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 and 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.

• Bursick, T. et al, June 2000
Full Citation

• Full citation of the published research:

• Bursick, T. et al, June 2000
Focus Points

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

*Bursick, T. et al, June 2000*
Research Need

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

[Bursick, T. et al, June 2000]
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

• Bursick, T. et al, June 2000
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)

- Bursick, T. et al, June 2000
Subjects

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

• Bursick, T. et al, June 2000
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.

*Bursick, T. et al, June 2000*
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

• Bursick, T. et al, June 2000
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)

*Bursick, T. et al, June 2000*
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)*

*Bursick, T. et al, June 2000*
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

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

Bursick, T. et al, June 2000
3. Measure Forward Reach

*Bursick, T. et al, June 2000*
3. Measure Lateral Reach

• Bursick, T. et al, June 2000
3. Measure Lateral Reach

- Bursick, T. et al, June 2000
3. Measure Sitting Posture

*Bursick, T. et al, June 2000*
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”

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 ot 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
    - $+22.97\text{mm}$  $p=0.016$  $n=12$

• Control Group:
  - Difference between Visit 3-Visit 2
    - $+42.69\text{mm}$  $p=0.039$  $n=13$

*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 = \(-7.33\text{mm}\) \(p=0.035\) \(n=9\)
  - Planar = \(+77.75\text{mm}\) \(n=4\)

- Bursick, T. et al, June 2000
Planar vs. Contoured Seat Backs

- Lateral Reach “Control”:
- Visit 3-Visit 1:
  - Contoured = -55.80mm  p=0.022  n=5
  - Planar = +50.17mm     n=8
- Visit 3-Visit 2:
  - Contoured = -77.07mm  p=0.011  n=5
  - Planar = +45.29mm     n=8

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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

• Bursick, T. et al, June 2000
QUEST “Satisfaction Variables”
t-test (V2-V1)

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

*Bursick, T. et al, June 2000*
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.

*Bursick, T. et al, June 2000*
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 is 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

• Bursick, T. et al, June 2000
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.

• Bursick, T. et al, June 2000
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