Feasibility of Providing Pediatric Neurology Telemedicine Care to Youth with Headache

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KEY WORDS
Headache, NP, telemedicine

INTRODUCTION

Telemedicine has been described as use of electronic communication between two sites to deliver medical information to improve a patient's clinical health status (American Telemedicine Association, 2010). It has been widely used since the 1990s in remote areas such as Alaska and the upper reaches of Canada in addition to other rural parts of the United States (Gifford, Niles, Rivkin, Koverola, & Polaha, 2012). The American Academy of Pediatrics (2015) has supported telemedicine as a way to deliver both primary care and certain specialty areas with provider shortages. The pediatric neurology workforce is insufficient for U.S. population needs, leading to lengthy wait times for patient appointments and no services in large portions of the country (Bale, Currey, Firth, Larson, & The Executive Committee of the Child Neurology Society, 2009). Advanced practice providers trained in neurology have been proposed to fill the gap, and alternative health care delivery models such as telemedicine have been suggested to bridge the gap between neurology services supply and demand (Freeman, Vatz, Griggs, & Pedley, 2013).

To address the identified supply and demand for Pediatric Neurology services in western New York, telemedicine services were offered. The child neurology practice at the large academic medical center where this project was conducted has a catchment area of 1.6 million individuals. Over half of the patients seen by the practice reside outside of the medical center's county, and another 25% reside more than two counties away. With little local neurology presence in outlying areas, patients must travel 3 hours or more for neurology care. Follow-up visits are only 30 minutes long, necessitating extensive travel for short appointments. Telemedicine services provide families with the option of seeking follow-up care locally.

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Headaches are the second most common diagnosis for referral to a pediatric neurology practice. Although

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there is little consensus about the prevalence of headaches in children, estimates of overall prevalence are around 54.4% of children and adolescents, with about 9.1% of those defined as migraine (Woeber-Bingal, 2013). Management consists of a combination of lifestyle changes and medication. A recent headache telemedicine project in Norway confirmed that patient outcomes for adult headache care delivered via telemedicine were comparable to outcomes for traditional clinic visits (Muller, Alstadhaug, & Bekkelund, 2016).

When considering telemedicine, providers generally suggest the adoption of a "hub and spoke" model, with specialty medical care delivered from an examination room at a "hub" site to a patient presenting at a rural "spoke" site (Wechsler, 2015). Traditionally, the spoke site is the local provider's office, and the patient is presented via telemedicine in an examination room. Within child neurology, nurse practitioners often see patients with headache, with the assistance of physician colleagues as backup if there are concerns or questions.

Patient and family satisfaction with telemedicine is high, with patients reporting improved access to care, enhanced convenience, less missed work and school time, and increased access to specialty care (Hooshmand & Foronda, 2018; L'Esperance & Perry, 2015). There is evidence of increased appointment compliance (Leigh, Cruz, & Mallios, 2009), and the cost of telemedicine services has decreased as technology options have become more affordable (Muller et al., 2016). A notable barrier is identified as inadequate staff training, leading to the abandonment of some telemedicine ventures (Wechsler, 2015; Yellowlees, 2005).

Pediatric telemedicine programs often focus on mental health care delivery in underserved areas. In a study of 223 children with attention deficit hyperactivity disorder (ADHD) ages 5 through 13 years in Oregon and Washington, subjects were randomized to optimal care, with medication and therapy delivered by mental health specialists, versus usual care, which was delivered by their primary care provider with the addition of one consultation session delivered via telemedicine (Myers, Vander Stoep, & Lobdell, 2013). Adherence to care was high in both groups (96%), showing that parents and primary care providers valued the service delivered. Additionally, the use of telemedicine allowed the researchers the opportunity to deliver care to multiple underserved communities.

The provision of care for ADHD patients via telemedicine noted positive patient and parent satisfaction, as well as equal benefit between telemedicine and face-to-face visits (Ellington, 2013). Patient encounters for 125 children ages 4 through 17 years old with ADHD and other disruptive behavior disorders were completed via telemedicine. A total of 54 satisfaction surveys were completed, with a mean score of 4.69 out of 5 for overall satisfaction, with 5 deemed very strong satisfaction.

A school-based telemedicine initiative enrolled 400 students with asthma in an attempt to use telemedicine to increase adherence to preventive asthma care (Halterman et al., 2018). Children ages 3 through 10 years were randomized to the school-based telemedicine asthma team or enhanced usual care for 1 year. The program consisted of supervised administration of preventive asthma medication at school and three school-based telemedicine visits to ensure appropriate assessment, preventive medication prescription, and follow-up care. Children in the telemedicine group had more symptom-free days per 2 weeks after the intervention compared with children in the enhanced usual care group. Children receiving the telemedicine care were also less likely to have an emergency department visit or hospitalization for asthma.

The main objective of this project was to develop, implement, and evaluate a child neurology headache care telemedicine program in an outlying pediatric primary care practice. The goals were to create a work plan to guide the process; train spoke site staff; conduct one in-person outpatient visit followed by three monthly telemedicine visits for children ages 7 through 17 years with headache; and assess feasibility, satisfaction, and headache outcomes. Because of time constraints on the part of the project manager, the decision was made to complete just three telemedicine visits for this project, with the hope of continuing with billable telemedicine visits after the project conclusion.

METHODS

Two nurse practitioners (NPs) with telemedicine experience at an academic medical center (hub site) directed the project. One acted as the project manager, establishing the telemedicine program with the outlying spoke site, scheduling patients, and assisting with data collection and analysis. The second NP was a headache expert who conducted an initial in-person new patient visit followed by three telemedicine visits. She also prescribed medications and reviewed lifestyle modifications with participants. A private telemedicine office at the medical center was used. Permission to conduct the project was obtained through the institutional review board at the academic medical center.

The spoke site was a primary care pediatric practice located 95 miles away. This large practice had 10 pediatricians and over 37,000 outpatient visits in 2015. At the time of project initiation, no local child neurology services were available near the practice. In addition to the physicians, the spoke site also had an office manager, a registered nurse (RN), three licensed practical nurses (LPNs), office staff, and a contracted information technology (IT) consultant.

Creation of a work plan, or "road map," was the first step in designing the project (Figure 1). All of the steps necessary for the project, including identifying team members, training spoke site staff, generating