Interventional and New Approaches to Stroke Prevention

Education Strategies for Stroke Prevention

Bernadette Boden-Albala, MPH, DrPH; Leigh W. Quarles, MPH

Stroke is a major public health burden in the United States, with indications that stroke is emerging as a global epidemic. Furthermore, there exists an appreciation that focus on clinical treatment alone will not significantly reduce the burden of stroke, including morbidity and mortality. Emphasis needs to shift to acknowledging the importance of behavioral change science. The focus of this monograph is to provide insight into considerations for the development of theory-based interventions for reduction of stroke through behavioral change.

The Science of Behavioral Change is a complex endeavor, and addressing the lifestyle changes during the life course needed to reduce the burden of stroke remains a significant challenge. Areas of exploration include an understanding of the acquisition of vascular risk behaviors; identifying and testing mechanisms for changing existing behaviors; identifying strategies that optimally support the maintenance of health behaviors; and choosing the appropriate level for behavioral change (ie, individual change versus population level or structural change). Part of understanding behaviors includes making predictions about why people behave the way they do. Behavioral theory used in the design of interventions allows us to assess an individual’s readiness to take action toward healthier behaviors. An accompanying theoretical platform, such as the transtheoretical model, provides the framework for the type of strategy or process needed to guide individual or system interventions through the stages of change, including action and maintenance.

An important epidemiological feature of cerebrovascular disease concerns the sharp gradients in morbidity and mortality by race-ethnicity. Indeed, some of the earliest educational materials for stroke prevention have been suboptimal because of the generic nature of information without reference to place or culture. For example, trust is a concern among many African American and Hispanic communities and low-income populations. Effective interventions in minority communities that optimally achieve change. We suggest that interventions need to focus on 2 key areas of behavior modification: stroke preparedness and stroke prevention. With the emergence of tissue-type plasminogen activator in 1996, there has been an emphasis on reducing stroke morbidity and mortality through increased action during acute stroke. Being prepared to take action requires individuals to be able to recall and recognize stroke warning signs, learn how to call 911, facilitate a dialogue about stroke, and navigate the emergency department so appropriate stroke codes are activated. Preparedness behavior may be best characterized by achieving competency skills that require short-term interventions with reinforcement.

Several interventions have actively addressed preparedness with mixed success in different populations (Table). One study reported that widespread acute stroke education was associated with a 10% decrease in the proportion of stroke patients presenting within 3 hours of symptom onset. Morgenstern group demonstrated that an aggressive, multilevel stroke educational intervention program can be effective in promoting behavioral change. They reported an increase in intravenous tissue-type plasminogen activator treatment from 1.38% to 5.75% among all cerebrovascular event patients in the intervention community (P=0.01) compared with a change from 0.49% to 0.55% in the comparison community (P=1.00).
### Table. Summary of Major Primary, Secondary Prevention, and Preparedness Stroke Interventions

<table>
<thead>
<tr>
<th>Study</th>
<th>Intervention Strategies</th>
<th>Outcome Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stroke preparedness</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temple Foundation Stroke Project&lt;sup&gt;6&lt;/sup&gt;</td>
<td>Community level social marketing campaign I</td>
<td>Community level acute stroke parameters</td>
</tr>
<tr>
<td>KIDS&lt;sup&gt;5&lt;/sup&gt;</td>
<td>Community engaged</td>
<td>Prepost 3-dimensional knowledge preparedness, stroke physiology, and risk factors school children and parents</td>
</tr>
<tr>
<td>HIP HOP Stroke&lt;sup&gt;9–11&lt;/sup&gt;</td>
<td>School based</td>
<td>Prepost (3 mo) knowledge in preparedness and risk factors school children and parents</td>
</tr>
<tr>
<td>Beauty shop&lt;sup&gt;12&lt;/sup&gt;</td>
<td>Community engaged</td>
<td>Knowledge of stroke warning signs, preparedness and risk factors</td>
</tr>
<tr>
<td>SWIFT&lt;sup&gt;13,14,22&lt;/sup&gt;</td>
<td>RCT</td>
<td>Measurement of individual acute stroke parameters in recurrent events</td>
</tr>
<tr>
<td>SWIFT community</td>
<td>Stroke-free community based</td>
<td>Prepost (1 y) knowledge in preparedness, and risk factors in multiethnic adults</td>
</tr>
<tr>
<td>ASPIRE&lt;sup&gt;15&lt;/sup&gt;</td>
<td>City-wide</td>
<td>Comparison of city-wide prepost intervention acute stroke parameters</td>
</tr>
<tr>
<td><strong>Primary stroke prevention</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SHARE&lt;sup&gt;16&lt;/sup&gt;</td>
<td>Community engaged</td>
<td>Reduction in vascular risk factors, including BP</td>
</tr>
<tr>
<td><strong>Secondary stroke prevention</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PROTECT&lt;sup&gt;17&lt;/sup&gt;</td>
<td>Structural integration of care with systematic evidence based, disease management program</td>
<td>Hospital discharge treatment and adherence rates</td>
</tr>
<tr>
<td>ICARUSS&lt;sup&gt;18&lt;/sup&gt;</td>
<td>RCT systems model</td>
<td>Reduction in vascular risk factors, including BP</td>
</tr>
<tr>
<td>SUSTAIN&lt;sup&gt;19&lt;/sup&gt;</td>
<td>Structural intervention</td>
<td>Measurement of BP at 6 mo after discharge</td>
</tr>
<tr>
<td>PROTECT DC&lt;sup&gt;20&lt;/sup&gt;</td>
<td>RCT Community health worker hospital-based initiation of secondary prevention strategies</td>
<td>Reduction in vascular risk factors including BP at 1 y Mortality</td>
</tr>
</tbody>
</table>

(Continued)
integrated care reduction of secondary stroke model, involv-
some related studies have found that education and interven-
tion for smoking cessation is feasible and can improve symp-
tom control and secondary prevention.4 5 6 7 8 9 10 11

Discussion

Secondary stroke prevention programmes remain the main
focus for improving stroke outcomes and reducing health care
spending.12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28

Other programs have focused on the basis of theory, educa-
tional interventions to improve intent to call 911 for stroke
among children.7 9 The Kids Identifying and Defeating Stroke
(KIDS) was a pilot, randomized, controlled trial to encourage
calling 911 for witnessed stroke among middle-school children
and their parents.8 A comparison of knowledge change between
intervention and control students was P<0.001 for each of
the 3 individual domains of stroke pathophysiology, stroke
symptom knowledge, and stroke preparedness. Unfortunately,
dissemination of this knowledge was suboptimal because of poor
parental response.8 Similarly, the Hip Hop Stroke intervention,
with its timely music and catchy phrases, demonstrated
improved stroke knowledge and behavioral capability to activate
emergency services at 3-month follow-up.9 A larger randomized
trial of Hip Hop is ongoing in New York City.10 11 The community
placed health-literate beauty shop intervention in African
American women improved knowledge of stroke warning
signs and calling 911, and this knowledge was sustained for
≥5 months.12 Although these studies have focused on increased
knowledge and behavioral intent (ie, will call 911), data from the
Stroke Warning and Information and Faster Treatment
Study (SWIFT) specifically measured preparedness outcomes
in a randomized group of 1200 stroke and transient ischemic
attack (TIA) patients.13 SWIFT found that 45% of stroke/TIA
patients randomized to health-literate educational materials;
and 46% of stroke/TIA patients randomized to intensive
inpatient intervention returned to the emergency department
within 4.5 hours of recurrent stroke onset. This is compared
with 18% at baseline and 20% in an urban control group.14 The
data also suggested that after-stroke reinforcement may be as
effective as hospital interventions.14 The Acute Stroke Program
of Interventions Addressing Racial and Ethnic Disparities
(ASPIRE) study is a multidimensional program aimed at
community, hospital, and emergency medical services for acute
stroke preparedness targeted to increased intravenous tissue-type
plasminogen activator usage in underserved black communities
in the DC metro area.15 A pilot feasibility study of 1 DC ward
reported preintervention mean and median time to arrival of 1600
minutes (27.0 hours) and 890 minutes (14.8 hours), respectively.
After the intervention, mean and median time to arrival was 1423

Table. Continued

<table>
<thead>
<tr>
<th>Study</th>
<th>Intervention Strategies</th>
<th>Outcome Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>DESERVE</td>
<td>RCT Mild stroke and TIA patients</td>
<td>Reduction in vascular risk factors including BP at 1 y</td>
</tr>
<tr>
<td></td>
<td>Discharge strategy</td>
<td>Change in lifestyle behaviors, including physical activity</td>
</tr>
<tr>
<td></td>
<td>Culturally tailored and bilingual staff</td>
<td>Lifestyle and adherence measures</td>
</tr>
<tr>
<td></td>
<td>Community health workers</td>
<td>Difference in recurrent stroke events</td>
</tr>
<tr>
<td></td>
<td>Chronic care model</td>
<td>Cost analysis</td>
</tr>
<tr>
<td></td>
<td>Patient-based educational videos</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Skill-based focus</td>
<td></td>
</tr>
<tr>
<td>PRAISE21</td>
<td>RCT Self-identified stroke</td>
<td>Reduction in vascular risk factors, including BP at 1 y</td>
</tr>
<tr>
<td></td>
<td>Community-based peer education workshops vs. usual care</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Culturally tailored and bilingual staff</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Flexible participant scheduling</td>
<td></td>
</tr>
<tr>
<td>FURRThER</td>
<td>RCT Culturally tailored</td>
<td>Measurement of BP at 1 y in stroke patients and family</td>
</tr>
<tr>
<td></td>
<td>Family-friend support networks, family-based counseling</td>
<td>networks</td>
</tr>
</tbody>
</table>

BP indicates blood pressure; RCT, randomized controlled trial; and TIA, transient ischemic attack.

As a structural intervention, the Preventing Recurrence of Thromboembolic Events through Coordinated Treatment
(PROTECT) study included integration of a quality initiative
program, which mandated documentation of discharge
medications among stroke/TIA patients.17 This discharge
intervention demonstrated success in increasing adherence to
stroke discharge medications during the first year after stroke
and reported 90-day adherence rates of 100% antithromboti-
cs, 99% statins, 92% angiotensin-converting enzyme, 99%
statins, 80% thiazides.17 The primary aim of the Integrated
Care for the Reduction of Secondary Stroke (ICCARUS)
study was to promote the management of vascular risk fac-
tors through ongoing patient contact and education via the

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integrated care reduction of secondary stroke model, involving collaboration between a specialist stroke service, a hospital coordinator, and a patient’s general practitioner. At 12 months after stroke, systolic blood pressure decreased in the integrated care group and increased in controls (P=0.04). The Families Understanding Risk Reduction through Educational Reinforcement (FURRThER) pilot study uses family and friend networks as a structural platform for vascular risk reduction. The ongoing Systematic Use of Stroke Averting Interventions (SUSTAIN) program seeks to improve the delivery of secondary stroke preventive services after hospital discharge. This care intervention includes group clinics, self-management support, report cards, decision support through care guides and protocols, and coordination of ongoing care.

There is an ongoing concern that vascular risk reduction programs have not been widely implemented or successful in reducing risk factors outside of a trial setting because interventions have not included community infrastructure or addressed behavioral barriers to vascular risk factor reduction, including health literacy, patient physician communication, and risk perception. There are numerous ongoing studies that have integrated components of community engagement into secondary stroke prevention. PROTECT DC piloted the use of community health workers as vehicles for reducing disparities in risk control after stroke. Prevent Recurrence of All Inner-City Strokes Through Education (PRAISE) a community-based peer education workshop versus usual care among self-identified stroke survivors, demonstrated significant improvements in blood pressure control in intervention versus control groups. The Discharge Educational Strategies for Reduction of Vascular Events (DESERVE) study of mild stroke and TIA patients, currently underway, incorporates a chronic care model of vascular risk management strategies with emphasis on integration of skills related to risk perception, medication adherence, and patient/physician communication.

This is an exciting time for behavioral interventions in stroke. As indicated above, there are a substantial number of interventions currently underway. Each of these trials will add unique information and ultimately inform optimal strategies for both stroke prevention and stroke preparedness. Key issues surrounding intervention design that still need to be resolved include cost, optimal reinforcement strategies, and the appropriate use of usual care for testing behavioral interventions because even educational brochures systematically distributed can be considered an intervention. Furthermore, given the burden of disparities in stroke, it may be that although these interventions equalize the field, the disparities gradient continues to exist. Indeed, equalizing the playing field is a good first step but not enough, and continued work identifying mechanisms and designing strategies addressing disparities will be critical. Finally, dissemination and implementation of successful intervention strategies must be underwritten so that what is successful in a few communities can be disseminated to all.

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**References**


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