Applicant Information

Date: 11/29/2006

NIDRR Project Name: RERC: Wheeled Mobility in Everyday Life

NIDRR Project Number: H133E0300535

Contact Person: Laura Cohen PT, PhD, ATP

Proposed Activity Start Date: 4/01/07

Proposed Activity End Date: 4/01/08

Utilization Model Described (* pages 5-9):

___ Best Practice
___ Collaborative Support
_X_ Knowledge Transfer
___ Technology Transfer
___ Other

Proposed Activity Budget Attached (* page 13)?

_X_ Yes
___ No

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

_X_ Yes
___ No

BUDGET JUSTIFICATION

The proposed 12-month project activities represent a substantial effort to advance the purposes of the RUSH grant program and extend the work from our current RUA award. To deliver a high return on NIDRRs investment, we will build on existing Mobility RERC training, evaluation and dissemination efforts by translating an evidence-based traditional continuing education (TCE) program to a web-based training (WBT) program. RUSH funds will be reserved exclusively for research activities that will permit us to examine the effectiveness and compare a WBT program with a TCE program. Funding for the WBT program will come from web course tuition and Mobility RERC funds. RUSH funds are therefore reserved exclusively for research activities. Both activities will utilize Shepherd Center and RERC personnel and facilities. Roles, responsibilities and FTE commitments for research project personnel are included in the proposal narrative. Budget justification and explanation follows: [DELETED BY RUSH STAFF]

Application Components

Relation between Proposed Utilization Activity and Project's Short-Term or Intermediate Outcomes for NIDRR-funded Project (5 points)

1. Describe how the proposed activity relates to the intended short-term or intermediate outcomes intended for the existing NIDRR-funded project.

CONNECTEDNESS BETWEEN PROPOSAL AND MOBILITY RERC OUTCOMES

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 **Knowledge Transfer Model** project will explore the effectiveness of a web-based training program (WBT) on ***knowledge and attitudes*** of professionals responsible for recommending manual wheelchairs for individuals with mobility impairments.

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 purpose of this research proposal (RUSH-WBT) is to extend the Mobility RERCs dissemination and training activities to include the study of utilization of rehabilitation research training. RUSH-WBT will accomplish this by measuring short- and mid-term impacts on ***knowledge and attitudes*** of clinicians who prescribe wheeled mobility.

A substantial deliverable from our current RUA project (RUSH-TCE) is an evidence-based curriculum designed to interpret and relate current seating and manual mobility research to daily clinical practice using a face to face traditional continuing education (TCE) program. In accordance with the Best Practice Knowledge Transfer Model, we plan to leverage this work. The Mobility RERC will translate the evidence-based curriculum into a web-based program, designed for greater continuance and broader reach. RUA support is being requested to study the impact and effectiveness of this approach.

RUSH-WBT will 1) determine the effect of the targeted web based training (WBT) program on *knowledge* of manual wheelchair technology, and clinician *attitudes* towards practice; and 2) compare the effect of web based training and traditional continuing education training.

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.

Clarity and Quality of Proposed Utilization Activity (25 points)

2. Describe the proposed activity in terms of its relation to the selected utilization model, specific goals to be achieved, likelihood of success, and quality of design.

OBJECTIVE AND SPECIFIC AIMS

This proposal is an extension of our current Research Utilization Award (RUSH-TCE) for which we have preliminary data that strongly supports continuing this track and enhancing dissemination methods. Herein the Mobility RERC proposes to do just that by developing a web-based training (WBT) program that has a wider base for continuance and dissemination of valuable evidence-based training materials.

The objective of this study is to measure the utilization of web-based rehabilitation research training by measuring short- and mid-term impacts on knowledge and attitudes of clinicians. We will build on our previous work by examining the effectiveness of a WBT program; and comparing the effectiveness of a WBT program with a TCE training program.

Specific Aim 1: Compare the effects of training on knowledge and attitudes using measurements taken before, immediately after and 6 months following a WBT 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 a WBT program (follow-up test). Control subject knowledge will be measured twice over a 6-month span.
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> Hypothesis 1b: Training participants will demonstrate a significant improvement in self-reported attitude score as measured by the Manual Wheelchair Practice Questionnaire, between pretest and posttest; and pretest and follow-up test (6 months following a WBT program).
>
> Hypothesis 1c: Training participants will demonstrate no difference in attitude score as measured by the Manual Wheelchair Practice Questionnaire between posttest and follow-up test.

Specific Aim 2: Demonstrate that WBT is equally effective to TCE training.

> Hypothesis 2a: WBT participants will demonstrate no significant improvement in knowledge score compared to a TCE training group as measured by a Pretest/Posttest Knowledge Questionnaire. Knowledge of training participants will be measured before (pretest), immediately after (posttest) and 6 months following (follow-up test) the educational intervention.
>
> Hypothesis 2b: WBT participants will demonstrate no significant improvement in self-reported attitude score compared to a TCE training group as measured by the Manual Wheelchair Practice Questionnaire. Attitude scores will be measured before (pretest), immediately after (posttest) and 6 months following the educational intervention.

TRAINING UTILIZATION MODEL

A model of training utilization has been developed that draws on the Research Utilization Support and Help (RUSH) model: **Best Practice Knowledge Transfer Model.** The overall aim of this training utilization model is to facilitate the transfer of knowledge and best practices 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.

Course evaluation forms for our TCE training program show an overall positive response to the evidence-based educational presentations, laboratories and materials (Appendix A). Preliminary results examining the effectiveness of the TCE training program also show promising improvements in knowledge scores.

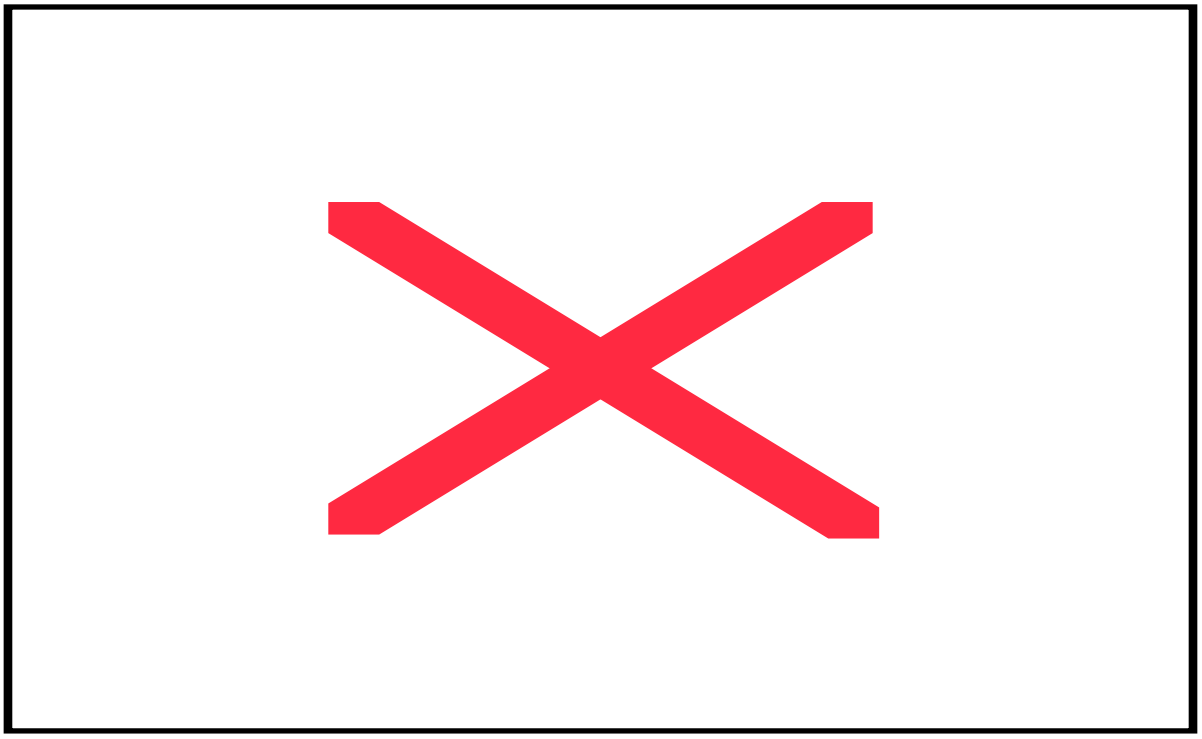
Preliminary analyses of knowledge scores for the TCE group show that there is no significant change in knowledge scores due to time alone (6 mo pre, preconference). A repeated measures ANOVA on the available scores for pre- and post- knowledge scores for the TCE group show a significant effect of time (d= 1.192, mean difference = 2.271, standard deviation = 1.906). All scores improved following the intervention. We found a significant correlation between the preconference scores and hours of seating and mobility service/week (r=0.215) and professional development hours/year (r=0.194) however, none of the variables predicted who would have the most change before and after the conference. Data collection and analysis continues; while final results are not yet available, preliminary findings are presented in Appendix A.

One tangible deliverable from our ongoing RUSH project (RUSH-TCE) is an evidence-based curriculum designed to interpret and relate current seating and manual mobility research to daily clinical practice. In accordance with the *Best Practice Knowledge Transfer Model*, the Mobility RERC plans to leverage this work and translate the evidence-based curriculum into a web-based program, designed to reach a broader audience. RUSH-WBT will examine the effectiveness of a WBT program and compare the effectiveness of the WBT to the TCE training program.

In addition, we will draw on elements of other RUSH Utilization models. Consistent with the *Collaborative Support Model*, we will partner with professional organizations such as RESNA, NRRTS, APTA and AOTA to promote and endorse this specialty web-based curriculum designed for their members (Appendix B). And, in accordance with the *Knowledge Synthesis Model*, web-based 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 (Appendix C). Training materials will be made available via website access to increase range for broader dissemination impact; and manuscripts describing the outcome of the educational effectiveness research are planned for peer-reviewed publications.

If the web-based 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, and alternate positioning systems). Future efforts will focus on disseminating web-based design methodologies with NIDRR researchers and others.

Figure 1- Logic Model: Outcomes of Training Utilization Project



Quality of Research Findings (20 points)

3. Describe the quality of the research findings intended for dissemination in terms of their scientific merit and likelihood of being adopted by target audiences.

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 [(2)]. Systematic reviews [(3-5)]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 [(3-6)]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)." [(7)]

The four-level hierarchy of evaluation developed by Donald Kirkpatrick (1994) [(8)] 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 [(8)]. 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.

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 (Appendix C). State-of-the-art research and development projects are supported and initiated through NIDRR and the Veterans Administration. In the first 3 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.

The Mobility RERC will translate our two day evidence based training curriculum to an interactive web-based program. The curriculum will be comprised of multimedia components including video, audio, text, PowerPoint, directed homework, and critical thinking discussion assignments. One of the biggest challenges will be converting more than 2 hours of interactive laboratory activities to the online environment so that the experience will be equally valuable. To accomplish this we plan to create lab components that consist of video showing a group working together, then a list of critical thinking discussion points, and a homework assignment. The critical thinking discussion points are meant to become "sparks" to facilitate clinical problem solving and facilitate course participants and non-participants to come together to think through and solve various real life issues (in place of lab networking). In this way, professional relationships are enhanced by involving critical conversations that matter in the everyday workplace. This practice is consistent with skills needed for lifelong learning.

TRAINING UTILIZATION METHODOLOGY

The purpose of this research proposal is to evaluate the effectiveness of a web-based educational intervention on influencing ***knowledge and attitudes*** 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 Mobility RERC investigators and other qualified clinical instructors will serve as faculty for the web-based program and laboratory sessions. Instructors will include Laura Cohen PhD, PT, ATP; Chris Maurer PT, ATP; Kim Davis MSPT, ATP; David Kreutz PT, ATP and Stephen Sprigle PhD, PT.

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 WBT program 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. To ensure content validity stakeholder input was the basis for identifying and prioritizing program focus. 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.

Bringing Manual Wheelchair Research to the Clinic Online Workshop will be designed to address several modes of learning in order to provide significant experiences for each participant. Program participants will study the range of manual wheelchair features available on the market today. Bringing Manual Wheelchair Research to the Clinic Online Workshop will incorporate multimedia components, directed homework, and critical thinking discussion assignments. The course material also will be enriched by online resources that will be a click away.

Bringing Manual Wheelchair Research to the Clinic Online Workshop will be divided into 10 modules.

* Module 1: Manual Wheelchair Features and Standards
* Module 2: Wheeled Mobility Assessment and Measurement
* Module 3: Postural Stability and Pressure Distribution
* Module 4: Rolling Resistance
* Module 5: Wheelchair Propulsion and Biomechanics
* Module 6: Repetitive Strain and Vibration
* Module 7: Case Studies
* Module 8: Team Roles and Responsibilities
* Module 9: Letters of Medical Necessity
* Module 10: Funding

Within each module, you will find 4 sections including didactic content, lab component, critical thinking discussion points, and a homework assignment which can include an experiential activity. The didactic section of each module will synthesize and present current research using multimedia components such as text, audio, and Power Point. The lab session of each module will apply the research to clinical practice. One of the biggest challenges in online education is converting face to face group experiences into the online environment so that the experience will be equally valuable. To address this issue, the lab components will consist of a video showing a group working together, then a list of critical thinking discussion points, and a homework assignment. The critical thinking discussion points are designed to facilitate the participant to come together with colleagues to think through and solve various scenarios. In this way, professional relationships are enhanced by involving critical conversations that matter in the everyday workplace.

The homework assignment provides the participant a way to take the information into the clinical setting. We want to teach participants to be good consumers of technology. Homework assignments will actively require participants to compare and contrast products; a skill needed for any exhibit hall. This type of activity will be used to facilitate knowledge organization for specific technologies and appropriate applications. Likewise critical thinking skills will be used to workout problematic case examples. As learning linked to clinical practice is the basis for this program, clinical examples will be used to provide exposure to "real-life" situations. Role reversal, inviting the participant to be the third party reviewer responsible for approving or denying a manual wheelchair request based on documentation provided will be another way used to facilitate learning.

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

Anticipated Outcomes of Proposed Activity (20 points)

4. Describe the utilization outcomes anticipated to result from the proposed activity in terms of how the specific outcomes indicate **change in practice, a policy, or a program**.

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 study can extend our previous work to study a web-based dissemination method and compare the effectiveness between a WBT program and a TCE program. Results from this work will serve as a pilot to develop and test a methodological process for a more extensive evaluation study in the future.

LIMITATIONS

We recognize that studying knowledge and attitudes 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 and clinical practices.

Unfortunately, the scope and length of this project precludes us from studying utilization and practice patterns of clinicians. We therefore intend to pursue alternate funding for the purposes of studying utilization and practice patterns of clinicians that complete a WBT program and compare the results to those of a TCE program

EVALUATION OF TRAINING IMPACT

The proposed study will evaluate training impact as evidenced by change in clinical knowledge, and attitudes. Supplemental funds will be sought elsewhere to study behavior (i.e., utilization practice patterns). The upper levels of Kirkpatrick's hierarchy for assessing training effectiveness are the foundation for developing two measures. Specifically, we are interested in learning how clinical practices recommending and specifying manual wheelchairs for clients with mobility impairments change following a WBT program.

Evaluation Criteria

Kirkpatrick's level 2 (knowledge) was the basis for developing the Pretest/Posttest Knowledge Questionnaire (Appendix D). 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 completion of web course), and 6 months following the WBT program. To compare the effects of the two day educational program to the web course the same knowledge questionnaire used in our previous study will be used. Additional items will be developed for use at the completion of each module.

A Manual Wheelchair Practice Questionnaire (Appendix E) 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 WBT 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 the web-course intervention and, if so, whether or not a change persists 6 months later.

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 used (Appendix D). To ensure content and contextual validity, assessment items have been reviewed by clinical experts and revised as indicated. Additional supplemental items will be developed for each web module.

Manual Wheelchair Practice Questionnaire An iterative process of peer review and modification was employed to develop and revise the Manual Wheelchair Practice Questionnaire (Appendix E). Mobility RERC 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. Results from our current work are being analyzed now.

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

Evaluation Measures	Constructs	Measure	Analysis
Pretest/Posttest Knowledge Assessment ***(Knowledge)***	Knowledge	Multiple choice items (Percent score)	Paired t-test
Manual Wheelchair Practice Questionnaire ***(Attitudes)***	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

Clarity and Appropriateness of Utilization Data Collection Plan (10 points)

5. Describe the data collection plan in terms of staff responsibilities, collection mechanisms, data sources, data types, and time frame for collection.

SUBJECT RECRUITMENT AND SAMPLE SIZE DETERMINATION

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. Professional organizations will join the Mobility RERC in identifying and referring clinicians eligible to participate in the WBT research project (Appendix B).

Interested clinicians will be contacted by a research investigator and invited to participate in the study. Historical data from the 27 control subjects from RUSH-TCE will be used for the control group.

From preliminary analysis of the RUSH-TCE data (Appendix A), the effect size for pre- post-TCE training was found to be d=1.192, a large effect size according to Cohen (1988). The detection of a similar effect size in the RUSH-WBT analysis used for Specific Aim 1a with power =.80 and alpha=.05 will require a WBT group with a sample size of at least 25. To maintain this sensitivity and increase the power to .95 (in order to reduce type II error) the WBT sample size will have to be at least 32 for the analysis used for Specific Aim 2a. An analysis for other variables in RUSH-TCE is not completed sufficiently to perform similar sample size determinations. In addition, protocol changes in the manual wheelchair practice methodology make the value of such a determination questionable. Based on experiences in RUSH-TCE, we

will estimate a 10% attrition rate and over sample accordingly, recruiting 35 subjects to obtain the desired sample size of 32.

All 32 subjects will be consented and enrolled in the WBT course cohort. Informed consent will be obtained prior to study enrollment. Historical data from the TCE Conference only, TCE cohort group and the TCE control group gathered in the RUSH-TCE project will be used in the between subject analyses.

Control Group subjects from RUSH-TCE completed questionnaires that measure knowledge and attitudes at initial contact and 6 months afterward. Historical data will be analyzed for the control group in this study.

WBT Cohort subjects will be used to collect information on knowledge and attitudes before and after the WBT program. Subjects will be tested prior to, upon completion, and 6-months after the web course. A market competitive tuition (~ 250.00) will be charged for the WBT program including the cost of RESNA Continuing Education Units (CEUs). Cohort subjects will receive a 50% rebate upon completion of the 6-month post WBT data collection.

DATA COLLECTION

Intensive collection of data consisting of a demographic questionnaire (Appendix F), pretest/posttest knowledge assessment and a self-report manual wheelchair practice questionnaire will be evaluated at various points as indicated in Table 3. All subjects will complete a demographic questionnaire and a manual wheelchair practice questionnaire prior to beginning the WBT program. A pretest / posttest knowledge assessment will be administered at the time of the beginning and completion of the WBT program and 6 months after completion of the program. Control group data from our existing study will be analyzed including the knowledge assessment at the time of initial contact and 6 months later. Any other training or education obtained in the area of manual wheelchairs or seating and mobility after the educational intervention will be noted.

Table 3 Data Collection by Group

	Demographic Questionnaire	Manual Wheelchair Practice Questionnaire **(attitudes)**			Pretest/Posttest Knowledge Assessment **(knowledge)**		
Time Collected	Initial Contact	Pre WBT	Post WBT	6 mo F/U	Pre WBT	Post WBT	6 mo F/U
Control Group (historical data)	x	Initial contact		x	Initial contact		x
WBT-Only	x	x	x	x	x	x	x

Pre WBT = Pre web-based training, Post WBT= Post web-based training, 6 mo F/U= 6 month follow-up

SAFETY OF DATA AND CONFIDENTIALITY

Data will be collected electronically. To ensure confidentiality, all data will only be identifiable by the subject's identification number, which will be recorded on the web forms. All data that is electronically transmitted to Shepherd Center will only be identifiable by the subject's identification 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 an identification number rather than by their name, and the information linking these case numbers with their identity will be kept separate from the research records.

Data management 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 managed by CATEA. Ten percent of the individual records will be randomly checked to verify that the computerized database is identical to the data recorded in the web course database.

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 a WBT 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 (WBT Cohort 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 (WBT Cohort 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 1c: Training participants will demonstrate no difference in self-reported attitude score as measured by the Manual Wheelchair Practice Questionnaire between posttest and follow-up test. This aim will be examined with a pairwise comparison as described below.

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. Because we are seeking evidence that there is no difference between groups for hypothesis 1c, we will hold Type II error to not greater than .05 by insuring that our power is .95 or higher.

Specific Aim 2: Demonstrate that WBT is equally effective to TCE training.

Hypothesis 2a: WBT participants will demonstrate no significant improvement in knowledge score as measured by a Pretest/Posttest Knowledge Questionnaire that will be equal or lower than that demonstrated by the TCE 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 (WBT Cohort 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 2b: WBT participants will demonstrate no significant improvement in self-reported attitude score as measured by the Manual Wheelchair Practice Questionnaire that will be equal or lower than that demonstrated by the TCE 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 (WBT Cohort 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. Because we are seeking evidence that there is no difference between groups, we will hold Type II error to not greater than .05 by insuring that our power is .95 or higher.

Management of the Activity (5 points)

6. Describe the staff management structure of the proposed activity, including individual staff responsibilities and time commitments.

MANAGEMENT OF THE ACTIVITY

The proposed research activity will occur after the translation of the Mobility RERCs TCE program to a WBT program. The web conversion portion of the study will be supported by the Center for Assistive Technology and Environmental Access (CATEA) and the Mobility RERC. The research portion of this project will be supported with RUA funds.

Laura Cohen PT, PhD, ATP, clinical research scientist and co-investigator on the RERC for wheeled mobility will have primary responsibility for oversight and management of the project (0.25 FTE). She will supervise a research assistant who will coordinate web course promotion, coordination, subject enrollment, data collection and analysis. A research assistant (0.50 FTE) will assist with data collection, data entry and analysis. Resources of the Mobility RERC will be used to support the WBT program including data management and support. Bill Delaune PhD will serve as a consultant for research methodology and data analysis. The project budget is provided on pages 2-3 (Appendix G).

Appropriate Time frame for Activity (5 points)

7. Describe the schedule around which the proposed activity will be conducted. Include discussion of benchmark achievements within specific time parameters.

PROJECT TIME LINE

Table 4 summarizes the study timeline. This 12-month project will commence upon completion of approximately a 6-month web course conversion phase. Two months of subject recruitment has been allotted to enroll sufficient subjects into the WBT Cohort, which will allow 6 months of data collection post WBT program. The WBT will utilize a rolling enrollment over a 4-month period in order to allow for 6 months of follow-up data collection upon course completion. Data analysis will commence immediately following the completion of the WBT and continue throughout the duration of the study. We anticipate 2 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
Subject Recruitment												
Study Enrollment												
WBT Intervention												
Post-WBT Intervention												
Data Analysis												
Publication												

Target Audience Participation in Activity Development (5 points)

8. Describe how the intended members of the target systems have been incorporated or have offered support in the design of the proposed activity.

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, the Mobility RERC will translate a TCE training program to a WBT program to facilitate broader dissemination and continuance of these timely research materials to front line clinicians.

NEED FOR TRAINING

Over the past three years, 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 Medicare resources. In order to be eligible for wheelchairs and scooters, beginning April 1, 2008 Medicare beneficiaries will be required to receive an evaluation by a licensed medical professional (i.e. physical or occupational therapist), with RESNA Assistive Technology Practitioner certification, and specialized training in seating and mobility. In addition, the wheelchair must be provided by a RESNA-certified Assistive Technology Supplier[15].

At present there is a paucity of specially trained and credentialed professionals to fill this need. To address this requirement quality training programs in seating and mobility are needed. We plan to translate a successful TCE training program to a WBT program to improve capacity for dissemination and training.

Contribution to Other NIDRR Utilization Activity (5 points)

9. Describe how the proposed activity could be applied in other NIDRR grant settings and is related to similar successful activities conducted by the applicant or others as described in *The NIDRR Grantees' Guide to RUSH Research Utilization Awards* or in relation to other projects with which you are familiar.

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 Best Practice Knowledge Transfer Model will explore the effectiveness of a WBT program.

The WBT methodology will be developed by the Mobility RERC based on evidence-based educational research developed during RUSH-TCE. The content for this program 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.