Social Script iPad Application Versus Usual Care Before Undergoing Medical Imaging: Two Case Studies of Children With Autism

■ Norah Louise Johnson, PhD, RN, CPNP; and Octavia Alexis Bree, BSN

ABSTRACT: **Autism spectrum disorders (ASDs) are neurodevelopmental disorders of socialization, communication, and repetitive behaviors. Children with ASD have underlying anxiety leading to challenging behaviors in unfamiliar situations. The anxiety impacts timely completion of an imaging procedure. The purpose of the case study was to describe the process of the social script intervention delivered using the iPad application on parent and child anxiety, child behaviors, and imaging procedure length between two parent and child dyads. The case study of two parent-child dyads demonstrated the process for comparing the social script intervention iPad app for preparing for imaging versus usual care. Parent anxiety decreased more for the parent with the intervention. Computerized tomographic scan length of time to hold still decreased more for child with the intervention. There were fewer challenging child behaviors for child with the intervention. The results guide development of larger study, with the potential to mitigate the negative experiences for a child with ASD and the family during imaging. (J Radiol Nurs 2014;33:121-126.)**

KEYWORDS: **Autism; Radiology case report; Anxiety.**

INTRODUCTION

Autism spectrum disorder (ASD) is prevalent in approximately 1 of every 88 people in the United States (Centers for Disease Control and Prevention, 2012). According to the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5; American Psychiatric Association [APA], 2013), children with ASD exhibit (1) impairments with social interaction and social communication and (2) restricted interests and repetitive behaviors. These symptoms affect both the child, who may experience anxiety and trouble cooperating, and their parent, who may experience anxiety during medical imaging (e.g., X-rays and computerized tomographic [CT] scans; Davis et al., 2011; de Andres-Garcia, Sarinana-Gonzalez, Romero-Martinez, Moya-Albiol, & Gonzalez-Bono, 2013; Lovell, Moss, & Wetherell, 2012; Peacock, Amendah, & Ouyang, 2012). Health-care providers (HCPs) find it difficult to complete imaging for children with ASD who are anxious and have trouble cooperating (Johnson & Rodriguez, 2013). With the large population of children with ASD, strategies to improve the imaging experience for the child and the parent are essential to timely and safe completion of imaging.

Previous studies indicate that children with ASD have different needs when being prepared to undergo a medical procedure, based on their level of development not their age (Koller & Goldman, 2012;

Norah Louise Johnson, PhD, RN, CPNP, is an Assistant Professor at Marquette University, Milwaukee, WI and Octavia Alexis Bree is a graduate student at Marquette University, Milwaukee, WI.

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Corresponding author: Norah Louise Johnson, Marquette University, 530 North 16th St., Milwaukee, WI 53233. E-mail: norah.johnson@marquette.edu

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Scarpinato et al., 2010). Imaging procedure preparation for typically developing children involves instruction "tools and tips" such as informational brochures, tours, coloring pages, and accurate information, selected based on a child's age (Metzger, Mignogna, & Reilly, 2013). However, children with ASD have distinct needs for procedure preparation that do not follow the age criteria of a typically developing child as a result of their sensory, communication, and social challenges (Johnson & Rodriguez, 2013). For example, unplanned medical procedures in an unfamiliar setting with HCPs unfamiliar with the child can provoke challenging behaviors, resulting in increased anxiety and distress for the parent and child, prolonged procedure times, increased costs, and poorer health-care outcomes (Liptak, Stuart, & Auinger, 2006; Lokhandwala, Khanna, & West-Strum, 2012). Moreover, behavioral problems can affect the imaging quality (Nordahl et al., 2008), delay or prolong imaging, and may even necessitate sedation, physical restraints, or canceling imaging procedures (Netzke-Doyle, 2010). Children with ASD could benefit from learning special coping strategies during procedure preparation by the HCP to be able to complete imaging.

Many studies report on the use of social stories™ as a strategy to help children cope with the stress of unfamiliar surroundings, people, and expectations for cooperation in nonmedical settings (Dodd, Hupp, Jewell, & Krohn, 2008; Kokina & Kern, 2010; Koller & Goldman, 2012; Reichow & Sabornie, 2009). A social story is a script written from the child's perspective, with photographs and words that provide a description about a procedure in a step-by-step approach (Gray, 2003). A social story helps guide the child's behavior and interactions so that they know what is socially acceptable and expected in the particular situation. The use of social stories has been demonstrated to lead to improved behavior and social functioning among children with ASD in schools and the community before new social situations with unfamiliar people (Kokina & Kern, 2010). However, there is a gap in the literature exploring the effects of a social story on children with ASD in preparing them to undergo medical imaging and the best method for delivering them.

Previous researchers have demonstrated that social stories can be delivered on iPads (Kagohara et al., 2013; Moore et al., 2013; Murdock, Ganz, & Crittendon, 2013; Vandermeer, Beamish, Milford, & Lang, 2013). Children with ASD enjoy iPads, are familiar with how they work, and are physically able to tap or slide their fingers across the iPad screen (Goodin, 2010). Thus, a social story delivered on the iPad as an approach to preparing a child for a medical procedure may provide the child with an increased perception of control of the situation because they are able to visualize, hear, anticipate, and operate the device.

The purpose of this case study was to compare the anxiety and challenging behaviors between one child with autism who underwent the standard preimaging preparation and another child with autism who was prepared for a medical imaging procedure with a social story intervention, delivered using the iPad application. A secondary purpose was to compare the anxiety of the parent who accompanied the child through the medical imaging procedure.

CASE DESCRIPTION

Presentation

Two boys with ASD who were scheduled for elective nonemergent CT scans at a tertiary care children's hospital imaging department in the Midwestern United States were selected to be studied in this University, and Hospital Institutional Review Board approved the study. Child 1 was a 16-year-old boy with autism and shunted hydrocephalus, scheduled for a CT scan of his head. Before the CT scan of the head, Child 1 received the social story intervention, delivered using the iPad application. Child 2, who received usual care, was an 8-year-old boy with autism scheduled for a CT head scan of the sinuses. He received preparation with verbal instruction before the CT scan. Both the procedural scans occurred in the imaging department of Children's Hospital of Wisconsin. In both cases, the parent/caregiver accompanied the child to the imaging room.

The two boys were selected for this case study comparison based on their matching characteristics of gender, imaging procedure ordered (CT head scan), and their underlying diagnosis of classic autism. Selecting the same imaging procedure and diagnosis allowed for control of other variables that would impact the outcome measures. For example, procedure time and challenging behaviors that may relate to severity of a child's ASD and the type of procedure would impact the expected length of set up time and total length of the imaging procedure.

Procedure

There were two researchers assigned per child/parent dyad. Data were collected at three time points by two researchers. The first researcher recruited the child with ASD and their parent before the start of the CT scan, in the imaging waiting room of the hospital, via an Institutional Review Board approved flyer. The parent provided informed consent before participating in any data collection. The child provided assent. Next, the