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Patients' responses to transient ischaemic attack symptoms:

a cross-sectional questionnaire study in Australian general practices

Abstract

Background
Consensus guidelines for transient ischaemic attack (TIA) recommend urgent investigation and management, but delays in management occur and are attributable to patient and health system factors.

Aim
To establish general practice patients' anticipated responses to TIA symptoms, and associations of appropriate responses.

Design and setting
A cross-sectional questionnaire-based study in Australian general practices.

Method
Consecutive patients attending general practices completed questionnaires that contained the Stroke Action Test (STAT) adapted for TIA about demographic, health system use, and stroke risk factors. STAT elicits appropriate or inappropriate anticipated responses to 28 symptom complexes. Anticipated actions in-hours and out-of-hours were elicited. Associations of independent variables with adapted-STAT scores were tested with multiple linear regression.

Results
There were 854 participants (response rate 76.9%). Urgent healthcare-seeking responses to transient neurological symptoms ranged from 96.8% for right-sided weakness with dysphasia to 59.1% for sudden dizziness. Associations of higher adapted-STAT scores were older age, Indigenous status, previous after-hours services use, self-perception of health as poor, and familiarity with a stroke public awareness campaign. A personal or family history of stroke, smoking status, and time of event (in-hours/out-of-hours) were not significantly associated with adapted-STAT scores.

Conclusion
Most general practice attendees expressed intentions to seek health care urgently for most symptoms suggestive of TIA, with highest levels of urgency observed in high stroke-risk scenarios. Intentions were not associated with a number of major risk factors for TIA and might be improved by further educational interventions, either targeted or at population level.

Keywords
attitudes; education; family practice; general practice; health knowledge; stroke; transient ischaemic attack.

INTRODUCTION

Transient ischaemic attack (TIA) confers a high early risk of stroke, with population-based studies without urgent treatment demonstrating an 11% stroke risk during the first 7 days post-TIA.[1] Prompt treatment, however, is effective with a relative risk reduction of 80%.[2] Consequently, clinical practice guidelines recommend urgent assessment and management of TIA.[3–5] Current Australian guidelines[4] advise investigation and initial treatment of TIA within 24 hours for higher-risk episodes and 48 hours for lower-risk episodes.

Delay in assessment after TIA may result from a lack of urgent response by the patient rather than by health services.[6] In a study in the UK where patients mainly attend general practice rather than an emergency department following TIA, 44.4% of people with TIA delayed seeking medical attention for 24 hours or more.[7] Care seeking is also correlated with time of event. Patients may delay presentation at out-of-hours times when their own GP is unavailable, that is, at night and at the weekend.[8]

Thus there is face validity for educating patients about the symptoms of a possible TIA and, concurrently, the need to seek urgent medical attention.

Public education programmes promoting these themes for stroke — 'time is brain', stroke is 'brain attack', and FAST (face, arm, speech, and time)[9–11] — have been running in many countries in recent years. In Australia, the FAST campaign is the principal community stroke-awareness activity and has been promoted by the National Stroke Foundation since 2006. Studies of FAST-based[10,12] and other[13] public stroke awareness campaigns have shown mixed results regarding stroke knowledge and appropriate anticipated action in the event of stroke. Despite numerous national stroke public awareness campaigns in the US, improvement in public knowledge of stroke warning symptoms over the 5 years from 2000 to 2005 was modest.[14] However, such public education programmes are specifically concerned with stroke and do not contain TIA-specific advice, that is, even if the symptoms resolve spontaneously, urgent medical care should be sought.

The aims of the project were to establish the anticipated actions in response to TIA symptoms by patients attending Australian general practices and to identify associations of appropriate anticipated actions, including recalled exposure to a prominent stroke awareness campaign. This study also sought to establish the association between appropriate anticipated actions and the timing of TIA symptoms, that is, whether they occur during or outside the times of routine healthcare provision.

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How this fits in

Transient ischaemic attack (TIA) confers a high early risk of stroke, and urgent investigation and treatment are essential. Previous research suggests that delay in assessment after TIA may result from a lack of urgent response by the patient rather than by health services. This study found that most general practice patients reported intentions to seek health care urgently for most symptoms of TIA, but that these intentions were not associated with patients' risk factors for stroke and TIA. This suggests a role for targeted education of those patients most at risk of stroke and TIA.

METHOD

This was a cross-sectional questionnaire-based GP waiting room study. The setting was the Hunter New England Central Coast Network of Research General Practices (NRGP), covering urban and/or rural areas and diverse socioeconomic status demographics in New South Wales, Australia.

All 16 NRGP practices were invited to participate. Consecutive patients aged >18 presenting to participating practices during three randomly assigned half-day sessions over a 2-week period were invited by reception staff to complete the anonymous questionnaire. This was returned to reception or, via reply-paid envelope, to the study investigators.

The questionnaire elicited demographic data, self-reported health status, medical history (including stroke/TIA), cerebrovascular disease risk factors (smoking, alcohol consumption, self-reported underweight/overweight, and exercise), health service use (GP, GP after-hours, emergency department, or ambulance), and participants' anticipated action in the event of TIA symptoms.

Anticipated action was assessed by means of a modification of the Stroke Action Test (STAT).[15] STAT is a 28-item instrument comprising 21 items eliciting responders' anticipated responses to neurological symptoms that can be caused by stroke, as well as seven items relating to non-stroke symptoms. The non-stroke symptoms represent both urgent and non-urgent medical scenarios.[15] STAT has good content validity, including items from all five groups of warning signs that major US organisations have agreed to use in their public education materials on stroke.[15,16] Internal consistency of STAT is good (α = 0.83).[15]

In the current study, for transient neurological symptoms compatible with TIA rather than persisting symptoms compatible with stroke, it was specified that the symptoms lasted for 15 minutes and had resolved. Also only 20 rather than 21 items were classified as representing TIAs (see Analysis). There were two questionnaire versions, differing only in the instructions for the items comprising STAT. One version elicited responses to symptoms occurring during office hours on a weekday (that is, in-hours) and the other elicited responses to events after-hours (on a Saturday night). The two versions were handed out alternately to potential responders in all participating practices.

Appropriate response to stroke symptoms on STAT is 'call 911 immediately'.[15] Responses considered as appropriate for TIA symptoms in this study, for the

Table 1. Participant demographics

Variable	Response	Percentage (95% CI)
Sex	Male	32.0 (27.1 to 36.9)
Age	Mean (95% CI)	51.1 (47.28 to 54.87)
Marital status	Married or *de facto*	63.6 (58.2 to 69.0)
	Single	18.6 (12.1 to 25.1)
	Divorced or separated	10.4 (8.2 to 12.6)
	Widowed	7.4 (5.1 to 9.7)
Torres Strait Islander	Yes	1.4 (0.4 to 2.3)
Aboriginal	Yes	3.4 (1.4 to 5.4)
Speaks language other than English at home	Yes	8.0 (4.8 to 11.3)
Education	No formal qualifications	8.6 (6.4 to 10.8)
	Year 10 (age 16 years) or equivalent	26.5 (22.8 to 30.1)
	Year 12 (age 18 years) or equivalent	14.9 (11.4 to 18.3)
	Trade or apprenticeship	8.7 (6.6 to 10.9)
	Certificate or diploma	23.8 (20.2 to 27.5)
	University degree	17.5 (12.2 to 22.8)
Exercise, days per week	None	15.3 (12.1 to 18.6)
	1–2 days	30.2 (26.1 to 34.3)
	3–4 days	31.9 (27.3 to 36.5)
	5–6 days	14.4 (11.9 to 16.9)
	7 days	8.2 (6.4 to 9.9)
Smoking	Current smoker	14.4 (10.3 to 18.4)
	Ex-smoker	34.9 (30.3 to 39.4)
	Never smoked	50.8 (44.7 to 56.8)
Alcohol, standard drinks per week	None	42.2 (37.7 to 46.6)
	1–7 drinks	39.4 (36.2 to 42.6)
	8–14 drinks	11.1 (7.0 to 15.2)
	15–28 drinks	6.0 (3.9 to 8.0)
	29 or more drinks	1.3 (0.3 to 2.3)
Attended GP in past 12 months	0–5 GP visits	51.1 (44.0 to 58.2)
	6–10 GP visits	27.8 (23.5 to 32.0)
	>10 GP visits	21.2 (16.8 to 25.6)
Has chronic disease	Yes	40.6 (36.2 to 44.9)
Recalls FAST campaign	Yes	11.3 (8.6 to 13.9)

Table 2. Responses to STAT TIA items in-hours and out-of-hours

Description	Percentage who answered appropriately[a]			
	Total	In-hours	Out-of-hours	χ^2
Sudden trouble seeing in one eye	64.9	66.3	63.6	0.5193
'She suddenly got clumsy; she couldn't even get her keys out of her purse'	78.4	78.8	78.0	0.8409
'While we were watching TV she said she started seeing double. She told me the room was spinning and she felt sick. She grabbed my arm and held on tight. She certainly didn't look drunk'	82.4	83.7	81.1	0.2894
Sudden numbness of the leg, especially on one side	81.4	82.6	80.3	0.5013
Sudden dizziness	59.1	62.9	55.4	0.1092
'It sounded like people were speaking some foreign language for a few minutes. I couldn't understand them, and they didn't seem to understand me either'	73.6	75.2	71.9	0.3395
'I answered the phone and realised I sounded drunk. I couldn't speak clearly no matter how hard I tried. I hadn't had any alcohol'	84.7	85.2	84.3	0.7582
'My left leg started tingling as I sat watching TV. It was strange, almost like my leg was falling asleep. I tried rubbing and shaking my leg to make the problem go away, but it wouldn't'	63.3	64.9	61.7	0.3325
Sudden weakness of the arm, especially on one side	84.1	85.4	82.8	0.2295
'I saw he was trying to eat lunch, but pieces of his sandwich kept falling out of the right side of his mouth'	88.8	89.3	88.3	0.7702
Sudden confusion	75.4	78.9	72.0	0.0437
Sudden dizziness and trouble seeing	80.2	81.2	79.3	0.5576
Sudden trouble understanding	77.0	79.8	74.3	0.1542
'Suddenly I couldn't reach for my purse because I couldn't make my right arm move. I started drooling out of the corner of my mouth. When I tried calling to my husband for help, the words wouldn't come out right'	96.8	96.8	96.9	0.9533
Sudden trouble speaking	84.3	85.3	83.2	0.4209
'I noticed that he kept covering and uncovering his eyes and blinking. He told me, "I can't see".'	91.0	92.0	90.0	0.3679
Sudden weakness of the face, especially on one side	93.7	95.1	92.2	0.1165
Sudden weakness of the arm and face, especially on one side, together with trouble speaking	95.8	96.8	94.9	0.2296
'All of a sudden my right arm wouldn't move'	91.4	92.6	90.3	0.324
Sudden loss of coordination	86.5	86.8	86.2	0.8012

[a]Appropriate responses were if in-hours: 'Call 000 or go to accident and emergency immediately' or 'Call your GP practice immediately and ask for an urgent appointment'; if out-of-hours: 'Call 000 or go to accident and emergency immediately' or 'Call your GP practice or after-hours service immediately'. STAT = Stroke Action Test. TIA = transient ischaemic attack.

in-hours TIA version, were 'Call 000 or go to accident and emergency immediately' or 'Call your GP practice immediately and ask for an urgent appointment'. The instruction stating '000' rather than '911' reflects the Australian emergency call service number. For the weekend after-hours TIA version, the second of the (equally) appropriate responses was 'Call your GP practice or after-hours service immediately'. These responses would enable early assessment and treatment consistent with Australian National Stroke Foundation clinical guidelines for TIA.[4] Coded responses for STAT non-TIA items were as for the original STAT, which were consistent with the medical urgency of the 15-minute scenario presented.

The questionnaire also elicited recall of exposure to the FAST stroke awareness media campaign.

Analysis

Demographic variables were summarised using percentage and 95% confidence intervals.

The significance of the association between in-hours/out-of-hours eliciting of appropriate responses to each STAT TIA item was tested using the Rao–Scott χ^2 test, adjusting for clustering by general practice clinic.

Responses on the adapted-STAT items were scored 1 if appropriate and 0 if not appropriate. A total STAT score was derived by a sum of individual item scores. The principal analysis of the STAT was scored including all 28 items, including non-TIA items, giving a score out of 28. This is the accepted STAT scoring method.[15,17,18] The inclusion of non-stroke items broadens response options and provides a control for social desirability bias.[17,18]

Table 3. Univariate and multiple regression analyses with 28-item STAT total as the outcome

		Simple regression		Multiple regression	
Predictor	**Class**	**Estimate (95% CI)**	***P*-value**	**Estimate (95% CI)**	***P*-value**
Timing of event	Out-of-office hours	Reference			
	During office hours	0.24 (–0.62 to 1.09)	0.596		
Age, years	>65	Reference			
	51–65	–0.09 (–0.97 to 0.79)		–0.74 (–1.71 to 0.23)	0.133
	35–50	–0.62 (–1.25 to 0.01)		–1.06 (–1.94 to –0.19)	0.017
	18–34	–1.49 (–2.42 to –0.56)		–1.79 (–2.9 to –0.68)	0.002
		Overall *P*-value	0.171		
Sex	Female	Reference			
	Male	–0.33 (–1.17 to 0.5)	0.418		
Marital status	Single	Reference			
	Married/partner	0.83 (–0.25 to 1.9)	0.222	0.19 (–1.05 to 1.42)	0.767
RRMA	Other rural centres	Reference			
	Large metropolitan areas	–1.59 (–1.81 to 0.51)			
	Other metropolitan areas	–0.92 (–2.73 to 0.89)			
	Large rural centres	–1.2 (–3.23 to 0.84)			
	Small rural centres	–1.27 (–2.99 to 0.45)			
		Overall *P*-value	0.588		
ATSI	No ATSI heritage	Reference			
	ATSI heritage	1.75 (0.67 to 2.82)	0.028	1.76 (0.56 to 2.95)	0.004
LOTE	No	Reference			
	Yes	–0.2 (–1.48 to 1.08)	0.767		
Educational attainment	University	Reference			
	School to year 12 (age 18 years) or trade certificate	–0.56 (–1.26 to 0.13)			
	No formal qualifications or school to year 10 (age 16 years)	–0.67 (–1.7 to 0.37)			
		Overall *P*-value	0.318		
Exercise, days per week	5–7 days	Reference			
	Up to 4 days	0.44 (–0.3 to 1.19)		0.37 (–0.53 to 1.26)	0.424
	No exercise	0.83 (0.08 to 1.59)		0.15 (–0.86 to 1.16)	0.769
		Overall *P*-value	0.127		
Smoking	Never smoked	Reference			
	Current smoker	0.01 (–1.0 to 1.02)		0.18 (–0.92 to 1.28)	0.748
	Ex-smoker	0.83 (0.05 to 1.61)		0.59 (–0.28 to 1.45)	0.184
		Overall *P*-value	0.141		
Alcohol, standard drinks per week	≥8 drinks	Reference			
	Light (1–7 drinks)	0.71 (0.01 to 1.41)			
	None	0.49 (–0.59 to 1.56)			
		Overall *P*-value	0.263		
Self-rated health	Very good or excellent	Reference			
	Good	0.85 (–0.19 to 1.9)		1.09 (–0.19 to 2.38)	0.096
	Poor or fair	0.32 (–0.74 to 1.39)		1.04 (0.09 to 1.99)	0.032
		Overall *P*-value	0.240		
Self-rated weight	Overweight	Reference			
	Slightly overweight	0.03 (–0.75 to 0.8)		–0.25 (–1.22 to 0.72)	0.612
	Underweight to average	–1.04 (–1.82 to –0.27)		–0.97 (–1.87 to –0.07)	0.035
		Overall *P*-value	0.066		
Attended GP in past 12 months	>10 GP visits	Reference			
	6–10 GP visits	0.20 (–0.90 to 1.3)			
	0–5 visits	0.47 (–0.66 to 1.59)			
		Overall *P*-value	0.604		
Has chronic disease	No	Reference			
	Yes	0.11 (–0.63 to 0.86)	0.768		
Used ambulance in past 12 months	One or more times	Reference			
	Not at all	–0.25 (–1.64 to 1.15)	0.724		
Used emergency department in past 12 months	One or more times	Reference			
	Not at all	–0.49 (–1.24 to 0.27)	0.21	–0.07 (–1.07 to 0.93)	0.888

... continued

Table 3 continued. Univariate and multiple regression analyses with 28-item STAT total as the outcome

		Simple regression		Multiple regression	
Predictor	**Class**	**Estimate (95% CI)**	***P*-value**	**Estimate (95% CI)**	***P*-value**
Used after-hours GP service in past 12 months	One or more times Not at all	Reference −0.57 (−1.03 to −0.11)	0.067	Reference −1.03 (−1.63 to −0.43)	0.001
Personal or family history of stroke	No experience of stroke Experience of stroke	Reference 0.35 (0.05 to 0.65)	0.053	0.16 (−0.32 to 0.64)	0.508
Recalls FAST campaign	No Yes	Reference 1.53 (0.85 to 2.21)	0.013	Reference 1.73 (0.85 to 2.62)	<0.001

ATSI = Aboriginal or Torres Strait Islander. LOTE = language other than English spoken at home. RRMA = Rural, Remote, and Metropolitan Areas classification.

However, a further analysis was performed with only STAT TIA-specific items included in the dependent variable. For this study of TIA rather than stroke symptoms, the STAT item 'Sudden severe headache with no known cause' was excluded (with analysis therefore carried out on a total of 20 items). Headache is quite common in stroke, especially in cerebral haemorrhage and posterior circulation strokes.[19] While a TIA may occasionally be accompanied by a headache, a history of headache during the event prompting referral to an acute TIA clinic has been found to be predictive of a non-cerebrovascular diagnosis[20,21] and carries a negative weighting in diagnostic prediction rules.[21] Headache as a symptom is also associated with discordance of emergency physician and neurologist diagnoses of TIA.[22]

The analysis of the variables associated with both the 28-item STAT scores and 20-item STAT scores was conducted using a regression model within the framework of generalised estimating equations. This assumed an exchangeable correlation structure to adjust for potential clustering by general practice clinic. Only variables with a *P*-value below 0.25 in a univariate analysis were included in the multivariate analysis.

Analyses were conducted using SAS (version 9.3).

RESULTS

Fourteen of the 16 NRGP member practices participated in the study. There were 859 questionnaires returned (854 usable) of 1111 distributed (response rate 76.9%). There were 427 in-hours and 427 out-of-hours usable questionnaires returned.

The sample demographics are presented in Table 1. Only 11.3% of responders reported having seen, heard, or read about the FAST media campaign.

Table 2 presents the percentage of appropriate responses for STAT TIA items overall and for in-hours and out-of-hours settings. Appropriate response rates on TIA-compatible symptoms varied and were greatest for motor symptoms. They were high for speech production symptoms but were lower for carotid territory visual symptoms, sensory symptoms, and poorest for 'sudden dizziness' (59.1%). The only presentation significantly more likely to be appropriately responded to in-hours as opposed to after-hours was 'sudden confusion'.

Table 3 presents associations of 28-item STAT scores, which control for social desirability of response, with variables elicited in the questionnaire. Being older, being Indigenous (Aboriginal or Torres Strait Islander [ATSI]), having poorer self-rated health, and self-perception of being overweight were predictors of a higher STAT score on multivariate analysis, as were having used an after-hours GP service in the past 12 months and having recalled seeing, hearing, or reading about the FAST media campaign. There was no association of the 28-item STAT score with in-hours or out-of-hours timing of TIA symptoms.

In the further analysis confined to the 20 TIA-specific STAT items, findings were essentially the same except that self-perception of being overweight was no longer significant ($P = 0.055$).

DISCUSSION

Summary

Participants reported appropriate planned responses to symptoms suggestive of having had a TIA in most cases. Responses ranged from 96.8% correct for symptoms involving right-sided weakness and dysphasia, to 59.1% correct for sudden dizziness. Whether the TIA symptoms occurred in-hours or out-of-hours was not significantly associated with STAT scores.

A higher STAT score was significantly associated with some risk factors for TIA/stroke (older age, overweight, and identifying as ATSI). But personal or family history of stroke/TIA and smoking were not associated with appropriate urgent responses to TIA symptoms.

A number of factors associated with familiarity with using medical services (higher GP attendances, ambulance use, and emergency department attendances in the past 12 months) were not associated with a higher STAT score. Use of after-hours GP services in the past 12 months, however, was associated with appropriate responses.

While educational level was not associated with STAT score, familiarity with the FAST campaign was significantly associated with higher STAT scores. The percentage of responders who recalled having seen, heard, or read about the FAST media campaign, however, was low (11.3%).

Strengths and limitations

Strengths of the study include a setting (the NRGP) that is broadly representative of Australian general practice[23] and the high response rate. The Australian health system, which has high accessibility to general practice and emergency services, is also broadly generalisable to the UK and many other healthcare settings.

Having elicited responders' stated intended actions rather than actual behaviours is both a limitation and a strength of this study. The use of vignettes and scenarios in surveys is established[24,25] but may have contributed to the lack of difference in STAT scores for in-hours and out-of-hours clinical scenarios in this study. While an intention to promptly access medical services out-of-hours may be stated, practical barriers to access out-of-hours may result in a mismatch of behaviour and stated intention. Such an anticipated/actual behaviour mismatch has been found for stroke in a US population.[26] Conversely, methodologies that assess observed behaviour rather than intention to act may be biased by ascertainment only of cases that come to medical attention. In a retrospective population-based US study, 2.3% of responders had been given a diagnosis of TIA but a further 3.2% reported TIA symptoms for which they did not seek medical care.[27] Furthermore, studies of actual rather than hypothetical intended behaviour in TIA are often of cases ascertained only in secondary or tertiary care settings,[28–30] which may also limit the generalisability of such findings.

Comparison with existing literature

The highest number of urgent responses were elicited for the symptoms that are predictive of early risk of recurrent stroke in the widely used ABCD2 (age, blood pressure, clinical features, duration of symptoms, and diabetes) stroke risk stratification scoring system.[31] STAT items with unilateral weakness and speech disturbance were consistently scored highly and patients experiencing these features, if as a result of a TIA, need to be treated urgently to reduce early stroke risk. This implies that patients with high-risk TIA may appropriately seek health care more urgently after the event.

Although methodologies are not directly comparable, anticipated responses to TIA symptoms of general practice participants in this study (by definition, health-seeking) were more frequently appropriate than those of a general public population in a UK questionnaire-based study.[32]

The finding that there was no significant difference in STAT scores for in-hours and out-of-hours TIA scenarios is surprising, given that in a UK study[8] the median time to call a GP following a TIA was significantly greater in the out-of-hours setting than during surgery hours (12 hours as opposed to 4 hours). This effect was greater for events at weekends where patients were much less likely to call their GP within 24 hours of a TIA (odds ratio = 0.10).[8] Similarly, the percentage of UK and Canadian patients who presented within 24 hours of a TIA was higher with events that occurred during the week rather than at the weekend.[33]

Although the current study found no association of a previous personal history of stroke or TIA with STAT score, this is consistent with the finding of Lasserson *et al* [8] in the UK that there was no difference in delay to healthcare help between patients with a first ever incident event and patients with recurrent events. The current study's findings of an association of higher STAT scores with older age and ATSI status are at odds with previous lack of evidence of association.[34]

The proportion of responders in the waiting room sample who had seen or heard of FAST (11.3%) was comparable with that of an Australian stroke population (12%),[11] but considerably less than the 22–40% in an Australian shopping centre sample.[10]

Implications for practice

The association of familiarity with the FAST campaign with appropriate anticipated action in response to TIA symptoms

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Ethical approval

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Provenance

Freely submitted; externally peer reviewed.

Competing interests

The authors have declared no competing interests.

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supports a continued, and even an expanded, role for this public awareness programme. Whether the FAST campaign could support additional TIA-specific information (concerning the relative urgency of self-limited symptoms) is another issue raised by this finding. One of the principal attributes of the FAST campaign is the simplicity of the message.[35] Unlike symptoms proposed for use in US education programmes, the only TIA symptoms encompassed by FAST are face and limb weakness, and speech disturbance; these have been found to capture the presenting symptoms of 91.8% of TIAs.[9] This efficiency could potentially be attenuated by the introduction of a further concept (duration of event).

Although the association of familiarity with the FAST media campaign with appropriate anticipated action was significant, equally important was the finding that only 11.3% of responders had seen or heard of FAST. This raises the question of whether intensification of public awareness measures is appropriate (given markedly higher FAST-recognition achieved in the UK),[36] or whether another strategy is indicated. Given the findings of a lack of association of most TIA/stroke risk factors with STAT scores, a targeted approach may be indicated. This would involve educational interventions aimed at those at higher risk of TIA, that is, those with atrial fibrillation, carotid stenosis, other vascular disease, and diabetes. Other target groups could be those with hypertension, renal disease, or hyperlipidaemia, and older people. General practice would be the optimal setting for these educational interventions, and practice nurses may be best placed to deliver them.

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