Stroke Public Awareness Campaigns Have Increased Ambulance Dispatches for Stroke in Melbourne, Australia

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Background and Purpose—Launch of the National Stroke Foundation stroke awareness campaigns has occurred annually during Stroke Week (September) since 2004. From 2006, the campaign used FAST (Face, Arm, Speech, Time) with calling an ambulance added in 2007. The aim of this study was to explore the impact of these campaigns on ambulance dispatches for stroke (Medical Priority Dispatch Card 28) in Melbourne, Australia.

Methods—A cross-sectional study examining the monthly proportions of ambulance dispatches for stroke between August 1999 and 2010 was conducted. The proportions of dispatches for stroke were used due to increases in the population and in ambulance dispatches over the study period. These proportions were statistically compared for the month before Stroke Week (August) and the month after Stroke Week (October) for each year and seasonal variation was examined.

Results—Between 1999 and 2009, the annual proportion of dispatches for stroke increased from 2.1% (n=4327) to 2.95% (n=9918). When stroke dispatches in August were compared with those in October, a significant increase in October was only detected since the call an ambulance message was added to FAST: 2007 (2.62% to 3.00%, P=0.006), 2008 (2.62% to 3.05%, P=0.003), and 2009 (2.70% to 3.09%, P=0.007). From 2005, the peak season for stroke dispatches shifted from winter to spring.

Conclusions—Ambulance dispatches for stroke significantly increased after the National Stroke Foundation campaigns began, particularly in years receiving greater funding and featuring the FAST symptoms and the message to call an ambulance. Monitoring ambulance use appears to be an effective measure of campaign penetration. (Stroke. 2011;42:2154-2157.)

Key Words: ambulance ■ diagnosis ■ emergency services ■ stroke ■ health education

In Australia, stroke is a leading cause of death, disability, and healthcare expenditure. Stroke affects the lives of many Australians with many stroke survivors left with some form of disability. Thrombolytic therapy, if administered within 4.5 hours, is effective in reducing the disability associated with ischemic stroke and in improving patient outcomes. However, treatment rates remain suboptimal because a significant number of patients delay in presenting to the hospital for symptoms.

Systematic reviews examining this “patient delay” have found poor stroke recognition, a lack of urgency for symptoms, and the types of medical services accessed to be significant factors. These findings, along with the goal of maximizing thrombolytic therapy rates, have motivated the global launch of public education campaigns aimed at increasing public awareness of stroke symptoms and the immediate need for rapid action.

In Australia, the National Stroke Foundation of Australia (NSF) launched their first community awareness campaign in September 2004. Each year since, a new campaign has been launched during Stroke Week in September (Table) with the FAST (Face, Arm, Speech, Time) campaign used since 2006. Telephone surveys conducted by the NSF demonstrated an awareness of these campaigns and an increase in the Australian public’s stroke knowledge. Another method to examine the real application of these campaigns, and the retention of their content, may be to examine the number of ambulance (ie, emergency medical services) dispatches for stroke. Although caller recognition of stroke in emergency calls to an ambulance is low, in those dispatched as stroke, it has been reported as high as 84%. Therefore, examining the number of these dispatches in the time before and after implementation of awareness campaigns could provide valuable information about changes in the public’s identification of stroke and provide a measure of the effectiveness of the campaigns. Such study is particularly suited to our setting, because Melbourne (Australia) has a single provider of emergency call-taking.

The aim of this study is to examine whether the NSF campaigns, particularly the FAST campaign, has changed the incidence of ambulance dispatch for stroke in metropolitan Melbourne. Specifically, examining the annual trends in...
ambulance dispatches for stroke before (1999 to 2003) and after (2004 to 2009) the first campaign, whether increases are seen after the annual promotion periods (Stroke Week, in September) and to explore the seasonal peaks in dispatches.

**Methods**

**Study Design**

We performed a retrospective observational study on the monthly proportions of ambulance dispatches for stroke between August 1999 and 2010. The hypothesis tested was the proportion of dispatches for stroke would increase over time, particularly after calling an ambulance was added to campaign materials.

**Study Setting and Population**

The study was conducted in metropolitan Melbourne, Australia. The population of Melbourne has grown (from 3.4 million in 1999 to 4 million in 2009), and the number of dispatches has also increased over the last decade. For this reason, the proportion of all ambulance dispatches that were dispatched as stroke was studied rather than the raw number of emergency calls.

**FAST and Stroke Week**

The NSF began awareness campaigns in 2004 with the FAST campaign used since September 2006. Campaigns are launched annually in Stroke Week (September: 18 to 24, 2006; 17 to 23, 2007; 17 to 23, 2007; 15 to 21, 2008; 14 to 20, 2009). Because of restricted funding, the campaigns have received varying levels of promotion with the campaigns since 2007 receiving the heaviest promotion in the city of Melbourne. All campaigns have included television and radio advertisements and displaying posters in public places (eg, shopping malls). The FAST campaign also featured handing out leaflets and wallet cards (eg, at train stations in peak hour).

**Advanced Medical Priority Dispatch System**

In Melbourne, the Medical Priority Dispatch System is used to provide a structured system for answering emergency calls for an ambulance. This dispatch system has provisions to determine and dispatch paramedics for a possible “stroke” (Medical Priority Dispatch System Card 28) based on the caller identifying the problem as a stroke or describing specific stroke symptoms. The Medical Priority Dispatch System versions in use over the study period were Version 10.2 and Version 11.3; however, there was no change to Medical Priority Dispatch System Card 28 between these versions and dispatchers were not provided with specific stroke education during the study period.

**Data Collection and Statistical Analysis**

Ambulance Victoria provided the monthly number of all ambulance dispatches and the number dispatched for stroke (ie, Card 28s) in metropolitan Melbourne between August 1999 and 2010. The monthly proportion of dispatches for stroke was calculated by dividing the monthly number of dispatches for stroke by the monthly number of total dispatches. Statistical differences in the annual proportion for each campaign year (September to August) and the proportion of stroke dispatches in months around Stroke Week (August compared with October) each year were performed using the $\chi^2$ test for equal proportion. A probability value $<0.05$ was considered statistically significant. To explore the seasonal variation, each year was divided into southern hemisphere seasons: spring (September to November), summer (December to February), fall (March to May), and winter (June to August).

**Results**

The average annual proportion of dispatches for stroke increased over the study period from 2.1% ($n=4327$) to 2.95% ($n=9918$) in 2009 (Figure 1). However, a statistical increase in this proportion from one year to the next was only seen in campaign years, and not in the years before 2004.

When examining the immediate impact of the launch of each campaign (Figure 2), increases were only seen in the month after the campaign (i.e., October) since 2007, when calling an ambulance if symptoms were experienced was added to all campaign materials.

Before 2004, dispatches for stroke were highest in winter (Figure 3). However, after the first campaign in Stroke Week (September 2004), the peak in dispatches for stroke moved to spring (Figure 3).
Discussion

This study has shown an increase in ambulance dispatches for stroke in metropolitan Melbourne since the start of the NSF’s stroke awareness campaigns. The increase was most apparent in recent years, which received the most funding and when the FAST symptoms were promoted and the message to “call an ambulance” was added to all of the campaign materials.

Investigations of the FAST campaign to date include: public awareness of the campaign and recall of its content\textsuperscript{10,11}; the number of patients with stroke presenting with FAST symptoms\textsuperscript{10,12}; and the impact of education using FAST on symptom awareness.\textsuperscript{13} However, this study is the first to explore the specified “action” provided in the FAST campaign (ie, calling an ambulance), which was possible due to the single dispatch and ambulance service in Melbourne. This study demonstrates the importance of specifying the exact required action in such campaigns. The largest impact on ambulance dispatches was only seen after release of the 2007 campaign, when the campaign’s “call to action” was changed from “seek medical attention” to “call an ambulance.” Although the campaigns from 2007 received heavier promotion than earlier years, this finding has important implications for all community awareness campaigns, which need to specify the exact, rather than generic, path of medical attention required.

Furthermore, campaigns with limited funding could concentrate their maximal promotion to the peak seasons of an illness. Australian\textsuperscript{14} and international\textsuperscript{15,16} evidence consistently demonstrate a seasonal trend in the incidence of stroke, increasing from summer to a peak in winter. However, in Australia, stroke awareness campaigns receive the most promotion in spring (from September), and our data suggest this has had an impact on the seasonal number of ambulance dispatches, which shifted from a peak in winter to a peak in spring. Although year-round promotion is optimal,\textsuperscript{17} it is also expensive. Therefore, concentrating this effort closer to the peak season in winter may be more cost-effective, particularly when funding is limited.

Unfortunately, we were unable to determine what proportion of dispatches after the campaigns were for actual strokes or transient ischemic attacks (ie, hospital diagnosis of stroke/transient ischemic attack). Before the campaigns, an Australian study reported 50% of patients dispatched as “stroke” (Card 28s) using our dispatch system were subsequently diagnosed with stroke or transient ischemic attack.\textsuperscript{9} Repeating such work could provide this information and should be a priority, particularly given the costs associated with providing emergency medical services. However, such costs may be countered if thrombolytic therapy rates are increased even a small amount.\textsuperscript{18,19} Additionally, integrating FAST into the dispatcher’s emergency call-taking assessment, as performed in newer versions of dispatch software, may improve this accuracy to approximately 84\%\textsuperscript{10,12,20} and should be investigated.

In summary, we have found an increase in the number of ambulance dispatches for stroke after the NSF’s campaign promotions. This was particularly apparent in years receiving the greatest promotion and since the campaign used the FAST symptoms and calling an ambulance was added to campaign materials. Monitoring ambulance use appears to be an effective measure of campaign penetration for stroke. The next stage in this research program is to determine what proportion of these dispatches were for actual stroke cases.
Acknowledgments
We acknowledge the National Stroke Foundation for providing campaign information.

Disclosures
The National Stroke Foundation of Australia sought advice from J.B. and I.M. regarding the development of the 2009 FAST campaign. Noncommercial advice was provided free of charge by the authors and all decisions regarding the development and design of the campaign remained with the National Stroke Foundation.

References
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Stroke. published online July 14, 2011;
Stroke is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
Copyright © 2011 American Heart Association, Inc. All rights reserved.
Print ISSN: 0039-2499. Online ISSN: 1524-4628

The online version of this article, along with updated information and services, is located on the World Wide Web at:
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