

Applicant Information

Date: 12/15/2004

NIDRR Project Name: RERC: Wheeled Mobility in Everyday Life

NIDRR Project Number: 1875-0102

Contact Person: Laura Cohen PT, PhD, ATP

Contact Person Telephone: 404 350-3082

Contact Person E-mail: Laura_Cohen@shepherd.org

Proposed Activity Start Date: 1/1/05

Proposed Activity End Date: 12/31/06

Utilization Model Described (* pages 5-9):

- Best Practice
- Collaborative Support
- Knowledge Transfer
- Technology Transfer
- Other

Proposed Activity Budget Attached (* page 13)?

- Yes
- No

Supporting Material Addressing Research Quality Attached (* page 11)?

- Yes
- No

BUDGET JUSTIFICATION

The proposed two-year project activities represent a substantial effort to advance the purposes of the RUSH grant program. Several factors permit us to deliver a high return on NIDRRs investment. These factors include our ability to build on existing Mobility RERC training, evaluation and dissemination efforts; partner with key stakeholders to sponsor the educational intervention program; and utilize Shepherd Center and RERC personnel and facilities. Because this research project is dependent upon a multi-site training program, separate budgets have been prepared for these two concurrent activities. Funding for the Training program will come from three sources, sponsorship, workshop tuition and Mobility RERC funds. RUSH funds are therefore reserved exclusively for research activities. Additional research support will be provided by the Mobility RERC. Roles, responsibilities and FTE commitments for research project personnel are included in the proposal narrative. Budget justification and explanation follows:

Total RUSH funds requested: \$XX,XXX

Salary: Salary support for a Research Assistant is requested in the amount of \$XX,XXX to support 0.15 and 0.2 FTE in Yrs 1 & 2, respectively. The RA will be responsible for data collection and compilation activities, including monitoring subject responses, contacting subjects, and management of the web-based survey system.

Fringe: Shepherd Center's fringe rate is 18%

Materials and Supplies: Support is requested for telephone communication with participants

Other expenses: All training workshop attendees and control group subjects will be offered a nominal gift (\$5) in appreciation of their time to complete the Knowledge and Attitudes surveys. The 60 research subjects will also be offered honoraria of \$150 in appreciation of their time.

Indirect rate: An indirect rate of 10% has been applied to the direct costs. This is a reduction of Shepherd Center's typical indirect rate of 41%.

Research Funds supplied by Mobility RERC. The Mobility RERC will provide \$XX,XXX in direct support for research activities to supplement RUSH funding. Funds will be used to support: Dr. Cohen's research effort (0.15 FTE); printing and mailing of research surveys, and development of the web-based data collection system.

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

Laura Cohen PT, PhD, ATP; Chris Maurer PT, ATP; Stephen Sprigle PhD, PT

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 is to measure the utilization of rehabilitation research training by measuring short- and mid-term impacts on 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*). Results of this project can be used to: 1) inform RERCs and other NIDRR research grantees about methods that can be used to monitor utilization, and 2) evaluate the effectiveness of a training activity.

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.

OBJECTIVE AND SPECIFIC AIMS

The objective of this study is to measure the utilization of rehabilitation research training by measuring short- and mid-term impacts on knowledge, attitudes and behaviors of clinicians. Training will be specifically tailored for clinicians responsible for recommending manual wheelchair technologies who have limited exposure to manual wheelchair research, technologies and service delivery practices. We will study training participants and a control group within a pretest-posttest design to evaluate the effectiveness of the training program.

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.

Hypothesis 1a: Training participants will demonstrate a significant improvement in knowledge score as measured by a Pretest/Posttest Knowledge Questionnaire compared to a Control group. Knowledge of training participants will be measured before (pretest), immediately after (posttest) and 6 months following an educational program. Control subject knowledge will be measured twice over a 6-month span.

Hypothesis 1b: Training participants will demonstrate a significant improvement in self-reported attitude score as measured by the Manual Wheelchair Practice Questionnaire, between pretest, posttest and 6 months following an educational program.

Specific Aim 2: Compare the effects of training on practice behaviors 6 months before and 6 months following an educational training program for a cohort of 60 subjects involved in the training program.

Hypothesis 2a: Training participants will demonstrate a significant improvement in the quality of documented clinical rationale measured 6 months after training compared to measurements taken 6 months prior to training. Clinical rationale will be quantified by a Work Product Review score based upon standardized review of Letters of Medical Justification.

Hypothesis 2b: Training participants will recommend significantly more manual wheelchair features 6 months after an educational program. Wheelchair features will be determined via review of manual wheelchair order forms.

TRAINING UTILIZATION MODEL

A model of training utilization has been developed that combines 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 is to facilitate the transfer of skills and behaviors among service providers with clinical responsibilities for wheeled mobility recommendations, but limited professional training and continuing education opportunities in this content area (Figure 1). The assumption is that exposure to scholarly research and “best practices” will translate into change in knowledge, attitudes and behaviors among service providers affecting utilization outcomes.

In accordance with the Best Practice Knowledge Transfer Model, an evidence-based educational intervention has been 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, has 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 will be made available to stakeholders for further use and distribution. Training materials will be made available via website access to increase range for broader dissemination impact. Additionally, manuscripts describing the outcome of the educational effectiveness research are planned for peer-reviewed publications.

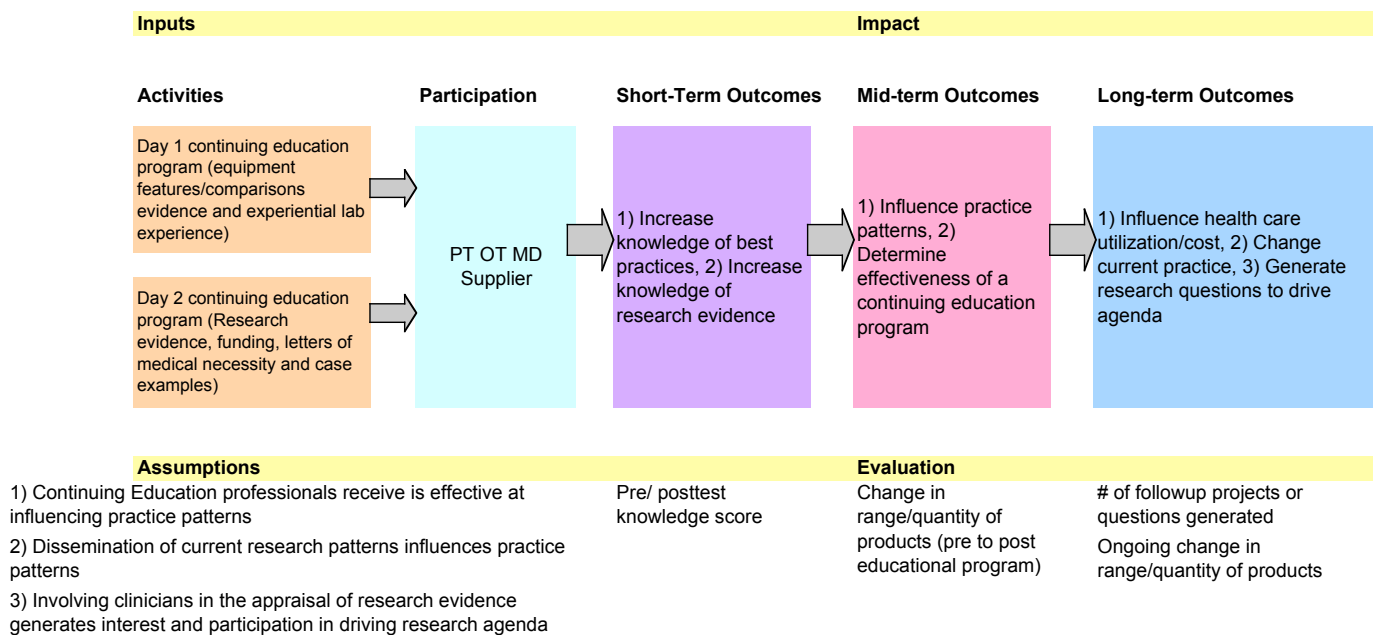
If the format is found to be an effective training utilization model, subsequent plans include replication of this dissemination effort with different content (e.g. seating systems, power

mobility systems, alternate positioning systems). Future efforts will focus on the development of efficient *interactive* on-line web-based training programs as an alternate model for exploring research dissemination and utilization patterns.

Figure 1- Logic Model: Outcomes of Training Utilization Project

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

Situation: Results of rehabilitation research often does not reach front line professionals to influence practice patterns and patient outcomes.
Priorities: To develop and test the effectiveness of an educational program to disseminate current research information and influence current practice for professionals recommending seating and wheeled mobility devices.



STAKEHOLDER PARTICIPATION IN PROJECT DEVELOPMENT

From needs assessment and program design, Mobility RERC stakeholders including clinicians, rehabilitation technology suppliers, third party payors, wheeled mobility manufacturers, researchers, and educators have been involved in the development and planning of this research project.

An established body of literature exists corroborating 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. To this end, stakeholders have agreed to partner in sponsoring this project.

Locations targeted for training

Congress and the Centers for Medicare and Medicaid Services (CMS) have focused on investigating and modifying the Medicare coverage policy for wheeled mobility devices in efforts to control waste and abuse, to ensure needed services and devices are provided to eligible beneficiaries, and to safeguard Medicaid resources. Data collected on behalf of CMS will be used to help identify six locations for the two-day educational program, the core intervention for this research project. (The program is described in detail later in this application.) Similarly, one separate location will be identified for Control-Group recruitment.

Selection of the locations will be based on durable medical equipment data submitted by the Statistical Analysis Durable Medical Equipment Regional Carrier (SADMERC). The SADMERC is responsible for collecting and analyzing utilization averaging data for durable medical equipment in all Durable Medical Equipment Regional Carrier (DMERC) regions in the United States for the CMS. Locations for the six educational programs and control group will be selected by project partners from a list of SADMERC- identified sites in need of education and training.

Program Content

Program content is founded in an established body of literature pertaining to manual wheelchair durability and lifecycle, wheelchair propulsion biomechanics, repetitive strain injuries from manual wheelchair use, shock, vibration, wheelchair comfort, rolling resistance, and wheelchair configuration. State-of-the-art research and development projects are supported and initiated through NIDRR and the Veterans Administration. In the first 2 years of the Mobility RERC several noteworthy projects have been initiated in the area of manual wheelchairs. Other NIDRR funded RERCs have also significantly contributed to the existing body of scientific literature on manual wheelchairs.

Clinicians have also contributed to the design of the project. A preliminary survey, of clinician stakeholders (N=29) from Shepherd Center, was conducted to identify course design, format, timing, and content. All clinicians polled from this convenience sample were interested in participating in an evidence-based educational program. The top three content areas of interest in order of popularity were as follows: current research related to seating and mobility; how to compare equipment from one manufacturer to another; and how to justify equipment. An 8-hour course was preferred. Clinicians indicated on average that they would be willing to pay \$64.00 (range 25-200) tuition to participate in this type of educational program. Other stakeholders

(manufacturers and educators) were queried and indicated that if a course was “free” they typically were not well attended. If there was a “waived” fee, however, attendance was far better. A conference program has been designed incorporating the top three content areas of interest, in a two-day (Friday-Saturday) schedule, the second choice preference identified through stakeholder input. A nominal course tuition fee of \$120.00 has been established taking into account clinician input and budgetary constraints.

Responsibility and Cost Sharing

This utilization research project is dependent on the administration of multi-site training workshops. Separate funding has been secured to support all training activities. Conference site expenses, marketing, and recruitment will be underwritten and supported with donations from stakeholder partners in addition to resources supplied by the mobility RERC. Six corporate manufacturer partners have been identified including Sunrise Medical, The Invacare Corporation, Pride Mobility Products Corporation, Kushall North America, TiLite, and Colours In Motion. RUSH grant monies will be allocated solely for the purpose of evaluating the impact of training.

Interactive, “hands-on” laboratory sessions are planned as part of the educational program. In addition to monetary donations, stakeholder partners have agreed to loan equipment for trial and exploration during laboratory activities. Each project partner has agreed to have a representative present at each location to serve as a laboratory instructor for these activities.

TRAINING UTILIZATION METHODOLOGY

The purpose of this research proposal is to evaluate the effectiveness of a two-day educational intervention on influencing ***knowledge, attitudes, and behaviors*** of professionals recommending seating and wheeled mobility equipment. A combination of evidence-based educational strategies and the needs assessment involving Mobility RERC stakeholders, led to a design utilizing an evidence-based, experiential, educational intervention. (The methodology for evaluating training effectiveness is detailed later in the application.)

Intervention

Training program goals are as follows:

1. Improve clinicians’ knowledge of scholarly research and “best practices” (indications and contraindications) for manual wheelchair technologies as applied to their daily practice and patient population.
2. Increase confidence and independence in recommending and specifying manual wheelchair technologies for individuals with mobility impairments.
3. Effect change in manual wheelchair recommendation practice patterns (utilization behaviors).
4. Increase quality of clinicians’ documented rationale in letters of medical necessity for manual wheelchair technologies.

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

A key assumption driving this study is that daily practice for “frontline” therapists is hectic. There is little time for keeping up to date with advances in research and technology. Clinicians have indicated that they are eager to be exposed to timely research literature in a format that is meaningful and easy to interpret and apply. The proposed educational seminar is specially designed to address this identified need. Therefore, the content for the program synthesizes “best practice” and “state of the science” research literature pertaining to seating and mobility for manual wheelchair users. Research evidence will be 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 will summarize and synthesize research literature focusing on application indications and contraindications as applied to daily clinical practice.

Similarly, stakeholder input was the basis for identifying and prioritizing program focus to ensure content validity. Program participants will study the range of manual wheelchair features available on the market today. Interactive laboratory experiences are planned to allow side-by-side trial and comparison of similar products from various manufacturers.

This educational experience is organized into a two-day program. A course schedule is provided in Appendix A. In order to comprehensively present information within a two-day continuing education program the content domain for this program has been limited to manual wheelchair technologies. As learning linked to clinical practice is the basis for this program, clinical examples are used to provide exposure to “real-life” situations. Furthermore, in order to provide an interactive, “hands-on” experience, partners have agreed to loan equipment for trial and exploration during laboratory activities. Four interactive hands-on laboratory sessions are planned on Day 1. Day 2 includes ample time for case examples and discussion followed by problem-based group activities with discussion. Sample letters of medical necessity and clinical rationale will be used to illustrate the range of quality documentation being submitted with funding requests. Group activities are planned to facilitate learning using role reversal, inviting the participant to be the third party reviewer responsible for approving or denying the request based on the documentation provided. Examples of exemplary letters of medical necessity will be provided as models for learning purposes.

Course materials will include program goals, objectives, and course notes. A summary and extensive bibliography of manual wheelchair research will be provided, as well as suggested reading, resources and additional references.

The educational intervention will be replicated in 6 locations as identified by stakeholder sponsors.

Subject Recruitment

A targeted recruitment strategy is planned to identify a cohort of licensed physical therapists, occupational therapists, and physicians responsible for recommending manual wheelchairs to consumers. Program sponsors, their local manufacturing representatives and suppliers in the areas identified by the SADMERC will assist in identifying and referring clinicians eligible to participate in the educational research project (6 training sites and 1 control site).

Interested clinicians will be contacted by a research investigator and invited to participate in a study group (control, conference only or utilization cohort). A total of 40 subjects from one geographic region will be recruited to join the Control group. Two hundred forty subjects will be recruited to participate in the Conference-Only Program (40 participants each site). A subset of subjects from each site will be consented and enrolled in the Utilization Cohort. A target of 60 subjects over the 6 sites is desired; in order to allow for attrition, 15 subjects will be recruited from each location. Informed consent will be obtained prior to study enrollment.

Control Group subjects will complete questionnaires that measure knowledge and attitudes at initial contact and 6 months afterward. These subjects will receive a gift certificate (\$10.00 value) in appreciation of their time.

Conference-Only subjects will be asked to complete questionnaires that measure knowledge and attitudes while at the Workshop and 6 months afterward. These subjects will receive a gift certificate (\$5.00 value) in appreciation of their time.

Utilization cohort subjects will be used to collect information on knowledge, attitudes and behaviors before and after the training program. Subjects will be tested 6-months prior to, while attending and 6-months after the workshop. This cohort of subjects will receive complimentary tuition for the educational program (\$120.00 value) and a gift certificate (\$50.00 value) upon completion of the 6-month postconference data collection.

EVALUATION OF TRAINING IMPACT

The proposed study will evaluate 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

Kirkpatrick's level 2 (knowledge) was the basis for developing the Pretest/Posttest Knowledge Assessment. A brief multiple-choice test assessing knowledge of empirical research and "best practices" as related to manual wheelchair applications will be 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 is designed to take only 20-30 minutes.

A Manual Wheelchair Practice Questionnaire will be used to explore Kirkpatrick's level 3 (transfer). This level is intended to measure the transfer that has occurred in a learner's behavior due to a training program. Evaluation at this level attempts to answer the question, "Is the newly acquired attitude being used in everyday clinical practice?" We will explore whether a change in attitude can be detected immediately following an intervention and, if so, whether or not a change persists 6 months later.

Similarly, we will investigate if an educational program affects practice patterns, particularly manual wheelchair recommendation and utilization practices. Therefore we plan to conduct a Work Product Review. This effort will involve the appraisal of documentation of clinical rationale as presented in letters of medical necessity for manual wheelchair requests. Finally, detailed manual wheelchair order forms will be reviewed to survey the range of manual wheelchair features requested for a period of 6 months before and after the educational program.

Measure Development

Pretest/Posttest Knowledge Assessment A 15-item multiple-choice test founded on the empirical evidence and best practice content planned for the educational program will be written. To ensure content and contextual validity, assessment items will be reviewed by clinical experts and revised as indicated.

Manual Wheelchair Practice Questionnaire An iterative process of peer review and modification was employed to develop and revise the Manual Wheelchair Practice Questionnaire (Appendix B). The investigators (LC, CM, SS) fulfilled the role of questionnaire developers. Founded on experience and judgment, it was theorized that attitudes toward practice would be reflected in a clinicians' perception of confidence, independence, leadership, and resourcefulness. Operational definitions of these constructs are listed in Table 1. Four researchers without seating and mobility expertise served as item reviewers, checking for item clarity, terminology, and brevity.

Table 1 Manual Wheelchair Practice Questionnaire Constructs

Construct	Definition	# of Items	Item Numbers
Confidence	Feeling of reliance or certainty, level of comfort with decision making or knowledge	4	1,2,3,5a-o
Independence	Feeling of autonomy, self-sufficiency and self-direction	3	4,5,6
Leadership	Ability to lead another person in a process	3	7,8,9
Resourcefulness	Ability to recognize, seek and properly use pertinent information	6	10,11,12,13,14,15

5-Point Likert scales were developed to represent a range of perceptions for three of the four constructs (confidence, independence, and leadership). Similarly, 6 items were written to correspond with resourcefulness. Parallel strategies of objective and self-reported ratings of attitudes were used to ensure reliability. Factorial analysis and intra-class correlation will be used to test internal consistency, repeatability and verify independence of the four hypothesized constructs.

Work Product Review Clinician documentation and order forms will be audited to track changes in range of manual wheelchair equipment features recommended to patients served within a 6-month period before and after the educational program. A grading rubric that measures content and competency will be created and used by a single researcher to appraise the quality of documented clinical rationale submitted in letters of medical necessity. A manual wheelchair features checklist will be used to document the range of equipment features indicated on submitted manufacturer order forms. To validate both the rubric scoring system and the feature checklist, intrarater reliability will be tested *a priori* for a sample of 10 test cases.

Table 2 Measures of Training Impact: Measures of clinicians' knowledge, attitudes, and behaviors related to service delivery for manual wheelchair technologies.

Evaluation Measures	Constructs	Measure	Analysis
Pretest/Posttest Knowledge Assessment <i>(Knowledge)</i>	Knowledge	Multiple choice items (Percent score)	Paired t-test
Manual Wheelchair Practice Questionnaire <i>(Attitudes)</i>	Confidence (feeling of reliance or certainty)	Likert scale	ANOVA, Descriptive Statistics
	Independence (feeling of autonomy, self-sufficiency, and self-direction)	Likert scale	
	Leadership (Percentage of time leading)	Ratio	
	Resourcefulness (sources of information, knowledge and utilization of resources)	Quantitative and Descriptive	Descriptive statistics and Descriptive data
Work Product Review <i>(Behaviors)</i>	Utilization (Range of features used)	Quantitative	Descriptive statistics
	Rationale	Grading rubric (score) and Descriptive	Descriptive statistics and Descriptive data

DATA COLLECTION

Intensive collection of data consisting of a demographic questionnaire (Appendix C), pretest/posttest knowledge assessment, a self-report manual wheelchair practice questionnaire, and a review of work output will be evaluated at various points as indicated in Table 3 depending

on group allocation. All subjects will complete a demographic questionnaire and a manual wheelchair practice questionnaire at the time of initial contact. A pretest / posttest knowledge assessment will be administered at the time of the educational program and 6 months after the educational program. The Control group will complete the knowledge assessment at the time of initial contact and 6 months later. Work product review will be completed for each subject in the Utilization Cohort for each manual wheelchair recommended (15 maximum), 6 months prior to and 6 months following the educational program to explore patterns for manual wheelchair equipment recommendations. Any other training or education obtained in the area of manual wheelchairs or seating and mobility after the educational intervention will be noted. Subjects will also be asked to report the number of manual wheelchairs recommended over the 6 months following the educational intervention.

Table 3 Data Collection by Group

	Demographic Questionnaire	Manual Wheelchair Practice Questionnaire (attitudes)			Pretest/Posttest Knowledge Assessment (knowledge)			Work Product Review (behavior)		
		Initial Contact	6 mo Pre Conf.	At Conf.	6 mo F/U	Pre Conf.	Post Conf.	6 mo F/U	6 mo Pre Conf.	6 mo Post Conf.
Control Group	x	Initial contact			x	Initial contact		x		
Conference-Only	x			x	x	x	x	x		
Utilization Cohort	x	x	x	x	x	x	x	x	x	x

Pre Conf.= Preconference, Conf.= Conference, 6 mo F/U= 6 month follow-up,
6 mo Pre Conf= 6 month Preconference, 6 mo Post Conf= 6 month Postconference

Safety of Data and Confidentiality

Subjects enrolled in the Utilization Cohort will be required to provide documentation including de-identified letters of medical necessity, equipment recommendations and order forms. Subjects will be required to remove personal identifying information (name, address, medical record number, social security number, insurance information) from documentation submitted, thereby breaking the information link between the patient and the investigators. Investigators will have no established relationship with the patient or facility and therefore no means to link medical record information to a specific person. Medical records will be studied to assess the quality of the clinical documentation and rationale as written by the study subject (the clinician). Intended use of the medical record information will be disclosed in the consent form provided to each subject. All data will be stored in a secure location accessible only to study investigators.

Two Institutional Review Boards (IRBs) have been consulted concerning the desire to access and study de-identified personal medical information. Investigators were advised that clear disclosure to subjects in the consent form outlining intended use of medical documentation, specific instructions for blinding documentation and safeguarding measures planned to protect personal information should be adequate to obtain IRB approval. Inability to access medical documentation will impede our ability to perform an evaluation of educational effectiveness with respect to the level of transfer of knowledge to practice.

Data will be collected by mail, fax and in person. To ensure confidentiality, all data will only be identifiable by the subject's case number, which will be recorded on the forms. All data that is faxed or electronically transmitted to Shepherd Center will only be identifiable by the subject's case number. Confidential information such as the subject's name, address, phone number, or other information that might be used to link the data back to the subject will not be transmitted. All records related to a subject's involvement in this research study will be stored in a locked file cabinet in the Crawford Research Institute, Shepherd Center. A subject's identity on these records will be indicated by a case number rather than by their name, and the information linking these case numbers with their identity will be kept separate from the research records.

Procedures will be developed and implemented to ensure accurate recording and entry of data. Standardized data collection forms will be used to record all data, and all data will be entered into a computerized database at the Shepherd Center. Ten percent of the individual records will be randomly checked to insure that the computerized database is identical to the data recorded on the data collection forms.

DATA ANALYSIS

Descriptive statistics, including frequency counts for categorical variables and measures of central tendency and dispersion for continuous variables will be calculated to summarize the data. All data will be screened to ensure they meet the assumptions for the inferential statistical analyses described below. The alpha level (α) for all analyses will be set at 0.05. The analyses for each specific aim are as follows:

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

Hypothesis 1a: Training participants will demonstrate a significant improvement in knowledge score as measured by a Pretest/Posttest Knowledge Questionnaire compared to a Control group. This aim will be examined with a two-way, 2X2 repeated measures ANOVA. The dependent variable will be the Knowledge test score. The independent variables will be 1) Intervention with two levels (Education vs. Control Group), 2) Time with two levels (preconference, 6-mo follow-up). The hypothesis of interest will be the two-way Intervention*Time interaction.

Hypothesis 1b: Training participants will demonstrate a significant improvement in self-reported attitude score as measured by the Manual Wheelchair Practice Questionnaire compared to a Control group. This aim will be examined with a two-way, 2X2 repeated measures ANOVA. The dependent variable will be the Attitude overall score. The independent variables will be 1) Intervention with two levels (Education vs. Control Group), 2) Time with two levels (preconference, 6-mo follow-up). The hypothesis of interest will be the two-way Intervention*Time interaction.

Planned pairwise comparisons of the simple effect of Intervention will be performed for test score for training subjects at each time point (pre, post and 6 month follow-up) using the

Bonferroni inequality. The Bonferroni procedure controls the overall family-wise α -level to .05, so that the probability of any single comparison being a Type-I error is not greater than .05.

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

Hypothesis 2a: Training participants will demonstrate a significant improvement in the quality of documented clinical rationale measured 6 months after training compared to measurements taken 6 months prior to training. This hypothesis will be examined with a one-way, 1X2 repeated measures ANOVA. The dependent variable will be the Work Product Review rubric score. The independent variable will be Time with two levels (6 mo pre, 6 mo post).

Hypothesis 2b: Training participants will recommend significantly more manual wheelchair features 6 months after an educational program. This hypothesis will be examined with a one-way, 1X2 repeated measures ANOVA. The dependent variable will be the number of manual wheelchair features. The independent variable will be Time with two levels (6 mo pre, 6 mo post).

Pearson product-moment correlation coefficient (r) analyses will be used to explore the strength of associations between practice opportunities and the retention of 1) knowledge 2) attitudes and 3) behavior. It is hypothesized that there will be a direct correlation between practice opportunities and retention of training. Individuals that are exposed to greater practice opportunities will have higher 6-month follow-up test scores for each measure.

ANTICIPATED OUTCOMES OF TRAINING UTILIZATION PROJECT

Understanding the unique aspects of the target audience makes this program essential to successfully influencing daily practice patterns and is crucial as a pioneering first step in capturing utilization practices. The seminar curriculum was created based on solicited input from clinician, third party payors, educators, and research stakeholders and is thought to meet the needs of a continuing education program that will impact clinical practice.

Expected short-term outcomes include: 1) an increased awareness of equipment features, 2) changes in attitudes about manual wheelchair payment coverage, 3) knowledge of indications/contraindications for manual wheelchair features, and 4) knowledge of best practices. We expect mid-term outcomes to reflect changes in recommendation practices resulting in utilization of a larger range of equipment features following the educational program. Projected long-term outcomes include 1) influencing health care utilization and cost, 2) effecting change in current patterns and 3) generating research questions to drive research agenda. It is proposed that this preliminary study can serve as a pilot to develop and test a methodological process for a more extensive evaluation study in the future.

LIMITATIONS

We recognize that tracking utilization and practice patterns of clinicians has multiple confounders that can influence the quality and quantity of the data collected. These factors include: a heterogeneous group of clinicians from multiple practice settings; variable patient populations; and variable funding sources with inconsistent coverage policies dictating equipment recommendations. Changes in the range of manual mobility equipment features recommended will be studied. We believe that the use of wheelchair order forms will provide enough detail to discern differences but acknowledge a limitation with this approach. We acknowledge that accurate collection of utilization data will be challenging. By design, we will perform a documentation review on specific data collected at the time of an equipment recommendation and follow the individual after the educational program to identify changes. Access to de-identified personal medical information in order to control for confounders (i.e. practice setting, severity of illness, age etc) is crucial for the success of this study.

TRANSPORTABILITY AND CONNECTEDNESS OF THE PROPOSED ACTIVITY

The literature provides little guidance to identify the most effective way to train professionals and limited evidence about whether or not training has an effect on practice patterns or patient outcomes. The proposed Dissemination Model will explore the effectiveness of our unique methodology, which incorporates research dissemination, experiential learning/laboratory experience, and the study of practice patterns.

The training methodology was based on evidence-based educational research. Similarly, the content was chosen based on user needs, dissemination and training plans for the Mobility RERC, and the plan to study the impact and effectiveness of training and dissemination efforts. If successful, this model can easily be transferred to other content areas and used for influencing clinical practice. Results of this project can be used to inform other RERCs and NIDRR research grants about methods that can be used to transfer research to clinical practice, and to monitor utilization of training activities.

MANAGEMENT OF THE ACTIVITY

The current proposal will be completed under the leadership of Laura Cohen PT, PhD, ATP, clinical research scientist and Chris Maurer PT, ATP, co-investigator on the RERC for wheeled mobility. Dr .Cohen (0.25 FTE) will have primary responsibility for oversight and management of the project, including sponsor contracting and coordination, conference logistics, subject enrollment, data collection and analysis. Ms. Maurer (0.20 FTE) will have primary responsibility for developing educational program materials, coordinating laboratory activities with sponsors, course instruction and scheduling management and implementation of web access to educational materials and references via the RERC website. Seminar instructors will include RERC Investigators: Stephen Sprigle PhD, PT; Chris Maurer PT, ATP; Laura Cohen PT, PhD, ATP. Other qualified instructors will be engaged to teach seminars in conjunction with an RERC investigator as needed. Seminar sponsors will serve as laboratory instructors with at least one representative from each sponsor present for Day 1 of the seminar in each of the six locations. An administrative assistant (0.05 FTE) will assist with conference registrations and preparations.

A research technician (0.15 in YR1 and 0.2 FTE in YR2) will assist with data collection and data entry and analysis. The project budget is provided on pages 2-5.

PROJECT TIME LINE

Table 4 summarizes the study timeline. This 24-month project includes a 3-month planning phase to confirm sponsorship agreements, identify site venues, and finalize conference dates for 2005-2006. Nine months of subject recruitment has been allotted to enroll sufficient subjects into the Utilization Cohort, which will allow 6 months of data collection prior to the first conference. Six conferences will be delivered sequentially over a 9-month period in order to allow 6 months of follow-up data collection after the last conference. Data analysis will commence immediately following the completion of the first conference and continue throughout the duration of the study. We anticipate 3 months of continued data analysis and manuscript preparation for publications and presentations following the completion of data collection.

Table 4 Study Timeline

Phase (month)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
Planning																									
Subject Recruitment																									
Study Enrollment																									
Pre-Conference Phase																									
Conference Intervention																									
Post-Conference Phase																									
Data Analysis																									+3
Publication																									+3

REFERENCES

1. Chen F, Bauchner H, Burstin H. A call for outcomes research in medical education. *Acad Med* 2004; 79(10):955-960.
2. Hutchinson L. Evaluating and researching the effectiveness of educational interventions. *BMJ* 1999; 318:1267-1269.
3. Wartman SA. Revisiting the idea of a national center for health professions education research. *Acad Med* 2004; 79(10):910-917.
4. Davis D, O'Brien MA, Freemantle N, Wolf FM, Mazmanian P, Taylor-Vaisey A. Impact of formal continuing medical education: do conferences, workshops, rounds, and other traditional continuing education activities change physician behavior or health care outcomes? *JAMA* 1999; 282(9):867-874.
5. Davis DA, Thomson MA, Oxman AD, Haynes RB. Evidence for the effectiveness of CME. A review of 50 randomized controlled trials. *JAMA* 1992; 268(9):1111-1117.
6. Oxman AD, Thomson MA, Davis DA, Haynes RB. No magic bullets: a systematic review of 102 trials of interventions to improve professional practice. *CMAJ* 1995; 153(10):1423-1431.
7. Bauchner H, Simpson L, Chessare J. Changing physician behaviour. *Arch Dis Child* 2001; 84:459-462.
8. Cantillon P, Jones R. Does continuing medical education in general practice make a difference? *BMJ* 1999; 318:1276-1279.
9. Bergen AF, Presperin J, Tallman T. Positioning for function: Wheelchairs and other assistive technologies. Valhalla, NY: Valhalla Rehabilitation Publications, Ltd., 1990.
10. Herman JH, Lange ML. Seating and positioning to manage spasticity after brain injury. *NeuroRehabilitation* 1999; 12:105-117.
11. Trefler E, Hobson DA, Taylor SJ, Monahan LC, Shaw CG. Seating and mobility for persons with physical disabilities. Tucson, AZ: Therapy Skill Builders, 1993.
12. Angelo J, Buning ME, Schmeler M, Doster S. Brief or New: Identifying best practice in the occupational therapy assistive technology evaluation: An analysis of three focus groups. *The American Journal of Occupational Therapy* 1997; 51(10):916-920.
13. Cooper RA, Trefler E, Hobson DA. Wheelchairs and seating: Issues and practice. *Technology and Disability* 1996; 5:3-16.
14. Cohen LJ. The Development and Validation of the Seating and Mobility Script Concordance Test (SMSCT). University of Pittsburgh, 2003.

Appendix A: Course Schedule *Research Cliff Notes: Bringing Manual Wheelchair Research to your Clinic.***Day 1**

8:00-8:30	REGISTRATION
8:30-9:00	Introduction Purpose (RERC, research study, website)
9:00-10:15	Rigid vs folding. Wheelchair features (STB, adj axle, dump, camber, front hanger angle, back heights, caster size, handrims, tires, inflation, armrests, materials, wheels, shock absorption, wheellocks)
10:15-10:30	BREAK
10:30-11:15	Feature Trials Lab (materials, rigid/folding, wheel locks, back height, casters, front rigging)
11:15-12:30	Postural stability and pressure distribution evidence
12:30-1:30	WALK ABOUT LUNCH
1:30-2:15	Pressure relief and postural stability lab (pressure mapping, manual tilt and recline, postural stability with varying dump and back angle)
2:15-3:15	Wheelchair propulsion biomechanics, repetitive strain injuries
3:15-3:30	BREAK
3:30-4:00	Ride comfort, vibration, shock
4:00-5:30	Propulsion and configuration(rear axle adj, camber, shock, tires, wheels)
4:30-5:00	Wheel/caster size, rolling resistance, solid inserts vs pneumatics, thorn proof etc.

Day 2

8:00-8:30	Durability, cost , WC standards
8:30-9:00	Wheel/caster size, rolling resistance, solid inserts vs pneumatics, thorn proof etc.
9:00-9:45	Wheeled mobility assessment and case studies to target learning
9:45-10:15	Case studies to target learning (2)
10:15-10:30	BREAK
10:30-11:15	Case studies to target learning (3)
11:15-12:00	LMN
12:00-1:00	LUNCH
1:00-2:00	What are reviewers looking for, case example
2:00-3:30	Case reviews and discussion
3:30-4:00	WRAP-UP

DRAFT

Manual Mobility Practice Questionnaire

We are interested in knowing about your practices for recommending and specifying manual wheelchairs for the clients that you serve. For this questionnaire, ***‘recommending’*** manual wheelchair equipment means proposing or suggesting particular manual wheelchair equipment features - matching a clients’ physical needs to a distinctive characteristic or part of a wheelchair (e.g. folding frame, rigid frame, swing away footrests, rigid foot platform, scissor wheel locks, push to lock wheel locks). ***‘Specifying’*** manual wheelchair equipment means determining the exact manufacturer and model for the manual wheelchair components. ***‘Confidence’*** refers to your feeling of reliance or certainty.

Using the scale below, please tell us how **confident** you are in the following:

- 0 = not at all confident
- 1 = little confidence
- 2 = somewhat confident
- 3 = confident
- 4 = very confident

1. Recommending manual wheelchair equipment features? (e.g. folding, rigid, frame material, adjustable seat to back, etc.)

0 1 2 3 4

2. Specifying the recommendation for a specific manual wheelchair (e.g. manufacturer, model, size, components, etc.)?

0 1 2 3 4

3. What percentage of the time do you question yourself or change your mind regarding your manual wheelchair recommendations?

_____ % of time

4. What percentage of the time do you seek additional input while making about manual wheelchair recommendations or specifications?

_____ % of time

5. The table below includes a list of manual wheelchair features. All features have inherent tradeoffs for particular applications. Please answer the following questions recognizing that there are no assumptions or right/wrong answers. Using the 5-point scales listed below, indicate **your level of confidence** with each of the manual wheelchair features in the chart below (Indications, Contraindications). Indicate **how frequently** you recommend each of the manual wheelchair features listed.

Confidence Scale
0 = not at all confident
1 = little confidence
2 = somewhat confident
3 = confident
4 = very confident

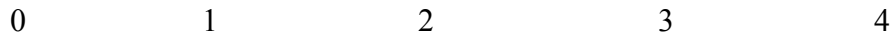
Frequency Scale
0 = never
1 = seldom
2 = occasionally
3 = frequently
4 = always

Feature	Level of Confidence in your understanding of		Frequency of recommendation
	Indications	Contraindications	
a) Folding frame	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4
b) Rigid frame	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4
c) Frame materials (weight, durability)	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4
d) Adjustable seat to back	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4
e) Squeeze or dump	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4
f) Adjustable axle	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4
g) Shock absorption (frame, casters)	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4
h) Camber	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4
i) Front riggings	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4
j) Foot supports	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4
k) Arm supports	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4
l) Wheels	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4
m) Tires	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4
n) Casters	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4
o) Handrims	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4
p) Push Handles	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4
q) Wheel locks	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4

Independence refers to your feeling of autonomy, self-sufficiency and self-direction. Using the scale below, please tell us how independent you feel in the doing the following:

- 0 = dependent**
- 1 = a little independent**
- 2 = fairly independent**
- 3 = moderately independent**
- 4 = completely independent**

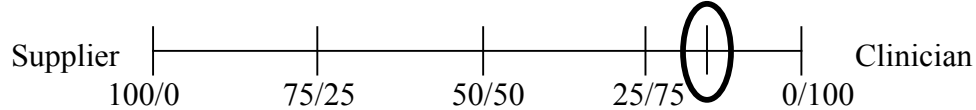
5. Recommending manual wheelchair equipment for your clients.



6. Specifying manual wheelchair equipment for your clients.

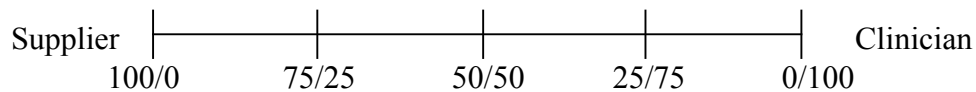


A **supplier** is an individual who is involved with the sale and service of rehabilitation equipment, assistive technology and commercially available products and devices. A **clinician** is an individual who is involved in analysis of a consumer's needs and training in the use of a particular assistive technology device. For the following items please indicate the percentage of time the supplier or the clinician provides the lead role. Draw a vertical line to mark the appropriate percentage – for example: *Indicate on average who wears better shoes?*

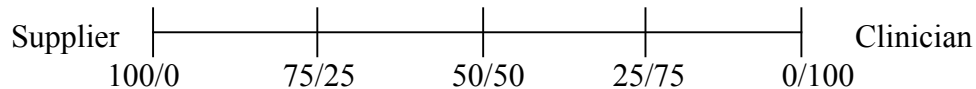


The example indicates that the supplier wears better shoes ~15% of the time and the Clinician ~85% of the time

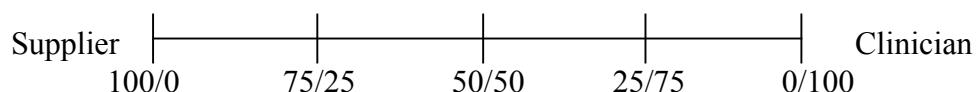
7. Indicate on average who leads the selection of the equipment features for the manual wheelchairs you recommend...



8. Indicate on average who leads the choice between the equipment features and the equipment specification...



9. Indicate on average who writes the letter of medical necessity...



10. What percentage of the time do you work with a NRRTS registered or RESNA credentialed rehabilitation technology supplier (ATS, RTS, CRTS) when recommending a manual wheelchair?

_____ % of time

11. What are your reasons for relying on a supplier?

___ 1. Insufficient time allowed to complete all components of evaluation

___ 7. Tentative or uncertain of my skills to determine definitive physical measurements for equipment specification

___ 2. Lack expertise for seating mat evaluation

___ 8. Not reimbursed for documentation when not with client

___ 3. Rely on supplier to do home/environmental assessment and equipment trial as I cannot get reimbursed for the service

___ 9. Supplier writes documentation and I sign it

___ 4. Need supplier to provide trial equipment

___ 10. Need supplier to modify or adjust equipment for optimal performance

___ 5. Unsure of equipment options and/or features

___ 11. Other (please specify):

___ 6. Depend on supplier to do product research

___ 12.

12. Check the resources you have used in the *last six months* to get more information when you are unsure of which equipment will meet the needs of your client? (Check all that apply)

- _____ a. Supplier
- _____ b. Manufacturer (representative, literature, customer service)
- _____ c. Colleague within organization
- _____ d. Colleague outside organization
- _____ e. Listserv
- _____ f. Internet
- _____ g. Exhibit Hall
- _____ h. Text book
- _____ i. Journal
- _____ j. Other (please specify)

Using the scale below, please tell us how **easy** the following tasks are:

0 = very difficult

1 = somewhat difficult

2 = neither difficult or easy

3 = fairly easy

4 = very easy

13. To find a skilled knowledgeable supplier in your area?

0 1 2 3 4

14. To find an expert or more experienced seating and mobility clinician in your area?

0 1 2 3 4

15. Do you encounter barriers in your practice that limit your ability to get the “right” equipment for your clients’?

___ Yes

___ No

If **yes**, describe the barriers you encounter:

Thank you for your participation!

ID# _____

1. Date of birth (mm/dd/yr): _____
2. Gender: ___ Male ___ Female
3. State _____
4. Postal Zip Code _____ - _____
5. Professional Designation (select all that apply)
 - Physical Therapist
 - Occupational Therapist
 - Physical Therapist Assistant
 - Occupational Therapist Assistant
 - Other (please specify) _____
6. Please complete all that apply:

DRAFT

Check all that apply	Degree	Year of graduation
<input type="checkbox"/>	Bachelors (entry level)	_____
<input type="checkbox"/>	Masters (entry level)	_____
<input type="checkbox"/>	Advanced level Masters (degree) _____	_____
<input type="checkbox"/>	Clinical Doctorate (entry level)	_____
<input type="checkbox"/>	Clinical Doctorate (advanced level)	_____
<input type="checkbox"/>	PhD (degree) _____	_____
<input type="checkbox"/>	Other (degree) _____	_____

7. Years of clinical practice ___ (years)
8. Years of seating and mobility service provision ___ (years)
9. How many hours per week do you work? ___ (hrs/wk ___)
10. How many hours per week do you work providing seating and wheeled mobility services? ___ (hrs/wk ___)
9. On average, how many wheelchairs do you recommend for individuals with mobility impairments? Estimate the **one** that is most appropriate for you.
_____ / week
_____ / month
_____ / year

Please continue on the next page!

Investigator Use Only

Study: Web Eff. Util.

10. Describe the training you received during PT or OT school regarding seating and wheeled mobility recommendations.

11. How many hours of professional development per year do you complete in the area of seating and wheeled mobility? _____ (hours/year)

12. In what types of professional development activities **in the area of seating and wheeled mobility service provision** do you participate?

Activity	Participation <i>(check all that apply)</i>
Continuing education conference (i.e. RESNA, ISS, CSUN, etc.)	
Inservice (supplier, manufacturer, colleague)	
Formal self study program (web course, correspondence course)	
College/University course	
Other (List)	

13. Of the MANUAL wheelchairs that you recommend each year, what is the distribution by diagnostic group?

Diagnoses	% of WCs / group <i>(Must equal 100%)</i>	Example
Progressive neurological disease (e.g. MS, ALS, MD, post polio, etc.)		0%
Neurological disorder (e.g. stroke, ABI, CP, SCI, spina bifida, cerebellar ataxia, transverse myelitis, etc.)		50%
Orthopedic (e.g. LBP, DJD, THA, TKA, OA, etc.)		15%
General deconditioning (multiple comorbidities, vascular diseases, pulmonary disorders, rheumatic diseases, renal diseases, obesity, etc.)		35%
<i>(Must equal 100%) Total</i>	100%	100%

Thank you for your participation!