

# Functional Outcomes of Wheelchair Seating and Positioning in the Elderly Nursing Home Population

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A Research Slide Lecture  
from the website of Wheelchair University  
(<http://www.wheelchairnet.org/>)  
Wheelchair University is a project of the  
Rehabilitation Engineering Research Center (RERC) on Wheeled  
Mobility

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## Abstract

- The purpose of this study was to investigate whether or not the elderly who reside in nursing home and sit in a wheelchair for 6 hours a day or longer, benefit from a custom fit wheelchair and seating system. Through an experimental design 24 people (60-98 yrs.) were randomized into two groups (intervention and control) and they received a new wheelchair, cushion and custom seat back. All were given four outcomes tests at specific time intervals. The administration of the Rand SF-36, QUEST, wheelchair mobility and postural stability tests were performed to compare current systems with custom prescribed systems.

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## Full Citation

- Full citation of the published research:
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## Focus Points

- Elderly population
- Nursing homes
- Inadequate wheelchairs
- Inadequate seating systems
- Nursing Home Policy barriers
- Inadequate funding, knowledge, & improper health care

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## Research Need

- Document functional status changes
- Enhance justification of payment for wheelchairs and seating systems in the elderly nursing home population

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## Purpose(s) of Study

- Investigate the individualized w/c seating needs of 60+ year old residents
- Investigate how custom fitted w/c & seating systems will be beneficial
- Strengthen the idea that outcome documentation will aid in justification of payment to funding agencies

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## Research Objectives

- Proper seating and mobility intervention will improve a person's:
  - Independent mobility
  - Forward & Lateral Reach
  - Quality of Life
  - Satisfaction with Assistive Technology (w/c +seating system)

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## Subjects

- 3 nursing homes participated
- 34 people randomly assigned to either
  - *Intervention Group*
  - *Control Group*

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## Inclusion Criteria

- Wheelchair used for 6+hours a day
- 60 + years
- Ability to understand commands and answer in a coherent and consistent manner.
- Ability to self-propel their wheelchair a distance of 25 ft.

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## Exclusion Criteria

- Existence of decubitis ulcer
- Dementia
- Alzheimer's Disease

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## Methods

- All 4 dependent variables administered to the subjects.
- Physical Evaluation performed by a Licensed OT
- 3 Visits with 3 month time intervals
- Data analysis to compare intervention & control groups and pre & post test interventions

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## Intervention/Control Time Frame

- Intervention Group:
    - **Visit 1** measurement in "old w/c" *Evaluation*
    - **Visit 2** measurement in "new w/c"
    - **Visit 3** measurement in "new w/c"
  - Control Group:
    - **Visit 1** measurement in "old w/c"
    - **Visit 2** measurement in "old w/c" *Evaluation*
    - **Visit 3** measurement in "new w/c"
- (\* 3 months between visits)

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# 1. W/C Mobility

- *Test #1:*
  - 25ft straight on level tile surface
- *Test #2:*
  - 10ft, rt. turn (90°), 15ft =total 25ft on level tile surface
- *Both tests recorded in time (seconds)*

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## 2. SF-36

- Contains 36 questions regarding subjects perception of their quality of life
  - *Administered in a one to one fashion*
  - *Questions/answers read aloud to subjects*

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### The MOS SF-36

A 36-item short-form (SF-36) was constructed to survey health status in the Medical Outcomes Study. The SF-36 was designed for use in clinical practice and research, health policy evaluations, and general population surveys. The SF-36 includes one multi-item scale that assesses eight health concepts: 1) limitations in physical activities because of health problems; 2) limitations in social activities because of physical or emotional problems; 3) limitations in usual role activities because of physical health problems; 4) bodily pain; 5) general mental health (psychological distress and well-being); 6) limitations in usual role activities because of emotional problems; 7) vitality (energy and fatigue); and 8) general health perceptions. The survey was constructed for self-administration by persons 14 years of age and older, and for administration by a trained interviewer in person or by telephone.

See <http://www.sf-36.com/>

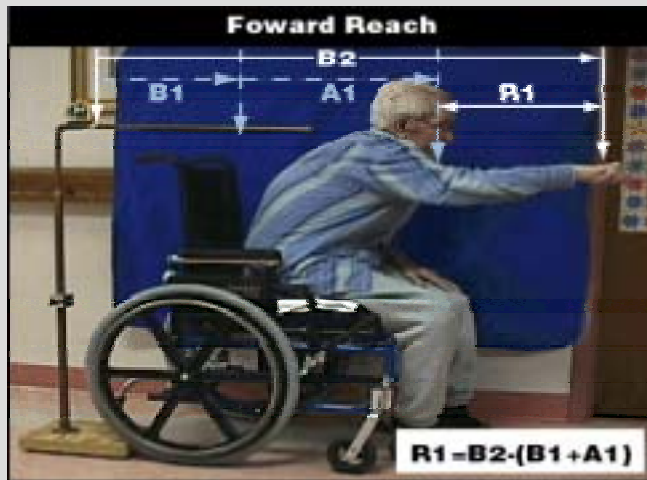
### 3. Measure Forward Reach



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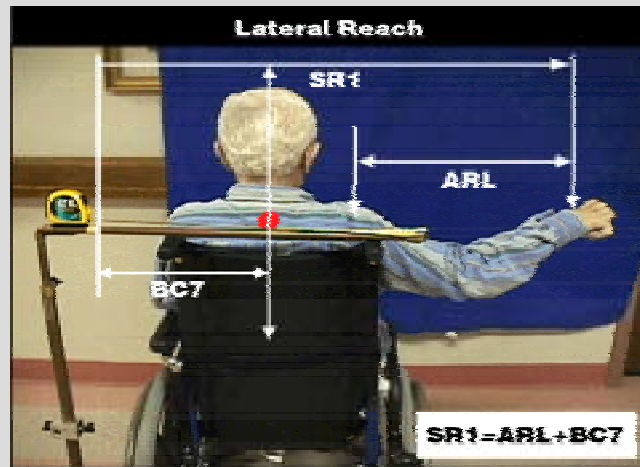
### 3. Measure Forward Reach



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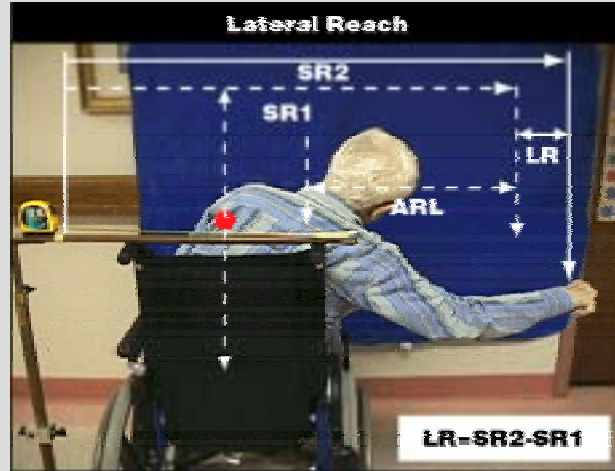
### 3. Measure Lateral Reach



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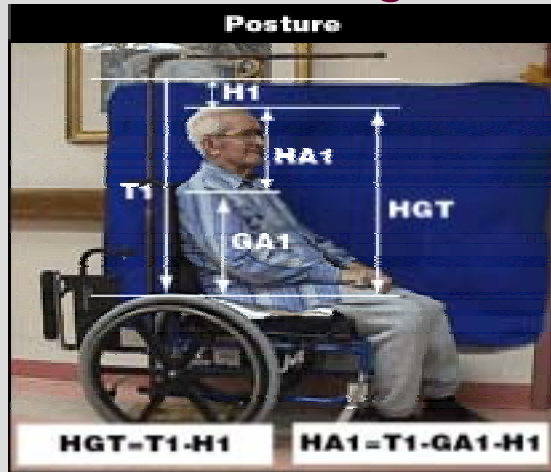
### 3. Measure Lateral Reach



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### 3. Measure Sitting Posture



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## 4. QUEST

- QUEST: Quebec User Evaluation of satisfaction with assistive Technology
- 1-5 rating scale for Satisfaction & Importance levels with current w/c & seating system
  - *Administered in a one to one fashion*
  - *24 variables for "Importance"*
  - *19 variables for "Satisfaction"*

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### **QUEST (Quebec User of Evaluation of Satisfaction with assistive Technology) possibly available summer 1999**

Authors: Louise Demers, M.Sc. OT(C), Rhoda Weiss-Lambrou, M.Sc. OT(C), Bernadette Ska, Ph.D.

The Quebec User Evaluation of Satisfaction with assistive Technology (QUEST) is a structured and standardized measure of user satisfaction with a wide range of technology devices. The concept of satisfaction consists of two factors related to assistive technology DEVICE (8 items) and SERVICES (4 items). QUEST can be self-administered or interview-based. With regards to its psychometric properties, QUEST has been tested for internal consistency, test-retest stability, content validity and factorial validity. It is available in English and French and a Dutch version translation was also constructed. QUEST will soon be published by the Matching a Person & Technology Inc. Please send your name and mailing address to the following address if you would like to order a copy of QUEST when published:

Contact: Dr Marcia J. Scherer, Director

The Institute for Matching a Person & Technology  
486 Lake Road  
Webster, NY 14580  
(fax)716-671-3461

## Results: Demographics

- No significant difference between groups with regard to age, gender, race, or facility
- At baseline: **34** total: **19** Intervention Group & **15** Control Group
- At study completion: **24** total, **12** Intervention Group & **12** Control

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## Continued

- **Age:** 82.4 +9.8
- **Race:** 91% Caucasian  
9% African American
- **Gender:** 81% Female  
19% Male
- **Facility:** NH "1" = **30%**  
NH "2" = **43%**  
NH "3" = **27%**

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## W/C Mobility "Univariate"

- Test 2 "Intervention Group"
- Visit 3-Visit 1      -8.53 sec p=0.042 \*44.39
- Baseline Test 1=    41.52sec            n=18
- Baseline Test 2=    52.92sec            n=18

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## W/C Mobility "Univariate"

- Test 1 "Control"
- Visit 3 - Visit 2  
- **-16.36sec**       $p=0.006^*$
- Visit 3 - Visit 1  
- **-13.95sec**       $p=0.002^*$  35.02
- Baseline Test 1 = 48.97sec       $n=14$
- Baseline Test 2 = 66.36sec       $n=14$

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\* @V2 = +2.41sec



## SF-36 "t-test"

- Social Functioning:
  - Intervention: Visit 2-Visit 1  
+8.04 p=0.007 n=14
  - Control: Visit 2-Visit 1  
-18.75 n=14
  - Intervention: Visit 3-Visit 2  
-9.38 p=0.011 n=12
  - Control: Visit 3-Visit 2  
+15.38 n=13

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## SF-36 "t-test"

- Role-Physical:
  - Intervention Group:
    - Visit 2-Visit 1 **+21.43**      **p=0.033**      n=14
  - Control Group:
    - Visit 2-Visit 1 **-8.92**      n=14
- Role-Physical:
  - Intervention Group:
    - Visit 3-Visit 2 **-8.33**      **p=0.045**      n=12
  - Control Group:
    - Visit 3-Visit 2 **+16.67**      n=12

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## Forward Reach "Univariate"

- Intervention Group:
  - Difference between Visit 3-Visit2
  - **+22.97mm**       $p=0.016$      $n=12$
- Control Group:
  - Difference between Visit 3-Visit 2
  - **+42.69mm**       $p=0.039$      $n=13$

\*no significant results for student t-tests between groups

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## Planar vs. Contoured Seat Backs

- Forward Reach "Intervention" At Visit 2:
  - Contoured= **-7.33mm** p=0.035 n=9
  - Planar= **+77.75mm** n=4

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## Sitting Posture

- No significant results to report
- Trends indicate that both groups GA distance increased after receiving new w/c + seating system

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## QUEST "Satisfaction Variables" t-test (V2-V1)

- *Global Satisfaction:*
- Intervention:  
+**1.00**      p=0.002      n=13
- Control:  
**-0.36**      n=14

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## QUEST

- Other variables indicating increased satisfaction as a result of intervention:
  - Comfort
  - Simplicity of Use
  - Dimensions
  - Durability
  - Appearance
  - Multi-purposefulness
  - Adjustments

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## Conclusions

- W/C Mobility:
  - Overall the subjects got faster
- SF-36 (Quality of Life)
  - Only 2 of 8 health concepts improved
  - Maybe due to statistical power: would need an average of 17 per group to see a difference of 20+ points, would need 255 per group to see a 5 point difference.

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## Conclusions Continued

- Posture:
  - Forward reach did increase but lateral reach did not.
  - Controlling for different types of seat backs proved that lateral reach is affected by contoured seat back.
  - No difference in sitting posture.
- Quest (Satisfaction with AT)
  - Overall a higher degree of satisfaction

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## Clinical Observations

- Subjects were more knowledgeable with decisions of choosing AT
- Proud of new wheelchairs
- Moving around was easier
  - Less weight to propel
  - Wheelchair dimensions were reduced
  - Not afraid to reach for TV remote due to lessened fear of falling out of w/c

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## Limitations of Study

- Subjects mean age of 82.4 @V1
  - Declining population
- Low “N” value at completion of study (34 dropped to 24)
- Threat to internal validity: testing
- Methods of measuring lateral Reach
  - *Seat backs, measurement errors*

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## Final Thoughts

- Results indicate major benefits of custom w/c & seating systems.
- Strong framework for future research.
- In process of doing a 6 month follow-up study of participants.

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