Effect of an educational research dissemination program on practice patterns for professionals recommending manual wheelchairs

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Purpose and Specific Aims:
The objective of this study is to measure the utilization of rehabilitation research training by measuring short and mid term impacts of knowledge, attitudes and behaviors of clinicians. Specifically, this project will determine the effect of a targeted evidence-based educational program on *knowledge* of manual wheelchair technology, clinician *attitudes* towards practice, and manual wheelchair recommendation practices (*behaviors*). The specific aims are:

Specific Aim 1: Compare the effects of training on knowledge and attitudes before, after and 6 months following an educational training program.

Specific Aim 2: Compare the effects of training on practice behaviors 6 months before and 6 months following an educational training program for utilization cohort subjects involved in the training program.

Background:
Keeping up with the rapid pace of change in the health care system and the development of technology has dictated that rehabilitation clinicians learn about ways to improve the quality of care over the course of their careers. Improvement in patient outcomes is often linked to the ability of clinicians to change and adapt new practices within their practice settings. There is particular interest in learning whether training actually works -- whether it results in clinicians' effecting positive changes in their clinical settings. There has been, however, remarkably little study of the association between the process of rehabilitation education and quality care. [(1)]

Assessing training effectiveness is complex and costly. There is fundamental difficulty in addressing the questions that need to be answered: what works, in what context, with which groups, and at what cost? Additionally, there are few proven methodologies.

The length of time needed for the evaluation, lag time between an educational intervention and follow up evaluation, lack of reliable objective measures, and the number of potential confounding factors increase the complexity of the issue under study. Challenges designing methodologies that can control for variations in training programs are vast. Variations include clinician knowledge, skills, and training; patient comorbidities and differences in severity of illness, and system level variables, such as policies and regulations influencing patient care practices and funding. For these reasons, health professionals are often reluctant to study the effectiveness of educational interventions.

Consequently, it is not surprising that research validating effective methods to train clinicians, influence practice patterns or impact patient outcomes is lacking [(3)]. Systematic reviews [(4-6)]of the educational literature found that few robust evaluations of educational interventions exist. However, some studies concluded that continuing education can improve clinical performance and patient outcomes, and indicated which methods were best at evoking change in clinician behavior. Founded in the literature [(4-7)]and as written by Cantillon and Jones,

"The most effective methods derived from these reviews include learning linked to clinical practice, interactive educational meetings, outreach events, and strategies that involve multiple educational interventions (for example, outreach plus reminders). Less effective strategies include audit, feedback, local consensus processes, and the influence of opinion leaders. The least effective methods are also the most commonly used in general practice medical education- namely, lecture format teaching and unsolicited printed material (including clinical guidelines)." [(8)]

The four-level hierarchy of evaluation developed by Donald Kirkpatrick (1994) [(2)] outlines a model that sequentially moves through evaluation levels assessing training effectiveness: 1) reactions (satisfaction or happiness), 2) learning (knowledge or skills acquired), 3) transfer (transfer of learning to workplace) and 4) results (transfer or impact on society). Information from each prior level serve as a foundation for successive, more precise higher levels of evaluation but at the same time requires greater time, resources and budget allowances [(2)]. Researchers in medical education are aware that the availability of funds for research and development is limited unless a link can be made between the proposed intervention and its impact on patient care, yet this link can be difficult to make.

An established body of literature indicates that a well-fitted seating and wheeled mobility system promotes a more functional posture, enhances independent mobility, improves comfort, and decreases the risk of pressure sores, postural deformities and repetitive strain injuries. Stakeholders report that competence, proficiency, and experience of therapy professionals evaluating and recommending wheelchairs and seating systems vary considerably [(9-11)]. Failure of clinicians to understand the factors

involved in evaluating individuals with mobility needs and matching the individual to the technology leads to difficulties recommending appropriate mobility devices.

Correspondingly, failure to understand the factors involved in prescribing an appropriate wheelchair and seating system often results in "technology abandonment, wasting of funding to replace poorly prescribed equipment and the consumer being without needed equipment" [12; 13]. Unfortunately, experienced and/or specially educated professionals (physical therapists and occupational therapists) trained to provide seating and mobility recommendations can be hard to find [14]. Providing effective educational programs that disseminate best practice and research evidence to elevate the level of clinical competency is needed.

Training Activities:
From needs assessment and program design, stakeholders were involved in the development and planning of this training research project. Training was specifically tailored for clinicians responsible for recommending manual wheelchair technologies who have limited exposure to manual wheelchair research, technologies and service delivery practices. Training participants and a control group were studied within a pretest-posttest design to evaluate the effectiveness of the training program.

Six training intervention programs were offered in locations based on input from the Statistical Analysis Durable Medical Equipment Regional Carrier (SADMERC). The SADMERC is responsible for collecting and analyzing data about durable medical equipment in all Durable Medical Equipment Regional Carrier (DMERC) regions in the United States for the Centers for Medicare and Medicaid Services (CMS). Locations for the six educational programs and control group were selected from a list of SADMERC- identified sites in need of education and training.

Evaluation of training impact:
This study evaluated training impact as evidenced by change in clinical knowledge, attitudes, and behavior (i.e., utilization practice patterns). The upper levels of Kirkpatrick's hierarchy for assessing training effectiveness are the foundation for developing three measures. Specifically, we are interested in learning how clinical practices recommending and specifying manual wheelchairs for clients with mobility impairments change following an educational training program.

Evaluation Criteria:
Knowledge (Kirkpatrick's level 2) was measured using a *Knowledge Assessment Test*. A multiple-choice test assessing knowledge of empirical research and "best practices" as related to manual wheelchair applications was administered before, immediately after (at the conference), and 6 months following the educational program. To ensure efficient test administration and maximize time allotted for the educational program, the test was designed to take only 20-30 minutes.

A *Manual Wheelchair (MWC) Practice Questionnaire* was used to explore transfer of learning (Kirkpatrick's level 3) resulting from the training program. The MWC Practice Questionnaire assessed attitudes in four areas, confidence, independence, leadership, and resourcefulness. Evaluation of transfer of learning attempts to answer the question, "Is the newly acquired attitude being used in everyday clinical practice?" We explored whether a change in attitude can be detected immediately following an intervention and, if so, whether or not a change persists 6 months later.

Finally, *Work Product Reviews* (WPR) investigated the impact of an educational program on practice patterns, specifically manual wheelchair recommendation and utilization practices. Measurement involved the appraisal of letters of medical necessity using a scoring rubric. The rubric assessed documentation in four domains, problem identification, feature match, solution selection and overall impression. Lastly, detailed manual wheelchair order forms were reviewed to survey the range of manual wheelchair features requested for a period of 6 months before and after the educational program. By design, one rater scored all WPRs. Intrarater reliability of the scoring process for the work product reviews (WPRs) revealed coefficient alpha values of .93 for the rubric and .95 for the feature match, indicating good reliability.

Study Enrollment:
A total of 160 subjects were enrolled in the study and 137 completed the study. Forty-eight subjects were enrolled in the utilization group and followed for 12 months- 6 months prior to and following the training intervention. Eighty-four subjects were enrolled in the conference only portion of the study (57 clinicians, 27 suppliers) and 28 were enrolled in the control group. A total of 23 subjects withdrew from the study or changed groups. The utilization group was used to collect all three measures – knowledge, attitude and behavior. The conference-only and control groups participated in the knowledge and attitude assessments.

Results:
The inclusion criteria for this study involved clinicians only; therefore initially we examined results from the demographic questionnaire eliminating suppliers from the analysis. Results showed no difference between the utilization group and conference only group for degree (entry/advanced), profession (PT/OT), years of clinical practice or years of seating and mobility services. A significant difference was found between groups for hours of seating and mobility service ($F=3.596$,

p=.031) and professional development hours (F=9.201, p=.000). The utilization group reported more hours of weekly seating and mobility service (7.97 vs. 3.68) and more professional development hours per year (12.87 vs. 5.76) contrary to our recruitment plan.

Knowledge Score Results

Analyses of knowledge scores for the utilization group found no significant change in knowledge scores leading up to the training (6 mo pre, preconference). Similarly, the control group showed no significant change in knowledge scores over a 6 month period. These results indicate that score improvement was not due to time or practice with the test. A repeated measures ANOVA on pre- and post- knowledge scores of the utilization and conference-only groups showed a significant increase after training (F=96.795, effect size d= 1.192, mean pre-post difference = 2.271, standard deviation = 1.906). No interaction between group and time was found, meaning that the groups improved equally.

Also, we found significant, yet low correlations between the preconference scores and hours of seating and mobility service/week (r=0.215) and professional development hours/year (r=0.194). Knowledge scores improved following the intervention. However, none of the variables predicted who would have the most change before and after the conference. Future analyses will explore which variables predict who maintains the knowledge change over time.

Attitude Score Results

The MWC Practice Questionnaire assessed attitude scores in the domains of confidence, independence, leadership and resourcefulness. Because individual items on the survey had such divergent scales, they were transformed into standardized (z) scores for the purposes of analysis. A repeated measures ANOVA for the preconference and follow-up measures revealed a significant interaction between pre- and 6-mo post test and subject group for the confidence scores (F=8.802, d.f.=3,135, p<.001) and independence scores (F=3.093, d.f.=3,135, p=0.029). No significant interactions were found for the leadership and resourcefulness scores. No significant differences due to training were found for any of the attitude scores.

Work Product Review Results

Rubric analysis for 18 subjects has been completed to date. Each subject completed a different number of preconference and postconference work product reviews, therefore weighted totals were used for analysis purposes. The paired sample correlations for pre- and post- administrations for all sections were statistically significant and ranged from r=.601 to r=.762. Paired sample t-tests, with alpha level corrected for multiple testing, revealed no statistically significant changes for any section between pre- and post- administrations.

Feature Utilization Results

The range of wheelchair features prescribed by the 18 subjects before and after training showed a statistically significant correlation of r=.824, p<.001. A paired samples t-test indicated that more manual wheelchair features were prescribed following the educational program as compared to before(t=-2.620, p=.018).

Discussion:

In general, knowledge scores showed a net gain over time. A significant improvement in knowledge scores was seen immediately following the training intervention however for all groups scores decreased six months following the course. We do not know if knowledge plateaus or continues to decline over time. Results showed that subjects with more hours of seating and mobility services per year and more manual wheelchair evaluations per year were more likely to retain their knowledge over time.

Overall, normalized attitude scores did not show any significant change before or after the training for confidence, independence, leadership or resourcefulness. A strong interaction between repeat and group for confidence and independence items was found. This indicates that some groups felt more or less confident or certain about evaluating and recommending specific manual wheelchair components but overall, there was no consistent change. Similarly, some groups felt more or less independent or self-sufficient recommending and specifying equipment, but overall, the training intervention was not associated with change. It may be that the impact of the training experience was mediated by the work setting of the target groups. Most subjects indicated that they experienced some sort of barrier to the provision of appropriate technology for their patients. The most commonly reported barrier was funding.

Work product reviews were submitted by subjects in the utilization group. By design we aimed to recruit therapists that had a responsibility for recommending manual wheelchairs but did not do a high volume of these types of requests. The extended portion of this study involved one year of subject commitment. Recruitment for this group was more difficult than anticipated. We found that therapists willing to participate in the extended portion of the study were those with more experience on average recommending equipment.

No significant relationship was found between experience and pretest rubric score. Yet, pretest rubric scores were most predictive of post test scores. A positive relationship was found between post test rubric scores and experience indicating that

therapists with more experience had higher posttest scores. We plan to use these data to further examine the psychometric properties of the rubric including internal consistency and validity. Preliminary analysis indicates that the rubric has high test-retest reliability but may not be sensitive to change associated with the training. Alternatively, the impact of training may have been thwarted by the number or types of cases submitted, or by facility documentation systems that did not allow for changes in documentation processes.

Overall the feature match appeared to be a psychometrically good tool with good test-retest reliability and internal consistency. Weighted feature match scores did show a significant difference in features recommended before and after the training program as expected.

Conclusion:

This study showed positive changes in knowledge scores immediately following the training intervention. While the impact of learning diminished over the first six months following the training, knowledge scores remained significantly higher than before training. Attitude and behaviors were not significantly influenced by the training program. Utilization practices showed improvement in number of features specified following the intervention however quality of documentation did not show change. Additional psychometric development of the manual wheelchair questionnaire and the work product review measures (rubric, feature match) is warranted. While preliminary analysis revealed promising internal consistency and test-retest reliability, it is important to more fully determine the responsivity, validity and reliability of these newly developed measures to determine if results were due to the sensitivity of the measures or the impact of training.

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