAL VASOCONSTRICTION SYNDROME: BEYOND A FOLLOW-UP-BASED EXCLUSION DIAGNOSIS. A RETROSPECTIVE STUDY OF 23 ISOLATED CEREBRAL ANGIOPATHIES PRESENTING AS NEUROVASCULAR EMERGENCIES

E. Auffray-Calvier1, A. Nél1, B. Guillou1, M. Hamidou1
1Hopital Guillaume et Rene Laennec, Nantes, France; 2Hotel Dieu, Nantes, France

Background: Multifocal arterial narrowing discovered in an emergency context can be related to numerous diseases. RCVS appears to be the most frequent diagnosis to be done in this setting, often after the spontaneous resolution of clinical and angiographic abnormalities. However its differential diagnosis as been seldom described and a follow-up based diagnosis may not be appropriated to the context of emergency.

We conducted a retrospective study of acutely-revealed intracranial arteriopathies to describe their etiology and to assess whether initial clinico-radiological characteristics could accurately distinguish RCVS from others non self-limiting disorders.

Inclusion Criteria:
Acute neurological symptoms (headaches and/or confusion and/or focal sign, lasting <21 days), multifocal arterial narrowing on conventional angiograms and Unknown diagnosis at time of angiography.

Results: 12 RCVS and 11 non self-limited angiopathies were included. As expected prognosis was poor among non-RCVS patients, confirming the unappropriatedness of a retrospective diagnosis in this setting. The lack of Thunderclap headache, a severe initial presentation (hemiplegia, decreased consciousness, elevated Rankin score), fever, abnormal cerebrospinal fluid (CSF) abnormalities or pericerebral lesion were associated with a non-RCVS diagnosis. Some of those patients had reversible arteriographic abnormalities. Conversely thunderclap headaches, moderated deficits, normal parenchyma or cortical sub-archnoid haemorrhage on MRI and normal CSF were associated with a diagnosis of RCVS. One of those patients suffered a relapsed a few hours after a follow-up conventional angiography.

Conclusion: In our experience RCVS represent only 50% of the underlying etiology when facing a multifocal cerebral angiopathy in the stroke unit. However it can be identified on simple clinico-radiological grounds at time of first evaluation. Invasive follow-up must be avoided as it can induce a relapse. In deed we believe that RCVS can’t be a follow-based diagnosis in clinical practice.
Background: Intracranial stenosis (ICS) is an important cause of stroke. It can be a dynamic lesion, increasing, decreasing or remaining stable with time. Aim of this study was to investigate evolution of MCA stenosis (MCAS) with transcranial colour-coded sonography (TCCS), correlating to etiology and local of lesion.

Methods: We included patients with MCAS who repeated TCCS in our Neurosonology Unit in a 4-year period. Data concerning demographics, vascular risk factors, stroke type and etiology (OSCP and TOAST classification) were correlated with stenosis grade (Baumgartner criteria), location and evolution. Statistics: SPSS 14.0 (significance with p < 0.05).

Results: In 4780 TCCS, 82 MCAS with follow-up exam were found, 61 in M1 and 21 at M1 bifurcation (M1B); 61% male; mean age (60±1.5). Mean follow-up 11±1.1 months. MCAS was symptomatic in 67% M1 and in 90% M1B cases. Most patients had lacunar or partial syndromes (29 and 28%, respectively). Age, sex and vascular risk factors did not correlate with MCAS location and did not increase the risk of non-recanalization. Location and stenosis grade were not significantly correlated with etiology of stroke, although atherosclerosis was the most frequent cause in M1 stenosis (29%), while stroke etiology in M1 bifurcation stenosis was evenly distributed by different causes. 47% of M1B stenosis recanalized, which happened in just 16% of M1 stenosis (p=0.012). Most M1 stenosis remained stable (66%). All cases of cardioembolic stroke recanalized, independently of stenosis location.

Conclusions: We highlight the fact that all stenosis in cardioembolic strokes recanalized and that location of stenosis in M1 bifurcation is predictive of recanalization. In conclusion, finding M1 bifurcation stenosis in acute phase, or M1 recanalization in a control exam, is predictive of a cardioembolic source, and may suggest a more extensive search for cardiac pathology in these patients.

Background: Activation of platelets after stroke using flow cytometry was assessed previously. Otherwise there are few data on the platelet reactivity after ischemic stroke. Then the purpose of our investigations was to evaluate the reactivity of platelets in patients after first-in-life ischemic stroke and to compare with results in controls.

Methods: 58 after-stroke subjects within 3-6 months after incident (M26/F32) aged 45-75 years (av. 61±9 ys) and 55 non-stroke (M28/F27) age and risk factors matched controls were examined. All studied subjects were permanently treated with aspirin. The whole blood platelet-derived microparticles (PDMP) and platelet aggregates (Ag) fractions, CD62p expression and PAC-1 binding were assessed with flow cytometry in the population of resting platelets and in the platelets stimulated with 8uM TRAP, 5uM ADP and thrombin (0.15 U/ml). We assessed the change of studied parameters (delta) in stimulated platelets. The statistical evaluation was performed using nonparametric ANOVA tests.

Results: After thrombin and ADP activation increase of the PDMP was significantly greater in stroke group than in controls (respectively activation with thrombin: delta = +0.71% ± 0.25 vs +0.37% ± 0.08; p=0.01 and activation with ADP: delta = +0.74% ± 0.32 vs +0.49% ± 0.24; p=0.05). Otherwise the increase of the CD62p expression and PAC1 binding were lower in stroke group after TRAP and ADP activation than in controls (p<0.0001). There was no significant difference in the formation of aggregates after stimulation with agonists between studied groups.

Conclusion: In convalescent phase of stroke lower reactivity of platelets assessed with CD62p expression and PAC1 binding may be apparent probably as a result of the chronic platelet shedding. It seems to be supported by easier PDMP formation in stroke subjects than in controls.
12 Etiology of stroke

ARTERIAL STIFFNESS INDEXES IN ACUTE ISCHEMIC STROKE:
RELATIONSHIP WITH STROKE SUBTYPE
A. Tuttolomondo, A. Pinto, D. Di Raimondo, R. Di Sciacca, G. D’Aguanno, G. Licata
Hospital Germans Trias i Pujol, Badalona, Spain; Hospital Germans Trias i Pujol, Badalona, Spain

Introduction: No study evaluated both arterial stiffness indexes in patients with acute cardiovascular or cerebrovascular event. We evaluated arterial stiffness indexes in subjects with acute ischemic stroke and to evaluate relationship between these indexes and other clinical and laboratory variables.

Methods: We enrolled all consecutive patients with a diagnosis of acute ischemic stroke admitted to the Internal Medicine Department at the University of Palermo between November 2002 and January 2005, and hospitalized control patients without a diagnosis of acute ischemic stroke. Control subjects were patients admitted, in the same period, to our Internal Medicine Department for any cause other than acute cardiovascular and cerebrovascular events. The type of acute ischemic stroke was classified according to the TOAST classification

Carotid-femoral pulse wave velocity PWV and Augmentation Index (Aix), were measured in the supine position using the automatic device (Complior; Compumedica Medical).

Results: We enrolled 107 patients with acute ischemic stroke and 102 control subjects matched for age, sex, cardiovascular risk factors and previous cardiovascular morbidity.

Stroke patients, in comparison with subjects without acute ischemic stroke, showed an higher mean Augmentation Index (Aix) (103±1.5 mmHg vs 99±4.6 mmHg) and PWV (11.8±3.3 m/sec vs 10.02±2.29 m/sec).

After adjustment for age, sex and history of hypertension, Augmentation Index (AI) and PWV values in lacunar subjects were significantly higher than in comparison with values observed in LAAS, CEI and ODE subtypes.

Discussion: Stroke is not an ominous disease and some study indicate that its pathophysiology differs for each subtype. Our findings could indicate that microvascular damage in the brain (lacunar infarction) could be strictly associated with arterial stiffening that may play a pivotal role in this cerebral microvessels involvement.

13 Etiology of stroke

DELAYED AMBULATORY HOLTER FOR THE DETECTION OF EMBOLIC ARRHYTHMIAS AFTER NORMAL ECG CONTINUOUS MONITORING DURING 72 HOURS IN ACUTE ISCHEMIC STROKE
M. Gomis1, M. Millán1, N. Pérez de la Ossa1, L. Dorado1, C. Guerrero1, A.C. Ricciardi1, E. López-Cancio1, A. Dávalos1
1Hospital Germans Trias i Pujol, Badalona, Spain; 2Hospital Germans Trias i Pujol, Badalona, Spain

Background: The routine use of acute ECG Holter monitoring (AHM) in stroke patients, in comparison with subjects without acute ischemic stroke, showed an higher mean Augmentation Index (Aix) (103±1.5 mmHg vs 99±4.6 mmHg) and PWV (11.8±3.3 m/sec vs 10.02±2.29 m/sec).

After adjustment for age, sex and history of hypertension, Augmentation Index (AI) and PWV values in lacunar subjects were significantly higher than in comparison with values observed in LAAS, CEI and ODE subtypes.

Discussion: Stroke is not an ominous disease and some study indicate that its pathophysiology differs for each subtype. Our findings could indicate that microvascular damage in the brain (lacunar infarction) could be strictly associated with arterial stiffening that may play a pivotal role in this cerebral microvessels involvement.

14 Etiology of stroke

NON-INVASIVE MEASURES OF ATHEROSCLEROSIS IN PATIENTS WITH ACUTE ISCHEMIC STROKE: WITH RESPECT TO STROKE SUBTYPES
S. Havemeister, A. Kritzelsmann, G. Thomalla, C. Gerloff, M. Rosenkranz
Dept. of Neurology, University Medical Center Hamburg-Eppendorf, Hamburg, Germany

Background: Carotid intima-media thickness (IMT), flow-mediated dilation of the brachial artery (FMD), and ankle brachial index (ABI) are sensitive surrogate markers of preclinical atherosclerosis. We determined these non-invasive measures of atherosclerosis in patients with acute ischemic stroke of different etiology.

Methods: We assessed IMT, FMD, and ABI in 143 consecutive patients with recent transient ischemic attacks or ischemic stroke due to cardioembolism (CE), small-artery occlusion (SAO), and large-artery atherosclerosis (LAA).

Results: IMT was above normal values in all stroke subtypes (1.34±1.5 mm) with the highest values in SAO (1.45±0.48 mm, n.s.). FMD was significantly lower in LAA (6.3±3.7%, p=0.006) and in SAO (5.8±4.7%, p=0.003; Fig. 2) as compared to CE (7.9±6.5%). ABI was within normal values in CE (1.03±0.14) and in LAA (0.94±0.18) but was significantly decreased in SAO (0.86±0.21) as compared to CE (p<0.02). IMT was inversely correlated with FMD (-0.32, p<0.001) and ABI (-0.28, p<0.05).

Conclusion: Ischemic cerebral events are associated with preclinical atherosclerosis irrespective of stroke etiology. However, atherosclerosis appears to be particularly pronounced in patients with stroke due to SAO. This underlines the need for aggressive preventive measures in these patients.

15 Etiology of stroke

POLYMORPHISMS OF PROINFLAMMATORY AND ANTI-INFLAMMATORY GENES IN PATIENTS WITH ACUTE ISCHEMIC STROKE
A. Tuttolomondo1, A. Pinto1, D. Di Raimondo1, R. Di Sciacca1, L. Vaccarino1, L. Scala2, G.L. Forte2, M. Sanacore2, D. Lio2, G. Licata1, D. Di Raimondo1, R. Di Sciacca1, L. Vaccarino1, L. Scala2, G.L. Forte2, M. Sanacore2, D. Lio2, G. Licata1
1Dipartimento Biomedico di Medicina Interna e Specialistica, Università degli Studi di Palermo, Palermo, Italy; 2Dipartimento di Biopatologia e Metodologie Biommediche, Università degli Studi di Palermo, Palermo, Italy

Introduction: Proinflammatory cytokines such as interleukin (IL)-6 and tumour necrosis factor alpha (TNF-alpha) and anti-inflammatory ones as the IL-10 play a central role acute phase of ischemic stroke. Our attention has been focused on the assessment of the contribution that some polymorphisms that map on genes that encode for these cytokines may give to the susceptibility for ischemic stroke.


Results: We enrolled 117 subjects with acute ischemic stroke and 60 controls without acute ischemic stroke but age, sex and previous cardiovascular morbidity prevalence matched.

We observed no significant differences in the frequency of genotypes and alleles of pro-inflammatory cytokines TNF-alpha and IL-6, while the frequency of genotypes and allele of IL-10 positive for the 819T allele - is significantly lower in the group of patients suffering from stroke compared with the controls.

Discussion: As reported recently, the presence of +819T allele is related to higher production of IL-10 by cell system monocito-macrofagico subject inflammatory stimuli. It is therefore conceivable that in subjects negative for this allele the production of IL-10 could facilitate the activation of pro-coagulant recruited inflammatory cells in a active atherosclerotic plaque, with consequent release of tissue factor and trigger the cascade coagulation. Our data, although preliminary, suggest that the assessment of polymorphisms of certain key genes of inflammatory network can afford to locate a genetic risk profile used in the prevention of ischemic stroke.

16 Etiology of stroke

MICROEMBOLIC SIGNALS DUE TO SOLID MICROEMBOLI DETECTED WITH CONTRAST-ENHANCED TRANSCRANIAL DOPPLER MAY BE ASSOCIATED WITH PRO-INFLAMMATORY TIA/STROKE
A. Chiti, G. Gualdini, E. Giorli, E. Terrin, G. Orlandi
Department of Neurosciences, University of Pisa, Pisa, Italy

Background: Contrast-enhanced Transcranial Doppler (c-TCD) can reliably detect right-to-left shunt (RLS), which represents the necessary but not sufficient physiopathologic substrate for paradoxical embolism. The test is considered
positive when microembolic signals (MES) due to gaseous microbubbles injected intravenously as contrast medium are recorded in the middle cerebral arteries. Multifrequency devices may discriminate gaseous microbubbles from solid microemboli, whose detection during cTCD exam could be involved in cerebrovascular symptoms occurrence.

Methods: We recorded the number of solid and gaseous MES during multifrequency cTCD exam in 36 patients (21 females and 15 males, mean age 50 years, range 23-61) with RLS. 24/36 (66%) patients had a recent (>36 hours) cryptogenic TIA/stroke, 12/36 (33%) migraine with aura and all patients performed transoesophageal echocardiography to evaluate the presence of atrial abnormalities such as patent foramen oval (PFO) and interatrial sept aneurism (ISA).

Results: All patients (36/36) had documented PFO and 2/36 (5.6%) ISA. Total number of microembolic signals was 502 and 86 were solid (17.1%). However, the number and the proportion of solid MES was much higher in patients with cryptogenic TIA/stroke (78/400, 19.5%; mean 9.8, range 1-44) than in patients with migraine with aura (8/102, 7.8%; mean 2.0, range 1-3). Both patients with PFO and ISA were in the first group and had 30/64 (31.3%, mean 15.0) solid MES.

Conclusion: The number and the proportion of solid MES detected during cTCD in patients with recent cryptogenic TIA/stroke may be associated with PFO, especially if ISA is present. Further research is needed to validate and to better define this observation.

17 Etiology of stroke
REDUCED MORG1 EXPRESSION IN ISCHEMIC HUMAN BRAIN
C. Mawrin1, D. Haase2, G. Wolf3
1Department of Neuropathology University of Magdeburg, Magdeburg, Germany; 2Neuropathology Jena, Jena, Germany; 3Internal Medicine III University of Jena, Jena, Germany

Background: The mitogen-activated protein kinase organizer 1 (Morg1) has been recently identified as a modular scaffold regulating ERK signaling. Morg1 also attenuates expression of the hypoxia-inducible factor-1z (HIF-1z) by activating or stabilizing of prolyl-hydroxylase 3 (PHD3).

Methods: Immunohistochemistry, RT real-time PCR and western blotting were applied to detect Morg1 in post-mortem human brain tissue. Damaged brain regions showed strong Morg1 expression. Attenuated expression of Morg1 was associated with ischemic damage. Moreover, reactive astrocytes in the surrounding brain tissue were more expressed. We studied astrocytes in different conditions to find a possible role of Morg1 in reactive astrocytes.

Results: We found Morg1 expression in the human brain in neurons, glial cells, and blood vessel walls. Immunohistochemistry, RT real-time PCR and western blotting indicated that Morg1 expression is reduced in human brain tissue with ischemic damage. Moreover, reactive astrocytes in the surrounding brain tissue showed strong Morg1 expression.

Conclusion: Here we demonstrate for the first time that Morg1 is expressed in the human brain in neuron, glial cells, and blood vessel walls. Moreover, Morg1 expression is reduced in ischemic-damaged brain, while Morg1 in reactive astrocytes in the penumbra is upregulated.

18 Etiology of stroke
SEROPREVALENCE OF CHLAMYDIA PNEUMONIAE ANTIBODIES IN YOUNG STROKE PATIENTS: A CASE CONTROL STUDY
V.C.S. Bandaru, S. Kaul, B. Demudu Babu, V. Lakshmi
Nizam’s Institute of Medical Sciences, Hyderabad, India

Background: There have been many reports in the last decade about the association of Chlamydia pneumoniae (C. pneumoniae) and atherosclerosis involving heart and brain.

Objective: To investigate the seroprevalence of C. pneumoniae antibodies in ischemic stroke patients below 45 years age, from the south Indian city of Hyderabad.

Methods: In this prospective, hospital based, case control study, we recruited 120 acute ischemic stroke patients admitted to NIMS hospital and 120 age and sex matched controls. All stroke patients underwent CT (Computerized tomography), MRI (Magnetic resonance image), MRA (Magnetic resonance angiography), Transorbhore Echocardiography and Carotid Doppler for stroke sub group diagnosis. We measured C. pneumoniae antibodies IgG and IgA by microimmunofluorescence technique in all patients and controls.

Results: We found C. pneumoniae antibodies in 29.1% (35/120) stroke patients and in 12.5% (15/120) control subjects (p=0.002). C. pneumoniae IgG antibodies were found in 27.5% (33/120) (0.006) and IgA antibodies in 5% (6/120) (0.03) of stroke patients. Presence of Chlamydia antibodies was noted in all subgroups of ischemic stroke in young patients except stroke of undetermined etiology.

Conclusion: C. pneumoniae IgG antibodies were found to be associated with ischemic stroke in young.

Key words: C. pneumoniae antibodies, stroke in young, microimmunofluorescence

19 Etiology of stroke
COMPARISON IN TWO SERIAL TCD FINDINGS OF SYMPTOMATIC MIDDLE CEREBRAL ARTERY (MCA) BETWEEN MCA DISEASE AND TANDEM ARTERIAL PATHOLOGY
J.S. Kim, I.M. Jang, K.B. Lee, H. Roh, M.Y. Ahn
Soonchunhyang University Hospital, Seoul, South Korea

Background: Either middle cerebral artery (MCA) disease or embolism from proximal atherosclerosis can manifest MCA occlusion on angiography. The aims of our study were to elucidate the differences in serial Transcranial Doppler (TCD) findings between intracranial MCA disease and tandem arterial pathology.

Methods: We have prospectively enrolled the patients with acute large infarcts located in the lenticulostriate artery territory and MCA stenocclusion on brain contrast-enhanced magnetic resonance angiography (CE-MRA). We classified stroke mechanisms into MCA disease (MCAD) and stroke of tandem arterial pathology (STAP) excluding cardioembolic infarction. For all patients, TCD were performed at 0 day and 7 days after CE-MRA. For the analysis of TCD diagnosis of MCA stenosis, we used a mean flow velocity (MFV) cutoff of ≥80 cm/s in the MCA as the criterion for stenosis. The MFVs of MCA were checked at depth of 60 and 66 mm on both sides. Complete or partial occlusions were diagnosed according to the TCD flow grades and TCD wave forms.

Results: In the two serial TCD performed with a 1-week interval in the STAP group, 9 patients (39.1%) showed a reduced or normalized MCA flow velocity. These findings were observed in only 3 patients in the MCA disease group (12.0%, P=0.046).

Conclusion: Significantly more patients with STAP showed reduced or normalized MCA flow velocity on follow-up TCD. This finding suggests that serial TCD test can be used to discriminate whether a MCA occlusion was result from intracranial MCA disease or stroke of proximal artery to artery embolization.

20 Etiology of stroke
INFLAMMATORY MARKERS AND CAROTID ATHEROSCLEROSIS IN ISCHEMIC STROKE
G. Favi1, M.A. Abbas2, F. Corea3, G. Comi5
1Soggh faculty of medicine, Soggh University, Cairo, Egypt; 2Soggh faculty of medicine, Soggh University, Cairo, Egypt; 3Via O; Istituo di Neurologia Sperimentale (INSPE), Istituto di Ricovero e Cura a Carattere Scientifico (IRCCS) San Raffaele, Milano, Neurologia, Dim, Milano, Italy

Background and purpose: Inflammation may have a crucial role in the pathogenesis of atherosclerosis. This hypothesis is supported by an increasing number of reports on the interaction between chronic infection, inflammation, and atherogenesis. The aim of our study is to study the association between inflammatory markers and different ultrasonographic markers of carotid atherosclerosis.

Methods: 160 patients with recent ischemic CVE were included and subjected to CT, MRI, carotid Duplex ultrasonography (to study IMT, RI, stenosis and plaques) and inflammatory markers.

Results: The mean age of patients is 72.42 years, with more than half of the patients in the age group 70-89 years, distribution of patients according to OCSP is PACIs (50.6%), PACIs (20%), LACIs (16.3%) and TACIs (5.6%). As regard the ultrasonographic atherosclerotic markers we found that the mean IMT is higher than normal in 66.25% of patients. The ICAs RI, is increased in about 60% of patients. Both of the IMT and the ICAs RI are significantly associated with markers of inflammatory activity (fibrinogen, fibrin D-dimer concentration and CRP). Carotid stenosis ≥ 50% is found in 54 ICAs, it is also significantly associated with inflammatory markers. We detected carotid plaques in 111 patients. Ulcerated plaques were found in 12.50% of patients and they are significantly associated with CRP. We found also a significant association between symptomatic unstable carotid plaques and CRP.

Conclusions: Ultrasonographic evaluation of carotid arteries is of great value for risk assessment, further management and secondary prevention of ischemic stroke patients. Inflammation may have a crucial role in the pathogenesis of atherosclerosis. Inflammatory markers may predict the risk of CVD even after adjusting of traditional risk factors. Assessment of inflammatory markers may be useful adjuncts in identifying those patients who are at a higher risk of developing vascular events, and in whom more aggressive treatments might be warranted.
Etiology of stroke

21 Etiology of stroke
MODERATE ELEVATED TROPOIN LEVEL CONTRIBUTES TO PREDICT ATRIAL FIBRILLATION OCCURRENCE IN ACUTE ISCHEMIC STROKE PATIENTS

Department of Neurology, Amiens University Hospital, Amiens, France;
Department of Cardiology, Amiens University Hospital, Amiens, France;
Biochemistry Laboratory, Amiens University Hospital, Amiens, France

Background: Elevated level of cardiac troponin I (cTnl) has been reported in numerous diseases, particularly acute ischemic stroke and atrial fibrillation. We tested the hypothesis that initial cTnl dosage helps predict atrial fibrillation occurrence (AF) early in the course of ischemic stroke in patients who have a sinus rhythm at admission.

Methods: This retrospective study included all eligible patients admitted to our stroke unit for acute ischemic stroke with symptom onset within 24 hours between January and December 2007 (n=402). Patients with known AF or AF discovered on admission were excluded. Blood samples were drawn on Emergency Department arrival. Elevated cTnl level was defined as cTnl level ≥ 0.04 µg/L. AF was defined as AF discovered on cardiac monitoring in patients who have a sinus rhythm at admission.

Results: Twenty seven (6.7%) patients had AF. In univariate analysis, patients with AF were older, had higher in-hospital mortality, and had more elevated cTnl level. Stepwise logistic regression selected the following independent factors for AF: in-hospital mortality (OR: 3.9; 95% CI: 1.07-14.57; p=0.04) and elevated cTnl level (OR: 3.49; 95% CI: 1.50-8.07, p=0.004).

Conclusion: Elevated troponin level at the acute stage of ischemic stroke is independently associated with AF. Elevated cTnl level may help in screening patients with ischemic stroke to identify new AF.

22 Etiology of stroke
SLEEP RELATED STROKE, OBSTRUCTIVE SLEEP APNEA AND PATENT FORAMEN OVALE
Dept. of Neurosciences, Ospedale Niguarda Ca’ Granda, Milano, Italy

Background: Patients affected by Obstructive Sleep Apnea (OSA) have an increased risk of stroke. Different pathophysiological mechanisms have been considered to explain such a relationship. In the recent years it has been shown that the prevalence of Patent Foramen Ovale (PFO), that is a potential risk factor for stroke via paradoxical embolism, is higher in patients affected by OSA. Moreover, right-to-left shunting (RLS), which is usually due to the presence of PFO, has been described during sleep apneas.

Methods: In the framework of the feasibility phase of an observational study aimed to “Detect sleep Apnea as Risk factor in Acute ischemic stroke” (D.A.R.I.A. study), we selected patients with ischemic stroke consecutively admitted in our Stroke Unit, fulfilling the criteria of having both OSA and RLS, apart from the presence of other risk factors and cause of stroke. All patients have been investigated according to a standardised protocol that included a polysomnographic study, a transcranial Doppler with contrast to detect RLS and the diagnostic work up to identify cardiac and arterial sources of thromboembolism.

Results: A total of 11 patients were individuated and 10 of them were men (91%). Their age ranged from 34 to 78 years (mean = 56.8±14.3 years) and body mass index from 24 to 31 (mean = 27.3±2.8). Arterial hypertension was the most frequent risk factor, being present in 7 patients (64%). No one suffered from atrial fibrillation. Their age ranged from 34 to 78 years (mean = 56.8 years). No one suffered from atrial fibrillation. No one suffered from atrial fibrillation. Their age ranged from 34 to 78 years (mean = 56.8 years). No one suffered from atrial fibrillation. Their age ranged from 34 to 78 years (mean = 56.8 years).

Discussion: We found that in our group of patients with ischemic stroke, the yield of Holter monitoring, thrombophilic screening and vasculitic screening tests was low for identifying abnormalities which significantly altered patient management. The use of these tests in younger stroke patients and in those with cryptogenic stroke requires further study.

Regional/national stroke aspects (EU and beyond)

1 Regional/national stroke aspects (EU and beyond)
SOCIOECONOMIC STATUS AND PREHOSPITAL DELAY IN ACUTE ISCHEMIC STROKE: PRELIMINARY REPORT FROM A KOREAN MULTICENTER STUDY
T.H. Park, S.Y. Ha, S.W. Ha, H.-G. Oh, K.H. Park, Y.C. Youn

1Department of Neurology, Seoul Medical Center, Seoul, South Korea;
2Department of Neurology, Chung-Ang University Yong-San Hospital, Seoul, South Korea;
3Department of Neurology, Seoul Veterans Hospital, Seoul, South Korea;
4Department of Neurology College of Medicine Soonchunhyang University Cheonan, South Korea;
5Cancer Information and Education Branch, National Cancer Center, Ilsan, South Korea;
6Department of Neurology, College of Medicine, Chung-Ang University, Seoul, South Korea

Background: Prehospital delay in acute ischemic stroke makes many patients ineligible for acute treatment. The aim of this study was to investigate the socioeconomic status (SES) affects prehospital delays after ischemic stroke in South Korea.

Methods: We analyzed prospectively registered 236 patients with acute ischemic stroke who admitted the emergency department (ED) of 5 participating hospitals within 48 hours of symptoms onset. Level of education, household income and family composition were used as indicators for SES. Logistic regression was used to identify independent predictors for prehospital delay after stroke.

Results: The median time from symptom onset to ED arrival was 7.0 (interquartile range 2.5 to 241) hours. 73 patients (30.9%) arrived within 3 hours and 114 (48%) within 6 hours. Univariate analysis showed a significantly longer prehospital delay in patients living alone (median 19 vs 7 hours, p=0.028), with stroke attributable to small vessel occlusion (SVO) (p=0.001), and with lower National Institutes of Health Stroke Scale (NIHSS) score (Spearman’s rho=-0.149, p=0.022), High-income tertile (vs. low-income, OR=2.55, 95% CI, 1.13-5.72, p=0.024), high NIHSS score (p=0.012), and stroke not attributable to SVO (p=0.027) showed independent association with ED arrival within 3 hours of symptom onset in regression analysis. Age, sex, mode of onset, stroke history, and level of education did not affect prehospital delay after ischemic stroke.

Conclusion: Although it is preliminary report, family composition and household income affects prehospital delay after ischemic stroke in South Korea. Policies are needed to reduce delay time of ED arrival in acute stroke patients with low SES.

Poster Session Blue
Regional/national stroke aspects (EU and beyond)
REGIONAL/NATIONAL STROKE ASPECTS (EU AND BEYOND)

RESULTS FROM THE FIRST IRISH NATIONAL AUDIT OF STROKE CARE (INASC) – CLINICAL AUDIT
F. Horgan1, S. Murphy2, A. Hickey1, H. McGee1, D. O’Neill3
1Royal College of Surgeons in Ireland, Dublin, Ireland; 2Midland Regional Hospital Mullingar, Mullingar, Ireland; 3Adelaide and Meath Hospital, Dublin, Ireland

Background: The Irish National Audit of Stroke Care (INASC) conducted a national clinical audit of hospital stroke care in the Republic of Ireland in 2007. We report on the findings of the clinical audit.

Methods: 36 public hospitals providing acute services to stroke patients participated. Data from consecutive discharges for a six-month period in 2005 with a primary diagnosis of stroke using ICD-10-AM were extracted for each of the hospitals for the chart review, which was based on the Clinical Audit Proforma of the UK National Sentinel Stroke Audit.

Results: 2,173 charts were individually audited. Over half were men and 37% were under 65 years. The majority (92%) were living at home prior to stroke with 73% independent in ADL. The co-morbidities included hypertension (51%), previous stroke or TIA (25%) and atrial fibrillation (22%). Only 1% of INASC patients were treated on a stroke unit and 61% were under the care of a general physician. Only 4% were scanned within 3 hours of stroke and 1% were thrombolysed. 19% died as inpatients. Mean (median) length of stay to discharge alive was 30 (14) days. 28% were independent in ADL on discharge. The majority were discharged on cardiovascular medications. The most common stroke risk factors were hypertension (56%) followed by atrial fibrillation (28%). There were considerable deficiencies in timely access to all allied health professionals. The Irish audit reported lower coverage on all 12 key indicators than recent UK Sentinel audits.

Discussion: These findings from INASC present for the first time a national overview of the processes of care in acute hospitals in the Republic of Ireland. The findings point to the need for an urgent review of stroke services in Ireland to provide appropriate and equitable care for Irish people of all ages with stroke, and in conjunction with the findings of the community surveys of INASC have contributed in a major way to a current governmental review of stroke service policy and delivery.

A NATIONAL AUDIT OF AUSTRALIAN POST ACUTE STROKE SERVICES
E. Lahor, D. Harris
National Stroke Foundation, Melbourne, Australia

Background: The nature of Australian stroke rehabilitation services has never been evaluated. Australian Clinical Guidelines for Stroke Rehabilitation and Recovery were produced in 2005. The aim of the 2008 National Stroke Audit was to assess adherence to evidence based recommendations in the guidelines and to describe variations in stroke services across the country.

Methods: Clinicians at participating sites completed an organisational survey and a clinical audit. A total of 2,119 case notes were audited. Amongst the 97 hospitals surveyed, 8 dedicated stroke rehabilitation units were identified. Most of the surveyed rehabilitation teams reported employing recommended strategies for effective stroke management, such as team meetings (100%), patient-centred management (83%) and ongoing specialist education (54%). Workforce establishment was reported to be below recommended levels. Access to community rehabilitation services varied. The clinical audit identified that while treatment had been provided for most of the consequences of stroke, only some of the therapies provided matched those recommended in the guidelines. For example, sensory impairment (38%), hypertension (56%), or speech rehabilitation (56%). Prior to discharge there appeared to be low rates of home assessments (71%), carer training (67%), or provision of information regarding self-management programs (40%), peer support programs (34%), and sexuality (13%).

Conclusions: Analysis of the audit data has provided insights into the performance of the Australian health system at providing post acute stroke care. The audit provides a focus for developing action plans to improve clinical practice and patient outcomes over time.
REGIONAL/NATIONAL STROKE ASPECTS (EU AND BEYOND)

USE OF WARFARIN AMONG PATIENTS WITH ATRIAL FIBRILLATION AT THE TIME OF ADMISSION TO HOSPITAL WITH A STROKE – THE IRISH EXPERIENCE

F. Horgan1, S. Murphy1, A. Hickey1, H. McGe1, D. O’Neill1
1Royal College of Surgeons in Ireland, Dublin, Ireland; 2Midland Regional Hospital Mullingar, Mullingar, Ireland; 3Adelaide and Meath Hospital, Dublin, Ireland

Background: The Irish National Audit of Stroke Care (INASC) conducted a national clinical audit of hospital stroke services in the Republic of Ireland in 2007. Warfarin is the most effective stroke prevention medication for high-risk individuals with atrial fibrillation, yet it is often underused. Data from comprehensive national studies can help to gauge the extent of the problem. We report on the warfarinisation rates at the time of admission with stroke from the first national clinical audit of stroke in Ireland.

Methods: 36 public hospitals providing acute services to stroke patients participated. Data from consecutive discharges for a six-month period in 2005 was extracted for each of the hospitals for the chart review, which was based on the Clinical Audit Proforma of the UK National Sentinel Stroke Audit.

Results: 2,173 charts were individually audited. There were 469 patients (21.6%) admitted with a stroke who were known to have atrial fibrillation. 120 (25.6%) were on warfarin on admission, 268 (57.1%) were on antiplatelet agents and 102 (21.8%) were not on either. 166 (35.4%) of the 469 had a prior TIA or stroke and 52 (11.3%) of these were on warfarin. 330 (70.4%) patients were discharged alive and 116 (35.2%) were on warfarin at that time. Factors independently associated with warfarin usage on admission were male gender (Odds ratio 1.3 [1.1-1.7] p=0.01) and prior TIA or stroke (Odds ratio 1.3 [1.0-1.6] p=0.02).

Discussion: This systematic national study clarifies that the most clear example of missed opportunities in primary and secondary prevention in stroke is the low level of anticoagulation pre and post stroke. Underutilisation of warfarin among women is also noteworthy. These findings should encourage greater efforts to prescribe and monitor appropriate antithrombotic therapy to prevent stroke in individuals with atrial fibrillation.

DRIVING AFTER A TIA: IMPACT OF NATIONAL TIA GUIDELINES IN THE NORTH OF IRELAND

M.O. McCarron
Altnagelvin Hospital, Derry, United Kingdom

Background: After a single transient ischaemic attack (TIA) or minor stroke the Driving and Vehicle Licensing Authority (DVLA) of the UK recommend a group 1 driving restriction for one month. In October 2006 all General Practitioners in the North of Ireland were sent TIA referral guidelines including a referral form documenting the need to remind TIA patients of the DVLA driving restriction. We sought to determine the compliance with the DVLA advice among patients referred with a suspected TIA or minor stroke prior to a neurovascular clinic before and after implementation of the launch of the TIA guidelines.

Methods: Patients were recruited prospectively at a TIA clinic. Age, sex, diagnosis and frequency of previous driving, recall of driving advice from referring doctor were recorded. Compliance was compared among patients before and after the launch of the TIA referral guidelines using the chi square test.

Results: 298 patients were referred, 146 men, 153 women, mean age 58.2 years. 149 consecutive patients before the launch of the guidelines were compared with the next consecutive 149 patients after publication of the guidelines. Similar proportions of patients referred had a diagnosis of TIA or stroke before and after the launch of the guidelines (76 of 149 versus 67 of 149, p=NS). There were also similar frequencies of drivers in both cohorts (84 versus 92, p=NS). More patients drove to the TIA clinic after the publication of the guidelines (60 versus 28, p=0.01). Recall of advice about driving from the referring doctor was static at less than 10% for each cohort (14 versus 12, p=NS).

Conclusions: Department of Health guidelines offer a poor educational tool to alter patient behaviour. These results add further impetus to provide urgent assessment for suspected TIA/minor stroke patients to reinforce necessary driving bans for TIA/stroke patients and to avoid unnecessary driving bans for other patients.
10 Regional/national stroke aspects (EU and beyond)

**ACUTE ISCHEMIC STROKE IN POLAND – THE COMPARISON OF NATIONAL HOSPITAL-BASED STROKE REGISTRIES IN 2000-2008**

M. Niewada1, E. Sarzyńska-Długosz2, M. Skowrońska3, A. Kobayashi3, B. Kamiski1, A. Członkowski1

1Medical University of Warsaw, Department of Pharmacology, Warsaw, Poland; 2Institute of Psychiatry and Neurology, 2nd Neurological Department, Warsaw, Poland; 3Department of Division of Decision Analysis and Support, Institute of Econometrics, Warsaw School of Economics, Warsaw, Poland

**Background:** To estimate changes in ischemic stroke clinical presentation, the acute care and outcomes in stroke centers participating in national hospital-based stroke three registries from 2000 to 2008 in Poland.

**Methods:** We compared ischemic stroke patients data in three national hospital registries: the PNSPTr (Polish National Stroke Prevention and Treatment Program) Registry and two editions of POLKARD (National Cardiovascular Disease Prevention and Treatment Program) Registry collecting data for 2000-2001, 2004-2005 and 2007-2008, respectively. WHO Steps Stroke and Swedish Stroke Registry (Riks-Stroke) based questionnaires were used to collect data on ischemic stroke patients admitted to participating centers. To ensure the quality only centers that reported at least 100 patients were analyzed.

**Results:** We analyzed data from 26, 73 and 123 centers and 8736, 20542 and 26361 ischemic stroke patients registered in PNSPTr Registry and first and second edition of POLKARD Registres, respectively. The prevalence of risk factors (i.e. atrial fibrillation, ischemic heart disease, diabetes, smoking and alcohol abuse) decreased from 2000 to 2008. The control of risk factors improved, with the exception for hypertensive users admitted in hypertensive patients. More patients were admitted within first 5 hours following stroke onset (in second edition of POLKARD Registries 32.9%, 46.5% and 56.2% patients were hospitalized within 3, 4.5 and 6 hours). More ischemic stroke patients received aspirin and less were reported to be treated with antibiotics and nootropic drugs. The mean hospital stay decreased by one day from 13.4 to 12.2 days. Early outcomes have improved: the in-hospital mortality decreased from 15.2 in PNSPTr Registry to 11.6 and 12.0% in POLKARD Registries.

**Conclusion:** The ischemic stroke care and outcomes improved in the last decade in Poland. These beneficial effects need further monitoring in Poland.

11 Regional/national stroke aspects (EU and beyond)

**HELLENIC STROKE COLLABORATION: A PROSPECTIVE MULTICENTER NATIONWIDE REGISTRY OF STROKE**

K. Spengos1, S. Giannopoulou1, C. Milionis1, A. Terentios4, S. Vassilopoulou1, S. Markoulka1, I. Kouzi3, K.N. Vemmos3

1Department of Neurology, University of Ioannina, Ioannina, Greece; 2Department of Internal Medicine, University of Ioannina, Ioannina, Greece; 3Department of Neurology, NIMTS Hospital, Athens, Athens, Greece; 4Acute Stroke Unit, Department of Clinical Therapeutics, University of Athens, Athens, Greece

**Background:** With the exception of the population-based study of Arcadia and a series of studies based on the Athens Stroke Registry there is a lack of epidemiological data regarding stroke incidence, aetiology, treatment, outcome, rehabilitation and economics in Greece. Aim of this collaboration is to establish a prospective multicenter nationwide registry of stroke that will provide current and reliable information about all above mentioned issues.

**Methods:** Departments of Internal Medicine and Neurology in all state or private hospitals all over Greece are principally invited to participate in this collaboration. Trained internists and neurologists with specific interest in stroke are supposed to fill in a standardised electronic data sheet and submit it online. Our evaluation includes demographic data, such as age, sex, height, weight and waist periphery, stroke risk factors and previous medications, details about stroke onset and hospital admission, in-hospital treatment, care and diagnostics, clinical course, rehabilitation, secondary prevention and at least 1-year follow-up. Collected data should be used in order to provide information and evaluate the current standard of care for stroke care in Greece and indicate the problems that need to be solved. Five centres participated in a pilot phase in order to finalize the evaluation form and check for system difficulties, before a series of ten further centres starts to collect data.

**Results:** Within the 3-month pilot period a total of 143 (62.9% males) strokes (69.2% ischemic; 16.8% hemorrhagic; 11.9% TIA; 0.7% subarachnoid haemorrhage; 1.4% sinus thrombosis) were documented. Mean age was 68.7 years and mean NIHSS score on admission 8.11. Hypertension, diabetes, smoking and hyperlipidaemia were found in 77.6%, 20.3%, 38.5% and 51.7% respectively.

**Conclusion:** Further centres are encouraged to participate in this project, which is solely initiated by physicians in the hope of improving stroke awareness and care in Greece.

12 Regional/national stroke aspects (EU and beyond)

**THE SECULAR TREND OF ISCHEMIC STROKE ANALYSES OF 3,456 CASES FROM THE INHA STROKE REGISTRY**


Inha University Hospital, Incheon, South Korea

**Background:** The study of long-term trends in the characteristics of ischemic stroke could offer insights into the stroke care system. The Inha Stroke Registry, which is the only large stroke registry in the Incheon metropolitan area of 4 million resident populations, could provide useful information.

**Methods:** We analyzed the data of 3,456 consecutive ischemic stroke patients who admitted to the Inha University Hospital within 7 days after onset. Data were divided into two groups according to the periods: January 1998 - June 2003 (Period I) and July 2003 - December 2008 (Period II). Demographics, risk factors, TOAST classification, stroke severity, and the time variables were analyzed.

**Results:** The Period I included 1,327 patients and the Period II included 2,129 patients. The demographics between two periods were similar in gender (male, 55.7% vs. 58.9%) and age (64.2±11.7 vs. 64.6±11.9). During this period, the proportion of patients < 55 and > 80 year-old slightly increased, but did not reach statistical significance (18.9 vs. 20.6% and 7.7 vs. 9.2%, respectively). The prevalence of hypertension, diabetes, and the hypercholesterolemia all significantly increased (59.9 vs. 74.8%, 66.0% vs. 77.9%, 17.2 vs. 51.3% respectively; all P<0.01), along with the rise in the proportion of patients who control the risk factor (hypertension 62.8 vs. 68%, dyslipidemia 9.4 vs. 37.3%, no smoking 64.6 vs. 67.9% respectively; all P<0.05). The TOAST classification showed significant increase in the proportion of cardioembolic stroke (16.1 vs. 20.6%; P<0.01). The severity of presenting stroke was worse in the Period I (median NIHSS 5 vs. 4; P<0.01). The mean interval between symptom onset and admission (31.6±38.4 vs. 31.9±38.9 hours) and the proportion of patients who received thrombolytic therapy (7.5 vs. 6.9%) was similar between the two groups.

**Conclusion:** Several remarkable trends were noticed from the ischemic stroke profiles during the last decades. Greater primary prevention efforts and the patient education are needed.

13 Regional/national stroke aspects (EU and beyond)

**SUBACUTE CASEMIX CLASSIFICATION FOR STROKE REHABILITATION. DOES IT HELP?**

J.J. Estell1, F. Kohler2, R. Renton1, H. Dickson1, C. Connolly4

1St George and Braeside Hospitals, Kogarah, Australia; 2Braeside and Liverpool Hospitals, Liverpool, Australia; 3Liverpool Hospital, Liverpool, Australia; 4Braeside Hospital, Wetherill Park, Australia

**Background:** The Australian National Subacute Non Acute Patient (AN-SNAP) case mix classification was developed for sub and non-acute care for both clinical and funding purposes.

**Aim:** The aim of this review was to analyse various models to explain the variance in length of stay (LOS), discharge destination and functional improvement of patients with stroke in an inpatient rehabilitation unit.

**Method:** All patients admitted to our unit for inpatient rehabilitation with a diagnosis of recent stroke; the Oxfordshire classification subgroup, sociodemographic data, and functional data were identified. The data were analysed using principal components analysis for categorical data (CATPCA) to identify the major underlying factors contributing to variance in outcomes. A categorical regression model was utilised to determine the percentage of variance of the individual variables.

**Results:** 1154 patients were included in the study. Three models for explanation for variance for LOS demonstrated

1. Admission motor Functional Independence Measure (FIM) score: 38.9% increasing to 40.2% if age at admission is added. 2. Total FIM 35.2% (36.8% incl. age). 3. AN SNAP v2: 33.4%. Variance for functional improvement as measured by FIM gain: 1. Admission motor FIM 37.4% (40.5% incl. age). 2. Total FIM 35.7% (38.8% incl. age). 3. AN SNAP v2: 32.3% (33.5% incl. age). Variance for discharge destination: 1. Admission motor FIM 16%. 2. Total FIM 15.7%.

18th European Stroke Conference
3. AN SNAP v2: 4.2%.

Conclusion: Both the admission motor FIM as well as the admission total FIM were better predictors of variance of LOS, discharge destination or functional improvement than AN SNAP v2 in our rehabilitation service. This needs to be taken into account when using casemix classification for clinical or funding purposes and it would be preferable to have a classification which explains more of the variance than AN SNAP v2.

14 Regional/national stroke aspects (EU and beyond)

REPRESENTATIVE STUDEY OF A SERIES OF 4733 EGYPTIAN CASES OF EXTRACRANIAL CAROTID ARTERY ULTRASOUND (US)
F.A. Abd Allah1, E.B. Ettay2
1Neurology Department, Cairo University, Cairo, Egypt; 2Department of Cardiovascular medicine, Cairo University, Cairo, Egypt

Background and objectives: To assess the burden, severity, and presentation of extracranial carotid atherosclerotic disease in large sample of the Egyptian populations and to correlate the known cardiovascular (CV) risk factors to the severity of carotid stenosis using carotid duplex ultrasound as a screening method.


Methods: In a retrospective manner, demographic and clinical data which obtained from each case are correlated with carotid duplex findings and data analysed to address the pattern of carotid artery disease among large sample of the Egyptian populations.

Results: Carotid artery disease was present in 40.9% of the study population (50% > 69% carotid stenosis in 1.9%, ≥70% stenosis in 0.7% and total occlusion in 0.06% of study population). Among arteries affected by >69% and ≥70% stenosis, only 38.8%, 32% of them were presented with hemispheric neurologic symptoms respectively. Plaques with irregular/ekated surface and those with heterogeneous echogenicity are associated with hemispheric symptoms in patients with ≥50%stenosis (p<0.01). Age, hypertension and diabetes are independent predictors of >50%stenosis (p<0.000 for each). Age was the only independent predictor of ≥70% stenosis (p<0.000). In patients undergoing coronary artery bypass graft (CABG), 50-69% and ≥70% stenosis were present in 4.5% and 0.4% of patients respectively.

Conclusion: Hemodynamically significant carotid disease is rare in Egyptian patients. The vast majority of patients with significant carotid disease are free of hemispheric neurologic symptoms. Carotid plaque morphology (heterogeneity and surface irregularity) can be used as a predictor of hemispheric symptoms. Cardiovascular risk factors are helpful predictors of the degree of severity of carotid stenosis.

Key words: carotid artery disease, ultrasound, Egyptian population

15 Regional/national stroke aspects (EU and beyond)

CORRELATION BETWEEN HEADACHE AND LOCALIZATION OF HAEMATOMA IN INTRACRANIAL HAEAMORRHAGE PATIENTS
S.Z. Atic, M.B. Savic
Hospital for Cerebrovascular Diseases, Belgrade, Serbia

Background: Headache is a symptom very often present in intracranial haemorrhage. It could herald the onset of disease or to be a following sign. In this study we attempted to determine the correlation between localization of haematoma and headache in intracerebral haemorrhage patients.

Methods: We studied patients with intracerebral haemorrhage confirmed by brain imaging techniques CT and/or MR. Half of them had as a following sign, and in the other half patients headache was absence.

Results: 52 patients were attended, 24 male and 28 female, age range 43 to 79. Among patients with headache 14 (53.8%) had haemorrhage with seepage into the ventricular system, 3 (11.5%) in thalamus, 2 (7.6%) in other basal gangliae, 2 (7.6%) in internal capusae, 1 (3.8%) in parietal lobe, 1 (3.8%) in parieto-occipital lobe and 3 (11.5%) in temporo-parietal lobe. Among patients without headache 4 (15.4%) had haemorrhage with seepage into the ventricular system, 7 (26.9%) in thalamus, 4 (15.4%) in other basal gangliae, 1 (3.8%) in internal capusae, 3 (7.6%) in parietal lobe, 1 (3.8%) in parieto-occipital lobe and 6 (23.1%) in temporo-parietal lobe.

Conclusions: 1. Among the patients with headache there is significant difference in group of intracerebral haemorrhage with seepage into the ventricular system comparing with other localizations. 2. Among the patients without headache there is significant difference in absence of headache in group of intracerebral haemorrhage in internal capsule then in other localizations.

Management and economics

1 Management and economics

RECONFIGURING POST-DISCHARGE STROKE CARE: LESSONS FROM A MULTI-METHOD STUDY
A. Cox1, C. Wolfe2, C. McKevitt3
1King’s College London, London, United Kingdom; 2, London, United Kingdom

Background: Specialist, multi-disciplinary and coordinated stroke unit care has improved patient outcomes. Post-discharge stroke care is often organised. We undertook a multi-method study to inform the development of post-discharge stroke care services delivered out of hospital.

Methods: Univariate and time trend analysis of service provision using the population-based South London Stroke Register (SLSR); in-depth interviews with 28 stroke care providers; 171 hours of observation of stroke care in and out of hospital; interviews with 39 patients; 4 focus groups with health care providers and patients/carers. Qualitative data were analysed using the constant comparison method.

Results: 1 year post-stroke 82% of SLSR patients had contact with a GP, 18% with deficits did not receive rehabilitation. Over 12 years, stroke unit admission increased and length of stay decreased (22-15 days, p<0.001). Qualitative data suggested broad agreement about what should be provided in post-discharge care (processes of care). This included rehabilitation therapies to meet on-going needs of patients discharged home; on-going medical review; advocacy for those unable to act on their own behalf; access to financial advice; improved access to public transport. There was less unanimity about how services should be organised (structures of care). Multi-disciplinary working was seen as required; co-ordination important in community settings where providers are not co-located. Leadership was key for both individual patient care and service development. Need for stroke specialist was contested by community providers but valued by patients/carers.

Conclusions: Multi-disciplinary and co-ordinated care are important for out of hospital care, as for stroke unit care, although lack of co-location makes the latter difficult to achieve. The nature of stroke specialism may be contentious for providers of post-discharge stroke care. Strategies to promote leadership may overcome the barriers identified.

2 Management and economics

ANTIHYPERTENSIVE DRUG USE AFTER FIRST STROKE IN ROUTINE CARE: RESULTS FROM THE GENERAL PRACTITIONER RESEARCH DATABASE (GPRD)
A.M. Toschke1, M. Gulliford1, C.D.A. Wolfe1, A.G. Rudd1, P.U. Heuschmann2
1King’s College London, London, United Kingdom; 2Charité Berlin, Berlin, Germany

Background: Guidelines emphasize the importance of antihypertensive drugs for secondary stroke prevention. Data is lacking on use of antihypertensive drugs according to published guidelines in routine clinical care.

Methods: The General Practitioner Research Database (GPRD) is a primary care database containing information from over 400 general practices across the UK. The General Practitioner Research Database (GPRD) is a primary care database containing information from over 400 general practices across the UK. The General Practitioner Research Database (GPRD) is a primary care database containing information from over 400 general practices across the UK. The General Practitioner Research Database (GPRD) is a primary care database containing information from over 400 general practices across the UK.

Results: 48239 patients with a diagnosis of first stroke were identified in the GPRD. From hypertensive stroke patients surviving 3 months after stroke 75% received any antihypertensive drugs within this period, increasing from 66% in 1997 to 83% in 2006 (p<0.001). 18% of hypertensive stroke patients surviving at least 3 months had no antihypertensive treatment prior to stroke; of whom 45% received any antihypertensive drug within the first 3 months after stroke and 31% first line treatment as recommended by guidelines (increasing from 24% in 1997 to 37% in 2006; p<0.001). Not recommended and recommended first line treatment was associated with beneficial effect on survival (hazard ratio compared to none treatment (HR) 0.79; 95% CI 0.61-1.00 and HR 0.63; 95% CI 0.53-0.75, respectively); recommended treatment also reduced the risk of recurrent stroke (HR 0.82; 95% CI 0.71-0.96).

Conclusions: Prescription of antihypertensive drugs as well as adherence to published guidance improved over time. First line treatment according to established guidelines was beneficial in stroke survivors in routine clinical care.

Cerebrovasc Dis 2009;27(suppl 6):1–241

231
Mean total direct costs outside the health care services was 79,49 €. The total cost per patient is lesser in the outpatient clinic than in the hospital. Most of the direct costs were supported by the health care services.

Conclusion:


Discussion: Our data indicate that educational programs do have gender-specific effects. Women show a better stroke knowledge and a better chance to gain information from classical educational interventions. Especially older women, however, tend to underrate their stroke risk. Future campaigns should be tailored economically and stress gender-specific risks. Moreover, different media should focus on specific risk groups like males or older women.

Background: Possible gender differences in stroke knowledge, risk perception and the educational effects of a multimodal educational intervention.

Methods: Computer-assisted telephone surveys were conducted among an average sample of 500 members of the general public (44.4% male, 55.6% female), before and immediately after an intense three-months educational campaign in a western German area of 400,000 inhabitants. The intervention comprised of poster advertisements and various print media. Slogans and stroke interest stories appeared regularly in local newspapers, on television and radio and public events focussed on the subject.

Results: Even before the intervention, more women than men were able to name at least one stroke warning sign (71.6 vs. 59.2%, p < 0.005), to name the correct emergency call number (33.4 vs. 47.6%, p < 0.005) or to cite the correct action in acute stroke (call emergency care?) (87.2 vs. 70.1%, p < 0.001). Women showed a generally better improvement of knowledge after the campaign (e.g. correct emergency call number: +6.3 vs. +2.1%, p < 0.05). Fewer women than men considered themselves as being at risk of stroke (24.3 vs. 32.7%, p < 0.05) with a significant increase following the intervention in both sexes (32.7%/46.2%, p < 0.01). The perception of different educational media varied between the sexes. For example, more women than men remembered posters and flyers that were presented in pharmacies and at the doctor’s office (62.1 vs. 48.3%, p < 0.002).

Discussion: Our data indicate that educational programs do have gender-specific effects. Women show a better stroke knowledge and a better chance to gain information from classical educational interventions. Especially older women, however, tend to underrate their stroke risk. Future campaigns should be tailored economically and stress gender-specific risks. Moreover, different media should focus on specific risk groups like males or older women.
Conclusions: 1/3 of stroke survivors are on suboptimal antithrombotic medication, 1/5 of them do not have any antihypertensive medication, and 2/5 of patients do not use a statin. Annual medication costs increase by 32% after a stroke. Optimal secondary prevention could potentially prevent hundreds of stroke recurrences. Medication use and adherence are useful quality indicators and should be routinely monitored where possible.

7 Management and economics

REHABILITATION AFTER HOSPITALIZATION FOR FIRST-EVER STROKE IN TAIWAN: 1998 TO 2003
M.C. Tseng1, J.S. Liu2, H.J. Lin3
1National Sun Yat-Sen University, Kaohsiung, Taiwan; 2National Health Research Institutes, Miaoli County, Taiwan; 3Chi-Mei Medical Center, Tainan, Taiwan

Background: Stroke is the second most common cause of mortality in Taiwan. We aimed to determine the readmission rate for patients discharged with first-ever stroke within 1 year in Taiwan and to examine the temporal trend.

Methods: We examined National Health Insurance (NHI) claims from 1998 through 2003. More than 96% of the total population of Taiwan is covered by the compulsory and universal NHI since the implementation in March 1995. The beneficiaries with a principal discharge diagnosis of stroke were identified based on ICD-9-CM and followed for 1 year. The primary outcomes are all-cause readmission and readmission diagnosis

Results: From 1998 to 2003, the number of hospitalization for first-ever stroke was around 50,000 each year, and the majority of the patients had no comorbidity (Charlson comorbidity score = 0). In-hospital mortality remained stable (from 2.6% to 2.3%). Among survivors of the index admission, more than 50% patients were readmitted at least once within 1 year. Rate of readmission decreased overall: 77.6% in 1998 to 52.7% in 2003 (-32%). Stroke was the most frequent reason for readmission among study patients, accounting for 22.4% in 1998 to 15.9% in 2003.

Conclusions: Readmission after a hospitalization for first-ever stroke was common, with over 50% readmitted within 1 year.

8 Management and economics

MODELLING RESOURCE USE, COSTS AND EFFECTIVENESS OF REPETITIVE FUNCTIONAL TASK PRACTICE BASED ON A SYSTEMATIC REVIEW
M. Leahy1, B. French1, C. Sutton1, J. McAdam1, L. Thomas1, A. Forster2, P. Langhorne1, C. Price3, A. Walker4, C. Watkins1
1University of Central Lancashire, Preston, United Kingdom; 2University of Leeds, Leeds, United Kingdom; 3University of Glasgow, Glasgow, United Kingdom; 4Northumbria Healthcare NHS Trust, Newcastle, United Kingdom

Background: Stroke rehabilitation currently comprises several components; one of these is the repetitive practice of functional tasks. This has the potential to be resource-efficient and may include delivery in a group setting or instructed practice in the home environment. The aim of this study was to develop an economic model to estimate the cost-effectiveness of repetitive functional task practice (RFTP).

Methods: A systematic review provided measures of efficacy for RFTP, which were used to inform the economic model. The economic model used a pre-existing dataset of 539 patients admitted to hospital and followed-up at regular intervals: data were collected on resource use and outcomes. Direct costs from the perspective of the NHS and Personal Social Services over a three year period were used for the model, which allowed us to estimate the potential cost saving per patient of RFTP. An average cost per person for RFTP was calculated based on staffing, equipment and length of intervention. Using the measures of efficacy, cost savings, and cost of the intervention, we estimated an incremental cost per quality adjusted life year (QALY) gained for RFTP.

Results: Per person, the average cost of RFTP was £1265, and the average cost saving was £537. Using the overall effect size from the systematic review, the incremental cost-effectiveness ratio (ICER) of RFTP was £10,870. In the UK an intervention is considered cost-effective if it is less than £20,000 per QALY gained. Given this threshold, RFTP is cost-effective so long as the net cost of the intervention per patient is less than £1,963.

Conclusion: The economic modelling suggested that RFTP was cost-effective. The cost-effectiveness of RFTP tends to stem from the relatively modest cost associated with this intervention.

10 Management and economics

VARIATION IN PROCESS INDICATORS OF QUALITY OF IN-HOSPITAL STROKE CARE
E. Maasland1, R.J. van Oosterbrugge2, C.L. Franks3, W.J.M. Scholte op Reimer2, P.J. Koudstaal2, D.W.J. Dippe1
1Erasmus Medical Center, Rotterdam, The Netherlands; 2University Hospital Maastricht, Maastricht, The Netherlands; 3Atrium Medical Center, Heerlen, The Netherlands

Background: Using process indicators in measuring and improving quality of stroke care is promoted as they offer an opportunity for intervention. Simple process indicators may not be representative of overall quality of stroke care, however. We assessed the validity of different process indicators by comparing process-of-care measurements across several domains of in-hospital stroke care.

Methods: 579 patients with acute stroke were prospectively enrolled in 10 Dutch centers. We selected 30 process-of-care indicators and categorized them along 2 axes: diagnostic, cure and care procedures (2 elements) versus the acute or preventive management procedures (2 elements), resulting in a matrix of 6 domains. We attributed a score of 1 to a indicator when the indicated procedure was carried out. We calculated average subcores per domain (range 0-1). We then derived subtotals per axis and a total score by adding up subcores. Linear regression analyses with adjustment for clustering per hospital were performed to compare scores of process indicators with (sub)total scores.

Results: Only start of physiotherapy on day 1 (21% of the patients) and CT/MRI on admission (98%) had a statistically significant association with all the domain scores, subtotals and total score. Spee chart therapy (49% with indication), rehabilitation consultant (49%) and antplatelets in patients without AF (88%) was significantly associated with the total score and at least 5 of the subcores. Intravenous thrombolysis was only strongly associated with the total score and at least 5 of the subcores.

Conclusion: The majority of the 30 process indicators used in our study was not a valid indicator of the overall quality. This suggests that the overall quality of stroke care should be measured by means of a carefully selected set of process indicators.
Background: As part of the EROS project we developed a quality of stroke care assessment tool based on the evidence and recommendations from national and international guidelines. This tool was used by multidisciplinary experts at site visits to assess quality of stroke care in 7 sites across Europe. However site visits are expensive and, at 251 items, the tool could be considered lengthy and impractical. We aimed to reduce the number of items in the assessment tool to make it more practical in application but without significantly reducing its validity.

Methods: Each of the original 251 items was scored on 3 aspects: the quality of the underlying evidence (1=low, 3=high); the measurement properties (reliability assessed by kappa scores) (3=high reliability) and level of consensus on the utility of the item, based on 2 rounds using the Delphi technique with multidisciplinary teams in all the collaborating centres (3=high level agreement). A simple algorithm was used with equal weighting for each aspect to derive a score out of a possible maximum of 9. Different configurations of questionnaire based on the rankings were produced for field testing.

Results: Simply selecting the highest scoring items results in a tool which concentrates exclusively on acute care (where most high quality evidence is available) e.g. “Are there written protocols for secondary prevention?”. If the structure of the original tool is maintained to select the highest scoring items at different parts of the whole patient pathway then a more balanced tool is obtained. We produced a 94 item and 22 item version of the quality of stroke care assessment tool that can be delivered by post or interview.

Conclusion: Our shorter quality of stroke care assessment tool, derived using simple methods might be useful in assessing quality of stroke care in a variety of settings, allowing comparison of service delivery and outcomes. Further testing of the optimum delivery and validity of the tool is required.

Cross-clinic comparison of sum scores using Rasch analysis

Á. Lundgren-Nilsson1, G. Grimby1, A. Tennant2, K.S. Sumnerhagen3
1Institute of Neuroscience and Physiology, Department of Clinical Neuroscience and Rehabilitation, University of Gothenburg, Göteborg, Sweden; 2Academic Unit of Musculoskeletal and Rehabilitation Medicine, Leeds University, Leeds, United Kingdom

Background: Assessing people’s functional ability, especially their performance of activities in daily living (ADL) is one of the oldest and most common methods of measuring severity and outcome of different interventions for disabling condition. A study of the use of outcome measures in Europe found the FIM™ (the Functional Independence Measure) to be the most frequently used measure, both within different diagnoses, and in general. The FIM™ has been used for instance in USA to establish different kinds of reimbursement systems in medical rehabilitation, e.g. the functional related groups and the weighted FIM scores, especially in the USA. The most common way to compare outcome between clinics is often group data comparison using sum scores of instruments.

Methods: To analyse the cross-clinical validity of the Functional Independence Measure (FIM™) motor items fitted to the Rasch measurement model. A detailed analysis of scoring functions was undertaken prior to testing fit to the model. Categories were rescored where necessary. For validation, analysis of Differential Item Functioning (DIF) was undertaken in the data pooled from the six facilities. Comparability of sum scores of the FIM™ across diagnoses was examined by Test Equating.

Major findings: The present scoring system for the FIM™ motor items was found to be valid, necessitating extensive rescoring. Even following this, DIF was found by clinic. Appropriate comparison of sum scores between the clinics was therefore not fully valid, particularly for lower sum scores.

Principal conclusions: The ability to compare different centres within the same diagnosis is compromised by cross-clinical DIF. Thus comparison of low sum scores should be made with caution. Further consideration should be given to the impact of misfitting items.
Management and economics

ASSESSING KNOWLEDGE, PSYCHOLOGICAL AND PHYSICAL BARRIERS TO PHYSICAL ACTIVITY POST STROKE: A PILOT STUDY OF SOUTH LONDON STROKE REGISTER (SLSR) PARTICIPANTS

J. Brooke, I. Wellwood, M. Toschke, C. Wolfe
Kings College London, London, United Kingdom

Background: Increased physical activity (PA) after stroke is recommended for secondary prevention in the European Stroke Initiative and other guidelines (level of evidence - consensus of working party). From current data it is unclear whether stroke survivors understand the level and intensity of physical activity required of them and whether psychological as well as physical barriers prevent them from being physically active. This study set out to establish a valid method to explore these issues.

Methods: Data were collected from a purposive pilot sample (n=6) from the SLSR, a population-based stroke register covering a multi-ethnic population of 271,817 (2001). Semi-structured interviews were carried out to determine stroke survivors’ knowledge and beliefs about PA. The interview schedule was based on the literature and revised with members of an established service user review group. Data were analysed using Interpretative Phenomenological Analysis (IPA). A standardized measure of PA in older adults, the Rapid Assessment of PA (RAPA) was administered. Participants rated the RAPA on ease of completion, understanding and relevance.

Results: One participant reported receiving explicit advice about PA, although none were aware of recommended PA levels. Five themes emerged from IPA, which included: emotional response, locus of control, support (social and general), loss of expectations and physical limitations. The psychological themes of positive beliefs, support and care were beneficial for PA. However, negative beliefs, depression and loss of expectations had a detrimental impact on PA. All participants found the RAPA easy, understandable and relevant.

Discussion: Physical and psychological themes were identified as barriers to physical activity. This study suggests the interview schedule and the RAPA are useful tools in understanding barriers to and levels of PA; these will be further validated in a larger sample.

THE ROLE OF PRIMARY HEALTH CARE TEAMS IN PREVENTION OF CARDIOVASCULAR DISEASES

A. Siket Ujvarine1, R. Papp2, S. Balogh2, A. Becka2, J. Betlehem3
1Faculty of Health Sciences University of Pecs, Nyiregyhaza, Hungary; 2Institute of National Basic Health Care, Budapest, Hungary; 3Faculty of Health Sciences University of Pecs, Pecs, Hungary

Introduction: Since 1980 cardiovascular mortality has declined in a descent way in EU-15 countries, while in the newly joined countries it is only typical after 1990. Our aim is the show the results of a preventive PHC programme launched by National Health Desk in 2005.

Method: The National Basic Health Care Institute compiled a recommendation to help the prevention of cardiovascular diseases and developed an information system (CardioNET) for screening. In this framework PHC providers undertook to screen 25% of their registered patients and to make a report on patients’ risk parameters on the informatics record. The analysis of reports occurred in the central module of the CardioNET according to geographical areas and age groups. The collected data were statistically analysed with SPSS 14.

Results: Out of 345 registered family doctor offices 107 practices made use of the services. Practices sending report counted 926(14 registered patients. 28.5% of them were screened, so the condition of the competition, 25%, was performed. During examining of relative incidence of major risk factors it appeared that in the age group of 50 and 70, women’s abdominal type of obesity and high cholesterol value are more frequent than men’s. In the age group of 20 and 40, the frequency of high risk supports the necessity of cardiovascular screening and the nursing suitable for the results.

Discussion: The processed details give a good survey of gender and age composition of those who were examined in the 107 family doctor practices, and of modifiable cardiovascular risk factors.

Management and economics

THE TENDENCY OF CARING CONDITIONS FOR STROKE PATIENTS IN A HUNGARIAN REGIONAL HOSPITAL (2003-2007)

I.M. Szogedi1, J. Nikli2, J. Betlehem3, I. Kriszbacher3, A. Olah3, J. Bodis3
1Faculty of Health Sciences University of Pecs, Zalaegerszeg, Hungary; 2Institute of National Basic Health Care, Budapest, Hungary; 3Faculty of Health Sciences University of Pecs, Pecs, Hungary

Background: The aim of the study was to explore the dynamic of incidence and the nursing conditions of stroke patients in one Hungarian regional hospital.

Methods: A retrospective data analysis was used to explore the occurrence of acute stroke cases, nursing days and other nursing related conditions, like nurse staffing, skill mix, etc in a regional stroke unit of Zala County Hospital. Data were compared to the professional standards lied in the government decree. The examined period was between 2003-2007. The data analysis was done with Chi-square and ANOVA using SPSS14.0.

Results: The institution represents 711 active hospital beds. The number of treated stroke cases, nursing days and other nursing related conditions, like nurse staffing, skill mix, etc in a regional stroke unit of Zala County Hospital. Data were compared to the professional standards lied in the government decree. The examined period was between 2003-2007. The data analysis was done with Chi-square and ANOVA using SPSS14.0.

Discussion: The processed details give a good survey of gender and age composition of those who were examined in the 107 family doctor practices, and of modifiable cardiovascular risk factors.