The Stroke 'Act FAST' Campaign: Remembered But Not Understood?

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Abstract

Background: The stroke awareness raising campaign ‘Act FAST’ (Face, Arms, Speech: Time to call Emergency Medical Services) has been rolled out in multiple waves in England, but impact on stroke recognition and response remains unclear.

Purpose: To test whether providing knowledge of the FAST acronym through a standard Act FAST campaign leaflet increases accurate recognition and response in stroke based scenario measures.

Methods: Population-based, cross-sectional survey of adults in Newcastle upon Tyne, UK, sampled using the electoral register, with individuals randomised to receive a questionnaire and ‘Act FAST’ leaflet (n=2500), or a questionnaire only (n=2500) in 2012. Campaign message retention, stroke recognition and response measured through 16 scenario-based vignettes were assessed. Data were analysed in 2013.

Results: Questionnaire return rate was 32.3% (n=1615). No differences were found between the leaflet and no leaflet groups in return rate or demographics. Participants who received a leaflet showed better campaign recall (75.7% vs. 68.2 %, p=0 003) and recalled more FAST mnemonic elements (66.1% vs. 45.3% elements named correctly, p<0 001). However, there were no between-group differences for stroke recognition and response to stroke-based scenarios (ps>0 05).

Conclusions: Despite greater levels of recall of specific ‘Act FAST’ elements among those receiving the Act FAST leaflet, there was no impact on stroke recognition and response measures.

Introduction

Stroke is one of the leading causes of morbidity and mortality and a major burden on healthcare resources.(1, 2) Treatment with tissue plasminogen activator (tPA) has been shown to increase survival and reduce disability when administered within 4.5 hours of stroke onset to eligible individuals.(3, 4) In addition, within the 4.5 hour tPA treatment window, the benefits increase the sooner an individual receives adequate treatment,(4, 5) underlining the importance of immediate contact with emergency medical services (EMS) following the onset of stroke.(6)

Despite the benefits of available treatment, individuals who experience or witness stroke symptoms often delay contacting EMS or contact non-specialist health services, thereby reducing the chances of optimal recovery.(7, 8) Evidence suggests that the pre-hospital delay (i.e. the delay between the onset of symptoms and the contacting of EMS) is the main contributor to suboptimal treatment for stroke.(9)

Mass media campaigns have been widely used to promote awareness of common health threats and preventive actions(10) with some evidence of effectiveness in improving health care utilisation.(11) Various mass media campaigns have been used to raise awareness of the signs and symptoms of stroke, and the need to immediately contact EMS.(12, 13) Campaigns have been found to impact on stroke awareness,(12, 14) with some evidence for impact on response behaviour, especially during phases of active campaign dissemination.(13)

In England, the Department of Health rolled-out the first national stroke awareness raising campaign ‘Act FAST’(15) between February 2009 and March 2014 in seven active waves. All waves included television advertisements targeting the general population, with the

earlier waves including additional dissemination channels such as radio, the press and outdoor advertising. The campaign also included printed materials, such as leaflets and posters, displayed and available in primary care. At the heart of the campaign was the stroke mnemonic FAST (which stands for Face, Arm, Speech, Time), highlighting the three common symptoms of stroke (i.e. facial weakness, arm weakness, speech disturbance) as well as the correct response behaviour (i.e. time to call EMS). Originally, the FAST acronym was developed as part of a rapid ambulance protocol to increase diagnostic accuracy of stroke in paramedical staff(16, 17) and was termed the Face, Arm, Speech Test. FAST has high levels of diagnostic accuracy(18) and good agreement between health professionals.(19) FAST was adopted as a public awareness instrument for stroke in English speaking countries such as the US, Australia, and the UK (20) by replacing 'test' with 'time (to call EMS)' to indicate the required response when encountering stroke. Although FAST is a well-established tool for guiding health professionals' stroke diagnoses, limited research to date has assessed the ability of the modified population level FAST acronym to guide stroke recognition and response. It is currently unknown whether individuals are able to apply the knowledge of the FAST acronym in relevant stroke contexts(21).

In this paper, we report on a population based survey designed to test whether providing knowledge of the FAST acronym through a standard Act FAST campaign leaflet increases accurate recognition and response in stroke based scenario measures.

The specific hypotheses were:

Individuals who receive an 'Act FAST' leaflet together with a knowledge questionnaire will acquire better knowledge of the elements of the FAST acronym.

Individuals who receive an ‘Act FAST’ leaflet together with a knowledge questionnaire will be better at correctly recognising stroke in scenarios that are in line with the FAST acronym. Individuals who receive an ‘Act FAST’ leaflet together with a knowledge questionnaire will be better at correctly responding to stroke scenarios that are in line with the FAST acronym.

Methods

Participants

A sample of the general, adult population in Newcastle upon Tyne, UK, was selected randomly from the electoral register. The electoral register lists the names and addresses of all adults aged 18 or over who are eligible to vote in the UK (in the UK, the right to register for voting extends to all British, Republic of Ireland, Commonwealth and European Union citizens resident in the UK), as well as those who will turn 18 and become eligible to vote in the next year. Registering to vote is a legal responsibility in the UK and individuals are given the opportunity, on a yearly basis, to opt out of their details being visible in the ‘edited’ register – which is freely available for purchase.

Design & Procedures

We selected 5000 individuals at random from the electoral register in 2012, who were then randomly assigned in equal proportions (using the RAND function in Microsoft Excel) to receive a questionnaire together with a standard A5 Department of Health Act FAST campaign stroke leaflet,(22) (Figure 1) or the questionnaire only. Invitations instructed those invited to read all enclosed information and complete the accompanying questionnaire if they agreed to participate. A reminder card was sent to non-respondents after two weeks to prompt questionnaire completion, followed by another questionnaire pack, including a leaflet where appropriate, eight weeks after the initial mail out to those who still had not responded.(23) There was no active wave of dissemination of the Act FAST campaign, such as television

advertisements, during the course of the study. Ethical approval for the study was obtained from the Faculty of Medical Sciences ethics committee at Newcastle University (Ref no: 00550/2012).

----------Insert Figure 1 about here----------

Power analysis

Power analysis suggested a sample size of N=1102 was needed to detect a small effect of Cohen's d=0.15 between the two groups, typical of leaflet based interventions, with a statistical power (1-β) of 80% and an alpha-level of α=0.05. Assuming a response rate of 25%, a sample of 4408 would be needed. We therefore sent 5000 questionnaires to potential participants.

Measures

Knowledge measures: Campaign familiarity was assessed using the item '*Have you heard of the Department of Health 'Act F.A.S.T.' campaign for stroke?'* with Yes/No response options. Those indicating campaign familiarity were further asked '*Can you remember what F.A.S.T. stands for?*' with free text response options for FAST elements (e.g. '*F' stands for…*). Response knowledge was assessed with the following item: '*If you thought someone was having a stroke, what would you do first*?' followed by five response options: '*Call the doctor's surgery (GP)*', '*Wait a couple of hours, then decide*', '*Call a family member or friend*', '*Call 999*' (999 is the emergency services telephone number in the UK, equivalent to 911 in the USA, and 112 in European countries) or '*Other*' followed by space for free text.

Vignette measures: Stroke response and recognition were assessed using a vignette based measure which had been content validated through stroke experts and further evaluated in a community sample in the USA.(24) The measure was adapted slightly for the current UK

cultural context. Vignettes consisted of 12 stroke and four non-stroke scenarios. Six of the stroke vignettes were congruent with the three symptoms covered by the FAST acronym (i.e. facial weakness, arm weakness and speech disturbance, with 2 vignettes per symptom respectively). The other six stroke vignettes describing stroke scenarios covered symptoms not congruent with the FAST acronym (e.g. sudden headache or confusion). Stroke recognition was assessed by asking participants to indicate whether a scenario was a '*potential stroke*', '*not stroke*' or '*don't know*'. Stroke response was assessed with the item "*If this happened, what would you do first?*" followed by five response options: '*Call the doctor's surgery (GP)*', '*Wait a couple of hours, then decide*', '*Call a family member or friend*', '*Call 999*' or '*Other*' followed by space for free text.

In addition, demographic variables such as age, gender, postal codes to facilitate the calculation of index of multiple deprivation (IMD) scores (an area based measure of deprivation status combining a number of indicators that cover a range of economic, social and housing issues, into a single deprivation score for each small area in England), ethnicity, marital status, stroke history and co-morbidities, and education were assessed using standard questions (available from the authors).

Analysis

For testing the main hypotheses of mean differences between intervention arms, a series of t-tests were conducted. Statistical inference of the t-tests was based on a non-parametric bootstrapping procedure with 5000 resamples, which makes no assumptions about the sampling distribution.(25) For comparisons of categorical outcome variables chi-square tests were used. Analyses were conducted based on the completed questionnaire items. Data were analysed in 2013.

Role of the funding source

The sponsors did not have roles in study design; data collection, analysis, or interpretation; or writing of the Article. The corresponding author had full access to all the data in the study and the final responsibility for the decision to submit for publication.

Results

Out of the 5000 invitation letters, 152 were returned unopened (3.3%; 79 and 73 in leaflet and no leaflet groups, respectively) indicating that recipients were not known at the address held in the electoral register. Five recipients were identified as deceased by friends or relatives (four were in the leaflet group). This left a total of 4844 valid invitations. Data were available for 1615 respondents (32.3% of 5000; 33.3 % of 4844) comprising 789 (48.8%) and 826 (51.2%) participants in the leaflet and no leaflet groups, respectively. There were no significant differences between the groups in terms of size, gender, age, education, IMD scores or morbidities indicating that randomisation had led to balanced groups (Table 1). Participants had a mean age of 53.9 (SD=17.3) years, ranging from 18-97 years. Slightly more women (57.1%) responded compared to men (42.9%). The sample was predominantly from a white background (91.6%), married or cohabiting (61.2%) and approximately one quarter had no formal qualification (25%).

----------Insert Table 1 about here----------

FAST knowledge

Overall, 71.3% of participants reported having heard of the Act FAST campaign. The proportion of participants from the leaflet group who had heard of FAST was significantly greater than the proportion from the no leaflet group (75% vs. 68% respectively; $\chi^2(1, 1525)=9.20$, $p<0.001$).

The average percentage of correctly named FAST elements was significantly greater in the leaflet group (*M*=66.10, SD=44.20) compared with the no leaflet group (M=45.34, SD=45.42), t(1613)=9.30, p<0.001), a medium sized intervention effect (d=0.46). The proportion of participants from the leaflet group who answered correctly what F, A, S and T stand for was 70%, 65%, 66%, and 62% respectively, compared to 52%, 45%, 44%, and 41% in the no leaflet group (Figure 2). The difference in proportions for each FAST element were significant (all p<0.001).

----------Insert Figure 2 about here----------

There was no difference between experimental groups in stroke response knowledge with 92.8% of respondents overall indicating that they would call 999 in the event of a stroke (χ^2(1, 1602)=0.85, p=0.21).

Stroke recognition

There was no difference between the leaflet and no leaflet groups in the mean percentage of correctly recognised scenarios in the present vignettes (Table 2, Figure 3). This was the case for all 12 stroke vignettes (t(1596)=-0.68, p=0.50), the 6 vignettes congruent with the FAST acronym (t(1595)=-0.60, p=0.55) as well as the 6 vignettes which were not in line with the stroke acronym (t(1591)=-0.86, p=0.39). Moreover, for the FAST congruent vignettes, no group differences were found for the vignettes representing the different FAST elements – i.e. the two vignettes representing Face, Arm and Speech respectively (all p>0.05).

----------Insert Figure 3 about here----------

Stroke response

There was no difference between the leaflet and no leaflet groups in the mean percentage of correct responses to vignettes (Table 2, Figure 4). This was the case for all 12 stroke vignettes

(t(1601)=1.00, p=0.32), the 6 vignettes congruent with the FAST acronym (t(1609)=1.05, p=0.30) as well as the 6 vignettes that were not in line with the stroke acronym (t(1608)=0.63, p=0.53). Moreover, for the FAST congruent vignettes, no group differences were found for the vignettes representing the different FAST elements i.e. the two vignettes representing Face, Arm and Speech respectively (all p>0.05).

----------Insert Figure 4 about here----------

Discussion

After the success of the original Face Arm Speech Test in improving diagnostic accuracy of stroke referrals in the 1990s,(18) the mnemonic FAST was modified to 'Face, Arm, Speech, Time' in order and incorporated into public health campaigns to encourage the public to accurately identify stroke symptoms and call EMS immediately.(15) In England, the 'Act FAST' campaign(26) has achieved relatively high retention; around 70% of our survey respondents reported having heard of the campaign previously and over 90% of respondents reported the intention to call EMS when suspecting a stroke. This is as high as in previous research carried out directly after the initial campaign roll out, which showed 82% awareness of stroke media campaign and equally high levels of intention to call 999 for slumped face (87%), inability to lift arm (72%) and slurred speech (74%).(1) But does campaign retention and high levels of knowledge of what to do in the event of stroke lead to better responses and recognition in stroke scenarios?

This study randomly assigned a sample of members of the public to a questionnaire testing stroke FAST knowledge, stroke recognition and stroke response delivered by post with or without an Act FAST campaign leaflet in the same envelope. This design created an idealised exposure scenario, unlikely to happen in a real life context, in which the campaign material

was made directly available at the same time as the response was assessed. Unsurprisingly, the provision of the leaflet led to significantly higher number of respondents being able to recall the specific campaign itself, as well as specific elements of the FAST mnemonic. Without the provision of a leaflet, around 50% of respondents were able to recall the relevant campaign elements. This increased to about 65% of campaign elements recalled when respondents were provided a leaflet. In both groups, the recall was best for 'Face' and worst for 'Time' (to call EMS). However, stroke recognition and, critically, stroke response based on 12 stroke vignettes describing symptoms did not differ between the groups. This suggests that, although the FAST elements are recalled by a large proportion of the population and although individuals who received the Act FAST leaflet showed significantly better recall of FAST elements, this knowledge might not translate into better recognition of common stroke symptoms witnessed or into better responses to stroke scenarios. This finding supports previous research that has highlighted the difficulty of matching perceived stroke symptoms to the specific elements of the FAST mnemonic.(20, 21)

The strengths of our study included random allocation of a large, randomly selected population sample to groups receiving and not receiving an Act FAST leaflet, and the use of validated, simulated outcomes assessing response to stroke symptoms. The study presents the first empirical study of the impact of FAST knowledge derived from Act FAST campaign material on stroke recognition and response. Weaknesses include the self-reported nature of the outcome and the deliberately artificial situation of assessing responses while participants had access to a campaign leaflet. While campaign evaluations usually measure exposure, intention, or past behaviour where appropriate, this study measured participants' simulated response and showed that campaign recognition and knowledge do not guarantee appropriate stroke recognition and response. Interpretations beyond the current cultural context should be

made with caution given that Newcastle upon Tyne is an urban environment with limited ethnic diversity in comparison to other parts, or the whole of the UK. In addition, although we randomly sampled from a population based register, respondents might not necessarily be representative of the local population. The response rate was 33% which is typical for postal surveys using population samples.(23) Lastly, although no active dissemination of Act FAST took place during the study, high levels of campaign awareness were found in both groups which potentially explains a lack of between-group difference in stroke recognition and response. However, knowledge of specific FAST elements was moderate and significantly lower in the no leaflet group compared to the leaflet condition suggesting that lack of differences were not solely due to a ceiling effect in prior stroke awareness.

This study supports evidence suggesting a high level of awareness of FAST(14) and further demonstrates that increased levels of FAST knowledge do not translate into better stroke recognition and response. In line with qualitative research,(20) the study provides evidence suggesting FAST awareness is not sufficient to appropriately recognise or respond to stroke signs and symptoms, supporting public health intervention studies showing suboptimal effects of stroke awareness campaigns on response behaviour.(12, 13)

Raising awareness of stroke signs and symptoms and the need to call EMS based on the current use of FAST in social marketing campaigns might be insufficient to reduce pre-hospital delay at a population level and thus may have minimal impact on public health. This study suggests that FAST may be poorly understood by most and does not facilitate stroke recognition and response, questioning its validity as a population based stroke awareness raising tool. Future campaign development efforts should engage in a systematic and transparent process of using the best available evidence and theory to raise stroke awareness.

This might include more targeted efforts aimed at at-risk populations for experiencing or witnessing stroke. Evidence suggests that additional factors other than stroke knowledge impact on stroke recognition and response(13, 27-30) and should be targeted alongside awareness based elements, such as the FAST acronym. More research is needed to understand how individuals process the Act FAST message and enact it, in particular with regard to pattern recognition and generalisability, emotion and linking cues with responses.(31) In addition, FAST recall and need for message reinforcement need further research attention. If the use of FAST is continued, then alternative methods to deliver more effectively the FAST message to relevant target audiences need to be developed.

Contributors: FFS, MW, GAF, and SUD conceived the study. FFS, MW, SUD, VAS, RGT, HR, GAF and JM developed the methods. SUD and JM collected the data. PG, FFS and SUD conducted the statistical analyses. SUD drafted the manuscript. All authors provided input to the development of the methods and drafting process. All authors approved the final version of the manuscript.

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Conflicts of interest: DF, GAF, HR, and RGT have been involved in developing a computerised decision aid for thrombolytic treatment in acute stroke care. GAF has received personal remuneration for educational and advisory work from Boehringer Ingelheim (manufacturer of Alteplase) and Lundbeck. GAF's institution has received research grants from Boehringer Ingelheim, and honoraria from Lundbeck for stroke-related activities. GAF developed the Face Arm Speech Test for use by ambulance paramedics in England.

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Figure captions

Figure 1: Stroke Act FAST leaflet used in the intervention group

Figure 2: Percentage of respondents correctly naming each of the FAST elements by experimental groups (leaflet vs. no leaflet).

Figure 3: Percentage correctly recognising stroke vignettes for all, FAST congruent and non-FAST congruent scenarios by experimental group (leaflet vs. no leaflet).

Figure 4: Percentage correctly responding to stroke vignettes for all, FAST congruent and non-FAST congruent scenarios by experimental group (leaflet vs. no leaflet).

Table 1: Sample characteristics for experimental groups and the overall sample

	Leaflet		*No leaflet*		*χ^2-test*		*Total*	
Variable	*%*	*n*	*%*	*n*	*χ^2 [a]*	*P-value [b]*	*%*	*n [d]*
Gender					1.73	0.19		
women	55.4	433	58.7	475			57.1	908
men	44.6	348	41.3	334			42.9	682
Mean age in years (SD)	53.9 (17.3)	775	53.9 (17.5)	806	0.11 [c]	0.91 [c]	53.9 (17.4)	1581
Ethnic group					3.89	0.14		
White British	92.1	718	91.2	737			91.6	1455
Other	7.9	62	8.8	71			8.4	133
Marital status					5.74	0.33		
Single	19.6	152	16.5	133			18.0	285
Married or cohabiting	61.8	479	66.5	536			64.2	1015
Separated, divorced, or widowed	18.6	144	17.0	137			17.8	281
Live alone (% yes)	24.1	168	21.7	153	1.21	0.27	22.9	321
Education					3.56	0.47		
No formal qualifications	26.7	202	23.4	183			25.0	385
O-levels, CSEs, GCSEs or equivalents	15.7	119	15.5	121			15.6	240
A-levels or equivalents	6.9	52	7.7	60			7.3	112
Vocational qualifications (e.g. NVQ, GNVQ or City or Guilds)	24.9	188	24.3	190			24.6	378
Degree (e.g. BA, BSc, MA, MSc)	25.8	195	29.1	227			27.5	422
Mean IMD score (SD)	25.3 (19·0)	757	25.7 (19·4)	777	-0.47 [c]	0.63 [c]	25.5 (19.2)	1534
Stroke history (% yes)								
Past stroke self	4.4	34	5·2	42	0.54	0.46	4.8	76

Past stroke in close network	46.7	364	46.7	381	<0.001	0.99	46.7	745
Witnessed stroke (% yes)	14.5	113	14.0	114	0.82	0.77	14.3	227
Called EMS for any medical reasons	41.7	325	40.0	326	0.49	0.49	40.8	651
Morbidities								
Stroke	12.6	33	16.3	41	1.80	0.41	14.4	74
Hypertension	18.6	147	17.8	147	1.79	0.41	18.2	294
Heart attack	4.9	39	3.6	30	2.45	0.33	4.3	69
Diabetes	9.1	72	7.3	60	2.19	0.34	8.2	132
Atrial fibrillation	2.8	22	2.3	19	1.37	0.50	2.5	41

Note. IMD = Index of Multiple Deprivation; SD = Standard Deviation; [a] = Pearson Chi-Square values are reported; [b] = 2-sided; [c] = results of a t-test are reported; [d].= discrepancies between overall response rate (n=1615) and total numbers for individual variables are due to missing data.

Table 2: Intervention effects on recognition and response to a series of stroke scenarios

Variable *Scenarios*	*Leaflet group* *Mean % correct*	*(SD)*	*No leaflet group* *Mean % correct*	*(SD)*	*t statistic* *t*	*df*	*Sig.*	*Cohen's d*
% correct recognition								
All 16 scenarios	61.1	(20.0)	61.7	(20.9)	-0.57	1597	0.57	-0·03
12 Stroke scenarios only	62.5	(23.6)	63.3	(23.9)	-0.68	1596	0.50	-0·06
6 FAST stroke scenarios only	78.4	(23.0)	79.0	(23.1)	-0.60	1595	0.55	-0·03
2 F stroke scenarios	93.1	(19.3)	91.8	(20.7)	1.27	1585	0.20	0·06
2 A stroke scenarios	68.4	(36.8)	70.8	(35.4)	-1.29	1583	0.20	-0·07
2 S stroke scenarios	74.5	(34.7)	76.3	(33.4)	-1.04	1589	0.30	-0·05
6 non-FAST stroke scenarios only	46.7	(30.4)	48.0	(30.4)	-0.86	1591	0.39	0·06
% correct response								
All 16 scenarios	58.1	(19.6)	57.4	(20.5)	0.71	1610	0.48	0·03
12 Stroke scenarios only	53.1	(26.1)	51.8	(26.6)	1.00	1601	0.32	0·05
6 FAST stroke scenarios only	65.6	(29.7)	64.0	(30.4)	1.05	1609	0.30	0·05
2 F stroke scenarios	76.7	(35.9)	73.8	(37.1)	1.59	1605	0.11	0·08
2 A stroke scenarios	50.3	(40.5)	48.2	(41.2)	1.05	1605	0.29	0·05
2 S stroke scenarios	70.2	(36.0)	70.7	(36.3)	-0.25	1604	0.80	-0·01
6 non-FAST stroke scenarios only	40.6	(28.3)	39.8	(28.5)	0.63	1608	0.53	0·03
4 Non-stroke scenarios only	73.1	(24.5)	74.3	(24.9)	-0.98	1609	0.33	-0·05