Home Health Prescription and 90-Day Readmission following Stroke

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Learning Objectives

At the conclusion of this session:

- Understand the future implications of the IMPACT Act of 2014 on occupational therapy practice
- Describe the risk of 90-day hospital readmission following discharge from rehabilitation facilities
- Explain the basic concept of propensity score matching methods in rehabilitation research areas
Improving Medicare Post-Acute Transformation (IMPACT) Act of 2014

Focuses on the development and implementation of a more uniform system of quality measurements across post acute settings:

- Skilled nursing facilities (SNFs)
- Inpatient rehabilitation facilities (IRFS)
- Long-term care hospitals (LTCHs)
- Home health agencies (HHAs)

Uniformity is laying the foundation for payment reform.

(DeJong, 2016)

(IMPACT Act; Pub L. 113–185)
The IMPACT Act requires providers to collect and report three types of data:

<table>
<thead>
<tr>
<th>Patient Assessment Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Continuity Assessment Record and Evaluation (CARE) Tool</td>
</tr>
<tr>
<td>• Diagnoses, including comorbidities; impairments; functional status; cognitive function and mental status; and services and treatments required</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Quality Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Physical and cognitive function and changes in function; skin integrity; medication reconciliation; incidence of major falls; and discharge planning</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Resource Use Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>• (1) Total Medicare spending per beneficiary</td>
</tr>
<tr>
<td>• (2) Whether the patient was discharged to the community</td>
</tr>
<tr>
<td>• (3) Preventable hospital readmission rates</td>
</tr>
</tbody>
</table>

(DeJong, 2016)

(IMPACT Act; Pub L. 113–185)
Search Strategy- Secondary Data

Archive of Data on Disability to Enable Policy and research (ADDEP) repository

http://datasetdirectory.disabilitystatistics.org/

https://www.utmb.edu/cldr/pilot-projects/travel-award-for-secondary-analysis
Search Strategy - Secondary Data

Kenneth J. Ottenbacher, PhD, OTR
Russell Shearn Moody Distinguished Chair in Neurological Rehabilitation; Professor & Director, Division of Rehabilitation Science; Director, Center for Recovery, Physical Activity and Nutrition; Senior Associate Dean for Graduate Education and Research, School of Health Professions

http://datasetdirectory.disabilitystatistics.org/
2005-2006 database, Stroke Recovery in Underserved Populations

- The dataset contains 1219 cases and 226 variables from 11 rehabilitation facilities across the United States

The data were collected at four time points:

- Admission
- Discharge from rehabilitation facility
- 80-180 days after discharge
- 365-425 days after discharge
- These data emphasize recovery of motor and cognitive functional status, positive emotion, and social networks

(Ostir, Ottenbacher, and Kuo, 2016)
Purpose

• To examine the effect of home health rehabilitation prescription on 90-day risk-adjusted hospital readmission after discharge from rehabilitation facilities among underserved adults with stroke.

Design

• A secondary data analysis of longitudinal data


• A logistic regression model with and without propensity score inverse probability weighting (PS-IPTW) methods (Rosenbaum and Rubin, 1983).
Methods

The best research design: a randomized control trial (RCT)

This design is costly, time-consuming, and may not be feasible in some cases.
Methods

Observational studies

Exposure

Assignment

Control

No Fair Comparison

Selection bias
Methods

An alternative research design: a quasi-experimental design

Propensity score matching methods

- Balancing groups on known confounders (Rosenbaum and Rubin, 1983, 1984)
## Methods

### Rehabilitation Facilities

- **Having home health rehabilitation prescription**
- **Control group**

### Problems

Significant differences in demographics, stroke comorbidities between patients who discharged with/without home health rehabilitation prescription

### Fair comparisons

Balancing Pts’ baseline demo, stroke commodities by PS matching

### Risk of hospital readmission

- **3 months follow-up**
- **PS matching**
# Table 1. Demographics among patients with stroke who with and without home discharge

<table>
<thead>
<tr>
<th>Variable</th>
<th>Home Discharge – Before Matching</th>
<th>Home Discharge – After Matching</th>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
<td>$p$</td>
<td>Yes</td>
<td>No</td>
<td>$p$</td>
<td></td>
</tr>
<tr>
<td></td>
<td>N=449 (40.9%)</td>
<td>N=720 (59.1%)</td>
<td></td>
<td>N=108.3 (50.6%)</td>
<td>N=105.6 (49.3%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>54-</td>
<td>59 (11.8%)</td>
<td>148 (20.6%)</td>
<td>&lt;.0001*</td>
<td>19.2 (18.2%)</td>
<td>18.6 (17.2%)</td>
<td>0.9983</td>
<td></td>
</tr>
<tr>
<td>55-64</td>
<td>77 (15.4%)</td>
<td>153 (21.3%)</td>
<td></td>
<td>15.9 (15.0%)</td>
<td>16.2 (15.0%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>65-74</td>
<td>137 (27.4%)</td>
<td>161 (22.4%)</td>
<td></td>
<td>26.0 (24.6%)</td>
<td>28.1 (25.9%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>75-84</td>
<td>164 (32.8%)</td>
<td>194 (27.0%)</td>
<td></td>
<td>32.4 (30.7%)</td>
<td>34.0 (31.4%)</td>
<td></td>
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</tr>
<tr>
<td>85+</td>
<td>62 (12.4%)</td>
<td>61 (8.5%)</td>
<td></td>
<td>11.9 (11.3%)</td>
<td>11.2 (10.3%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td>0.0011*</td>
<td>53.1 (50.3%)</td>
<td>52.5 (49.7%)</td>
<td>0.8114</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>215 (43.0%)</td>
<td>377 (52.5%)</td>
<td></td>
<td>52.0 (48.0%)</td>
<td>56.2 (51.9%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>284 (56.9%)</td>
<td>340 (47.4%)</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
<td>0.6570</td>
<td>86.1 (81.5%)</td>
<td>88.1 (81.3%)</td>
<td>0.9772</td>
<td></td>
</tr>
<tr>
<td>Non-Hispanic White</td>
<td>377 (77.5%)</td>
<td>541 (75.1%)</td>
<td></td>
<td>86.1 (81.5%)</td>
<td>88.1 (81.3%)</td>
<td>0.9772</td>
<td></td>
</tr>
<tr>
<td>Non-Hispanic Black</td>
<td>86 (17.2%)</td>
<td>114 (15.8%)</td>
<td></td>
<td>8.9 (8.5%)</td>
<td>8.0 (7.4%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>27 (5.4%)</td>
<td>47 (6.5%)</td>
<td></td>
<td>5.9 (5.5%)</td>
<td>7.3 (6.8%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other race</td>
<td>9 (1.8%)</td>
<td>18 (2.5%)</td>
<td></td>
<td>4.5 (4.3%)</td>
<td>4.7 (4.4%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stroke Type</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ischemic</td>
<td>274 (74.9%)</td>
<td>517 (71.8%)</td>
<td>0.3166</td>
<td>77.9 (73.8%)</td>
<td>79.5 (73.7%)</td>
<td>0.9836</td>
<td></td>
</tr>
<tr>
<td>Hemorrhagic</td>
<td>75 (15.0%)</td>
<td>132 (18.3%)</td>
<td></td>
<td>20.0 (19.0%)</td>
<td>20.0 (18.5%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>50 (10.0%)</td>
<td>71 (9.8%)</td>
<td></td>
<td>7.5 (7.1%)</td>
<td>8.4 (7.7%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Education (High school more)</td>
<td>347 (69.5%)</td>
<td>542 (75.2%)</td>
<td>0.0266*</td>
<td>19.1 (74.9%)</td>
<td>81.3 (75.1%)</td>
<td>0.9744</td>
<td></td>
</tr>
<tr>
<td>Married (Yes vs. No)</td>
<td>235 (47.0%)</td>
<td>399 (55.4%)</td>
<td>0.0042*</td>
<td>53.9 (51.0%)</td>
<td>54.1 (49.9%)</td>
<td>0.8756</td>
<td></td>
</tr>
<tr>
<td>CESD Cut-Off Score Above 16 (Yes vs. No)</td>
<td>153 (31.0%)</td>
<td>237 (32.9%)</td>
<td>0.4955</td>
<td>34.8 (32.9%)</td>
<td>36.0 (33.3%)</td>
<td>0.9589</td>
<td></td>
</tr>
<tr>
<td>Sum of 7 Stroke Comorbidities, Mean (SD)</td>
<td>2.9 (1.2)</td>
<td>2.6 (1.2)</td>
<td>0.0022*</td>
<td>2.6 (1.2)</td>
<td>2.6 (1.2)</td>
<td>0.9056</td>
<td></td>
</tr>
<tr>
<td>LOS in Rehabilitation Facilities, Mean (SD)</td>
<td>22.2 (10.7)</td>
<td>19.1 (11.5)</td>
<td>&lt;.0001*</td>
<td>21.9 (9.1)</td>
<td>21.6 (11.4)</td>
<td>0.8760</td>
<td></td>
</tr>
<tr>
<td>Number of Falls, Mean (SD)</td>
<td>0.16 (0.49)</td>
<td>0.11 (0.38)</td>
<td>0.5037</td>
<td>0.13 (0.43)</td>
<td>0.13 (0.41)</td>
<td>0.9824</td>
<td></td>
</tr>
<tr>
<td>FIM Scores at Discharge, Mean (SD)</td>
<td>82.7 (19.6)</td>
<td>20.2 (26.5)</td>
<td>0.9843</td>
<td>81.9 (22.3)</td>
<td>82.9 (22.0)</td>
<td>0.7551</td>
<td></td>
</tr>
<tr>
<td>Duke-UNC Functional Support Score at Discharge, Mean (SD)</td>
<td>49.8 (7.3)</td>
<td>50.5 (6.8)</td>
<td>0.0514</td>
<td>50.2 (6.1)</td>
<td>49.5 (7.3)</td>
<td>0.5648</td>
<td></td>
</tr>
</tbody>
</table>

* significance at a $\alpha$ value of less than 0.05

CESD, Center for Epidemiologic Studies Depression Scale (CES-D) cut-off score 16 or above at discharge
Duke-UNC Functional Support Score at Discharge (Scored 11-55 with 11 items) with 55 highest social support
## Results

Table 2. Regression models predicting the likelihood of having a history of post discharge hospitalization at 3 month follow-up.

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Statistical Methods</th>
<th>Odds Ratio (OR)</th>
<th>Lower 95% CI</th>
<th>Upper 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home health rehabilitation prescription (Yes vs. No)</td>
<td>Unadjusted</td>
<td>0.562</td>
<td>0.404</td>
<td>0.782</td>
</tr>
<tr>
<td></td>
<td>Simple Adjusted†</td>
<td>0.325</td>
<td>0.138</td>
<td>0.764</td>
</tr>
<tr>
<td></td>
<td>PS Matching Method‡</td>
<td>0.407</td>
<td>0.183</td>
<td>0.906</td>
</tr>
</tbody>
</table>

*Note.*
†, Logistic regression models accounting for gender, age, race, marital status, length of stay in rehabilitation facilities, educational attainment, Functional Independent Measure total score at discharge, number of falls, Duke-UNC functional support at discharge, Center for Epidemiologic Studies Depression Scale (CES-D) at discharge, stroke type, and 11 stroke comorbidities.
‡, Inverse probability weighting for covariate adjustment (IPW) with logistic regression models.
Limitations

- Not clear about home health prescription for discipline
- No causal relationship can be established
- Limited knowledge in frequency or length of home health services
Future Implications

- Potential RCT studies
- Emphasize value of OT for prevention of rehospitalization
- Advocacy for OT referrals
- Increase inter-professional relationships
- Potential reduction in medical costs


Acknowledgements

Collaborators

• Meredith F. Shields, BS, COTA
• Samantha Wimberly, BS
• Ickpyo Hong, PhD, OTR
• Loree Pryor, MS, OTR
• Timothy A. Reistetter, PhD, OTR

Grants

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• Claude D. Pepper Older American Independence Centers (OAIC): # P30-AG024832
• Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the NIH/Claude D. Pepper OAIC.
<table>
<thead>
<tr>
<th></th>
<th>Ickpyo Hong, PhD, OTR</th>
<th>Timothy A. Reistetter, PhD, OTR</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assistant Professor</strong></td>
<td>Department of Occupational Therapy</td>
<td>Department of Occupational Therapy</td>
</tr>
<tr>
<td><strong>School of Health Professions</strong></td>
<td>University of Texas Medical Branch</td>
<td>University of Texas Medical Branch</td>
</tr>
<tr>
<td><strong>Phone</strong></td>
<td>409-772-3082</td>
<td>409-772-9941</td>
</tr>
<tr>
<td><strong>Fax</strong></td>
<td>409-747-1615</td>
<td>409-747-1615</td>
</tr>
<tr>
<td><strong>Email</strong></td>
<td><a href="mailto:ichong@utmb.edu">ichong@utmb.edu</a></td>
<td><a href="mailto:tareiste@utmb.edu">tareiste@utmb.edu</a></td>
</tr>
</tbody>
</table>
MOTION FEEDBACK DEVICE TO ASSIST IN IMPROVING JOINT MOTION

Rajeshree Jaiswal, OTR, CHT - Texas Children’s Hospital
Laurie M. Reddy, OTR, CHT - Baylor Scott & White
Jeff Feng, Professor - University of Houston
Nishika Jaiswal – University of Texas at Dallas
BACKGROUND

• One of the most common sequelae after elbow fracture or dislocation is joint stiffness. \(^1,2,5,7,10,11,12,16\)

• Elbow stiffness can lead to long-term limitations in basic activities of daily living. \(^1,2,5,7,10,11,12,16\)
BACKGROUND

• Approximately 8-10% of the fractures and dislocations in children occur at the distal humerus or proximal radius and ulna.\textsuperscript{6,8,11}
DISTAL HUMERUS FRACTURE

Anterior/Posterior View

Lateral View
Elbow dislocation, radial head or neck fracture and coronoid process fracture.
Elbow dislocations are the most common dislocation in the pediatric population. 4,6,13
ELBOW DISLOCATIONS

Posterior Elbow Dislocation

Anterior Elbow Dislocation
Elbow problems are also prevalent in the adult population.

The incidence of fractures in adults is most common in elderly females and young males.\(^4\)

Elbow dislocations are second only to shoulder dislocations in the adult population.\(^3,4,6,13\)

Elbow dislocations are thought to be between 6 and 8 per 100,000 people annually.\(^4,6\)
BACKGROUND

• The elbow is “unforgiving” due to its:
  • Anatomy- Superficial joint, numerous muscles, nerves, joint capsule
  • Pathology- Spontaneous misbehavior – exaggerated response to insult
  • Treatment options - Most treatments are “unreliable” - both operative and non-operative
    • Rehabilitation is unpredictable and frustrating at best
• Superficial (subcutaneous) joint that is prone to infection (2-5%) and problems with wound healing
BACKGROUND

• Following elbow fracture or dislocation, patients are typically immobilized with a sling, posterior elbow orthosis or cast at 90° during the acute phase of healing. 7,11,13

• All previous studies agree that early active mobilization is the essential component in helping to regain full mobility and preventing stiffness and complications. 1-8,10-11,12,13,16,17
PROBLEM

• Therapists struggle with fact that their patients, especially children, “resist” during active assistive range of motion.
• In order to overcome these challenges, a motion feedback device was designed using the latest technology, to encourage active range of motion (AROM) to allow for quicker recovery and restoration of function.
The device was conceptualized while working with children that were guarding during their therapy session.

The therapist wanted a mechanism that would not only allow the patient to relax, but also enjoy their treatment session.

Music was utilized as the tool to provide motivation and instant positive feedback.

The ROM device is strapped on the patient with Velcro and via a Bluetooth connection to any smartphone, music is activated once the target ROM is achieved.
MOTION FEEDBACK DEVICE
PURPOSE

• Will a motion sensitive, music activated, feedback device be able to detect changes in elbow position within ±10° through a predetermined arc of motion?
METHODS

• N=60 typically developing children and adults ranging in age from 7 to 70 years.

• All participants were tested bilaterally in both flexion and extension three times.

• A goniometer was used to measure both the initial (90°) and targeted angle (extension 70°, flexion 110°) for music activation.
• The ROM device activated 100% of the time providing feedback to the patient.

<table>
<thead>
<tr>
<th>ID</th>
<th>Gender</th>
<th>Age</th>
<th>R Elbow-Ext</th>
<th>Average</th>
<th>R Elbow-Ext</th>
<th>Average</th>
<th>L Elbow-Ext</th>
<th>Average</th>
<th>L Elbow-Ext</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>R Elbow</td>
<td></td>
<td>R Elbow</td>
<td></td>
<td>L Elbow</td>
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<td>L Elbow</td>
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<td></td>
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<td>Ext</td>
<td>Flex</td>
<td>Ext</td>
<td>Flex</td>
<td>Ext</td>
<td>Flex</td>
<td>Ext</td>
<td>Flex</td>
</tr>
<tr>
<td>1</td>
<td>M</td>
<td>54</td>
<td>68 70 71</td>
<td>69.67</td>
<td>110</td>
<td>109.00</td>
<td>74</td>
<td>73.33</td>
<td>118</td>
<td>114.00</td>
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<td>2</td>
<td>F</td>
<td>36</td>
<td>74 71 77</td>
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<td>72</td>
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<td>119.33</td>
<td>68</td>
<td>67.67</td>
<td>115</td>
<td>117.67</td>
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<tr>
<td>4</td>
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<td>35</td>
<td>70 75 72</td>
<td>72.33</td>
<td>110</td>
<td>113.33</td>
<td>70</td>
<td>73.33</td>
<td>114</td>
<td>115.67</td>
</tr>
<tr>
<td>5</td>
<td>F</td>
<td>38</td>
<td>70 72 76</td>
<td>72.67</td>
<td>115</td>
<td>112.33</td>
<td>68</td>
<td>71.33</td>
<td>118</td>
<td>120.00</td>
</tr>
</tbody>
</table>
RESULTS

**Right Elbow Flexion**

**Left Elbow Flexion**
RESULTS

Right Elbow Extension

Left Elbow Extension
DISCUSSION

- Participants in this validation study valued the concept of this device. All the participants, especially the children, enjoyed the ability to select their own songs, the activation of the music, and the instant feedback it provided.
DISCUSSION

• Initially, the device had pre-recorded music and was mounted directly onto a prefabricated hinged elbow brace. Knowing that this set up would be cost prohibitive for patients, the device was modified by removing it from the brace, and a Velcro strap was added. Currently, the device can connect via Bluetooth to any smartphone’s music library, compared to playing pre-recorded music.
In future generations of this device, the researchers hope to have a mobile application that will capture the duration the device was worn, how long the patients were able to maintain the targeted angle and the extent of battery life available. Future research will not only be conducted on patients with traumatic elbow injuries, but also on patients with stiffness of other large joints including the shoulder, wrist, hip, knee, and ankle.
CONCLUSION

• Device can be used for many applications . . .
  • Immediately following injury for controlled ROM
  • Early mobilization for post operative patients
  • Assist with active/passive stretching during the rehab phase
  • Soft tissue tightness
  • Assist with decreasing tone in neurological patients
REFERENCES


REFERENCES


COMMENTS/QUESTIONS?