

■ **Decreasing the Knowledge-to-Action Gap Through Research–Clinical Partnerships in Speech-Language Pathology**

■ **Réduire l'écart entre les connaissances et la pratique grâce à un partenariat entre chercheurs et cliniciens en orthophonie**

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Abstract

A partnership between a Swallowing Rehabilitation Research Laboratory (SRRL) team and four clinical speech-language pathologists (S-LPs) was created to address an identified knowledge-to-action (KTA) gap with respect to the use of a novel treatment technique for dysphagia. Clinicians who had previously been educated in the use of surface electromyography (sEMG) biofeedback in swallowing rehabilitation, but who had not adopted this technique in their clinical practice, received hands-on mentorship to facilitate utilization of the treatment technique in question. An action plan was devised following the framework of the KTA process outlined by Graham et al. (2006). Analysis of post-training interview data indicated that the clinicians valued their experience working with the SRRL team. Clinicians reported that support from the SRRL team helped them overcome various barriers, including therapeutic time constraints, difficulty maintaining knowledge of current research literature, and lack of confidence in implementing new techniques. Overall, a successful KTA process was achieved, benefiting clinicians, patients, and researchers.

Abrégé

On a créé un partenariat entre l'équipe du Swallowing Rehabilitation Research Laboratory (laboratoire de recherche sur la réadaptation de la déglutition) et quatre orthophonistes cliniciens pour examiner un écart entre les connaissances et la pratique en ce qui a trait à l'utilisation d'un nouveau traitement pour la dysphagie. Les cliniciens qui avaient déjà reçu une formation sur l'utilisation de la rétroaction biologique de l'électromyographie de surface (sEMG) pour la réadaptation de la déglutition, mais qui n'avaient pas adopté cette technique dans leur exercice clinique ont reçu un encadrement pratique pour faciliter l'emploi de cette technique de traitement. On a élaboré un plan d'action suivant le cadre de la démarche du passage des connaissances à la pratique décrite par Graham et collaborateurs (2006). Une analyse de l'entrevue consécutive à la formation a indiqué que les cliniciens ont aimé leur expérience de collaboration avec l'équipe du laboratoire de recherche. Les cliniciens ont rapporté que le soutien offert par cette équipe les a aidés à surmonter divers obstacles, y compris des contraintes de temps en thérapie, la difficulté de rester au fait de la recherche de pointe, et le manque de confiance en leurs capacités de mettre en pratique de nouvelles techniques. Dans l'ensemble, la démarche de passage des connaissances à la pratique a été réussie, ce qui a profité aux cliniciens, aux patients et aux chercheurs.

Key words: knowledge translation, knowledge-to-action, dysphagia, research utilization

Introduction

Dysphagia (difficulty swallowing) is prevalent following stroke, traumatic brain injury, and other neurological diseases. Speech-language pathologists (S-LPs) are often responsible for the evaluation, management, and/or treatment of dysphagia. Current clinical practice patterns favour the use of *compensatory* behavioural interventions such as texture modification or altered positioning to manage disordered swallowing (Steele et al., 2007). These compensatory approaches do not attempt to alter the underlying physiological dysfunction causing the swallowing problem, but to provide temporary improvements while waiting for natural recovery to occur (Huckabee & Pelletier, 1999). Recently, however, several studies have shown that rehabilitative swallowing exercises practised using biofeedback from surface electromyography (sEMG) can facilitate improvements in swallowing physiology (Crary, 1995; Crary, Carnaby Mann, Groher, & Helseth, 2004; Huckabee & Cannito, 1999).

In the academic rehabilitation hospital where the current study was conducted, the S-LPs had received previous exposure to the treatment technique of interest (i.e., rehabilitative swallowing exercises practised using sEMG biofeedback) in a didactic teaching session on evidence-based swallowing rehabilitation techniques. The necessary sEMG biofeedback equipment was available in the hospital. Nonetheless, the S-LPs remained hesitant to employ sEMG biofeedback in their clinical practice. The movement of knowledge into practice, referred to as knowledge transfer or knowledge translation, is critical for patients to benefit from new therapeutic techniques.

When a clinician has the knowledge but does not use it in practice, it creates a situation that is called a *knowledge-to-action (KTA) gap*. In a KTA gap, the “transfer of research findings into practice is often a slow and haphazard process” (Graham et al., 2006, p. 13). The Canadian Institutes of Health Research indicate that “effective knowledge translation is underpinned by effective exchanges between researchers and users—exchanges premised on meaningful interaction with intent to appropriate use of the latest and most relevant research in decision-making” (Canadian Institutes of Health Research, 2008).

The current paper outlines the process that the research team from the Swallowing Rehabilitation Research Laboratory (SRRL) in the hospital undertook to address the identified KTA gap in dysphagia rehabilitation. First, we describe the treatment technique in question and the KTA framework that was used as the basis for the project. Then, we describe the intervention that was provided, identifying key elements of the KTA process model that were included. Finally, we report the results of a qualitative analysis of interview transcripts collected from the S-LPs who received the KTA intervention.

Surface EMG biofeedback to facilitate swallowing rehabilitation

Surface EMG is a technique for measuring the timing and relative amplitude of muscle contraction. It captures the electrical activity of muscles via adhesive electrodes placed on the skin’s surface. Visual biofeedback is displayed on a computer screen during therapy. The signal represents the activity of the suprahyoid muscle group during swallowing. Surface EMG can be used to provide patients with biofeedback regarding the execution of two specific swallowing exercises: 1) the Effortful Swallow, in which greater amplitudes of muscle contraction are elicited (Hind, Nicosia, Roecker, Carnes, & Robbins, 2001; Huckabee & Steele, 2006); and 2) the Mendelsohn Manoeuvre, in which the duration of peak muscle contraction is prolonged (Mendelsohn & McConnel, 1987; Ding, Larson, Logemann, & Rademaker, 2002). These exercises aim to improve swallow physiology by increasing muscle strength and building endurance and have been reported to yield functional improvements in swallowing (Crary 1995; Crary et al., 2004; Huckabee & Cannito, 1999).

Study Design – The KTA Process (Graham et al., 2006)

The framework behind the KTA intervention in this study was the KTA process model devised by Graham et al. (2006). The model posits that the KTA process is comprised of two key components: *knowledge creation* and *knowledge action*. As shown in Figure 1, the knowledge creation cycle is represented by the inner cycle (dashed arrows), and the knowledge action cycle is represented by the outer cycle (solid arrows). The relationship between knowledge creation and knowledge action is recognized as fluid and dynamic, each influencing the other. Knowledge creation, where ideas are formulated and techniques and products are developed, lies at the heart of the model. This process involves knowledge inquiry, knowledge synthesis, and knowledge tools/products. In the end, it reveals the most refined data that is both valid and useful (Graham et al., 2006).

The KTA Intervention

In the current case, knowledge creation had been facilitated at a two-day training workshop that was held one year prior to the beginning of this study. During the workshop, the literature on swallowing rehabilitation using sEMG biofeedback was reviewed and basic training was provided. However, this original workshop failed to incorporate an *action cycle* (Graham et al., 2006) through which the acquired knowledge could be implemented and applied with patients. Consequently, despite training, the clinical S-LP team had failed to employ the tool in their clinical practice during the year that followed their training (*Identification of the Problem*—see Figure 1). Members of the SRRL research team therefore set out to facilitate an action cycle (Graham et al., 2006) to address this KTA gap. The research team reviewed the literature, designed a treatment

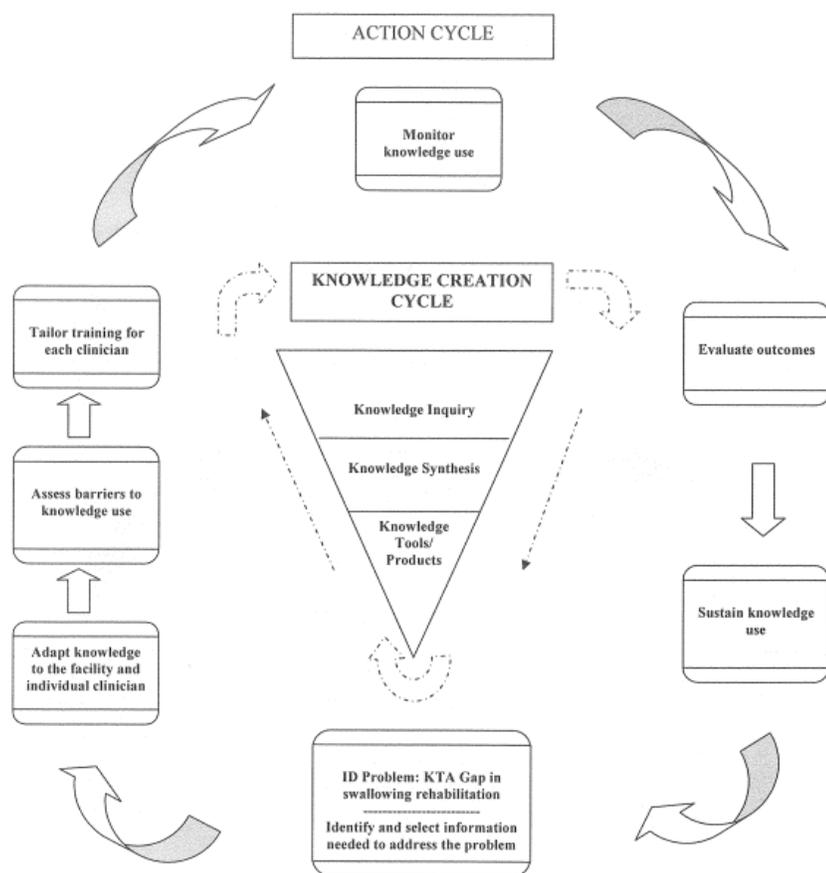


Figure 1. The Knowledge-to-Action Process (adapted from Graham et al., 2006 with permission)

with the technology, and competing priorities (*Assessment of Barriers to Knowledge Use* – see Figure 1). To relieve these barriers, the research team assisted with patient selection and customized training sessions to suit each clinician (*Selection, Tailoring, Implementation of Interventions*—see Figure 1). Indication for the exercises used with sEMG biofeedback is based on swallow physiology as viewed under videofluoroscopy. Specifically, patients who demonstrate poor hyoid excursion and/ or pyriform sinus residue make good candidates for the Mendelsohn Maneuvre and the Effortful Swallow (Huckabee & Pelletier, 1999). Members of the SRRL already attended the scheduled biweekly videofluoroscopic swallow studies for stimulus preparation and study recording purposes; therefore, they could easily assist in identifying appropriate patients for sEMG biofeedback guided exercises. Once patients were identified, each clinician received approximately two hours of one-on-one hands-on training by an S-LP from the SRRL. Clinicians who requested additional direct mentorship were offered as much support as required. Also, the mentor was available to monitor progress and provide troubleshooting assistance on an as-needed basis by email, telephone, and in person (*Monitoring of Knowledge Use* – see Figure 1).

Evaluation

To evaluate the outcome of the action cycle (*Evaluation of Outcomes* – see Figure 1), a research assistant from the SRRL (who was not otherwise involved in the study) conducted interviews with the participating clinicians upon discharge of their first sEMG patient. Interviews were conducted after the therapy sessions of the first four patients were completed so that the SRRL could review the KTA process and implement changes for optimal impact on future cases. It should be acknowledged that despite the fact that the interviewer was not directly involved with the sEMG study, her position as a member of the SRRL may have introduced some bias in the responses. A standard set of eight interview questions was developed (Appendix A). The interviews lasted approximately 30 minutes and were digitally recorded, anonymized, and transcribed. Transcripts were then coded in NVIVO₇ software (QSR International) and major themes were extracted by three independent raters. The coded data were reviewed to extract information related to four themes:

1. Why were clinicians not using sEMG biofeedback previously?
2. How did this experience change the clinical skill set?

protocol, and obtained research ethics board approval to implement an experimental protocol of sEMG biofeedback guided swallowing exercises with patients at the hospital (*Identification, Review, and Selection of Knowledge* – see Figure 1). Four S-LPs were approached to participate in the KTA intervention study. The participating clinicians all worked in a rehabilitation setting but had varying caseloads (2 clinicians worked in inpatient acquired brain injury, 1 clinician worked in outpatient stroke, and 1 clinician worked in outpatient geriatric rehabilitation), varying levels of experience (1 clinician > 15 years, 3 clinicians < 5 years), and varying number of years at the institution (1 clinician > 15 years, 3 clinicians < 5 years). All 4 clinicians received regular referrals of patients with swallowing impairments (approximately 25 to 50% of their caseload). Further, all the participating clinicians had attended the prior workshop and had access to the necessary sEMG equipment, yet none had implemented the technique.

The SRRL team members set up individual appointments with the clinicians to review the sEMG tool and to discuss its potential application to their caseloads (*Adaptation of Knowledge to Local Context* – see Figure 1). These discussions revealed several potential barriers to the clinical implementation of sEMG biofeedback, including time restrictions, appropriate patient selection, discomfort

3. What observations did clinicians have about this technique when they tried it?
4. What was the influence of having mentorship available?

A detailed discussion of the results of the outcome evaluation interviews follows.

Results

1. Why were clinicians not using sEMG biofeedback previously?

Time constraints

The participating clinicians reported that the limited number of patient treatment sessions available each week made it difficult to initiate sEMG biofeedback therapy. Based on the prior didactic workshop, they believed that sEMG biofeedback was best delivered in an intensive course of treatment either daily or three times weekly. Clinicians reported not having the time to research the technique, interpret the literature, or design a protocol for their patients.

“I don’t have time to read about new techniques, disseminate, and interpret data,” one clinician said, when asked why she had not been using sEMG therapy.

Competing priorities

In addition to providing services for dysphagia, S-LPs are also specialists in communication disorders. All four of the clinician participants identified this duality of service provision as a barrier to incorporating new techniques in clinical practice.

One clinician commented: “...if there are speech or language needs as well as swallowing needs...I’m always trying to balance how much time I should spend on language versus swallowing.”

The clinicians also highlighted patient preference and patient-centered care as factors in determining whether speech or swallowing would become the primary focus for a given patient’s therapy.

One clinician commented: “If there is a patient with swallowing problems who wants to work on speech, I have to comply with what they want to focus on.”

Comfort level

Several clinicians reported that a lack of comfort and confidence with the sEMG biofeedback technique was a barrier to its clinical use. Two clinicians were intimidated by the technical nature of the intervention.

One clinician stated: “I’m used to traditional swallowing exercises without electronic devices. I was apprehensive.”

The S-LPs commented that simply knowing about the technique was not the same as receiving hands-on training and accessible support.

“To have a research S-LP come to help set up and give the patient directions was very helpful. It was also helpful to be able to call her and ask her questions,” said one clinician.

2. How Did This Experience Change the Clinical Skill Set?

Learning

Prior to the study, the participating clinicians primarily employed compensatory management techniques for dysphagia rather than active rehabilitation. Hands-on exposure to sEMG biofeedback was reported to “add something extra to the clinical skill set.”

One clinician explained, “I feel like I have a larger repertoire to offer patients. There’s a rehabilitation piece that was missing before that I feel I have access to now.”

The intervention not only enhanced their learning but also allowed them to offer a greater quantity and variety of services to their patients. Clinicians reported that having hands-on training by a research S-LP was more effective than a lecture on the same topic.

One clinician reported, “It’s helpful to have demonstration and teaching on an ongoing basis versus going to one lecture, seeing something once, and reading the manual. I think it’s necessary to have a training period if you are going to be using a new technology.”

With regards to learning from the tailored partnership, it became clear that “there’s a huge difference between knowing the background information on a therapy...and actually knowing how to place things such as electrodes in the right way,” said one clinician.

Implementation

The guidance of the SRRL team was reportedly an important component in the development of new clinical skills. Mentorship enabled clinicians to go beyond traditional management techniques and to use rehabilitative strategies for dysphagia intervention.

When asked how the one-to-one experience changed her perspective on providing swallowing rehabilitation, one clinician said, “the fact that I had this experience and the technique was explained makes me think it’s more worthwhile to invest the time in learning how to do it and to spend the time with the patient.”

3. What observations did the clinicians have about this technique when they tried it?

Patterns of patient response

Among the most interesting learning reported by the participating clinicians was greater insight into patient performance. They appreciated the quantitative information from the sEMG biofeedback signal regarding the amount of muscular effort exerted by the patient. The availability of the sEMG signal enabled the clinicians to compare the relative amplitude of muscle contraction between a regular effort and an effortful swallow. The clinicians also valued the availability of information regarding the manner in which the patient was performing specific manoeuvres. They commented that the biofeedback allowed them to determine whether a manoeuvre was being performed correctly (i.e., according to the expected signal pattern) and to better appreciate consistency in patient

performance across repeated tasks, both within and across sessions. Similarly, the sEMG biofeedback signal enabled them to recognize signs of possible fatigue.

Finally, several clinicians noted that the sEMG biofeedback therapy allowed them to appreciate change over time in the form of gradual improvements in patient performance across sessions. Importantly, one clinician commented that working with this technique gave her “hope” for the patient and instilled in her the impression that there was “true rehabilitation potential.” In this respect, the motivation derived from receiving performance-contingent feedback in a treatment session was experienced not only by the patient but by the clinician responsible for providing verbal encouragement to the patient.

4. What was the influence of having mentorship available?

Support

Clinician participants attributed an increase in their confidence to conduct sEMG biofeedback therapy to the support received from a research S-LP. One clinician revealed that the availability of support made her experience with sEMG less daunting: “It is a little intimidating to do it alone in front of a...patient. It was really helpful to have someone who was familiar with the program to help me.”

Clinicians also noted that their mentors’ perceived confidence with the tool and its application influenced their own attitudes and perceptions about sEMG biofeedback therapy.

Expanded treatment options

The interviews revealed that the participating clinicians felt better prepared to conduct sEMG biofeedback therapy independently as a result of their mentorship training.

One clinician reported: “I feel much better equipped to be of benefit to patients with dysphagia that are appropriate for [swallowing] rehab versus only offering management techniques.”

Additionally, clinicians felt that this experience expanded their ability to cater to specific patients. One clinician explained, “It’s added another tool to my kit.”

Another clinician concluded confidently, “I feel like I have a larger repertoire to offer to patients...I have something to offer other than compensatory manoeuvres or a diet modification.”

Innovative practice

The clinician participants felt more self-assured about engaging in novel or experimental treatment protocols as a result of their partnership with the SRRL. They reported that this practical experience facilitated more efficient learning than learning from a manual. Clinicians reported a sense of reassurance in the treatment when it was supported by the SRRL.

One clinician said, “By having the research S-LP here, I get that research component and also because this is

evidence-based practice, I feel more comfortable advocating for the therapy.”

Being involved in a program that provided positive results encouraged them and made them more confident about using sEMG therapy in the future.

Discussion

The partnership between the SRRL and the clinical S-LPs at this rehabilitation hospital was designed to reduce the KTA gap (Graham et al., 2006) in implementing sEMG biofeedback guided swallowing exercises for patients with dysphagia. Outcomes of this KTA intervention were evaluated using interview data. The data revealed many positive themes and successful implementation of the KTA process. When this study is juxtaposed against Graham et al.’s KTA process model, it becomes clear that successful KTA requires support at both the knowledge creation stage and at the knowledge action phase. For example, at the knowledge creation stage, members of the SRRL researched the technique and educated the clinicians to ease time constraints. Also, SRRL members designed the protocol and obtained research ethics board approval which, arguably, could be considered an overwhelming task from a clinical perspective. During the knowledge action phase, SRRL members provided mentorship, hands-on training, and technical support. This direct training and support facilitated changes in real time and is an example of workplace learning.

It should be noted that the KTA process model described by Graham et al. (2006) outlines one final component in a successful KTA process (*Sustain Knowledge Use*—see Figure 1). The current study has led to an ongoing partnership between the SRRL team and the clinicians at this rehabilitation hospital, which continues to foster the use of sEMG biofeedback guided swallowing exercises. Clinicians continue to access support from members of the SRRL on issues such as appropriate patient selection, treatment options, troubleshooting, and current trends in the literature.

The insights derived from the evaluation of this KTA intervention have allowed the SRRL to refine the protocol used in supporting clinicians to narrow the KTA gap through implementation of an action cycle (Graham et al., 2006). As described by Graham et al., the process of KTA is fluid and dynamic and with each cycle the process becomes more refined. The SRRL continues to distil their techniques and tailor their support to the clinical staff as patient outcomes are evaluated. Of note, since the original experience of collecting the interview data described in this manuscript, six more clinicians at the same rehabilitation hospital have partnered with the SRRL team to provide their patients with rehabilitative swallowing treatment. Lessons learned in the course of this KTA intervention will help to develop a roadmap for introducing other evidence-based techniques into clinical practice. Future research evaluating the outcomes of KTA cycles is needed. Specifically, future studies should focus on measurement of change in practice

patterns post-KTA process and transmission of change (both within a facility and across facilities).

Finally, the authors recognize that access to an externally funded swallowing research laboratory is unusual in a rehabilitation hospital and many health care facilities and clinicians would not have access to mentorship from research S-LPs. Like other barriers, this can be overcome by motivated and determined clinicians. When a team of clinicians attempts to address a KTA gap in the absence of support from a research team, it may be feasible to appoint one clinician as the team leader. The team leader's role would be to facilitate the action cycle of Graham et al.'s (2006) KTA model. This appointed team leader might attend workshops, read available literature, and help his or her fellow clinicians identify appropriate patients. Being a team leader and balancing a clinical caseload would be challenging, so his or her colleagues might have to provide the team leader with clinical support to protect time for facilitating the action cycle (Graham et al., 2006). A team leader's time commitment would be greatest in the early stages of addressing the KTA gap. Long-term involvement would be restricted to the *Sustain Knowledge Use* (see Figure 1) phase of the action cycle, which may involve training new staff or incorporating updates from the research literature.

Lessons for practice

Several important lessons were learned for future service delivery planning. First, the participating S-LPs welcomed the support of, and benefited from their partnership with, the research team in initiating a novel technological therapy technique. Second, the clinical staff required hands-on training (often across more than one session) to feel comfortable providing sEMG biofeedback therapy. Third, having access to a protocol designed by a researcher made clinicians more likely to use this new tool as the time burden and the anxiety associated with initiating a new therapy were removed. Fourth, the research team's willingness to invest time in facilitating knowledge transfer was perceived by clinicians to bring credibility to the technique. Finally, the research team benefited from the opportunity to observe the protocol being used with different types of clinical cases. As a result, new insights regarding the patient selection for this technique were gained.

Conclusions

By evaluating the outcomes of this KTA intervention, it is apparent that knowledge acquisition alone can be insufficient to change practice. The partnership between a research team and clinicians and guided by a KTA framework was successful in bridging the gap between empirical knowledge and clinical practice. When research and clinical teams work together, innovative research protocols and therapies can efficiently and effectively reach frontline clinicians and have a positive impact on the patients they work with.

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Author Notes

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Appendix A: Questionnaire

Interviews were conducted with the four participating clinicians. The following questions were asked:

- 1) What previous approaches were used with dysphagic patients?
- 2) What challenges were faced with respect to caseload management?
- 3) Did sEMG biofeedback training influence your ability to carry a complex dysphagia caseload?
- 4) How were clinical impressions of patients influenced by sEMG?
- 5) Was it helpful to be trained on the technique, have troubleshooting assistance, and be given a protocol?
- 6) Comment on having research S-LPs as support in learning new therapy techniques.
- 7) Did this experience change your ability to provide one-to-one swallowing therapy?
- 8) Would you use sEMG biofeedback again?