Treatment, rehabilitation and awareness of stroke in a region with limited resources

A descriptive study in the West Bank, the occupied Palestinian territory

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Master thesis, Department of Medicine, Sahlgrenska Academy

UNIVERSITY OF GOTHENBURG

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Master thesis in Medicine

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Table of contents

Abstract

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Background

Stroke is the second most common global cause of death. Screening, post-stroke rehabilitation, secondary prevention, an increased knowledge of stroke symptoms and risk factors could decrease the mortality of stroke.

Aim

The purpose was to describe the general conditions in cerebrovascular health care at Palestine Medical Complex (PMC) and further to investigate the awareness of risk factors and symptoms in stroke among non-stroke patients at PMC.

Methods

Twenty-nine patients with diagnosed stroke were included and examined during eight weeks at PMC for an observational study. Ninety-two non-stroke patients were included at a general ward, PMC, for a questionnaire study.

Results

Twenty-five percent of ischemic stroke patients were prescribed the combination acetylsalicylic acid + Plavix®. Furosemid® (39%) were most common treatment of hypertension. Patients with NIHSS 3-14 (National Institutes of Health stroke scale) and patients under 65 years were more frequently receiving rehabilitation and follow-up than

patients with NIHSS >15 and elderly patients.

Seventy-five percent of the non-stroke patients recognized ≥1 correct symptom. Patients with university studies were more likely to recognize >2 correct risk factors (OR 9.6, 95% CI 1.9-49.5, P=0.007). Patients in 40-59 years and in ≥60 years were more likely to recognize ≥1 correct symptoms (OR 4.1, 95% CI 1.4-12.2, P=0.011 respectively OR 8.8, 95% CI 1.7-44.3, P=0.009).

Conclusion

Patients with severe stroke and high age were less frequently receiving rehabilitation and follow-up in our stroke population. Some generally unproven treatment combinations were common among stroke patients. Future studies is needed which could possibly contribute to guidelines for treatment and rehabilitation at PMC.

The awareness study showed a lack of general knowledge concerning stroke symptoms. University studies and high age were associated with increased recognition of stroke symptoms and risk factors. A study representative for the whole population is suggested to address the areas for public information.

Background

The second most common global cause of death is cerebrovascular disease, causing 5.9 million deaths/year, and an incidence of 258 persons per 100 000 persons [1]. Usually cerebrovascular diagnoses are divided into two main types: ischemic stroke and hemorrhagic stroke, although the wide classification of cerebrovascular disease is also including transient ischemic attack, asymptomatic carotid stenosis, sinus thrombosis [2]. Stroke is a symptom-based diagnosis – WHO:s stroke definition is “rapidly developed clinical signs of focal (or global) disturbance of cerebral function, lasting more than 24 hours or leading to death, with no apparent cause other than of vascular origin" [3]. Cerebrovascular disease has been considered as the disease of the ageing population, but there are indications of a growing trend in incidence among younger people. Rosengren et al highlighted this trend in a recent publication – an increasing incidence of ischemic stroke during 1987-2010 among persons under the age of 65 years [4]. Disability-adjusted life years (DALYs) is an instrument used to measure disease burden; the life years lost caused by death are added to the life years with disability. Cerebrovascular disease has the third highest number of DALYs globally, with ischemic heart disease in first and lower respiratory disease in second [5]. Feigin et al have estimated the global and regional burden of stroke and found a decreasing trend in stroke mortality during the last twenty years. In contrary they also showed that the absolute number of affected people, stroke survivors and DALYs lost are increasing, especially in low- and middle-income countries [1].

The risk for developing stroke is multifactorial – e.g. transient ischemic attack, high blood pressure, diabetes mellitus, smoking, psychological stress, high body mass index, atrial fibrillation are independent long-term risk factors for developing stroke [6]. A study by Ezzati et al indicates that a few risk factors are together attributable to 70–76% of stroke disease

burden, with hypertension as the main risk factor [7]. The comprehensive INTERSTROKE study identified ten risk factors correlative to 90% of all stroke types (hypertension, current smoking, waist-to-hip ratio, diet risk score, physical inactivity, diabetes mellitus, alcohol intake, psychosocial stress and depression, cardiac causes, ratio of apolipoprotein B to A1). The authors suggest interventions to reduce the burden of stroke – e.g. hypertension treatment and smoking reduction, physical activity and healthy diet promotion [8]. As mentioned above hypertension is the most important risk factor, and in a meta-analysis Law et al showed that a reduction of 10 mmHg systolic and 5 mmHg diastolic blood pressure correlated with 41% reduction in stroke accidents [9].

Another aspect of reducing the burden of stroke and improving survival in stroke is the time from onset of symptoms to acute in-hospital treatment e.g. tissue plasminogen activator (tPa). TPa is used as a thrombolytic treatment in ischemic stroke patients. To decrease mortality and sequel symptoms tPa has to be administered to the patient before 4.5 hours from symptom onset. Therefore, it is of great importance to decrease the delay in time from symptom onset to in-hospital treatment. The delay in time could be divided into two components: pre-hospital delay factors and in-hospital delay factors. The pre-hospital factors are more patient-related – the care-seeking behaviour from the first appearance of neurological symptoms to emergency room arrival [2, 10]. Faiz et al showed in a Norwegian study that more than half of the stroke patients pre-hospital delay time was caused by decision delay i.e. time from onset of symptoms to first medical contact. Increasing the stroke awareness and knowledge among high risk individuals have been suggested to reduce the pre-hospital delay [11].

The risk for developing a stroke is high the first 3 months after a minor stroke or TIA, nearly 20% according to Coull et al. Even the first 7 days after minor stroke/TIA is critical with an

estimated risk for a stroke of 8% in TIA patients respectively 12% in minor stroke patients. These analysis have raised the question regarding possibilities to reduce the incidence in early recurrent stroke with rapid secondary preventive treatment [12]. Rothwell et al showed in their prospective study that the risk for recurrent stroke the first 3 months after a stroke incident could be reduced by 80% with rapid assessment and preventive treatment [13]. Early rehabilitation is a cornerstone of stroke treatment guidelines around the world and a lot of research studies has been investigating the effect of rehabilitation. Cumming et al conducted a RCT – one group receiving very early rehabilitation (within 24 hours from stroke onset) and another group receiving standard stroke rehabilitation. The outcomes in the very early rehabilitation group were sooner recovery in terms of less days from symptom onset to walking a 50 m distance unassisted and also a higher rate of patients discharged to home instead of rehabilitation centre [14].

Health care in the occupied Palestinian territory

The occupied Palestinian territory (oPt) has a population of 4.2 million citizens and 75 000 are situated in Ramallah, the administrative capital of the West Bank [15]. The Israel-Palestine area is strongly associated with conflict and the people living in the area has suffered and are suffering from consequences of the unsolved political situation. One consequence of the conflict is inadequate health care. The access to hospitals and other health care institutions are restricted by the Israeli authorities – e.g. patients in need for specialized care in East Jerusalem, Israel. Restrictions of movement are supported by military orders and different regulations. The patients need a valid permit to enter the area of East Jerusalem and especially elderly patients and children are extra vulnerable. Another aspect of the conflict is restricted drug storage and lack of general resources [16]. Decreased access to medicine together with a high rate of unemployment [15] are obstacles for chronic treatments e.g. secondary stroke

prevention and hypertensive medication. In the oPt there is a lack of research on cerebrovascular disease, Sweileh et al has conducted studies on both stroke epidemiology and discharge medications in the Nablus district, northern oPt. They found that hypertension (70%), diabetes mellitus (45%), renal dysfunction (34%) and smoking (21%) were common risk factors in their patient material. On discharge day, every stroke patient was prescribed, in average 4.9 drugs (SD =1.9), including antiplatelet treatment and other medications. An average monthly income in Palestine is less than 200 USD. This highlights the economic burden for the relatives of stroke patients and the problem with secondary prevention for the Palestinians [17, 18].

Screening, better control of risk factors, post-stroke rehabilitation and secondary prevention are suggested to decrease the mortality of stroke disease. An increased awareness and knowledge of risk factors and cerebrovascular disease may lead to a better cerebrovascular health care – decreasing the time from onset of symptoms to hospital arrival and diminishing the impact of risk factors. My research question is therefore twofold:

How is the medical care of patients with stroke at Palestine Medical Complex performed, concerning defining diagnosis, post-stroke treatment and rehabilitation?

What is the general knowledge regarding risk factors and symptoms in cerebrovascular disease among non-stroke patients at Palestine Medical Complex?

Aim

The purpose of this study is to describe the general conditions in cerebrovascular health care at Palestine Medical Complex and further to investigate the awareness of risk factors and symptoms in stroke amongst non-stroke patients at Palestine Medical Complex. Earlier

awareness studies have shown a correlation between increased awareness and higher education level, history of smoking, history of cardiac disease, family history of stroke, younger age [19-22].

Material and methods

To answer the research questions the project was divided into an observation study and a questionnaire, both performed March-April 2014 at Palestine Medical Complex (PMC), Ramallah.

Sample

The study population for the observation study were consecutive selected patients diagnosed with stroke (n=29) during eight weeks, 4 days/week 9 a.m. to 3 p.m. at PMC. The stroke diagnoses were confirmed by CT scan and after assessment of neurologist, Dr Zaid Ghanim. The aim for this study was to include every stroke patient passing by the Emergency room (ER), approximately 30-60 patients. An unknown number of stroke patients were discharged from the ER without assessment of neurologist and therefore it was not possible to include them in the material. Beside that exclusion, 3 patients were excluded due to already participated in the study, discharged by the medical staff before our assessment or went home against advice.

To define the study sample for the questionnaire a general ward with non-stroke patients were chosen. The ward consisted of patients from varied specialities – surgery, orthopaedics and medicine. The questionnaire was distributed to non-stroke patients (n=92) at the ward during eight weeks, once per week. All in-ward patients, at the specific time for distribution of the

questionnaire, were included except 41 patients due to previous diagnosed stroke, age ≤ 15 years, anxiety, decreased level of consciousness, not willing to participate and infectious isolation.

Data collection procedures

For examination of the patients a protocol (see appendices) was used. Data concerning time to hospital, age, gender, heredity of cerebrovascular accidents (CVA), previous transient ischemic attack (TIA)/stroke, previous coronary artery disease, atrial fibrillation, smoking, diabetes, hypertension, hyperlipidaemia, current treatment was collected through the patients/relatives or reading case books. To measure body mass index (BMI) the patients/relatives were asked about approximate length and weight. The variables BMI and heredity of CVA were lost in 1 patient due to early discharge from the ward. National Institutes of Health Stroke Scale, NIHSS, was used to examine the patients and for additional assessment of neurological deficits we also examined: hearing test using finger snapping, Rombergs test, uvula deviation, pupillary reaction using flashlight, diadochokinesia tests, Babinskis test, reflexes in biceps, brachioradialis, patella and achilles. For blood pressure measurement we used case book notes (selecting the first noted value the first and second day). The staff used following devices for measurement of blood pressure: Criticare Comfortcuff 506N3, Criticare nGenuity 8100E, Criticare nCompass 8100H or Welchallyn Masimo Set 53STO.

Lab tests (venous P-glucose) were collected from case books (selecting the first P-glucose after admission to ER). The blood pressure (n=2) and the P-glucose (n=3) were sometimes not found in the case books. Lipid blood samples were not part of standard routine at the hospital and not investigated. The conversations with patients/relatives were interpreted by Dr Ghanim or Palestinian medical students. During the physical examination the

abovementioned tests were performed by medical student Johan Hultegard or Dr Ghanim. The diagnosis and the location of lesion were confirmed by Dr Ghanim using CT scan together with clinical picture. Oxfordshire Community stroke project (OCSP) classification [23] was applied for subgrouping the stroke diagnoses. Data concerning treatment, active treatment start, rehabilitation, follow-up, discharge day were collected verbally from Dr Ghanim or case books. Data concerning active treatment start was missing in 1 patient due to unmodified medication. Data concerning rehabilitation, follow-up and discharge day were missing in 1 patient due to death during hospital stay. Rehabilitation and follow-up plan were unknown in 3 patients due to referrals to hospitals located in Israel.

The structure of the questionnaire (see appendices) was previous used in a similar study performed in Korea [19]. The first part was divided into close-ended questions: age, gender, education and smoking. The second part contained two questions about knowledge in stroke risk factors and stroke symptoms. The patients were asked to name 4 or less risk factors respectively 4 or less stroke symptoms. The risk factors and stroke symptoms were evaluated and divided into correct responses and incorrect responses. The English version was translated to Arabic by Dr Ghanim and the patients answered the questions verbally or in written form. The answers were translated by Dr Ghanim or Palestinian medical students. Before participating in the study the patients were asked if they had medical history of stroke or if they already had participated in this study, thus avoiding to include stroke patients in the non-stroke material and double registration of patients.

Statistical methods

IBM SPSS Statistics version 22 was used to calculate number, percentage, mean, median and range. The diagrams were structured in Microsoft Excel 2013 and IBM SPSS statistics

version 22. Mann-Whitney U-test was used to investigate differences between gender and age groups concerning time from onset of symptoms to arrival to Emergency Room. To compare the mean values of correct recognized risk factors and correct recognized symptoms in different age groups ANOVA test was performed. Binary logistic regression analysis was used to investigate associations between the indicators age, gender, education level, smoking level and the variables knowledge of >2 risk factors and knowledge of ≥1 symptom. Statistical significance was set at $p \leq 0.05$.

Ethics

Ethic approval for the research study was given from the direction of Palestine Medical Complex. The patients were verbally informed regarding the study, voluntary participated and registered anonymous regarding data before participating in the study. Verbal informed consent was collected from the patients or their relatives. All protocols and questionnaires were structured with individual numbers and the Palestinian ID-numbers were removed when the material left the hospital. This study was not considered as harmful for the patients and had a low-risk for intervening the medical stroke care.

Results

Observation study

In the observation study data was collected from 29 stroke patients passing by the ER at PMC. *Table 1* shows the age and sex distribution in the study material. The mean age among men was 6.6 years lower than the mean age among women. Half of the patients were 60-79 years, nearly a fifth were over 80 years and a third of the cases were under 60 years. The patients were almost equivalent distributed in gender.

Table 1. Demographic data of stroke patients (n=29). Data presented in mean (SD) or numbers (%).	
Age	65.1 (14.6)
Women	68.5 (15.2)
Men	61.9 (13.9)
<50 years	3 (10%)
50-59 years	7 (24%)
60-69 years	8 (28%)
70-79 years	6 (21%)
>80 years	5 (17%)
Sex	
Women	14 (48%)
Men	15 (52%)

The most common stroke diagnosis was ischemic stroke and just over an eighth of the patients had hemorrhagic stroke (*Table 2*). After admission to the ER every patient underwent a CT scan. We examined the patients on average 2.5 (SD 1.2) days after symptom debut and during that specific examination the median value of NIHSS were 8.0 (IQR 2.0-14.5).

Table 2. Clinical characteristics of stroke patients (n=29). Data presented in numbers (%), mean (SD) or median (IQR).	
Diagnosis (n=29)	
Ischemic stroke	24 (83%)
Transient ischemic attack	1 (3%)
Hemorrhagic stroke	4 (14%)
OCSP classification of ischemic strokes (n=24)	
Total anterior circulation infarction	5 (21%)
Partial anterior circulation infarction	6 (25%)
Posterior circulation infarction	5 (21%)
Lacunar infarction	8 (33%)
TIA (n=1)	1 (100%)
Classification of haemorrhagic strokes (n=4)	
Lacunar hematoma	2 (50%)
Subarachnoid haemorrhage	1 (25%)
Posterior circulation hematoma	1 (25%)
Diagnostics (n=29)	
CT scan	29 (100%)
Severity of stroke (n=29)	
NIHSS	8.0 (2.0-14.5)
Assessment of NIHSS, x days after symptom onset	2.5 (1.2)

OCSP= Oxfordshire Community stroke project, TIA= transient ischemic attack, CT= computed tomography, NIHSS= National Institutes of Health stroke scale, SD= standard deviation, IQR= interquartile range.

In our patient material the most common risk factors (*Table 3* and *Fig. 1*) were overweight (64%), hypertension (62%), diabetes mellitus (48%) and smoking (35%). Hyperlipidemia, coronary artery disease and atrial fibrillation were more prominent among the male patients, 67% of the men were either smokers or ex-smokers, compared to none of the women who identified themselves as smokers or ex-smokers.

Table 3. Distribution of risk factors in stroke patients (n=29). Presented in numbers (%).			
	Female	Male	Total
Atrial fibrillation (n=29)	1 (7%)	3 (20%)	4 (14%)
Diabetes mellitus (n=29)	7 (50%)	7 (47%)	14 (48%)
Heredity CVA (n=28)	3 (23%)	6 (40%)	9 (32%)
Hyperlipidaemia (n=29)	3 (21%)	5 (33%)	8 (28%)
Hypertension (n=29)	9 (64%)	9 (60%)	18 (62%)
Overweight BMI (n=28)	10 (71%)	8 (53%)	18 (64%)
Overweight BMI 25.0 – 29.9	2 (14%)	6 (40%)	8 (29%)
Obesity BMI ≥30.0	8 (57%)	2 (13%)	10 (36%)
Previous CAD (n=29)	2 (14%)	5 (33%)	7 (24%)
Previous CVA (n=29)	4 (29%)	3 (20%)	7 (24%)
Smoking (n=29)	0 (0%)	10 (67%)	10 (35%)
Ex-smoker	0 (0%)	4 (27%)	4 (14%)
Smoker	0 (0%)	6 (40%)	6 (21%)

CVA= cerebrovascular accidents, BMI= body mass index, CAD= coronary artery disease.

Among the female stroke patients 71% had a BMI above 25.0, compared to 53% of the male patients. The gender difference was even larger in the patient group with BMI above 30.0 (57% to 13%).

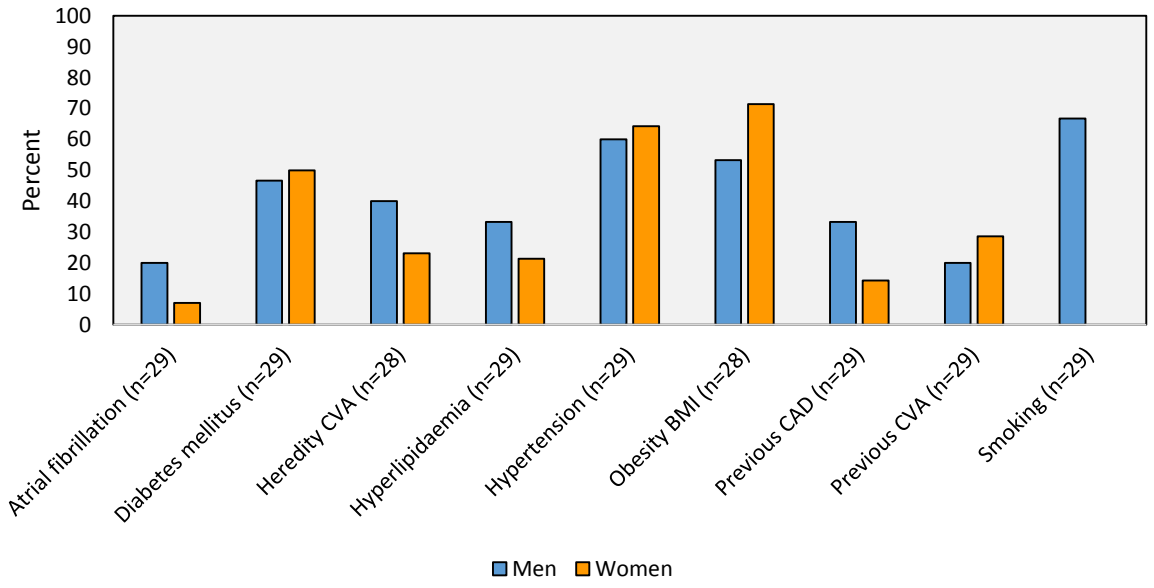

Figure 1. Distribution of risk factors in stroke patients (n=29). Presented in %. Obesity category includes overweight (BMI 25.0-29-9) and obesity (BMI ≥30.0). Smoking category includes ex-smokers and smokers.

Concerning the time from onset of symptoms to arrival at ER, (*Table 4*) our patient material had a great range, from 0.5 h to 48 h. The median time was lower for the male patients. There was also a difference between women in ages ≤65 years and >65 years. When analyzing men and women together the median time was 1.0 h, in both age groups. The patients were discharged on average 3.6 days after symptom debut (*Table 5*).

Table 4. Time from onset of symptoms to arrival Emergency Room. Presented in hours (SD).

	Women		Men		Total	
	Mean	Median	Mean	Median	Mean	Median
Time to hospital (n=29)	8.6 (13.7)	3.0	3.7 (6.7)	1.0	6.1 (10.9)	1.0
Age ≤65 years (n=15)	7.3 (11.3)	2.3	4.8 (8.0)	1.0	5.5 (8.7)	1.0
Age >65 years (n=14)	9.2 (15.2)	3.0	1.1 (0.9)	0.8	6.7 (13.0)	1.0

Table 5. Active treatment start and discharge day. Presented in number of days after symptom onset. Mean (SD) and median (IQR).

	Mean	Median
Active treatment start after onset (n=28)	2.1 (1.2)	2.0 (1.3-2.8)
Discharge day after onset (n=28)	3.6 (2.4)	3.0 (2.0-4.8)

In *Fig. 2* antiplatelet and anticoagulant treatment among TIA/ischemic stroke patients were compared before the stroke accident and after the stroke accident. Six patients (24%) were prescribed the treatment combination acetylsalicylic acid + Plavix® as secondary prevention. Over 50 % of the stroke patients were prescribed Clexane® for one week. Two patients (8%) were discharged without any secondary prevention. Tissue Plasminogen activator (tPa) was not available at PMC.

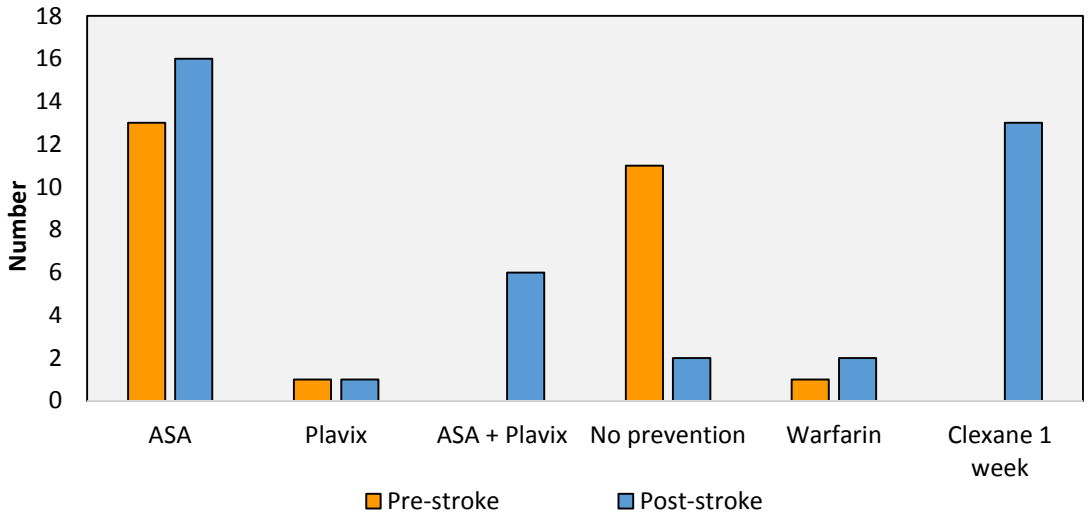

Figure 2. Antiplatelet and anticoagulant treatment in ischemic stroke and TIA patients (n=25). Presented in numbers and divided into pre-stroke and post-stroke treatment. ASA= acetylsalicylic acid.

Eighty-nine percent of the stroke patients with already diagnosed hypertension had an antihypertensive treatment. In *Fig. 3* the distribution of antihypertensive treatment among the stroke patients with hypertension is presented. Furosemid® (39%), enalapril (28%) and atenolol/bisoprolol (22%) were the most frequent medications.

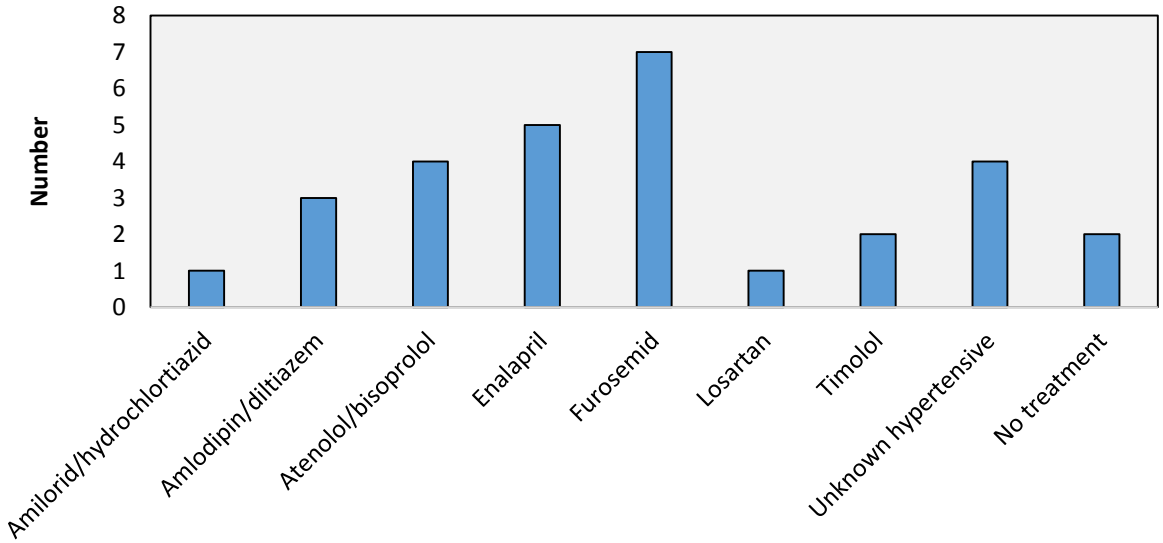

Figure 3. Antihypertensive pre-stroke treatment in stroke patients with diagnosed hypertension (n=18). Presented in numbers. The columns including both single and combination therapies.

Figure 4 shows that 19 (70%) of the stroke patients had a mean high blood pressure (mean systolic BP ≥140 mmHg and/or mean diastolic BP ≥90mmHg), 7 patients (26%) with a mean high blood pressure had no history of hypertension.

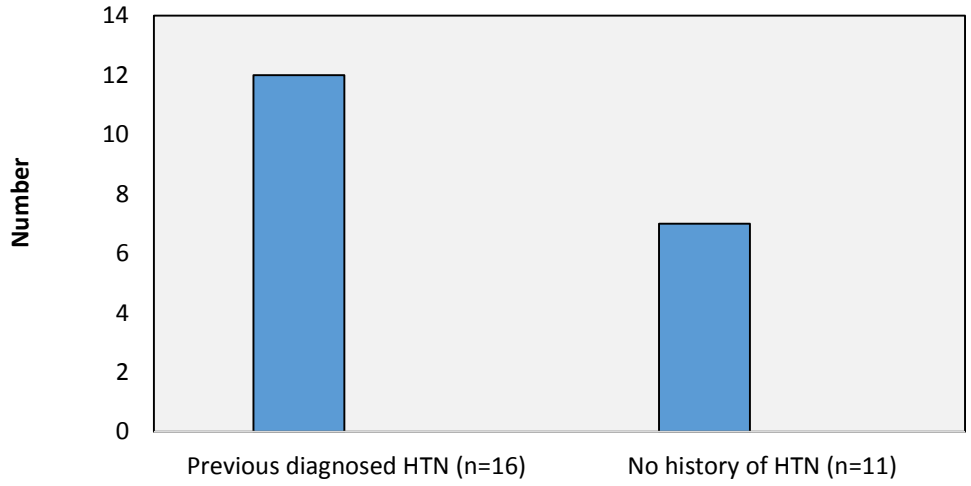

Figure 4. Mean systolic blood pressure ≥140 mmHg and/or mean diastolic blood pressure ≥90 mmHg among the stroke patients (n=27) based on two different measurements. Presented in numbers.

Figure 5 describes the most common antidiabetic treatment in the study population – metformin, glibenklamid and insulin. When measuring non-fasting venous plasma-glucose (*Fig. 6*) 7 of 11 (63%) diabetic stroke patients had a venous P-glucose ≥11.1 mmol/l, 2 patients without previous diabetes diagnosis had also a venous P-glucose ≥11.1 mmol/l. No significant differences between men and women were found concerning vP-glucose values.

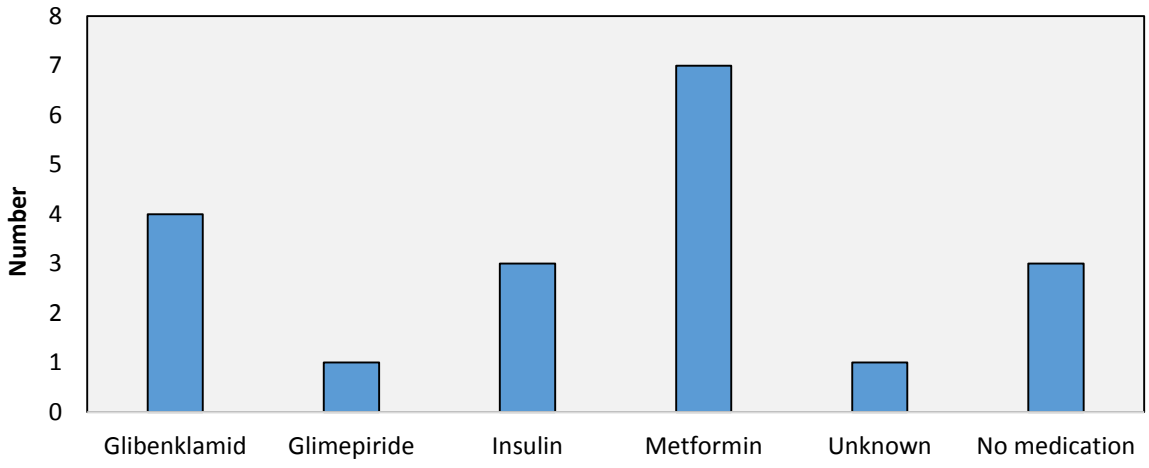

Figure 5. Anti-diabetic treatment among the stroke patients with diagnosed diabetes (n=14). Presented in numbers.

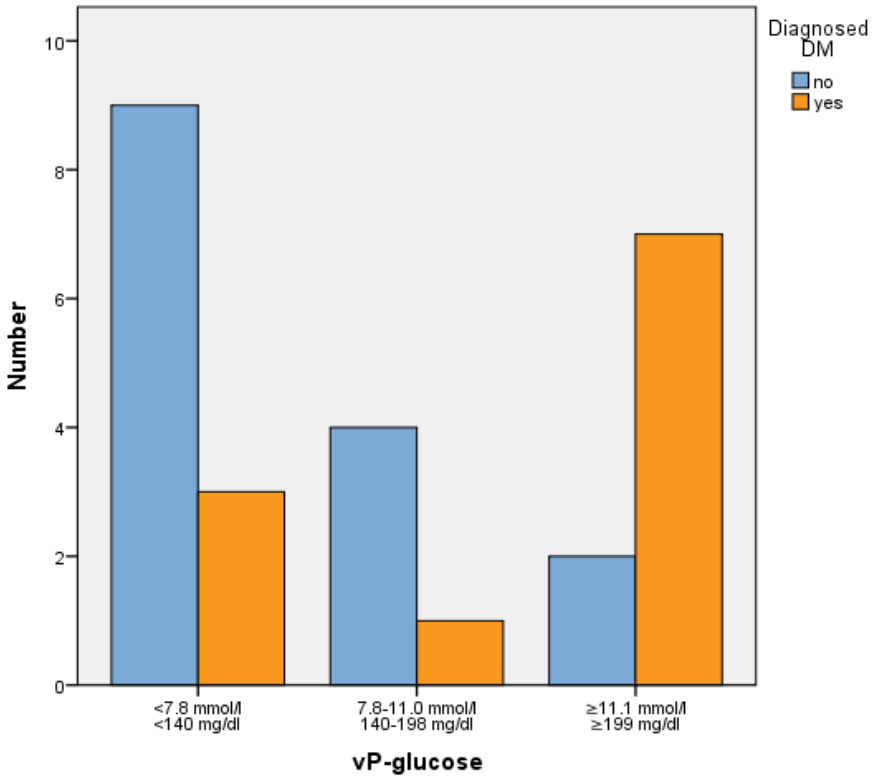

Figure 6. Non-fasting vP-glucose measurement in mg/dl and mmol/l in stroke patients (n=26). Presented in numbers.

The patients with hemorrhagic stroke (n=4) were prescribed two different medications – 4 patients got dexamethasone for several days and 2 patients got additional treatment with mannitol. Concerning rehabilitation (*Fig. 7-8*), 9 (32%) patients were discharged with either rehabilitation at home or at physiotherapy clinic. The elderly individuals were more frequently receiving rehabilitation at home than the patients ≤65 years, 16 (57%) patients were discharged from the ward without any rehabilitation. When analysing the rehabilitation regarding NIHSS-score the patients with more severe stroke (NIHSS >15) and the patients with minor symptoms (NIHSS <2) were prescribed less rehabilitation.

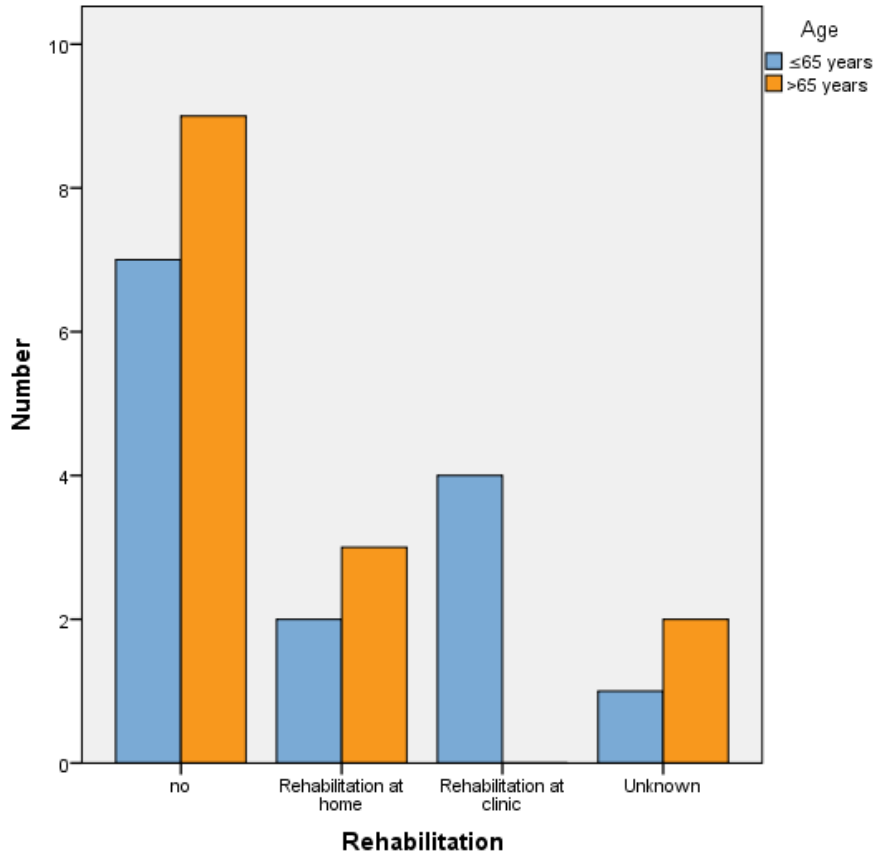

Figure 7. Post-hospitalization rehabilitation in stroke patients, related to age (n=28). Presented in numbers.

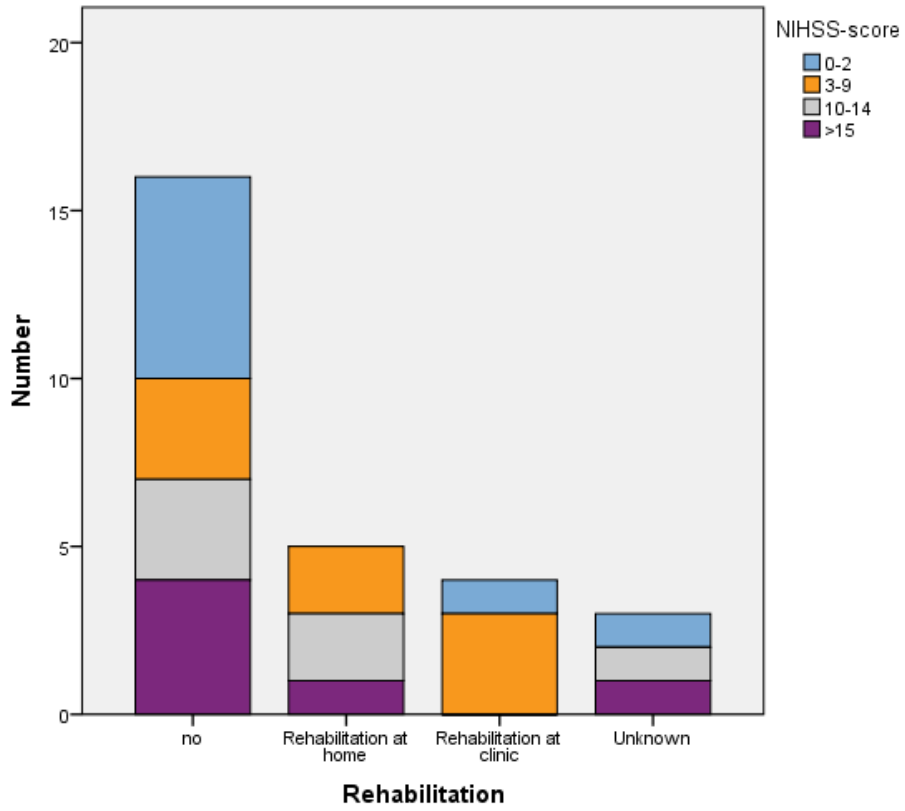

Figure 8. Post-hospitalization rehabilitation in stroke patients, related to NIHSS (n=28). Presented in numbers.

Figure 9 shows the distribution of different follow-ups. Nine (32%) patients were discharged without any follow-up, most of them were elderly patients, 15 (54%) patients were planned a visit in 2-3 months at neurological out-patient clinic. Some of the patients were also investigated with TTE, carotid Doppler, thrombophilia investigation, MRI, MRA and MRV. No significant differences between men and women were found concerning rehabilitation and follow-up.

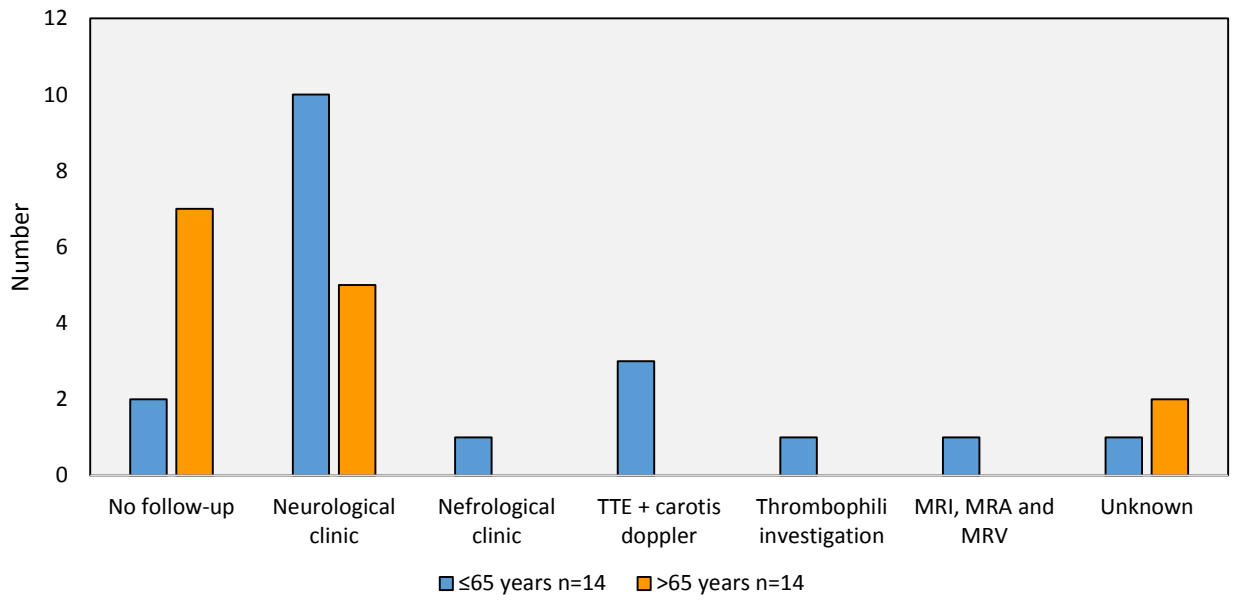

Figure 9. Follow-up in stroke patients, related to age (n=28). Presented in numbers.
TTE= transthoracic echocardiogram, MRI= magnetic resonance imaging, MRA= magnetic resonance angiography, MRV= magnetic resonance venography.

Questionnaire study

The questionnaire was distributed to 92 non-stroke patients (41% women, 59% men). The mean age of the study population was 47 years. Among the participants 16% had no education, 32% went to primary school, 34% went to secondary school and 19% had studied at university level. Half of the patients were non-smokers and the other half were ex-smokers or current smokers.

Table 7. Characteristics of non-stroke questionnaire patients (n=92). Presented in mean (SD) or numbers (%).

Age	46.9 (16.9)
Women	53.1 (15.0)
Men	42.6 (16.9)
15-39 years	30 (33%)
40-59 years	40 (43%)
≥60 years	22 (24%)
Sex	
Women	38 (41%)
Men	54 (59%)
Education level	
No education	15 (16%)
Primary school	29 (32%)
Secondary school	31 (34%)
University	17 (18%)
Smoking	
Never-smoker	48 (52%)
Ex-smoker	23 (25%)
Smoker	21 (23%)

In *Table 8* most common recognized risk factors and symptoms are listed, related to age groups. Stress (69%), hypertension (36%), smoking (34%) and hyperlipidaemia (27%) were the most frequently answers in our study population. The mean correct answered risk factors were 2.3 and when analysing the patients related to age groups there was a difference from 2.0 (15-39 years) to 2.5 correct answers (≥60 years). This difference were not significant (P=0.232), 96% of the non-stroke patients were aware of at least one risk factor.

Table 8. Knowledge of risk factors (n=92). Presented in numbers (%) and mean (SD).				
	Total	Age		
		15-39 years	40-59 years	≥60 years
Risk factors				
Stress*	63 (69%)	16 (53%)	31 (78%)	16 (73%)
Hypertension*	33 (36%)	9 (30%)	15 (38%)	9 (41%)
Smoking*	31 (34%)	11 (37%)	13 (33%)	7 (32%)
Hyperlipidaemia*	25 (27%)	7 (23%)	10 (25%)	8 (36%)
Diabetes mellitus*	12 (13%)	2 (7%)	5 (13%)	5 (23%)
Dietary fat intake*	11 (12%)	3 (10%)	3 (8%)	5 (23%)
Depression or anxiety*	7 (8%)	1 (3%)	5 (13%)	1 (5%)
Obesity*	7 (8%)	2 (7%)	3 (8%)	2 (9%)
Cardiac causes*	6 (7%)	1 (3%)	5 (13%)	0 (0%)
Food intake (spicy, fried, artificial)	6 (7%)	3 (10%)	2 (5%)	1 (5%)
Physical inactivity*	5 (5%)	3 (10%)	2 (5%)	0 (0%)
Mean correct response	2.3 (1.1)	2.0 (1.2)	2.4 (1.0)	2.5 (0.9)
Knowledge of ≥ 1 risk factor	88 (96%)	26 (87%)	40 (100%)	22 (100%)

*considered as correct recognized risk factor.

Headache (21%), weakness in arms and legs (20%), loss of consciousness (19%), vertigo (17%) were most common recognized stroke symptoms (*Table 9*). The patients recognized in average 1.4 correct symptoms and, in similarity with the knowledge of risk factors, the elderly patients had a higher mean correct symptom response. This difference when comparing age groups were not significant (P=0.086), 75% of the study population recognized ≥1 correct symptom and among patients 15-39 years 53% recognized ≥1 correct symptom.

Table 9. Knowledge of symptoms in stroke (n=92). Presented in numbers (%) and mean (SD).				
	Total	Age		
		15-39 years	40-59 years	≥60 years
Symptoms				
Headache*	19 (21%)	6 (20%)	6 (15%)	7 (32%)
Weakness in arms and legs	18 (20%)	4 (13%)	7 (18%)	7 (32%)
Loss of consciousness*	17 (18%)	5 (17%)	9 (23%)	3 (14%)
Vertigo*	16 (17%)	4 (13%)	7 (18%)	5 (23%)
Hemiparesis*	13 (14%)	2 (7%)	8 (20%)	3 (14%)
Mouth or tongue deviation*	12 (13%)	5 (17%)	4 (10%)	3 (14%)
Sweating	11 (12%)	1 (3%)	7 (18%)	3 (14%)
Dyspnoea	10 (11%)	3 (10%)	6 (15%)	1 (5%)
General fatigue	10 (11%)	2 (7%)	6 (15%)	2 (9%)
Sensory loss*	9 (10%)	3 (10%)	2 (5%)	4 (18%)
Aphasia*	8 (9%)	1 (3%)	4 (10%)	3 (14%)
Dysarthria*	8 (9%)	1 (3%)	3 (8%)	4 (18%)
Pain	8 (9%)	2 (7%)	4 (10%)	2 (9%)
Peripheral cyanosis	8 (9%)	3 (10%)	3 (8%)	2 (9%)
Amnesia*	6 (7%)	2 (7%)	3 (8%)	1 (5%)
Nausea*	5 (5%)	0 (0%)	4 (10%)	1 (5%)
Confusion	5 (5%)	0 (0%)	4 (10%)	1 (5%)
Visual loss*	5 (5%)	1 (3%)	2 (5%)	2 (9%)
Mean correct response	1.4 (1.1)	1.0 (1.2)	1.4 (0.9)	1.7 (1.0)
Knowledge of ≥ 1 symptom	69 (75%)	16 (53%)	33 (83%)	20 (91%)

*considered as correct recognized symptom.

We found significant correlations between university studies, age and increased knowledge of risk factors/symptoms. Patients with university studies were more likely to recognize >2 correct risk factors (OR 9.6, 95% CI 1.9-49.5, P=0.007) compared with the patients without any education. Patients in ages 40-59 years and ages ≥60 years were more likely to recognize ≥1 correct symptoms (OR 4.1, 95% CI 1.4-12.2, P=0.011 respectively OR 8.8, 95% CI 1.7-44.3, P=0.009), when compared with the patients in ages 15-39 years. No significant correlations were found between smoking level, sex and increased awareness.

Discussion

In the group of ischemic stroke/TIA patients we found an unexpected distribution of antiplatelet and anticoagulant treatment: twenty-five percent were prescribed antiplatelet treatment combination acetylsalicylic acid (ASA) + Plavix® and over 50% were prescribed Clexane® for one week. Among the stroke patients Furosemid® (39%) were most common hypertensive treatment. Rehabilitation and follow-up were more frequently prescribed to patients under 65 years than to elderly patients. The patients with moderate stroke (NIHSS-score 3-14) were more frequently prescribed rehabilitation than the patients with severe stroke (NIHSS-score >15).

In the awareness study 75% of the non-stroke participants could recognize ≥1 symptoms and in the age 15-39 years the results were even lower (53%). We found a correlation between high age, education level and knowledge of symptoms/risk factors. Patients with university studies were more likely to know >2 risk factors and patients in age above 40 years were more likely to know ≥1 symptom. These are the main findings in our study.

Tissue plasminogen activator was not available at PMC, instead the secondary preventive combination ASA + Plavix® were common (25% of the ischemic stroke/TIA patients) in the study population. Usually the patients in this study were added Plavix® to an already existing ASA treatment as secondary prophylaxis. This combination is supported by Yang et al in a recent cohort study, showing a lower risk for recurrent stroke than ASA and Plavix® single therapies [24]. Other studies have the last twenty years questioned the combination ASA + Plavix® and Diener et al showed a non-significant difference in prevention of cerebrovascular accidents when compared Plavix® single therapy with ASA + Plavix® combination therapy. In contrast, the risk of major hemorrhages was increased in this group. Another suggested

option is to add dipyridamole to stroke patients already on ASA, giving an additive prevention for new vascular events [25, 26]. The numbers of individuals in this study is not sufficient to make any longstanding conclusions, a more extensive retrospective study is needed to analyze antiplatelet post-stroke treatment at Palestine Medical Complex. The high appearance of treatment with Clexane® could be interpreted as a consequence of the short hospital stay and a lack of in-ward places.

In this study Furosemid® (39%) were most common antihypertensive treatment, enalapril (28%) the second and atenolol/bisoprolol (22%) the third. When handling a patient with hypertension life style changes are of great importance for decreasing the risk of cardiovascular disease. Worldwide pharmacological treatment are used if the life style changes are insufficient for lowering the blood pressure. The first line treatment, recommended by the Swedish Council on Health Technology Assessment, consists of thiazide diuretics, angiotensin converting enzyme inhibitors, calcium antagonists, angiotensin receptor blockers and beta blockers. Furosemid® is not suggested as an antihypertensive treatment [27]. Sweileh et al described enalapril as the most common antihypertensive treatment at a hospital in northern Palestine [18]. This indicates that our result perhaps is a consequence of a low number of participants rather than an actual distribution of antihypertensive at PMC.

The lack of rehabilitation/follow-up in elderly patients and in patients with severe stroke could be explained by lack of resources which leads to prioritizing younger people with moderate stroke symptoms. The negative prognosis of high age and severe stroke is well-known, Appelros et al described a correlation between increased mortality risk within the first year after a first-ever stroke and the variables age and stroke severity [28]. The higher mortality in these groups may explain our results where older patients and patients with severe stroke received less rehabilitation. In our study we could not investigate the direct causes of the differences in rehabilitation prescription - a future more detailed study focusing

on the rehabilitation and different correlating variables is needed. The lack of resources at PMC is most likely affecting the health care of stroke patients and a raise in financial support is of greatest importance to increase the standard of treatment and rehabilitation.

In the awareness part of this study only 75% could recognize ≥1 correct symptom, even lower (53%) among the patients in ages 15-39 years. Although when compared with a Korean awareness study structured in a similar way with open-ended questions, the total general knowledge was higher in our study population. In their study 56% could recognize ≥1 symptom and 57% among 20-39 years could recognize ≥1 symptom. One interesting difference was in the age group ≥60 years: 49% in the Korean study compared to 91% in our study could recognize ≥1 symptoms [19]. Our study population were patients, compared to the randomized participants from public areas in the Korean study, and perhaps more educated in stroke symptoms.

The correlation found between education level and increased knowledge of stroke risk factors/symptoms has been supported in previous awareness studies. Our results showed that elderly individuals were more likely to recognize correct symptoms. This is completely the opposite of the results in other studies, where the younger population were more likely to recognize risk factors and symptoms [19-22]. The variables smoking level and sex were not significantly associated with increased knowledge in this study. Accordingly, our hypothesis that education level is associated with a greater knowledge in stroke symptoms was strengthened. Our assumption that young age is associated with a greater knowledge was disproved in our study and in contrast a higher age turned out to be correlated with knowledge of stroke symptoms. Our findings need to be followed up by an awareness study representative for the whole population to address the areas for public information (awareness campaigns).

Limitations

As mentioned in the method the aim of the observation study was to include every patient with diagnosed stroke passing by the ER at PMC. An unknown number of stroke patients were discharged directly from the ER, after CT scan. According to the journal system 45 patients were diagnosed with cerebral infarction during the study time period. Though, the use of diagnosis codes (ICD) at the ER was inconsistent, therefore it was not possible to get the exact number of drop-outs. The questionnaire was distributed to in-ward, non-stroke patients and not completely representative for the Palestinian population. A more varied population could be a better way to investigate awareness. In this study we had limited access to interpreters and therefore we chose to investigate the awareness among in-ward patients. The questionnaire could be extended with more variables and questions e.g. about the source of stroke knowledge. To prevent a high drop-out rate we used a simple structure in the questionnaire which could contribute to a simplified explanation regarding awareness. Probably we have a translation bias in the questionnaire part of this study, e.g. the definitions of emotional stress, depression and anxiety are overlapping and could easily be confounding.

Conclusions

Patients with severe stroke and high age were less frequently receiving rehabilitation and follow-up in our stroke population at PMC. We found that some generally unproven treatment combinations were common among stroke patients. Both the disparity in rehabilitation and the unusual treatment policies could be ruled out in future studies with a larger patient material and with more narrowed research questions. This could possibly contribute to guidelines for treatment and rehabilitation at Palestine Medical Complex. A raise of financial support to stroke units is suggested to increase the standard of cerebrovascular health care.

The awareness study showed a lack of general knowledge concerning stroke symptoms. Patients with university studies were more likely to recognize more than two risk factors and elderly individuals were more likely to recognize stroke symptoms. Public education is needed to increase the awareness of common risk factors and the knowledge of stroke symptoms. The main focus should be to reach, in particular, young and low-educated people. To address the most important areas of improvement we suggest a more comprehensive awareness study with a more varied study population.

Populärvetenskaplig sammanfattning

Denna studie genomfördes våren 2014 på Palestine Medical Complex (PMC) i Ramallah, Västbanken, det ockuperade palestinska territoriet (oPt). Studien var uppdelad i två delar: en del där vi undersökte strokepatienter och en annan del där vi frågade patienter, som inte haft stroke, om deras kunskaper angående symtom och riskfaktorer för stroke.

Vi fann att strokepatienterna i ovanligt hög utsträckning behandlades med två olika behandlingsprinciper som har varit ifrågasatta och inte finns med i dagens behandlingsriktlinjer, acetylsalicylsyra + Plavix® för att förebygga nya blodproppar och Furosemid® för att sänka blodtrycket. En viktig del av dagens strokebehandling är rehabilitering för att minska risken för bestående men. De äldre patienterna och patienterna med allvarligare stroke i vår studie fick sällan rehabilitering och uppföljning jämfört med de yngre patienterna och patienterna med lindrigare stroke. För att komma fram till dessa resultat undersöktes 29 strokepatienter och vi samlade in material från dessa patienter angående riskfaktorer, behandling och uppföljning. Denna studie behöver följas upp av en mer omfattande studie där det är möjligt att undersöka samtliga strokepatienter på PMC. Eventuellt skulle detta kunna bidra med underlag till framtida riktlinjer angående behandling

och rehabilitering på PMC.

I den andra delen använde vi oss av ett frågeformulär för att undersöka kunskapsläget om symtom och riskfaktorer i stroke bland icke-strokepatienter på PMC. Våra resultat visade att framför allt kunskaperna om strokesymtom var begränsade, endast 75% i vår studie kunde nämna ett eller flera symtom. Vi såg också ett samband mellan universitetsstudier och ökad kunskap om riskfaktorer samt ett samband mellan hög ålder och ökad kunskap om symtom. Vårt material samlades in från patienter på en avdelning och därför finns det ett behov av en liknande studie på en population som är mer representativ för hela befolkningen. Denna skulle i sin tur kunna undersöka brister i kunskapsområden som kan förebyggas genom en allmän informationskampanj om stroke. Att öka kunskapen om stroke i befolkningen är viktigt för att förbättra överlevnaden i stroke genom att snabbare komma in till sjukhus för akut behandling.

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Front page: Olive trees in Ramallah, the occupied Palestinian Territory. Photo: Johan Hultegård.

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Appendix 1 – Questionnaire

Questionnaire – Stroke risk factors and symptoms

When there are several alternatives - please circle the alternative which matches you best.

1. **How old are you?** _____
2. **What is your gender?** Male Female
3. **What is your nationality?** _____
4. **What is your highest completed education level?**

   No education Obligatory school Secondary school University

5. **Do you smoke?**

   Never smoking Smoked, but stopped Smoking

6. **Do you know any risk factors for stroke? Please name 4 factors or less below, the most important factor first and the least important factor last.**

   1. _____
   2. _____
   3. _____
   4. _____

7. **Do you know any typical stroke symptoms? Please name 4 signs or less below.**

   1. _____
   2. _____
   3. _____
   4. _____

Thank you for participating!

Appendix 2 – Protocol

Check-list for questions stroke patients **Identification no: _____**

Time to hospital: Age:

Gender: Heredity CVA:

Previous diagnoses

Previous TIA/stroke: Previous CAD:

Atrial fibrillation: Smoking:

Diabetes: Hypertension:

BMI: Hyperlipidaemia:

Treatment:

Status

Symptoms day 1:

NIHSS: Orientation:

Nystagmus/eye movements: Facial motoric funct.:

Motoric funct.: Finger-nose:

Heel-knee: Sensibility:

Verbal communication: Dysarthria/dysphasia:

Neglect:

Hearing: Romberg:

Uvula deviation: Visual field, pupillary react.:

Diadochokinesia: Babinski:

Finger play: Reflexes:

Heart ausc: BP Day 1: BP Day 2:

P-glucose:

Assessment and follow-ups

Diagnosis: Diagnostics:

Treatment: Active treatment start:

Rehabilitation: Follow-up:

Examination day: Discharge day: