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Stroke Awareness in Luxemburg: Deficit Concerning Symptoms and Risk Factors

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ABSTRACT

BACKGROUND: Awareness of stroke risk factors is important for stroke prevention. Knowledge of stroke symptoms and awareness regarding the necessity of seeking urgent stroke treatment are vital to provide rapid admission to a stroke unit. Data on this specific knowledge in Luxemburg are lacking.

METHODS: We investigated 420 patients from the Department of Neurology and their relatives using a questionnaire. There were 44% men and 56% women; 25% were immigrants and 75% Luxemburgish nationals; 13% already had had a stroke or transient ischemic attack (TIA); and the mean age was 55 years ranging from 18 to 87 years.

RESULTS: A total of 88% of participants knew that a stroke occurs in the head/brain. In all, 10% of participants did not know any symptom of a stroke. The most frequently quoted symptoms (>15%) were paralysis/weakness (36%), speech disorders (32%), cranial nerve deficit (16%), vertigo (15%), and visual disorders (15%). Sensory deficits were mentioned by only 4% of patients. Known risk factors (>15%) were smoking (40%), hypertension (32%), alcohol (32%), poor nutrition (28%), high cholesterol (26%), stress (23%), and lack of exercise (19%). Age (4%), diabetes (6%), carotid stenosis (2%), and heart disease (1%) were less frequently known. In all, 11% of participants did not know any risk factor of a stroke. A total of 89% of participants would correctly call the 112 (emergency phone number). The following groups were better informed: Luxemburgish nationals, younger people, and participants with higher education level. Stroke/TIA patients were better informed concerning stroke symptoms, but unfortunately not concerning how to react in the case of a stroke. There was no relevant gender difference.

DISCUSSION: Although most of the participants knew what to do in the case of a stroke, they did not know the relevant stroke symptoms and risk factors. Future campaigns should therefore focus on risk factors and symptoms, and should address immigrants, elderly persons, less-educated persons, and patients who had already suffered a stroke/TIA.

KEYWORDS: stroke, awareness, symptoms, risk factors

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Introduction

Stroke is the third leading cause of death and the most common cause of acquired handicap. Therefore, stroke has a major medical, social, and economic impact.[1–3] Stroke is a neurological emergency that warrants immediate admission to a stroke unit, where a dedicated team offers state-of-the-art diagnostic and therapeutic measures. On a stroke unit, the diagnosis of stroke is confirmed, and – if possible – a blocked artery can rapidly be recanalized either by intravenous or arterial thrombolysis, or mechanically.[4] Stroke units reduce death and disability by 18%.[5] The faster the recanalization started, the better the outcome.[6]

Rapid recognition of and response to stroke symptoms are vital for both the treatment of stroke and avoidance of

stroke risk factors. These are paramount for both primary and secondary stroke preventions.

International data on knowledge of stroke symptoms, necessity of calling the emergency phone number, and risk factors from numerous countries are established, with the exception of Luxemburg.[7–14] Prevalence of stroke is comparable to the surrounding countries; however, despite its economic wealth, Luxemburg has a relatively high in-hospital stroke mortality within Europe.[15] A lack of knowledge concerning stroke symptoms and concerning the necessity to dial the emergency phone number may be reasons for this.

There is evidence that knowledge of stroke risk factors and of stroke warning signs, and the necessity to call emergency care improve the following educational campaigns.[16,17] Mass media campaigns can be effective but require sustained funding and ability to target high-risk subgroups.[18]

In this study, we wanted to assess the knowledge on stroke symptoms and on the necessity to call the emergency phone number in Luxemburg to detect subgroups that might most benefit from information campaigns, and to identify information on stroke that is particularly needed.

Methods

Subjects. We investigated 420 in- and outpatients of our *Department of Neurology* and accompanying relatives. There were 56% women. The mean age was 55 years ranging from 18 to 91 years. In all, 75% of participants were from Luxemburg or had immigrated to Luxemburg before primary school; the remaining had attended primary school in another country and are referred to as immigrants. A total of 29% of participants had finished primary school, 41% a technical high school, and 30% grammar school. In all, 13% of participants had already suffered a stroke/TIA. Overall, 79% of participants lived in a family or with a partner, 20% lived alone, and only 1% lived in a nursing home. The participants signed an informed consent form, and the research complied with the principles of the Declaration of Helsinki. The study was approved by the local ethics committee and notified to the national data protection commission.

Questionnaire. The interview lasted 5–15 minutes. We used a modified questionnaire already used by Müller-Nordhorn et al.[13] and Weltermann et al.[14] The following questions were asked: Which part of the body is affected in stroke? Which stroke symptoms are you aware of? Which stroke risk factors are you aware of? What would you do in case of a stroke? Whom would you contact in the case of stroke? When should stroke therapy ideally be started? Where did you get your knowledge about stroke? Have you suffered a stroke yourself? Are you a relative of a stroke patient? The answers were free. German or French versions were used depending on the preferred language of the participants.

Statistics. The statistics were performed at the Institute of Medical Mathematics and Biomathematics of our university using a Microsoft Office Access database (2003) and SPSS for Windows release 15.0.1 (Chicago, USA). We give all the values above 5% and interesting values below 5%. Continuous values were tested for normal distribution using the Kolmogorov–Smirnov test. Because the samples are not normally distributed, the non-parametric Wilcoxon test was used to compare the differences between two dependent groups. The Chi-squared test following Pearson and the Fisher tests were used to compare the relationships between two categorical variables. A P-value of <0.05 was considered statistically significant. We carefully investigated the knowledge of the most important symptoms (motor, sensory, vision, and speech disorder) used in our national emergency medical services. Headache and rotational vertigo were considered weaker indicators of stroke. We also investigated the knowledge of the most important risk factors for stroke (besides age): arterial hypertension, lack of physical activity, overweight, blood lipids/cholesterol, smoking, and poor nutrition.[19,20]

Results

In all the 420 subjects, all the questions were answered.

Localization of a stroke. In all, 88% of the participants knew that a stroke occurs in the brain/head, 9% thought in a half of the body, 4% thought in the heart, and 1% thought everywhere in the body.

Symptoms of a stroke. Table 1 gives the main symptoms of stroke mentioned by the participants up to the items given by at least 4% of participants and classical symptoms if mentioned by less than 4% of participants. Sudden onset of symptoms was not mentioned at all, and hemiparesis only in 13.6% of participants.

Risk factors for stroke. Table 2 gives the main risk factors of stroke mentioned by the participants up to the items given by at least 4% of participants and classical risk factors if mentioned by less than 4% of participants.

Interestingly, previous stroke was not mentioned to be a risk factor. Carotid stenosis was only mentioned by 1.7% of participants and heart disease by 1.2% of participants, respectively.

Behavior in case of an acute stroke. 76.4% knew that they had to be admitted to a hospital in case of an acute stroke, only 7.9% would seek help from their general practitioner, 6.7% would put the patient into a stable lateral position, 5.5% did not know, 4% would deliver first aid, 2.4% would try to calm the patient, and 1.9% would try to keep the airways open. 89% would call the European emergency number (112), 73.4% knew that stroke therapy should be started immediately. 15.8% did not know when stroke therapy should be started.

Differences between groups in relation to desired answers. Table 3 gives the results of the main symptoms and risk factors in subgroups.

We also tested for relationships between groups using the Chi-squared test. We only found two significant interactions: women had a lower education level than men (only 63% had attended a technical school or a grammar school, whereas

Table 1. Main symptoms of stroke mentioned by the participants up to the items given by at least 4% and classical symptoms if mentioned by less than 4%.

SYMPTOM	PERCENTAGE OF PARTICIPANTS MENTIONING THIS SYMPTOM
Paralysis, weakness	35.5%
Speech disorder	32.1%
Cranial nerve symptoms other than visual (mainly facial nerve palsy)	15.7%
Vertigo	15.2%
Vision disorder	15.0%
Loss of consciousness	14.1%
Headache	12.9%
Disorientation	11.2%
I do not know	10.2%
Nausea/Vomiting	9.1%
Pain	5.5%
Memory loss	5.2%
Sensory symptoms	5.8%
Death	1.9%
Double vision	1.4%

81% of the men had done so, $P = 0.001$), and people who had already suffered a stroke/TIA were more frequent in the older group (22% in the group ≥ 70 years, as opposed to 10% in the group <70 years, $P = 0.004$).

Where does the knowledge on stroke come from?

Table 2. Main risk factors of stroke mentioned by the participants up to the items given by at least 4% and classical risk factors if mentioned by less than 4%.

SYMPTOM	PERCENTAGE OF PARTICIPANTS MENTIONING THIS SYMPTOM
Smoking	40.2%
Arterial hypertension	32.4%
Alcohol	32.1%
Nutrition	27.6%
Cholesterol	26.4%
Stress	22.6%
Lack of physical exercise	19.3%
Overweight/Obesity	14.3%
Hyperlipidaemia	13.1%
I do not know	10.5%
Peripheral arteriopathy	7.9%
Hereditary factors	7.1%
Diabetes mellitus	6.2%
Poor circulation	4.3%
Age	3.8%

In all, 41.1% of participants got their knowledge on stroke from the media, 38.1% from family and friends, 23.6% from school, 15.5% from word of mouth, 9.3% from personal experience, 6.2% from brochures, 4.3% considered it to belong to general knowledge, and the same percentage derived their knowledge from personal interest. Only 2.6% of participants got their knowledge from a neurologist and the same percentage from their general practitioner.

Discussion

In our study, we could confirm the results of previous studies in other countries and in Luxemburg. People are aware that they should immediately be admitted to hospital in case of a stroke, but they do not know stroke symptoms and risk factors very well. Elderly participants, participants with lower school level, immigrants, and unfortunately, patients who have already suffered a stroke know less about the disease and should be targeted in campaigns. The inferior knowledge of stroke/TIA patients could partly be explained by their older age.

In the review of 39 studies on stroke awareness by Jones et al, similar tendencies were found.[12] As in our study, in the review, older members of the population, ethnic minority groups, and those with lower levels of education had consistently poor levels of stroke knowledge.[12] Recent studies confirm poorer knowledge in elderly patients and patients with a lower education level,[21,22] and in immigrants.[23] Jones et al also found a strong inverse correlation between age in the group of patients who had already had a stroke and level of information. When asked what action people would take if they thought they were having a stroke, between 53% and 98% of participants replied that they would call the emergency medical services, which is consistent with our study (89%).[12] People generally obtained information about stroke from family and friends rather than from the media in the review by Jones et al.[12] In our study, 41.1% of participants obtained their knowledge on stroke from the media, and 38.1% from family and friends. This may be in relationship with the size and wealth in Luxemburg with a high access to daily newspapers and television.

Campaigns to improve stroke awareness are highly effective. In a study performed in Northern Germany, knowledge of stroke risk factors increased during the campaign for overweight, physical inactivity, old age, and stroke in the family ($P < 0.05$). The knowledge of stroke warning signs was low, although it significantly increased during the campaign ($P < 0.001$) as paresis/weakness (46%) and speech problems (31%) were most frequently named. The majority of respondents indicated that the first action after suffering from stroke should be calling emergency care (74% before vs. 84% after campaign, $P < 0.001$).[17] In a recent review on public education campaigns by Rasura et al, 22 intervention studies and 5 web-based campaigns were included. Most interventions proved partially effective, namely in terms of gender preference (women). Mass media campaigns can be effective but require

Table 3. Differences between groups. The following groups were better informed: Luxemburgers (6 items), younger people (8 items), and participants with higher education level (9 items). Stroke patients knew better stroke symptoms (1 item), but unfortunately did not know better what to do in the case of a stroke. There was no clear tendency for gender.

	LUXEMBURGER	IMMIGRANT	*P*	<70A	≥70A	*P*	♂	♀	*P*	NO LYCÉE	LYCÉE	*P*	STROKE	NO STROKE	*P*	ALL
Localisation of stroke																
Head/brain	90	83	n.s.	90	82	n.s.	87	89	n.s.	**82**	**90**	**0.023**	80	89	n.s.	88
Symptoms																
Paralysis, weakness	38	35	n.s.	37	30	n.s.	31	39	n.s.	33	36	n.s.	35	36	n.s	36
Speech disorder	**75**	**25**	**0.009**	34	25	n.s.	**25**	**37**	**0.009**	29	33	n.s.			n.s.	32
Vision disorder	17	15	n.s.	17	8	**0.037**	13	17	n.s.	**7**	**19**	**0.002**	16	10	n.s.	15
Hemiparesis	15	11	n.s.	14	13	n.s.	14	13	n.s.	12	14	n.s.	15	13	n.s.	14
Sensory symptoms	5	9	n.s.	7	5	n.s.	7	5	n.s.	2	5	n.s.	**11**	**3**	**0.006**	6
I do not know	9	13	n.s.	**8**	**16**	**0.018**	9	12	n.s.	13	9	n.s.	9	10	n.s.	11
Risk factors																
Arterial hypertension	33	30	n.s.	32	34	n.s.	**25**	**37**	**0.007**	31	33	n.s.	44	31	n.s.	32
Lack of exercise	20	16	n.s.	**23**	**7**	**0.001**	**25**	**15**	**0.010**	**11**	**23**	**0.008**	**9**	**21**	**0.040**	19
Overweight	16	10	n.s.	**17**	**6**	**0.010**	**10**	**17**	**0.037**	9	17	0.044	7	15	n.s.	14
Cholesterol	27	25	n.s.	28	26	n.s.	23	29	n.s.	28	26	n.s.	18	28	n.s.	26
Hyperlipidemia	13	13	n.s.	13	14	n.s.	10	15	n.s.	15	12	n.s.	9	14	n.s.	13
Smoking	42	35	n.s.	**46**	**21**	**0.001**	44	37	n.s.	**23**	**48**	**0.001**	**42**	**25**	**0.016**	40
Poor nutrition	30	21	n.s.	30	20	n.s.	28	28	n.s.	29	71	0.001	22	29	n.s.	28
I do not know	**8**	**17**	**0.010**	**6**	**25**	**0.001**	12	9	n.s.	**20**	**6**	**0.001**	13	10	n.s.	11
Behaviour in case of stroke																
Immediately to hospital	**79**	**68**	**0.017**	**80**	**64**	**0.017**	75	78	n.s.	**70**	**79**	**0.045**	**60**	**79**	**0.003**	76
Call GP	**5**	**11**	**0.045**	**5**	**15**	**0.002**	7	7	n.s.	11	5	n.s.	11	6	n.s.	7
I do not know	**4**	**11**	**0.002**	6	5	n.s.	7	4	n.s.	**9**	**4**	**0.044**	11	5	n.s.	6

sustained funding. Three community-based participatory stroke promotion interventions proved partially effective. Web-based campaigns are efficient in reaching a large number of people but tend to attract a selected population.[18] For Luxemburg, a practical issue of our study would be to include information in Portuguese as 16% of the populations are of Portuguese origin. Furthermore, in the stroke unit, patients should be better informed on their disease.

The study was limited to people attending neurological clinics and their relatives. Corrections were not made for subgroups; response bias may influence results and may lead to an overestimation of knowledge as recruited participants may be more interested in health issues.[24]

Conclusion

Our study confirms previous results on stroke awareness in other populations: people know that they should immediately be admitted to hospital in case of a stroke, but they do not know stroke symptoms and risk factors very well. These results will help to better plan and target public education campaigns.

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Author Contributions

Conceived and designed the experiments: DWD, JS, RM, NO. Analyzed the data: DWD, JS, RM, NO. Wrote the first draft of the manuscript: DWD. Contributed to the writing of the manuscript: DWD, JS, RM, NO. Agree with manuscript results and conclusions: DWD, JS, RM, NO. Jointly developed the structure and arguments for the paper: DWD, JS, RM, NO. Made critical revisions and approved final version: DWD, JS, RM, NO. All authors reviewed and approved of the final manuscript.

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