Using the Traffic Light System to Implement Evidence-Based Practice

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The implementation of evidence-based practice (EBP) is considered best practice in occupational therapy, yet it is currently estimated that it takes more than 17 years to translate research into practice (Morris et al., 2011). Many occupational therapy practitioners support adopting and implementing EBP; however, research indicates that these desires often do not materialize because of perceived barriers, including lack of time, limited availability and accessibility of research, and having limited research skills (Upton et al., 2014).

To support the implementation of EBP, it is important to first understand its foundational components. EBP has three pillars: (1) best research evidence, (2) clinical expertise, and (3) client values and preferences. All are equally essential to using the best evidence to inform clinical expertise, and ultimately, provide client-centered, evidence-based occupational therapy services. This article discusses the collaboration of an occupational therapist (OT) with expertise in pediatric neurorehabilitation, co-author Alison Heinekamp, and her occupational therapy doctoral (OTD) student, co-author Grace Reifenberg, to successfully implement EBP in the inpatient rehabilitation setting at Cincinnati Children's Hospital Medical Center, in Ohio.

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Heinekamp works on a pediatric inpatient rehabilitation unit that is certified as a brain injury specialty program by the Commission on Accreditation of Rehabilitation Facilities. The program serves a high number of clients with neurologic conditions, including traumatic and acquired brain injuries, strokes, brain tumors, and atrioventricular malformations. Clients with neurologic conditions that result in upper extremity hemiplegia are at a high risk for shoulder subluxation. Shoulder subluxation can negatively affect occupational performance by causing secondary complications, such as rotator cuff injuries, decreased range of motion, poor motor recovery, and chronic pain (Kumar & Swinkels, 2009). These complications considerably affect a client's ability to participate in meaningful occupations, such as ADLs, social pursuits, school routines, and play or leisure activities. Before the pediatric rehabilitation unit implemented a new evidence-based treatment plan, standard care consisted of several interventions, including:

- Educating clients and families regarding safe and optimal positioning, passive range of motion (ROM), and active assisted ROM (AAROM)
- Using therapeutic taping to improve shoulder joint positioning and stability

- Using generic upper extremity slings to reduce risk of shoulder injury

With an increasing number of clients with upper extremity hemiplegia and resulting shoulder subluxation, Heinekamp began to question the efficacy of the then standard care interventions because of slow progress related to joint integrity, motor recovery, and independence and participation in occupations such as dressing. Many clients were discharged from the inpatient rehabilitation unit with unmet goals related to daily life participation. Heinekamp wanted to identify evidence-based interventions for managing pediatric clients with shoulder subluxation to address her concern regarding its effect on their occupational performance outcomes and overall quality of life. Although Heinekamp's main goal was to improve client outcomes by using evidence-based practice, she also knew that a literature review of best evidence would help justify with management the additional supplies or resources needed to best manage clients with shoulder subluxation. Heinekamp collaborated with Reifenberg, who was completing her doctoral experience, to investigate current evidence. Using Heinekamp's clinical knowledge and experience, and Reifenberg's advanced research skills developed through her doctoral program, the following research question was developed: "Among children with hemiplegic shoulder subluxations, what evidence-based interventions improve functional outcomes?"

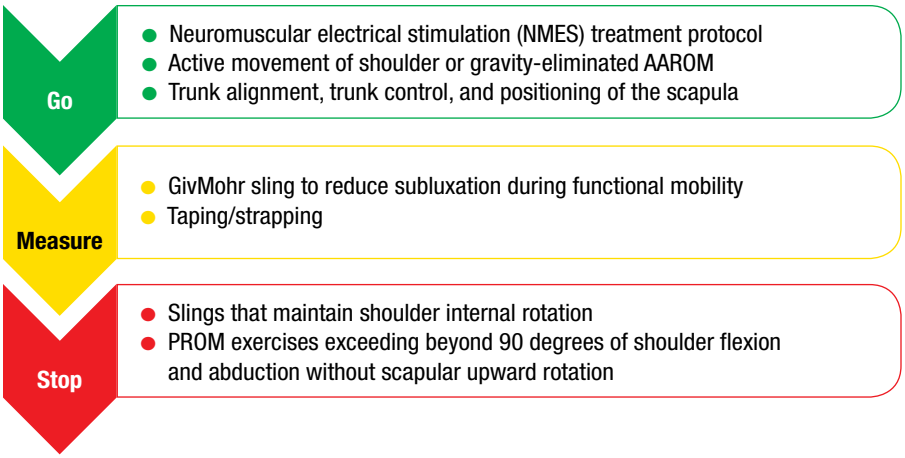
After Heinekamp and Reifenberg collaborated to develop their clinical question, Reifenberg completed a literature review using common health care databases, such as PubMed and CINAHL. They met to discuss and develop evidence-based recommendations based on the results. These recommendations were translated into a clinician-friendly, evidence-based resource that outlined hemiplegic shoulder management using the Traffic Light Level of Evidence system (Novak 2012; see Figure 1 on p. 30).

Based on this system, three types of interventions were identified:

- Green "Go" interventions: those with strong evidence
- Yellow "Measure" interventions: those with mixed or moderate strength evidence
- Red "Stop" interventions: those with poor strength of evidence or evidence that suggests the intervention may be harmful

The Traffic Light Level of Evidence system provided a clinician-friendly representation of best-evidence interventions to support pediatric clients with hemiplegic shoulder subluxations, and ultimately, enhance independence in meaningful, functional activities. At a glance, clinicians were able to identify "Go" interventions, such as a neuromuscular electrical stimulation (NMES) treatment protocol, active movement of shoulder, gravity-eliminated AAROM, and trunk alignment interventions to prepare the pediatric client for functional activities that require shoulder stabilization and active movement.

Figure 1. Traffic Light Level of Evidence System for Pediatric Shoulder Subluxation Management



Heinekamp and Reifenberg presented these evidence-based findings, including the Traffic Light Level of Evidence system, to the inpatient rehabilitation team to encourage knowledge translation. This presentation included a hands-on demonstration on applying the NMES unit to correct pediatric shoulder subluxation in compliance with the Green "Go" treatment protocol. During this presentation, Heinekamp and Reifenberg demonstrated the distinct value of occupational therapy in shoulder subluxation management for pediatric clients and how these evidence-based interventions can help clients achieve meaningful, functional goals through an interdisciplinary approach. Examples were provided to illustrate how this modality facilitated a client's increased independence through preparatory and occupation-based activities, including applying NMES to the shoulder before and during therapeutic activities, such as dressing, grooming, and self-feeding.

To enhance the knowledge translation of these evidence-based pediatric shoulder subluxation interventions, Heinekamp and Reifenberg also presented a pilot case study of a 10-year-old pediatric client with hemiplegia secondary to an atrioventricular malformation rupture. Heinekamp and Reifenberg collaborated with the client using the Canadian Occupational Performance Measure (Law et al., 2014) to identify the direct effects of shoulder subluxation on her participation in ADLs, school, and meaningful social and leisure activities, and on functional mobility. The client identified specific, measurable goals, such as donning her shoes and pulling her hair into a ponytail, which were addressed using evidence-based NMES for both preparatory and occupation-based activities to ultimately achieve her self-identified functional goals.

During the knowledge translation process, notable barriers were identified that threatened the successful adoption of these evidence-based interventions to manage pediatric clients with shoulder subluxation. The NMES treatment protocol is recommended for 6 hours per day, for 5 days per week (Paci et al., 2005). This dosage was not feasible within the structure of the inpatient rehabilitation treatment protocol of 1.5 hours of occupational therapy and 1.5 hours of physical therapy per day for 5 days per week. To successfully integrate these research findings on the inpatient rehabilitation unit, they were combined with the clinicians' expertise to create a modified treatment protocol that was feasible within the treatment context: up to 3 hours per day for 5 days per week, as tolerated by the client. (*Note*: Adapting an evidence-based intervention does not always translate to the same or similar outcomes as proven by the research intervention. However, it is not uncommon to find this type of barrier when applying research evidence to the clinic/health care environment.)

This protocol modification highlights an important drawback to using research-based interventions: In this case, the intervention dosage could not be feasibly translated to the treatment setting, which may influence the effectiveness of the intervention.

The modified treatment protocol presented several challenges to the team during initial implementation. First, Heinekamp explored the capabilities of current equipment available to the inpatient rehabilitation team to ensure it could be used to implement the treatment protocol dosing, but also to enhance occupation-based interventions. Second, it was necessary for the entire team to buy into using this treatment protocol, as the dosing required close collaboration between OTs and physical therapists. Although the OTs initiate and direct the treatment protocol and monitor outcomes, they rely on the physical therapists to carryover this intervention into physical therapy sessions to maximize the amount of time the client can receive it. Last, many pediatric clients may not tolerate the intervention because of discomfort with continuous NMES or lack of understanding of the intervention and its purpose.

To continue to improve the application of research findings as they relate to clients with shoulder subluxation, Heinekamp developed strategies to overcome the aforementioned barriers. Since the initial presentation of evidence to the inpatient rehabilitation occupational therapy/physical therapy team, Heinekamp has provided them with additional education, including:

- Equipment capability and application in various occupation-based activities
- Placement of NMES electrodes for optimal shoulder subluxation correction
- Eliminating the use of generic slings that position the client's upper extremity in static internal rotation.

Heinekamp has also worked with other clinicians in the community with expertise in functional electrical stimulation to learn strategies for increasing the pediatric client's tolerance to NMES protocols. After the initial implementation of the NMES treatment protocol, Heinekamp observed improved outcomes for clients with shoulder subluxation, including improved shoulder positioning and active ROM, decreased limitations because of shoulder pain, and overall improved participation in daily life activities. For example, the 10-year-old pediatric client discussed previously demonstrated improved active shoulder ROM and decreased pain, which

increased her independence with ADLs, such as donning a shirt, removing her ankle-foot orthosis, styling her hair, carrying a backpack, and resuming her preferred leisure activities of cheerleading and spending time with friends.

This process demonstrates the three EBP pillars at work through:

- Applying clinical expertise to identify a gap in clinical practice
- Using foundational research strategies to search, identify, and appraise recent literature
- Collaborating with a 10-year-old pediatric client to identify the feasibility and effectiveness of these evidence-based interventions.

Through the partnership between a clinician and OTD student, implementing evidence-based practice increased clinician knowledge and confidence with a high-risk condition and facilitated meaningful changes in practice, ultimately leading to improved client outcomes.

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