Transferring Stroke Knowledge from Children to Parents: A Systematic Review and Meta-Analysis of Community Stroke Educational Programs

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Background: The purpose of this systematic review and meta-analysis on child-to-parent communication of stroke information (Child-Mediated Stroke Communication, CMSC) is to provide the highest levels of evidence supporting the role of this approach in community education. *Methods:* Databases such as PubMed, Google Scholar, PsycINFO, Web of Science, MEDLINE, and CINHAL were searched to gather information on CMSC followed by a meta-analysis. The eligibility criteria were as follows: (a) children aged 9-15 years and parents, (b) randomized or non-randomized trials, and (c) outcome variables that included the proportions of parents answering the pretest and post-test on stroke knowledge regarding risk factors, symptoms, and what to do in the event of stroke. *Results:* Of the 1668 retrieved studies, 9 articles were included. Meta-analytical findings yielded that the proportions of correct answers for stroke symptoms and its risk factors among parents were 0.686 (95% CI: 0.594-0.777) at baseline and increased to 0.847 (95% CI: 0.808-0.886) at immediate post-test and 0.845 (95% CI: 0.804-0.886) delayed post-test. The proportions of correct answers for behavioral intent to call 911 when witnessing stroke was 0.712 (95% CI: 0.578-0.846) at baseline, rising to 0.860 (95% CI: 0.767-0.953) at immediate post-test, and 0.846 (95% CI: 0.688-1.004) at delayed post-test. *Conclusions:* CMSC is effective for educating families. More work is needed to increase the use of validated stroke literacy instruments and behavioral theory, and to reduce parental attrition in research studies.

Key Words: Child-mediated stroke communication—tissue plasminogen activator—Hip-Hop stroke—stroke symptoms—stroke risk factors—911 behavioral intent—systematic review—meta-analysis.

Introduction

On average, every 40 seconds, someone in the United States will experience a stroke.[1] Indeed, stroke ranks among the leading causes of long-term disability and death globally.[2] Reducing the time between stroke symptom onset and hospital arrival improves patient outcomes by enabling the administration of acute stroke treatments such as intravenous tissue plasminogen activator (t-PA) within the critical 4.5-hour treatment window[3,4] and mechanical thrombectomy. However, due to cognitive and physical debilitation, victims are often unable to reach out for help, relying instead on witnesses and bystanders to take appropriate action, which is to call 911.[5]

One of the priorities of stroke center designation programs, which have also been outlined in stroke guidelines, is community education on stroke prevention, awareness of stroke symptoms, and calling 911. Yet, there

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is a dearth of evidence supporting best practices for accomplishing these goals. Mass media communication is one commonly adopted strategy by health departments and stroke associations, but the costs of this method make it difficult to embrace or sustain by stroke hospitals.

Since children may be the only ones present during an acute stroke involving a parent, grandparent, or guardian, they may be uniquely positioned to influence time to treatment by recognizing stroke and immediately calling 911.[6] Moreover, children may be able to positively influence a family's stroke knowledge, lifestyle behaviors, and support parental self-management of illness.[7–9] Indeed, as much as 45% of stroke knowledge has been reported to originate from family and friends, some of whom may be children.[10–12] These reports create a favorable environment for the design and rigorous evaluation of community stroke education programs targeting children.

School-based stroke education efforts have been shown to be effective in increasing children's stroke knowledge.[13] A number of studies have found statistically significant improvement in children's stroke knowledge and behavioral intent to call 911 during immediate post-tests.[11,14–20] The incorporation of an age-appropriate, culturally relevant intervention with appealing design components, such as video games, manga comics, visual arts projects, and Hip-Hop music, has been included in multiple studies as core components of the interventions.[11,17,19–23]

The importance of stroke knowledge transfer from child to parent is heightened by its potential as a community stroke awareness strategy owing to the diffusion of information from the children to parents, and then from parents to extended family and friends. While educational interventions directly targeting adults have been shown to reduce prehospital delays and increase acute stroke treatment rates,[24] harnessing the power of children to influence their parents may be a more sustainable approach due to the captive audience schools provide and may have broader effects on stroke knowledge by imparting knowledge and behavioral skills to a generation before they develop risk. This strategy provides an additional channel through which public health professionals may reach their target populations. A prior meta-analysis[6] found improvements in stroke knowledge among children who participated in stroke education. However, the rigor of the methodological approaches used to form conclusions is often challenged due to a lack of attention to the validity of stroke knowledge instruments used, theoretical underpinnings, and absence of control groups, creating a need to critically review these programs and their effects on parental stroke knowledge. While this meta-analysis explores these areas, it also shifts attention towards parental knowledge gained from their children.

The purpose of this study is to examine the existing evidence supporting the premise that stroke knowledge can be effectively transferred from children to parents. The review compares the stroke knowledge scores of parents who were educated by their children, and examines the multiple modes through which children were educated (by neurologists versus nonstroke expert such as Emergency Medical Technicians, teachers and Lay Health Workers). Since this child-to-parent educational model is relatively new, a review of the existing studies will provide insights into factors influencing successes and failures and the efficacy of these interventions. This study is designed to address the knowledge gap regarding meta-analytical data focused on the transfer of stroke knowledge from children-to-parents—a critical component for the community-level success of school-based stroke education programs.

Methods

Our study was prospectively designed but not registered. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses guideline was used as the template.

A systematic literature review was conducted to gather relevant studies focused on child-mediated stroke communication using PubMed (548 manuscripts), Google Scholar (289 manuscripts), PsycINFO (179 manuscripts), Web of Science (310 manuscripts), CINAHL (112 manuscripts), and MEDLINE (230 manuscripts). Given the relatively small number of studies focused on this topic, the search was not limited by year of publication. The following index terms were used to capture relevant studies: “stroke and children,” “stroke education through children,” “child-mediated stroke education,” “parent and children stroke,” and “cerebrovascular accident, children, knowledge.” Unlike prior reviews,[6,13] this study included index terms in the descriptors such as “parent” and “cerebrovascular accident” to ensure that all potential studies were retrieved and included in the analysis.

Data collection occurred from September 1, 2017 to April 18, 2018. We also evaluated the reference lists of identified studies to ensure that all relevant studies were included in this review of the literature.

Selection of Studies

We limited the inclusion criteria to peer-reviewed articles published in English, randomized or nonrandomized child-mediated stroke communication interventions, with children aged 9-15 years and their parents. The outcome variable associated with the inclusion criteria included the proportions of parents responding to the pretest and post-test on stroke knowledge instruments regarding risk factors, symptoms, and what to do in the event of stroke. Studies that did not report the proportions of parents responding to the above stroke knowledge items were excluded. In the context of this review, the term “parent” refers to any adult or caregiver living in