

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

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**ABSTRACT**

**BACKGROUND & PURPOSE:** Keeping up with the rapid pace of change in the healthcare system and the development of technology has dictated that clinicians learn about ways to improve quality of care over the course of their careers. Yet there has been little study of the association between the process of rehabilitation education and quality care. The purpose of this study is to measure the effect of an evidence-based educational program on clinician *knowledge* of manual wheelchair technology, *attitudes* towards practice, and manual wheelchair recommendation practices (*behaviors*) for professionals recommending seating and wheeled mobility equipment.

**METHODS:** A two-day traditional continuing education (TCE) program (intervention) tailored for clinicians responsible for recommending manual wheelchair technologies was designed synthesizing “best practice” and “state of the science” research literature pertaining to seating and mobility for manual wheelchair users. A pretest-post test design with control group was employed using a convenience sample of 160 clinicians, from cities identified in need of education and training due to utilization practices. Subjects were enrolled and assigned to one of three groups (48 utilization cohort, 84 conference only, 28 control). Three measures designed to detect change in clinical knowledge, attitudes, and behaviors (i.e., utilization practice patterns) were administered before, after and 6 months following the intervention. The control group completed the knowledge and attitude measures at the time of initial contact and 6 months later. Work product reviews (behaviors) from subjects in the utilization cohort were examined 6 months before and after the intervention.

**RESULTS:** Knowledge scores improved for all groups following the intervention with no interaction between group and time, meaning that the treatment groups all improved equally. There was no statistically significant decline between the post test and the six month follow-up indicating that the performance improvement was maintained. Overall, normalized attitude scores did not show any significant change before or after the training for any domain. A strong interaction between repeat and group for confidence and independence items was found indicating that some groups felt more or less confident or self-sufficient recommending and specifying equipment. Work product reviews of clinician documentation revealed no significant changes between pre and post intervention scoring, however, weighted feature match scores did show a significant difference in features recommended before and after the training program as hypothesized.

**CONCLUSIONS:** 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. Attitudes and behaviors were not significantly influenced by the training program. Utilization practices showed an increase in the number of features specified following the intervention however quality of documented clinical rationale did not show change. Consequently, education and training alone may not go far enough to impact research utilization. Other system barriers such as organizational documentation processes, public policies and funding/reimbursement issues may have a mediating affect on clinical practice influencing research utilization outcomes. Furthermore, additional psychometric development of the attitude and behavior measures is warranted. While preliminary analysis revealed promising internal consistency and test-retest reliability, it is important to more fully determine the responsiveness, 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.

## INTRODUCTION & OBJECTIVES

Training is an important aspect of all Rehabilitation Engineering Research Centers (RERCs). Educational programs are a common way used to disseminate knowledge acquired through research. A challenge faced by RERCs is the incorporation of research results into clinical practice. Results of rehabilitation research often do not reach frontline professionals to influence practice patterns and client/patient outcomes. Since RERCs are focused on a specific area of rehabilitation research, centers are challenged to train clinicians and other stakeholders about the current state of science with the intent that new knowledge and skills will result in improved clinical outcomes.

The objective of this study was 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 determines 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. <sup>(1)</sup>

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 <sup>(3)</sup>. Systematic reviews <sup>(4-6)</sup> 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 <sup>(4-7)</sup> 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).” <sup>(8)</sup>

The four-level hierarchy of evaluation developed by Donald Kirkpatrick (1994) <sup>(2)</sup> 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 <sup>(2)</sup>. Researchers in medical education are aware that the availability of funds for

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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<sup>(9-11)</sup>. 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”<sup>(12;13)</sup>. Unfortunately, experienced and/or specially educated professionals (physical therapists and occupational therapists) trained to provide seating and mobility recommendations can be hard to find<sup>(14)</sup>. Providing effective educational programs that disseminate best practice and research evidence to elevate the level of clinical competency is needed.

### Training Intervention:

For this project a two-day training program was specifically tailored for clinicians responsible for recommending manual wheelchair technologies who have limited exposure to manual wheelchair research, technologies and service delivery practices (Appendix A). The training program was specially designed synthesizing “best practice” and “state of the science” research literature pertaining to seating and mobility for manual wheelchair users. Research evidence was presented highlighting studies in the following content areas: 1) pressure relief and postural stability, 2) wheelchair propulsion biomechanics and wheelchair configuration, 3) repetitive strain injuries, 4) ride comfort, vibration, shock, 5) wheel features and rolling resistance, 6) durability, cost, and wheelchair standards. Educational content and materials summarized and synthesized research literature focusing on application indications and contraindications as applied to daily clinical practice. Interactive laboratory experiences allowed participants an opportunity for side-by-side trial and comparison of similar products from various manufacturers available on the market today.

A combination of two, Mobility RERC investigators and other qualified clinical instructors served as faculty for each of the training programs (Appendix A). In addition, manufacturer representatives, who are experienced with manual mobility technologies, served as laboratory instructors.

### Training Activities:

Training participants and a control group were studied within a pretest-posttest design to evaluate the effectiveness of the training intervention 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 based on utilization trends (Table 1).

**Table 1: Number of attendees at 2 day training program**

Location	Attendees
Birmingham, AL	20
Little Rock, AR	27
Savannah, GA	24
Tucson, AZ	16
Jackson, MS	21
Portland, OR	22
<b>TOTAL</b>	<b>130</b>

\*Note: Eight registrants were only able to attend part of the course (4 therapists, 4 suppliers) and therefore only 122 were eligible to participate in the research portion of the study.

## TRAINING UTILIZATION MODEL

A blended model of training utilization was used for this project. We combined elements from three Research Utilization Support and Help (RUSH) models: **Best Practice Knowledge Transfer Model, Collaborative Support Model and Knowledge Synthesis Model**. The overall aim of this blend of training utilization models was to facilitate the transfer of skills

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and behaviors among service providers with clinical responsibilities for wheeled mobility recommendations, but limited professional training and continuing education opportunities in this content area. We hypothesized that exposure to scholarly research and “best practices” would translate into change in knowledge, attitudes and behaviors among service providers therefore affecting utilization outcomes.

In accordance with the Best Practice Knowledge Transfer Model, an evidence-based educational intervention was designed to assist clinicians who have limited exposure to continuing professional educational seminars on seating and wheeled mobility interpret and relate current research to their daily practice. The Mobility RERC, consistent with the Collaborative Support Model, engaged a group of stakeholders to identify program content, participate in conference planning and design, partake in interactive laboratory sessions, and underwrite the educational program expenses to leverage funding monies for the research project. Compatible with the Knowledge Synthesis Model, training materials summarizing state of the science evidence-based literature as applied to daily practice was developed and made available to stakeholders for further use and distribution. Additionally, manuscripts describing the outcome of the educational effectiveness research are in development for peer-reviewed publications.

### **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 were the foundation for developing three measures. Specifically, we were 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. Clinician documentation and order forms generated to justify and specify manual wheelchair requests were audited. This documentation is regularly used by third party payors to make determinations of medical necessity and funding decisions. Measurement involved the use of a scoring rubric to appraise a clinicians’ rationale for the requested manual wheelchair as documented in letters of medical necessity (LOMN). 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 139 completed the study. Forty-eight subjects were enrolled in the utilization group and followed for 6 months before and after 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 21 subjects were lost to attrition. Five utilization cohort subjects withdrew prior to the conference and a total of 16 subjects were lost to follow up (5 utilization cohort, 9 conference-only and 2 control group). The most common reason for withdrawal from the utilization group was lack of pre or post conference manual wheelchair evaluations.

### **Results:**

Data analysis was completed with the assistance of a statistical consultant. 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 ( $F=9.201$ ,

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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.

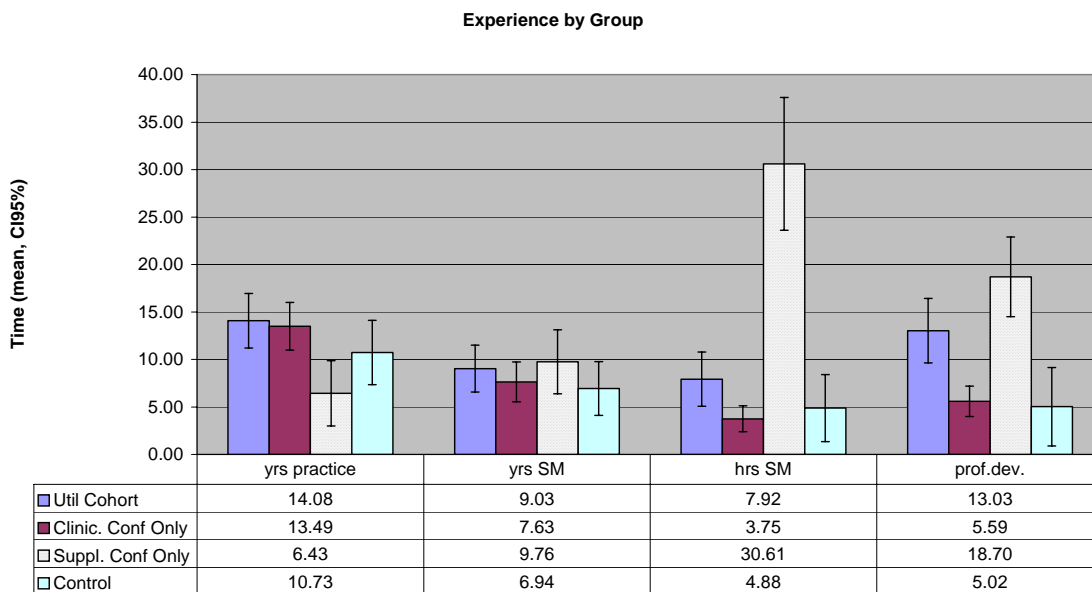
Table 2 and Figure 1 show demographic and experience summaries by group separating the conference only group into two subgroups (clinicians and suppliers). On average suppliers had more hours of seating and mobility service (hrsmsv) and seating and mobility professional development hours (profdevhrs) than clinicians.

**Table 2 Demographic summary by group**

Group	Utilization Cohort	Conf Only Clinicians	Conf Only Suppliers	Control
(n=139)	(n=38)	(n=53)	(n=22)	(n=26)
<b>Female</b>	33 (87%)	44 (83%)	7 (32%)	24 (92%)
<b>Male</b>	5 (13%)	9 (17%)	16 (73%)	2 (8%)
<b>PT</b>	32 (84%)	39 (74%)	0 (0%)	26 (96%)
<b>OT</b>	6 (16%)	9 (17%)	0 (0%)	0 (0%)
<b>PTA</b>	0 (0%)	1 (2%)	0 (0%)	0 (0%)
<b>OTA</b>	0 (0%)	4 (8%)	0 (0%)	0 (0%)
<b>Other Prof.</b>	1 (3%)	1 (2%)	22 (100%)	0 (0%)
<b>Degrees Obtained</b>				
<b>BS</b>	30 (79%)	34 (64%)	10 (45%)	16 (62%)
<b>MS</b>	14 (37%)	20 (38%)	3 (14%)	12 (46%)
<b>MS Advanced</b>	7 (18%)	4 (8%)	1 (5%)	2 (8%)
<b>Clinical Doctorate</b>	1 (3%)	2 (4%)	0 (0%)	3 (12%)
<b>Advanced Doctorate</b>	1 (3%)	1 (2%)	0 (0%)	0 (0%)
<b>PhD</b>	1 (3%)	1 (2%)	0 (0%)	0 (0%)
<b>Other Degree</b>	5 (13%)	8 (15%)	7 (32%)	1 (4%)

Note: A total of 160 subjects were initially enrolled and 139 completed the study. 21 were lost due to attrition. 5 utilization cohort subjects withdrew prior to the conference and a total of 16 subjects were lost to follow up (5 utilization cohort, 9 conference-only and 2 control group).

**Figure 1 Experience summary by group separating the conference only group into two subgroups (clinicians and suppliers).**



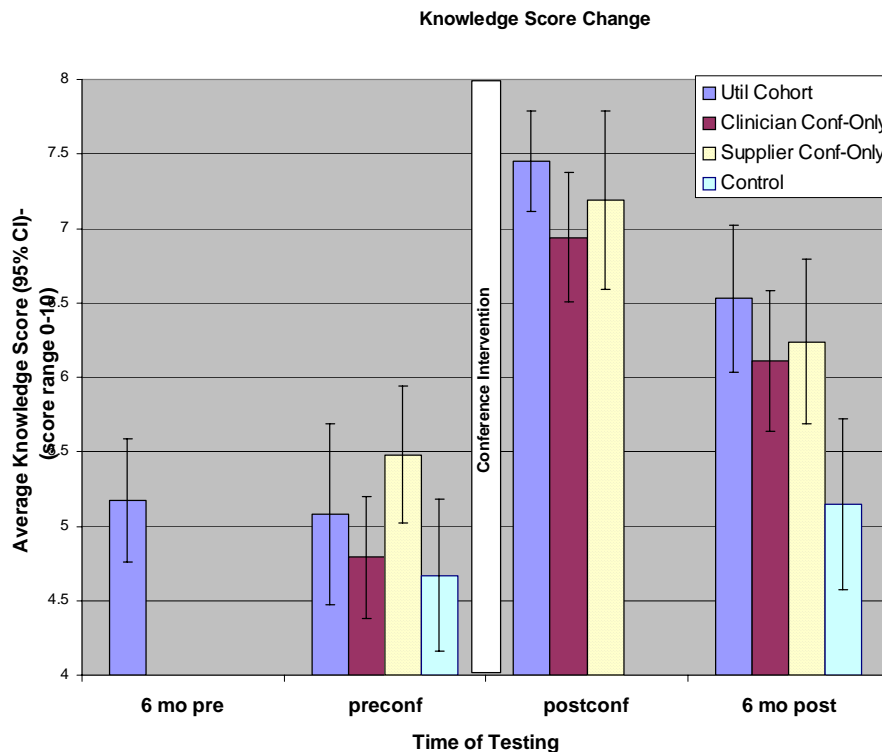
Note: yrs practice= years of practice, yrs SM= years of seating and mobility, hrs SM= hours of seating and mobility, prof dev= hours of professional development. Due to the nature of a supplier’s job, the majority of their time (hrs SM) is committed to the provision of complex rehabilitation technology. It follows then that the majority of a suppliers’ professional continuing education is focused in this domain, whereas clinicians’ practices typically span many content areas beyond seating and mobility.

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 for 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 (Figure 2).

We found a significant correlation between the preconference scores and hours of seating and mobility service/week ( $r=0.545$ ). Postconference scores were significantly correlated with years of clinical practice ( $r=0.562$ ) and with years of seating and mobility experience ( $r=0.523$ ). All scores improved following the intervention. However, none of the variables predicted who would have the most change before and after the conference. While knowledge levels tested six months after the conference decreased, they remained above the preconference levels in all treatment groups.

Figure 2 Summary of Knowledge



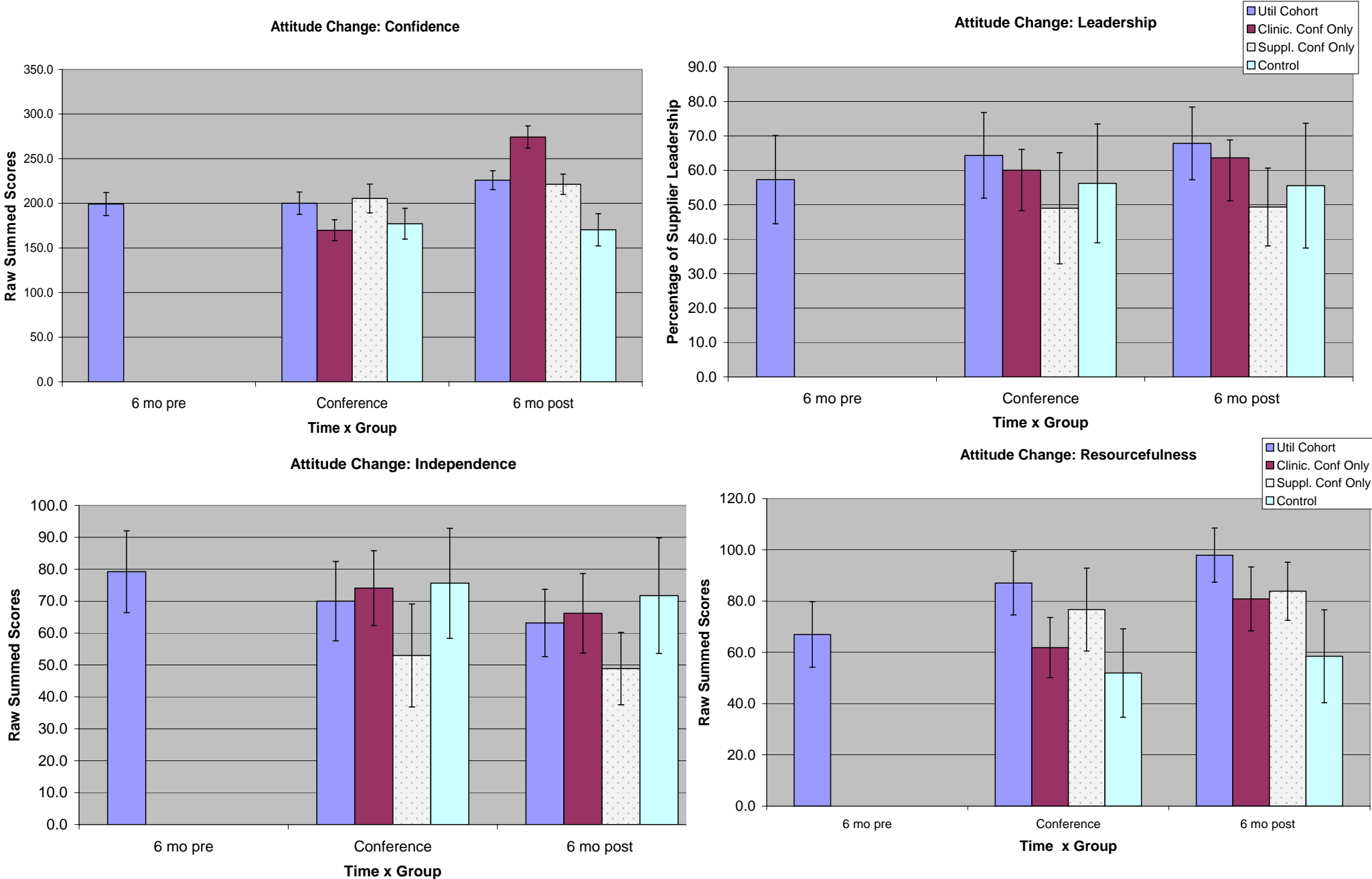
Attitude Score Results

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. Figures 3a-3d display the raw responses for the MWC survey scales.

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**Figures 3a – 3d Change in attitude scores by group and domain (confidence, leadership, independence, resourcefulness)**



Note: Overall, normalized attitude scores did not show any significant change before or after training for any domain. A strong interaction between repeat and group for confidence and independence was found. This indicates that some groups felt more or less confident or certain about recommending specific manual wheelchair components but overall, there was no consistent change.

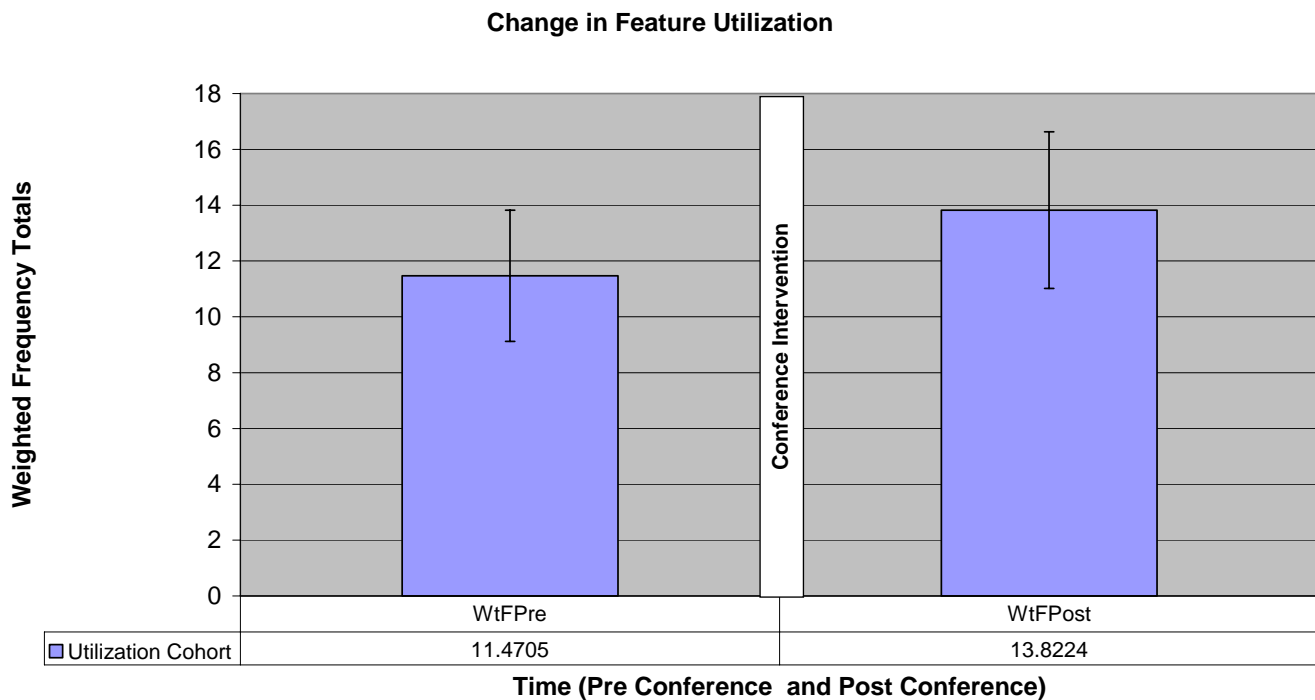
Rubric Score Results

A Rubric Analysis was undertaken for 38 subjects pre- and post- conference. A total of 500 (291 pre and 209 post) work product reviews were scored. The rubric assessed documentation in four domains (problem identification, feature match, solution selection and overall impression). 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  $r=.655$  to  $r=.842$ . Paired sample t-tests Bonferonni corrected for multiple testing revealed no statistically significant changes for any section between pre- and post-administrations.

Feature Utilization Results

The feature weighted totals for 38 subjects pre- and post- conference showed a statistically significant correlation of  $r=.851$ ,  $p<.001$ . A paired samples t-test showed a significant difference between pre- and post- weighted totals ( $t=-3.132$ ,  $df=37$ ,  $p=.003$ ) with higher totals after training (means of 11.5 pre and 13.8 post) (Figure 4).

Figure 4 Change in feature utilization by group



**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 any domain (confidence, independence, leadership or resourcefulness). However, a strong interaction between repeat and group for confidence 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 more a clinician learned about the complexities of the technologies and science behind matching a person to technology, the more it affected the self assessment of his or her own skills. This in fact is a positive finding as it is a clinician’s ethical responsibility to recognize the limits of their expertise, opt out, and refer on to another practitioner when a practice area exceeds their skills.

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. Consequently, one afternoon of the training program was dedicated entirely

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to discussing and problem solving documentation and insurance coverage issues. Recent vast policy changes by the Centers of Medicare and Medicaid Services (CMS) has resulted in restricted access to insurance coverage and payment for durable medical equipment (walkers, canes, manual and power wheelchairs and scooters). Since CMS policies are held as a “standard”, what CMS implements other third party payors tend to adopt. This finding is significant and suggests that education and training alone is not sufficient to influence system level barriers such as funding. Even if a clinician is familiar and knowledgeable about the manual wheelchair technologies available and is able to adequately present clinical rationale and documentation, if policy and funding issues are not considered clinicians will continue to have difficulty procuring appropriate technologies for their patients. Larger scope policy considerations need to be addressed in order to influence clinical practice.

Work product reviews were submitted by the 38 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 that had more years and hours per week of SM service which was converse to our recruitment plan.

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. We theorized that after the intervention clinicians would have a better understanding of indications and contraindications for manual wheelchair features and therefore would specify more equipment features following the intervention than before. Weighted feature match scores did show a significant difference in features recommended before and after the training program as hypothesized.

### Implications of Blended Training Utilization Model:

This project combined elements of three training utilization models: *Best Practice Knowledge Transfer Model*, *Collaborative Support Model* and *Knowledge Synthesis Model*.

The *Best Practice Knowledge Transfer Model* was an effective way to disseminate current research in a manner that therapists can easily incorporate into their daily practice. As indicated on the course evaluation forms course participants found the content informative and useful. A sample of participant comments follows:

- “This has been the most helpful and applicable seating and positioning course I have been to. I just hope I can apply this new knowledge confidently and effectively for my patients.”
- “Couldn’t be improved! The work groups’ actually applying the information was great!”
- “In eight years I have never had such an informative education – from the studies cited to the labs to the environment of therapist & suppliers. Thank you.”
- “I feel much more confident understanding & recommending w/c components than before this course.”

Consistent with the *Collaborative Support Model*, stakeholders played a vital role to the success of this project. Specifically corporate partners (Sunrise Medical, Invacare, Pride Mobility, PDG, Colours, and TiLite) assisted with subject recruitment and advertising for the training program. Furthermore, each manufacturer provided extensive demonstration equipment at each conference location for hands-on laboratory sessions. Representatives served as lab instructors participating and interacting with course participants. Corporate sponsors underwrote expenses associated with the two-day training program (travel, refreshments, CEUs, etc.) without which the training intervention would not have been possible. Midway through year one, we found that we needed to address difficulties we experienced in subject recruitment and conference registration. As a solution we engaged “local champions” who were familiar with community therapists to assist. We found that clinicians were more likely to participate and respond to registration information if it was coming from a local person known by the subject.

Compatible with the *Knowledge Synthesis Model*, extensive training materials summarizing state of the science evidence-based literature as applied to daily practice was developed and made available to stakeholders in course handouts. Training materials are now being converted into an interactive web-based training program to increase range for broader dissemination

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impact and opportunity to explore an alternate model of research utilization. A recent presentation to stakeholders at the International Seating Symposium in Orlando, FL summarized the results of this project.<sup>(15, 16)</sup> An interactive poster presentation session will be offered during the RESNA annual conference scheduled June 15-19, 2007 in Phoenix, AZ<sup>(17)</sup>. A manuscript and additional publications describing the outcome of this knowledge translation project are planned for peer-reviewed publications (i.e. Disability & Rehabilitation: Assistive Technology, Assistive Technology, Physical Therapy).

### 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 an increase in the number of features specified following the intervention however quality of documentation did not show change. Consequently, education and training alone may not go far enough to impact research utilization. Other system barriers such as organizational documentation processes, public policies and funding/reimbursement issues may have a mediating affect on clinical practice influencing research utilization outcomes. Furthermore, 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 responsiveness, 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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