

Incorporating Self-Management in Prosthetic Rehabilitation: Case Report of an Integrated Knowledge-to-Action Process

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Background. In improvement of clinical practice, unidirectional approaches of translating evidence into clinical practice have been pinpointed as main obstacles. The concept of engaged scholarship has been introduced to guide knowledge-to-action (KTA) processes, in which research knowledge and practical knowledge derived from therapists, patients, and organizational structures mutually inform each other. Accordingly, KTA experts should engage end-users earlier in knowledge translation and work in concert with them on both knowledge creation and knowledge implementation.

Purpose. The purposes of this case report are: (1) to provide an illustrative example of an evidence-informed improvement process in prosthetic rehabilitation in a local setting and (2) to articulate the bidirectional translation work incorporated into an integrated KTA process.

Case Description. A KTA expert translated research knowledge on self-management and task- and context-specific training into a functional prosthetic training program for patients with a lower limb amputation. Therapists contributed as co-creators to the translation process with practical knowledge of the specificities of the target group and local organizational context. The KTA expert moved the co-created knowledge into action in iterative and interactive steps with local therapists, patients, and managers.

Outcome. This bidirectional KTA translation process led to shared ownership of the functional prosthetic training program, in which self-management and task- and context-specific training principles and practices were integrated.

Discussion. Bidirectional knowledge translation builds on explicating and integrating the different knowledge practices of researchers, therapists, and their patients. Knowledge-to-action experts and end-users have their own roles and activities in such knowledge translation processes. Appreciating these different roles in genuine partnerships and acknowledging the distinct but equally valued knowledge practices can help in effectively translating evidence into action.



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Despite strong support for evidence-based practice in physical therapy and other health care fields, the application of available evidence to local practices continues to have modest success.¹⁻³ Researchers and policy makers easily point toward practicing therapists for not being compliant with evidence summarized in reviews and evidence-based clinical practice guidelines.³ In doing so, they implicitly frame the limited use of evidence in clinical practice as a knowledge transfer problem.⁴⁻⁷ They thereby assume that evidence produced in clinical trials is ready-made knowledge, is easy to access, and is simple to implement in local practices as long as therapists are willing to act upon that proven knowledge.^{4,5}

There is growing recognition, however, that a problem in knowledge production rather than in knowledge transfer hinders the knowledge-to-action (KTA) translation process.^{4,8,9} Most knowledge transfer approaches value objective knowledge gained in clinical trials over subjective knowledge from, for example, therapist and patient experiences.^{8,9} Such a unidirectional approach has been pinpointed as one of the main obstacles hindering improvement of clinical practice with available research knowledge.^{3,4,8,9} This finding has prompted a need to reconsider the evidence and assumptions that underlie our current knowledge translation approaches.^{4,8-10}

To prevent knowledge production problems, the concept of engaged scholarship has been introduced, emphasizing the importance of collaborative inquiry and meaningful interaction of researchers and end-users from the very beginning of the research.^{4,9} In engaged scholarship, it is recognized that researchers and therapists bring their own expertise in providing multidirectional learning.^{4,9} It is thereby acknowledged

that research and practical knowledge are 2 distinct but equally valued types of knowledge that can provide complementary insights for understanding reality.^{8,9} The concept of engaged scholarship in KTA efforts has social science roots. It draws on participatory action research rather than on clinical epidemiological research promoted by evidence-based medicine.^{4,10} Moving toward a sociology of knowledge translation may help to reduce the research-practice gap.⁹

The purpose of this case report is to provide an illustrative example of an integrated KTA process in which an engaged scholarship was formed to translate self-management and task- and context-specific training principles into functional prosthetic training. A well-known KTA framework was used as guide in the translation process⁷ (Figure). This framework distinguishes 2 concepts in KTA processes: (1) the knowledge creation funnel and (2) the action cycle.⁷ Each concept encompasses ideal phases. Knowledge creation includes several types of research that can be used to distill and refine the knowledge so that it becomes more useful to stakeholders. The action cycle represents all steps that can be taken to facilitate the use of knowledge. Although the 2 concepts are distinguished in this framework, in reality the process is complex and dynamic, and boundaries are fluid and permeable.⁷ The phases of the action cycle may occur consecutively or concurrently, and the phases of the knowledge creation may influence the phases of the action cycle.⁷ This case report describes the dynamic and fluid nature of a bidirectional knowledge translation process. The various roles and activities of the KTA expert, therapists, patients, and medical manager and their shared effort for a genuine partnership are thereby made explicit.

Case Description

The target setting was a Dutch rehabilitation center providing multidisciplinary inpatient and outpatient rehabilitation for people with disabilities, injury, or disease to regain optimal functioning in all facets of life. The target population of this KTA process was adults with a lower limb amputation (LLA). Each year, approximately 52 patients with LLA visit the center for inpatient or outpatient prosthetic rehabilitation. During this rehabilitation period, a multidisciplinary team including physiatrists, physical therapists, occupational therapists, prosthetists, psychologists, and social workers collaborate with patients to regain the level of functioning they aim for. The scope of this case report is limited to the interventions of physical therapists and occupational therapists. Creating optimal conditions for prosthesis use and teaching how to regain mobility with the prosthesis are the main focuses of the physical therapists. The main focus of the occupational therapists is integrating the use of the prosthesis in activities of daily living.

This case report is part of a larger research project in which participatory action research methodology is used to engage the multidisciplinary team in the evidence-informed improvement process.^{5,10,11} Two problems were leading motives at the start of this bidirectional KTA process, as was described in a previous article.⁵ First, therapists were concerned about a possible decline in outcome after rehabilitation discharge in elderly people with amputations. Second, therapists struggled with encouraging patients to be active learners (ie, they experienced difficulties in translating principles and practices of active learning to their target population). A literature study in the field of prosthetic rehabilitation provided no insight into useful principles and practices and

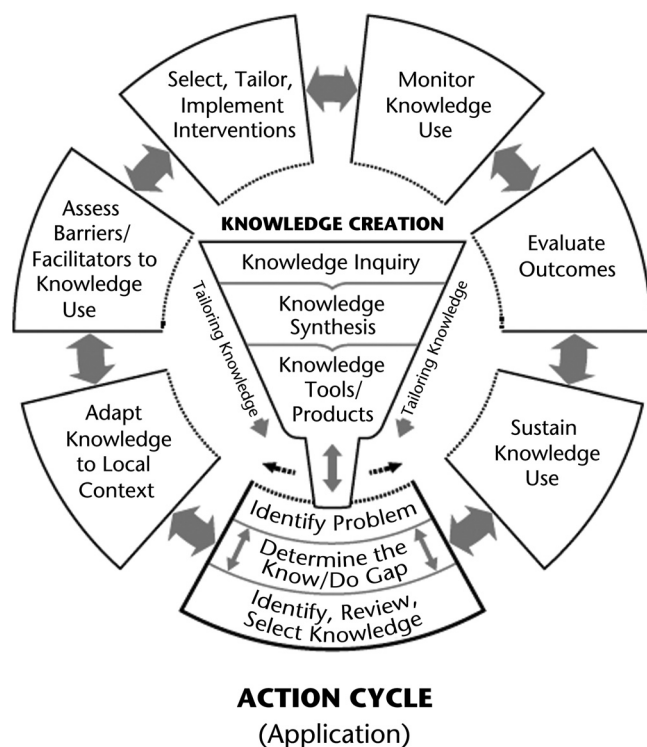


Figure.

The knowledge-to-action process. Reprinted with permission of John Wiley & Sons from: Straus SE, Tetroe J, Graham ID, eds. *Knowledge Translation in Health Care: Moving From Evidence to Practice*. 2nd ed. Chichester, United Kingdom: John Wiley & Sons Ltd; 2013.

how they should be applied to give content to active learning.⁵

Literature on rehabilitation of chronic diseases and on neurological and geriatric rehabilitation provided information on effective interventions encouraging active learning (ie, self-management education^{12–15} and task- and context-specific training,^{16–19} respectively). Integrating these interventions into prosthetic training could be a solution to the experienced carryover problem.⁵ The problem then identified was how to translate these principles and practices into prosthetic rehabilitation. Together with the multidisciplinary team, it was decided to develop 2 training interventions—psycho-educational training intervention and motor skill training—to encourage active participation of

patients with LLA.⁵ In this case report, the focus is on the development and implementation of the motor skill training in which principles and practices of task- and context-specific training and self-management education were incorporated.

The engaged scholarship for this translation process was formed by several stakeholders. The KTA expert (first author and a former physical therapist and human movement scientist) reflected with a research project group (other authors) on the entire KTA translation process. Three physical therapists, 3 occupational therapists, and the medical manager participated as co-creators in the development of the training. Patients with LLA were engaged by sharing their experi-

ences with the newly developed training in individual interviews. All stakeholders had a share in the different phases of the KTA process.

The KTA Process

The leading question in this integrated KTA process was: How can self-management education and task- and context-specific training principles and practices be translated and integrated into prosthetic rehabilitation in the local setting?⁵

Knowledge Creation: Tailoring Knowledge

In previous studies, a first exploration of self-management education and task- and context-specific training was conducted.^{5,20} To enable translation and implementation of these interventions to patients with LLA, we needed a more detailed description. Thus, a first activity of the KTA expert was to map the principles and practices described in the scientific literature on self-management education and task- and context-specific training. A brief summary of the explicated principles and practices revealed that often self-management education programs are informed by social cognitive theory.^{20–22} The self-efficacy of patients to perform self-management skills is thereby explicated as a mediating principle between the self-management behaviors and outcomes.²¹ The practices that therapists can use to enhance patients' self-efficacy are based on exposure to 4 sources: performance mastery, modeling (learning from peers), verbal persuasion, and interpretation of symptoms.^{12,13,21,22} Of all self-management skills, problem-solving skills are regarded as the most important skills needed to self-manage.^{13,20,23} According to Hill-Briggs, "Effective disease problem-solving would follow from the use of a rational problem-solving approach, a positive problem-solving orienta-

tion, adequate disease-specific knowledge, and ability to transfer knowledge and experience to new disease-related problem situations.”^{23(p188)} Practices that therapists can use are: (1) teaching patients how to find knowledge, (2) stimulating a positive problem-solving orientation, and (3) teaching patients the 4 steps of problem solving (ie, problem definition, brainstorming for solutions, decision making, and implementation and evaluation).^{24,25}

The task- and context-specific training is informed by muscle physiological, biomechanical, cognitive, and motor learning principles.²⁶ From a physiological and biomechanical point of view, it has been argued that training of functional tasks is remedial in itself because muscles are activated on the same length they are activated during these functions in daily life.²⁷ Practices concerning instructions, feedback, and delivery mode follow from cognitive and motor learning principles. That is, because of the cognitive nature of the first phase in learning activities, much emphasis is placed on mental practice of the patient and on the way the therapist provides instruction (short and clear, with focus on the aim of the task) and feedback (with cues on knowledge of performance).^{27,28} Often, task- and context-specific training is given content by the use of workstations, providing an individually tailored treatment in a group training.^{16,17,29,30} The use of workstations also enables the practice of including variation in the context, thereby stimulating as closely as possible the condition of daily tasks, so that problem solving of patients is stimulated.^{17,26,31}

Adapt Knowledge to Local Context

The KTA expert subsequently educated the physical therapists and occupational therapists in the expli-

cated self-management education and task- and context-specific training principles and practices. Afterward, she asked them to reflect on these principles and practices and to outline the possibilities and obstacles they saw in translating the principles and practices to patients with LLA. The therapists appreciated the task-oriented focus of the training and recognized the importance of communication and interaction for enhancing self-efficacy. However, they foresaw many obstacles on an organizational level in putting the workstations together, and they had a hard time visualizing how the workstations should look.

The actual translation of the principles and practices into the new motor skill training consisted of 2 phases: tailoring of principles and practices to the target group (ie, patients with LLA) and a more generic translation of the principles and practices. For tailoring of principles and practices to their target group, the therapists were asked to share information on which tasks were important and challenging for patients with LLA. They mentioned tasks in which patients: need to make transfers, have to deal with the specific instructions of their prosthesis, have a lack of visual feedback, or have to maneuver in a small place. This practical knowledge led, for example, to a workstation in which patients have to transfer with a laundry basket or a tray with coffee cups from one room to another when passing a threshold. In addition, the therapists were asked to specify which patients would or would not be indicated for this new training. This process led to the formulation of inclusion and exclusion criteria, such as excluding patients with a vulnerable foot or wound problems on the nonamputated limb.

The KTA expert then refined, in close collaboration with the thera-

pists, the design of the functional prosthetic training with a further translation of the generic principles and practices. The principles on variation led to a broad selection of tasks and in the context of the workstations to create challenges (“motor problems”) for the patients. The principles on problem solving resulted in concrete instructions and feedback given by the therapist. In that way, therapists can stimulate mental practice (ie, problem solving) of patients and teach them how to deal with the variety in tasks and context. The training was designed to be group training in order to enable modeling and thereby enhance self-efficacy. To enhance self-efficacy, instructions were given to enable positive skills mastery for patients and create a positive atmosphere during training sessions in which verbal persuasion of therapists and other patients can be stimulated. All of this was written down by the KTA expert in a concept protocol for therapists.

Assess Barriers to Knowledge Use

The KTA expert anticipated, in close collaboration with all stakeholders, possible barriers hindering good implementation of the training. Possible barriers were identified on 3 levels: (1) the organizational level: several organizational aspects (eg, how and when to include patients, scheduling of the training, availability of therapists and of facilities and materials) needed to be taken care of; (2) the professional level: therapists needed to be able to let go of their usual routines and had to act more in a problem-solving manner; and (3) the target group level: the new training should be appealing and identifiable for patients with LLA.

Select, Tailor, and Implement Interventions

The identified barriers led to several activities intended to facilitate the

Table 1.

Items to Evaluate of the Concept of Motor Skills Training

Issue	Method	Issue	Method	Issue	Method	Issue	Method
Content of the training		Material/training		Practical implementation		Patients' experiences	
Applicability of problem-solving concept	Focus group therapists	Usefulness of training before implementation	Focus group therapists (and feedback after sessions)	Experiences with size of the group	Focus group therapists (and feedback after sessions)	Added value/ usefulness/ satisfaction	Evaluation with patients
Adaptations to the content	Diary of the training	Usefulness of training on the job	Focus group therapists (and feedback after sessions)	Experiences with frequency of sessions	Focus group therapists (and feedback after sessions)	Delivery mode/ need of additional material/ organizational context	Evaluation with patients
Adaptations to inclusion and exclusion criteria	Focus group therapists	Completeness of provided material	Focus group therapists (and feedback after sessions)	Experience of combining patients with and without prosthesis in the functional training	Focus group therapists (and feedback after sessions)	Need for attendance of partner	Evaluation with patients
Suitability of workstations	Feedback after sessions	Clarity of instructions for therapists	Feedback after sessions	Problems with scheduling the training	Focus group therapists (and feedback after sessions)	Complementary issues for improvement	Evaluation with patients

actual use of the new training. On the organizational level, barriers were tackled by the KTA expert, in close collaboration with therapists and staff, in making a script for who was responsible for inclusion of patients, scheduling of the training, and usability of facilities such as the room where the training was provided. The script also described on which items the training would be evaluated, when, and by whom (Tab. 1).

On a professional level, the KTA expert anticipated identified barriers by training therapists on 3 training aspects: (1) giving instruction and feedback on how to enable problem solving by patients instead of reaching out with solutions for how to deal with the challenging task, (2) integrating variety in tasks and contexts, and (3) applying techniques for enhancing self-efficacy of patients.

Barriers regarding the target group level were addressed during a meeting in which the KTA expert pre-

sented the training for feedback to 3 delegates of 2 national associations for patients with amputations. They reflected positively on the training and brought points of attention forward, such as providing tailored individual care within group training and the role of partners in this training.

Monitor Knowledge Use

To refine the design of the training and monitor knowledge use, the KTA expert organized a pilot implementation. For this pilot implementation, a time period of 7 months was scheduled. During this period, the therapists trained 20 patients, 2 times a week, in 2 stages during their prosthetic rehabilitation: (1) when they did not have a prosthesis yet and (2) when they had learned the basics of how to deal with their own individual prosthesis. As the number of training sessions was tailored to the individual needs of the patient, they varied from 1 to 16 sessions. In most sessions, the KTA expert provided on-the-job training for therapists when they had difficulty carrying out the principles and practices

of self-management education and task- and context-specific training.

As the KTA expert observed most sessions, instant feedback and experienced inadequacies from therapists and patients were easily communicated. This approach enabled direct adaptations to the training where needed. Several deviations from the planned training were regarded to be necessary and drew attention to information on what was missed in the planned training, without doing harm to the underlying essential principles and practices. Thus, in this iterative and interactive process, the training was continuously refined and brought into practice, which led to training that was optimized for the local context.

Evaluate Outcomes

To evaluate outcomes, the KTA expert conducted a focus group with all therapists and the medical manager of the team in which the training itself and the KTA process were evaluated. With regard to the training, therapists emphasized that

providing this training in a group was seen as an important added value. On the other hand, they pointed out a limitation of group training: the group process can be hindered by a negative contribution of a single participant. The vulnerability of group training also came to the fore when few patients attended prosthetic rehabilitation at the rehabilitation center or when participants canceled their training, leaving their co-participants alone, which negatively affected the opportunity for learning from modeling. In the opinion of the therapists, therefore, guiding the group process was still a point of attention for them.

With regard to the KTA process, therapists experienced the participatory presence of the KTA expert as very constructive and enabling for direct and low-level communication, which was reflected in quick responses where adaptations and organizational interferences were needed. This co-creation process led to an ongoing refinement of the training, tailored to the specific target population and to the local setting. Therapists appreciated the involvement of the KTA expert from the start of the improvement process. They felt they were listened to and that the training on the job gave them the opportunity to truly master the training principles. The KTA expert also evaluated the training in individual interviews with 5 patients. The patients emphasized the usefulness of the training. They explained that they not only learned from doing the challenging tasks themselves but also had learned from their co-participants in how they solved the challenges in their own manner. Patients felt left alone when co-participants did not attend the training and proposed to make the training compulsory.

Sustain Knowledge Use

Several activities were initiated to sustain knowledge use. The KTA expert described the final training in a booklet for therapists.³² Regular meetings of the KTA expert with the therapists were planned and are still part of the ongoing process. In these meetings, the training is discussed as are the successes and barriers experienced by therapists. These meetings keep all participants focused on why the training was originally developed and on how to keep the problem-solving principles active in the functional prosthetic training.

Discussion

In this case report—focused on improving the transition from the clinical setting to the home setting in prosthetic rehabilitation—both research knowledge described in the literature (in this case, on principles and practices of self-management education and task- and context-specific training) and practical knowledge and contextual knowledge (in this case, therapist and patient knowledge about LLA in a Dutch rehabilitation center) were represented as distinct but equally valued knowledge practices.^{8,9} In doing so, complementary insights were provided for bridging the experienced research-practice gap. Self-management and task- and context-specific training principles and practices developed for other target groups in physical rehabilitation were translated and incorporated into a functional prosthetic training for patients with LLA. Therapists and the medical manager provided the amputation-specific information and knowledge on the organizational context, and the KTA expert with skills in participatory action research conducted the articulation, translation, and integration work. This form of genuine partnership led to shared ownership of the improved functional prosthetic training focused on active learning of patients with LLA,

which now has become part of usual care.

Despite this genuine partnership, therapists had to overcome several difficulties in putting the principles and practices into action. During knowledge creation, it turned out that therapists had a hard time shifting from their daily practice and routines to the abstract level of the presented principles. During the pilot implementation, therapists experienced difficulties in letting their own routines go and continuing to act in a problem-solving manner. They also had to deal with barriers that are common in usual practice such as work pressure, a sudden reduction in number of patients, fewer staff during holidays, and so on. Nevertheless, the translation of knowledge into action was experienced by those involved as effective and successful. Conditions known from partnerships with patients, such as mutual respect, clear communication, flexibility, and sufficient time to deal with foreseen and unforeseen barriers, contributed to a fruitful KTA process.^{9,33,34}

This case report elucidates the concept of engaged scholarship, departing from a sociologically informed way of conceiving of what sciences are and do.^{4,8,35} Instead of holding on to the contrast between clinical practice and science in terms of subjective versus objective, as they are explicated in positivistic conceptions of science, both therapeutic and scientific work are regarded as different but equally valued knowledge practices in the integrated KTA process.^{8,35} The KTA expert played the roles of searcher, observer, articulator, translator, and integrator of both research knowledge reported in scientific literature and tacit practical knowledge possessed by therapists and their patients. Such an expert needs conceptual analytic skills to integrate the different

Table 2.

Roles of Knowledge-to-Action (KTA) Expert and Physical Therapists in an Integrated KTA Process

Phases of KTA Project	Roles of KTA Expert	Roles of Therapists
Knowledge creation	— Collector and translator of promising principles and practices	
Adapt to local context	— Educator of principles and practices — Integrator of research and practical knowledge practices — Co-creator of concrete protocol	— Providers of disease-specific knowledge — Co-creators of concrete protocol
Assess barriers	— Integrator of aspects from different stakeholders and contexts	— Providers of knowledge on local organizational context
Select, tailor, and implement interventions	— Trainer — Facilitator — Co-organizer — Negotiator of all stakeholders	— Co-organizers
Monitor knowledge use/pilot implementation	— Observer — Receiver of feedback — Adapter — Trainer on the job	— Performer — Critical reflector — Reporter of feedback and adjustments
Evaluation of content and process	— Receiver of feedback — Translator of comments for refinement of final training	— Providers of feedback
Sustain knowledge use	— Writer of final handbook — Discussor of successes of and barriers to final training	— Discussor of successes of and barriers to final training

knowledge practices and ethnographic skills to assist therapists and patients to give words to their know-how.^{35,36} Therapists are then well prepared to critically reflect on the designed intervention during pilot implementations. The different roles of the researcher and physical therapists are summarized in Table 2.

A limitation of this iterative and reflective KTA approach is that the quality of the improvement was not evaluated quantitatively, for instance, by measuring functional performance, participation, and autonomy.¹¹ A previous study, however, revealed that many diverse factors affected functioning and participation of patients with LLA in the clinic and community, acting sometimes as barriers for some individuals and as facilitators for others.¹¹ To address this complexity, we advocate the use of mixed-method designs in future evaluation research. By using both quantitative and qualitative methods and data in combination in a single study, or set of related studies, the interactions among physical, personal, and envi-

ronmental factors can be better understood.³⁷

This case report is part of a larger research project in which participatory action research methodology is used to relate to and build on knowledge that already exists in rehabilitation practice and research. It is about localized and generalized knowledge that needs to be put into words, translated to other target groups and contexts, and integrated in recognized and owned capacities for improvement. The focus of this case report was on the development of motor skills training in which physical therapists and occupational therapists encouraged active learning of patients with LLA. In complementary psycho-educative training, psychologists conduct group sessions to teach patients with LLA problem-solving skills to prepare them for possible postdischarge problems such as skin conditions, bad weather issues, and loss of supervision, therapy structure, and encouragement of peers.³²

To summarize, shared ownership and genuine partnership between therapists and the KTA expert are of great importance for changing and enriching therapeutic knowledge practices with new insights and moving therapists away from their comfort zone. A KTA expert needs conceptual analytical skills to integrate scientific and therapeutic knowledge practices and ethnographic skills to give words to the know-how of therapists and their patients.³⁶ In this process, it is essential to value scientific and therapeutic knowledge equally. A next step in this integrated KTA process is to translate the motor skill training and related know-how to and from other target groups and settings. Some insights may be generic; others need to be tailored to the specificities of the target group or target setting under study. Currently, not much is known about how co-created knowledge and lessons learned by doing in one setting might benefit others. We address this challenge and hope that others will join us.

All authors provided concept/idea/project design. Ms van Twillert, Dr Postema, and Dr Lettinga provided writing. Ms van Twillert provided data collection, patients, facilities/equipment, and institutional liaisons. Ms van Twillert and Dr Lettinga provided data analysis and fund procurement. Ms van Twillert, Dr Geertzen, and Dr Postema provided project management. Dr Geertzen, Dr Postema, and Dr Lettinga provided consultation (including review of manuscript before submission). The authors thank the therapists and patients of the multidisciplinary team for their successful collaboration in this process.

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