A cross-sectional survey questionnaire-based study

Knowledge of stroke risk factors and warning signs among transient ischaemic attack / stroke survivors in a local Swiss population

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Summary

AIMS: To ascertain the degree of awareness of stroke risk factors, response in the case of symptoms, as well as the knowledge of stroke treatments in transient ischaemic attack / stroke survivors in a local bilingual setting.

METHODS: A cross-sectional survey questionnaire-based study using a validated stroke awareness questionnaire. Enrolment was over 6 months including patients who had suffered a transient ischaemic attack (TIA) or a stroke.

RESULTS: Sixty-nine patients were included, of whom 35% (n = 24) correctly defined a TIA and only 29% (n = 20) considered a TIA to be equally serious as a stroke. There was a statistically significant positive relationship (p = 0.006, 95% confidence interval [CI] 0.1–0.53, r = 0.3) between interpretation of stroke and TIA as a serious event. Thirty-nine (56.5%) of the patients were able to correctly identify a minimum of three stroke symptoms and 47.8% (n = 32) patients stated that they would call an ambulance immediately at symptom onset. The decision to call an ambulance was significantly associated with a good knowledge of stroke risk factors (p = 0.03, 95% C: 1.09–9.92) and stroke therapies (p = 0.05, 95% CI 0.99–7.36). Twenty-six (37%) of the patients were able to cite three or more acute stroke therapies or secondary treatment medications and only 8.7% (n = 6) were able to name thrombolysis as being one of these therapies.

CONCLUSIONS: Even in a population of TIA/stroke survivors, the overall knowledge of stroke risk factors and treatments significantly influences the immediate response to stroke symptoms. Patients who recognise a stroke as a serious medical emergency are more likely to consider a TIA to be the same. Knowledge of acute stroke treatments should be emphasised in future public health programmes.

Introduction

Stroke is responsible for a significant amount of morbidity and mortality worldwide [1]. Improving knowledge of stroke symptoms and risk factors within the community is crucial to reduce time to consultation. Stroke knowledge varies across different countries highlighting the need for country specific and culturally appropriate programs [1–3].

The present study included patients treated at a stroke unit in the city of Biel within the canton of Bern in Switzerland. It aimed at ascertaining the level of awareness in TIA/stroke survivors in a local bilingual setting regarding stroke symptoms and response, risk factors and treatments available in the aftermath of a stroke. This information was then used to identify features associated with a correct reaction to immediately call an ambulance after the onset of stroke symptoms.

Methods

Study design and participants

We conducted a cross-sectional survey questionnaire study based on the validated Irish stroke awareness questionnaire by Dr Anne Hickey and colleagues [1]. The questionnaire was translated into French and German with adaptations for the Swiss epidemiological context. Both translations were validated by native speakers and some local dialectal terms were indicated as synonyms in the questionnaire, for example "Streifung" for transient ischaemic attack (TIA). Patients hospitalised in the stroke unit or consulting ambulatory services after having suffered a TIA or a stroke from January to June 2021 were included. A TIA was defined using the tissue-based definition whenever magnetic resonance imaging (MRI) had been performed. For those patients who had a computed tomography (CT) scan without follow-up imaging showing a lesion, the time-based definition was used. All patients had already been informed by the treating physician about

their diagnosis and were informed about the risk factors and causes of stroke while still in the stroke unit. If deemed necessary, physiotherapy, speech therapy, and/or occupational therapy had already been provided. Patients with severe pre-stroke or post-stroke neurological deficits (for example severe aphasia and dysarthria, severe hemiparesis, severe cognitive deficits) with a modified Rankin scale score above 2 were excluded from the study. We excluded patients not fluent in either German or French but did not specifically exclude any patient based on their education level. All patients fulfilling these criteria had the necessary basic reading skills to complete the questionnaire during the study period. The questionnaire was administered only by the principal investigator.

Setting

Biel is a town in the canton of Bern, Switzerland, with a population of around 106,000 people. It is situated on the border between the French- and German-speaking parts of Switzerland and is extensively bilingual. The Biel Regional Hospital is a multispecialty public hospital with a stroke unit and several rehabilitation facilities including physiotherapy, speech therapy, occupational and neuropsychological services. Patients also receive educational brochures regarding stroke risk factors and other relevant information during their stay.

A study in the city of Biel could help to identify the level of awareness in both French- and German-speaking populations simultaneously. This is particularly interesting in Switzerland, which has four national languages (French, German, Italian and Romansh), and also because other studies evaluating stroke awareness were undertaken predominantly in German-speaking populations in Switzerland [2–4].

Sample size

Our goal was to include a minimum of 90 patients, on the basis of a total sample size of about 200 patients with an associated standard error of ±7.5% at a 95% confidence interval (CI).

We were able to include 69 patients over a limited time period from January to June 2021. All data were collected and stored in an entirely anonymised manner.

Measures

Demographic information

Age, gender, marital status, residential location, type of insurance and interest or willingness to be contacted in the event of any future stroke/TIA prevention programmes was recorded in all cases.

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Knowledge of warning stroke symptoms and response

A good awareness of stroke symptoms was defined as the ability to correctly identify three or more stroke symptoms. The response to call an ambulance immediately after the onset of stroke symptoms was defined as the only correct response.

Knowledge of stroke risk factors and post-stroke treatments

A good knowledge of stroke risk factors and treatments was defined as the ability to identity three risk factors. A good awareness of acute stroke treatments and secondary prevention was defined as being able to cite at least three or more of the same. Knowledge of two or more therapies (including physiotherapy, ergotherapy, speech therapy and neuropsychological treatment) was considered to be adequate.

Statistical analysis

Descriptive and comparative analyses were conducted using SPSS statistical software, version 25. Demographic patient characteristics were documented as mean (standard deviation [SD]) or median (interquartile range [IQR]) values depending on whether the variable was normally distributed or not. Chi-square and Fischer exact tests using a p-value significance level of 0.05 were used to compare relevant nominal variables. Spearman's test of association was performed to identify any association between chosen ordinal variables. A correlation coefficient r-value of less than or equal to 0.3 was considered to be a weak correlation.

Ethics

The study was exempted from the requirement of formal ethics approval by the local cantonal authorities from the canton of Berne, Switzerland. We also gained approval to use the stroke awareness questionnaire from the first author (Dr Anne Hickey) of the original publication of the Irish Stroke Awareness Questionnaire [1].

Results

A total of 69 patients (39 women) were included in the study. The mean age of participants was 68 years (± SD 11.68) with 57.9% (n = 40) more than 65 years of age (table 1). Only 35% (n = 24) of patients knew the correct interpretation of a TIA. Seventy percent (n = 47) of patients felt that having a stroke was a very serious medical emergency whereas only 29% (n = 20) considered a TIA to be equally serious. Analysis using Spearman's correlation coefficient (r = 0.3) indicated a statistically signifi-

cant weak linear positive relationship (p = 0.006, 95%CI 0.1–0.53) between interpretation of stroke and TIA as a serious event. There was no statistically significant association between correct knowledge of the meaning of a TIA and a patient's age (p = 0.2, odds ratio [OR] 2, 95%CI 0.69–5.80, 69.5% aged more than 65) or gender (p = 0.4,

Table 1: Demographic features of survey patients.

Demographic features	Participants	
	Number	%
Age (mean ±SD 68 ± 11.7		
>65	40	57.9
<65	29	42.0
Gender		
Male	30	43.5
Female	39	56.5
Residential location		
City	16	24.2
Town	22	33.3
Village	26	39.4
Rural	2	3
Marital Status		
Single	7	10.1
Partnership	2	2.9
Married	51	73.9
Divorced	7	10.1
Widowed	2	2.9
Insurance		
General	67	97.1
Private	2	2.9
Willingness to be recontacted		
Yes	46	66.7
No	23	33.3

Table 2: Association of the decision to call an ambulance with awareness of stroke symptoms and therapies.

Call an ambulance at the onset of stroke symptoms			p-value (Pearson chi square test)	Odds ratio (95% CI)
	Knowledge of three or more stroke symptoms		0.06	2.59 (0.96–6.95)
	Yes	No		
Yes	22	10		
No/other	17	20		
	Knowledge of three or more stroke risk factors		0.03*	3.3 (1.09–9.92)
	Yes	No		
Yes	26 (81%)	6 (18%)		
No/other	21 (56%)	16 (43%)		
	Knowledge of three or more stroke therapies (acute or secondary prevention)		0.05*	2.7 (0.99–7.36)
	Yes	No		
Yes	16 (50%)	16 (50%)		
No/other	10 (27%)	27 (73%)		

OR 0.68, 95%CI 0.25–1.89, 62.5% female). Overall, 52.9% of patients felt that more women were likely to die from a stroke irrespective of age.

Personal risk factor profile

Twenty seven patients (39.1%=) had a previous history of a stroke or TIA and in 77% (n = 21) of cases the events occurred in the last 12 months. Atrial fibrillation was verified from prior medical records. The other common risk factors included hypertension and hypercholesterolaemia (fig. 1).

Knowledge of stroke risk factors and warning symptoms

Forty-seven patients (68%) were able to identify three or more stroke risk factors. Smoking (n = 34, 49.3%), hypercholesterolaemia (n = 29, 42%) and hypertension (n = 28, 40.6%) were the three most cited stroke-related risk factors identified by patients included in the study. The commonest reported stroke warning symptom, cited by 88% (n = 61) of patients, was weakness of the face or one side of the body, and slurred speech was cited by 65% of patients (fig. 2).

Only 16% claimed to have seen television or newspaper advertisements or information regarding stroke warning signs recently. Thirty-nine patients (56.5%) were able to identify a minimum of three stroke symptoms. A good knowledge of stroke symptoms was not associated with the age (p = 0.7, 60% older than 65 and 39% younger than 65, OR 1.2, 95% CI 0.44–3.09) or the gender of the individual (p = 0.6, 58% female, OR 0.79, 95% CI 0.30–2.08). The knowledge of stroke symptoms and risk factors did not differ significantly between patients who had a first-ever stroke / TIA as compared with patients who had a previous TIA or stroke, including the subgroup of patients who had a TIA or stroke in the last 12 months (p = 0.56 for stroke symptoms and p = 0.48 for stroke risk factors using the Fischer exact test) (fig. 3).

Response to stroke

Thirty-two patients (47.8%) responded that they would call an ambulance immediately in the case of stroke symptoms (fig. 4).

The choice to call an ambulance was not associated with the age (53% younger than 65 and 47% older than 65, p = 0.06, OR: 0.38, 95% CI 0.14–-1.05) or the gender (p = 0.3, 62% females, 37.5% males, OR 0.6, 95% CI 0.24-1.66) of the individual. The decision to call an ambulance immediately after stroke-like symptoms was significantly associated with a good knowledge of stroke risk factors (p = 0.03, 95% CI 1.09–9.92) and stroke therapies (p = 0.05, 95% CI 0.99–7.36) as shown in table 2.

Awareness of acute stroke treatments, secondary prevention and post-stroke therapies

Twenty-six patients (37%) were able to cite three or more acute stroke therapies or secondary treatment medications. Although 86.9% (n = 60) of patients affirmatively stated that acute treatments could reduce stroke severity, only 8.7% (n = 6) were able to name thrombolysis as being one of these therapies. Only 22% of patients had knowledge of two or more post-stroke therapies (inclusive of physiotherapy, ergotherapy,

speech therapy and neuropsychological therapy). The least well-known therapy was ergotherapy (fig. 5).

Discussion

Stroke is responsible for a significant amount of morbidity and mortality worldwide [5]. Time is brain and the faster a patient can get to a hospital and get appropriate medication can significantly influence long term morbidity and mortality [6]. In spite of global
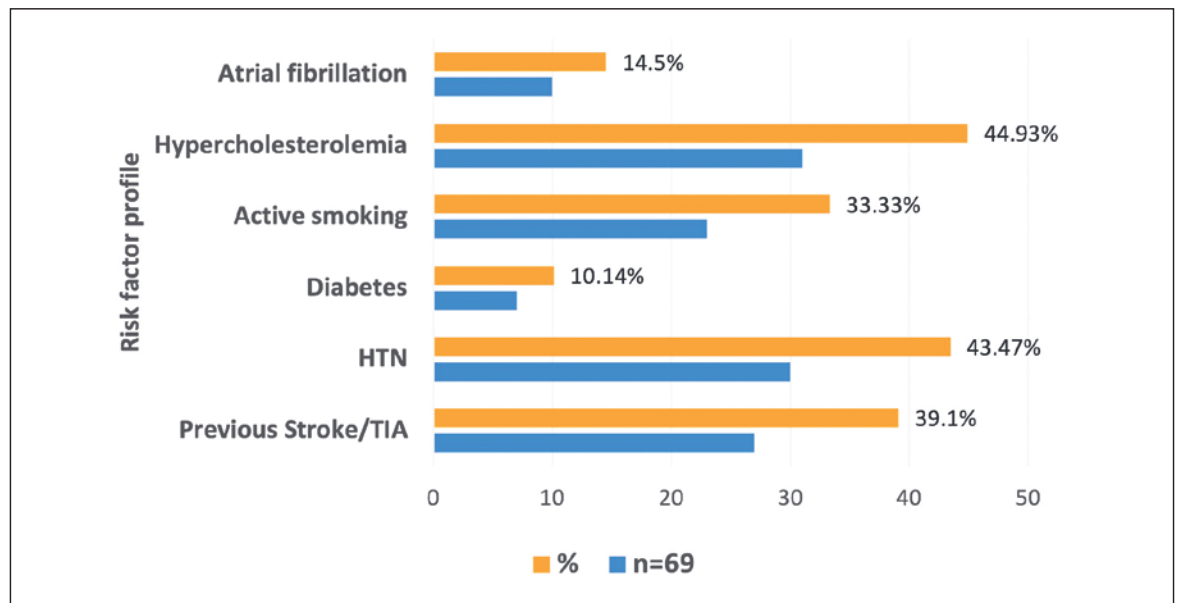
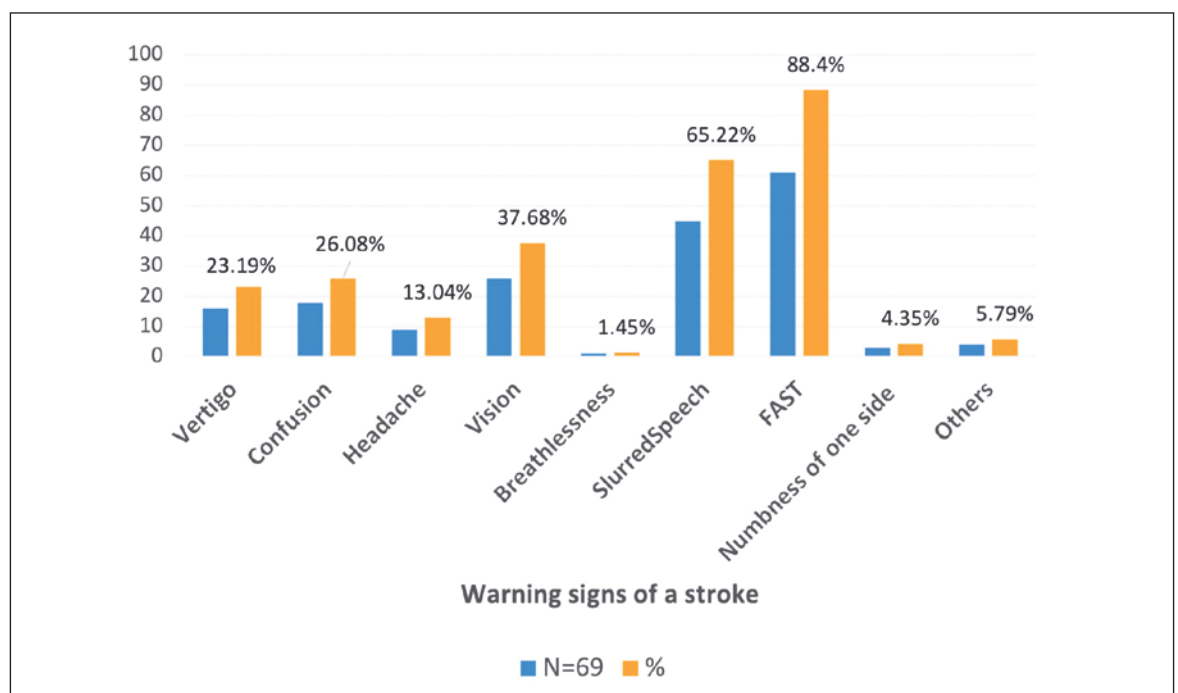**Figure 1:** Risk factor profile of survey patients.

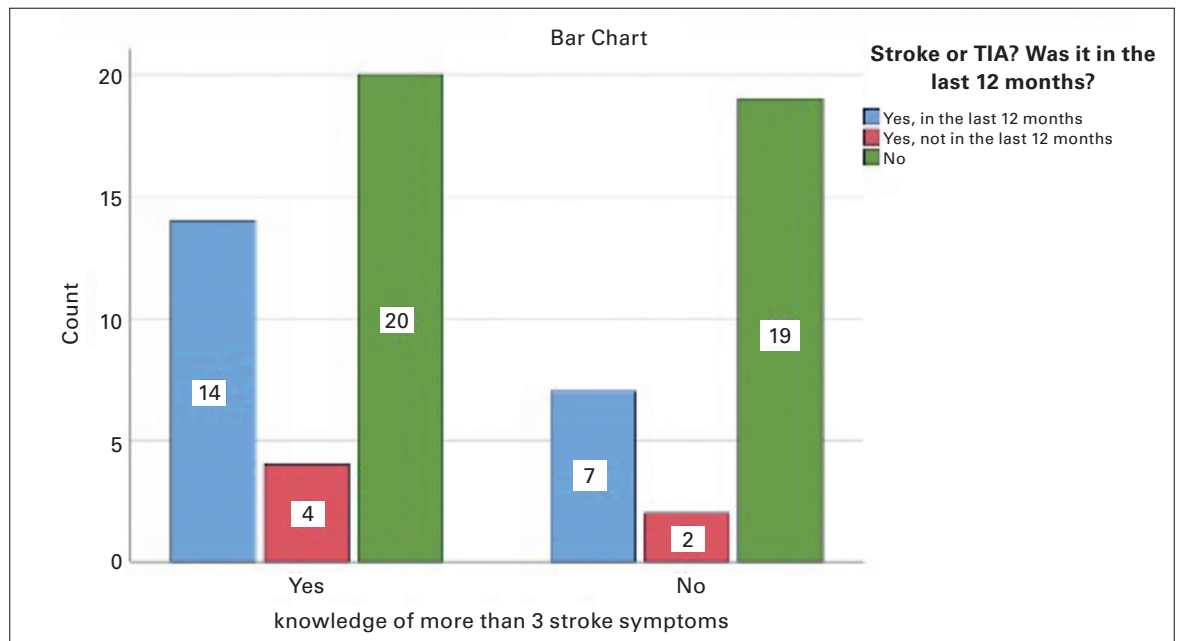**Figure 2:** Warning signs of a stroke as cited by survey participants.

Figure 3: Comparison of knowledge of stroke symptoms in different patient sub-groups.

efforts to disseminate information regarding the vital importance of time in acute stroke treatment, a very small percentage of stroke patients consult the emergency services within an hour of onset of symptoms [7 , 8]. The degree of awareness as regards to stroke in adults in Switzerland has not been adequately studied and direct comparison with studies undertaken in other industrialised European countries is not entirely satisfactory [9–12]. A register-based study in children within the Swiss Neuropaediatric Stroke registry showed that only one third of children could be diagnosed with a stroke within the first 6 hours [3].

Stroke unit services

The creation of specialised stroke units has helped to reduce the burden of stroke-related disability across the entire spectrum of stroke severity [13]. In order to maintain an appropriate level of care, stroke units undergo certification procedures every few years. In addition, internal auditing measures help in maintaining a continuity of sustained quality stroke care [14]. We aimed to evaluate the level of awareness among patients who had been recently admitted to the stroke unit owing to a stroke or a TIA.

Knowledge of stroke symptoms and response to stroke

Europe will see a sharp rise in the percentage of elderly persons between 2017 and 2050 with an estimated increase of about 35% [15]. Paradoxically, although older

people are at a greater risk for strokes and TIAs the level of awareness is especially low in this subgroup [16]. Consequently, public health campaigns need to be designed to improve stroke awareness in this age group. Detection of stroke warning signs lies at the very beginning of the stroke chain of survival and stroke care cannot be improved without concentrating on this aspect [17, 18].

In an isolated closed-ended questionnaire-based study conducted among inhabitants of the canton of Bern, Switzerland, the overall level of stroke knowledge was determined to be good (64.7%) but only a small fraction of patients (8.3%) were able to correctly define a TIA [2]. In a telephone survey using the Stroke awareness questionnaire conducted in the general Irish population to evaluate changes in population knowledge following a media-based stroke awareness campaign only 11.4% could give a correct definition of a TIA [19]. Thirty-five percent of patients in our study were able to correctly define a TIA and were considered to have a good knowledge of stroke symptoms in 56% of cases. In our study, 47.8% of patients said that they would call an ambulance immediately in the case of stroke symptoms, as compared with 64.4% in the Bernese study [2]. A Spanish study conducted in post-stroke patients found that 56.5% were able to identify a minimum of two warning signs of a stroke [20]. TIA was identified as a serious medical event seen by only 29% of our study participants. Individuals who considered a stroke to be a serious medical emergency were more likely to do the
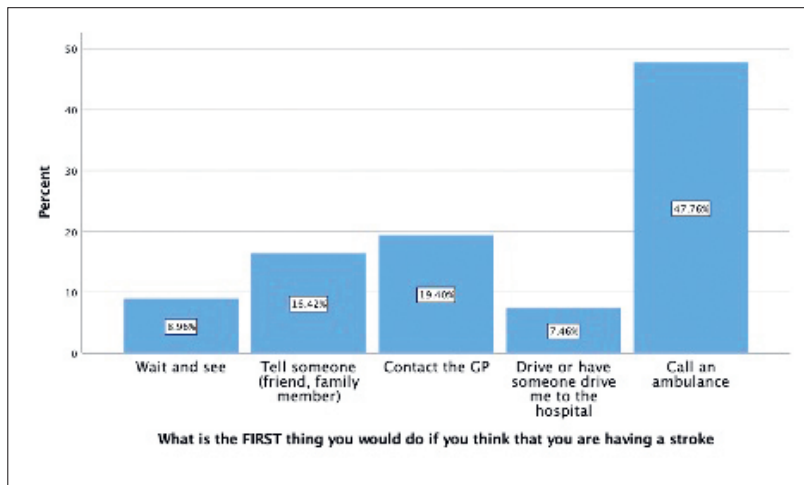
Figure 4: Response to the question: What is the first thing you would do if you think you are having a stroke?

same for a TIA. In the Bernese study, only 2.8% of people from the general population considered a TIA to be a severe potentially harmful disease requiring immediate medical attention [2].

Stroke awareness campaigns need to address both individuals who might experience stroke symptoms as well as those who might be witness to a stroke and sometimes also family physicians to optimise recognition of and intervention for stroke [21]. Although we did not specifically address the question of having a relative with a stroke in our study, the study conducted in a Bernese Swiss TIA/stroke survivor population found that being a woman, advancing age and having an afflicted relative were associated with a good knowledge of stroke warning signs. In our study a good knowledge of stroke symptoms and the need to call an ambulance were not associated with the age or sex of the individual [2]
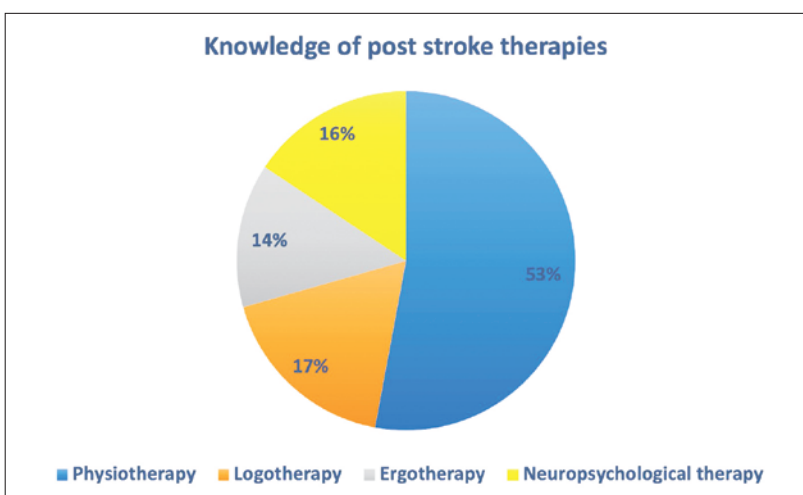

Figure 5: Knowledge of post-stroke therapies.

Knowledge of stroke risk factors and prevention

Appropriate secondary prevention focused on modifiable cardiovascular risk factors can diminish the risk of a recurrent cerebrovascular event by as much as 80% [22–24]. A large majority of Swiss people have a minimum of one or two vascular risk factors, with hypertension and overweight being the most frequent [25]. In a questionnaire-based follow up study administered to patients in the outpatient setting at a university hospital clinic in French-speaking Switzerland 3 months after their stroke, the level of awareness of cerebrovascular risk factors and their pertinence to recurrent stroke prevention was found to be suboptimal [26]. In our study patients the three most common risk factors were hypertension, hypercholesterolaemia and a previous history of stroke or TIA. Thus, simply highlighting the importance of hypertension as a risk factor for stroke could enable faster detection and better compliance with treatment.

Using a more stringent definition requiring correctly naming five or more stroke risk factors, the Bernese stroke awareness study identified 6.4% individuals who fulfilled the criterion [2]. Their knowledge was associated with their level of education, but not with age, sex or having an afflicted relative or friend. In our study including only post stroke or TIA patients and using a more lenient definition requiring identification of three or more risk factors 68% of patients fulfilled the criterion of a good knowledge of stroke risk factors.

Knowledge of acute stroke treatments

Acute stroke care treatments have evolved significantly in the last few years. In consideration of the time-dependent benefit of recanalisation therapies in patients with acute ischaemic stroke, acute care systems need to constantly strive to reduce the time to start of treatment before the ischaemic injury is beyond repair [27,28]. The overall knowledge of acute stroke therapies or secondary treatments was poor in our study, with only a small percentage of patients (8.7%) being able to cite thrombolysis as an acute stroke therapy. In a Norwegian study including patients admitted to the stroke unit 6.9% were able to name "intravenous thrombolytic therapy / clot-dissolving treatment" as a treatment option [29]. In an Irish population-based survey conducted after a media campaign for stroke awareness less than 5% of the participants identified thrombolysis an emergency treatment for stroke [19]. In keeping with the prevailing lack of sufficient knowledge of stroke therapies, future public health programmes need to improve focus this [30–33].

Factors influencing response to stroke

We found that the response to immediately call an ambulance at the onset of stroke like symptoms was significantly associated with a good knowledge of stroke risk factors and stroke therapies. In the Irish telephone-based survey using the stroke awareness questionnaire participants who knew of two or more risk factors or warning signs of a stroke were more likely to call an ambulance. Other factors found to influence the intended response to stroke in the Irish study included age under 65 years, having seen relevant advertisements on television and pre-existing vascular disease [19]. In a study conducted in the Czech Republic, calling an ambulance was related to the identification of a stroke as a serious and treatable medical emergency and not to the recognition of warning symptoms [34].

Knowledge of post-stroke therapies

Highly effective therapies such as thrombolysis and thrombectomy have considerably helped in improved post stroke outcome [35–38]. Furthermore a majority of patients would need neurorehabilitation services in spite of receiving thrombolysis or thrombectomy [39]. In our study only 22% of patients were able to name two or more post stroke rehabilitation therapies. Lack of knowledge about stroke rehabilitation services is a major barrier to accessing these services [40, 41].

Measures for the future

Only 16% of patients in our study stated that they had received information about stroke warning signs from television or newspaper advertisements. This could be explained by the datedness of TV programmes dedicated to the specific subject of stroke warning signs. In the online archives of the German-speaking Swiss broadcasting company (SRF) we detected more relevant television programmes for 2011–15 than for 2016–20 (keyword: "Schlaganfall"). Although in its French-speaking counterpart (RTS) the opposite was true for the same timeframes (keyword: "accident vasculaire cérébral"), there was a general paucity of such programmes. On the other hand, a Canadian study conducted in a urban population in Toronto found that 60% people received information about stroke from a television source [42,43]. Regular evaluation of the effect of public health campaigns can help in identifying key points that need to be put forth on a periodic basis in order to sustainably increase public knowledge taking cultural and regional preferences into consideration.

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Limitations of the study

A drawback in our study was that we included only patients who had suffered a TIA or a stroke and had therefore more recent access to information on stroke prevention and treatment. This survivor population is not representative for the entire population, but it is an interesting finding that even among patients exposed to recent bedside education, the knowledge of TIA or stroke risk factors is often lacking. We were able to include only a limited number of patients due to the finite time available as this study was conducted as a part of a Master thesis project. The study will need to be reproduced on a larger scale to ascertain its applicability in the general population.

Conclusion

Knowledge of stroke risk factors and treatments can significantly influence the immediate response to stroke-like symptoms. Patients who recognise a stroke as a serious medical emergency are likely to consider a TIA in the same light. The knowledge about efficient acute stroke treatments such as thrombolysis and post-stroke therapies seems to be poor in an urban Swiss population. This topic should be especially addressed in future public health programmes as it can help reduce symptom onset to hospital consultation times and thereby improve stroke outcome.

References
You find the complete bibliography in the online version of the article at http://doi.org/10.4414/sanp.2022.w10115.