<p>| Reviewer ID: Zoe Raffard, John Zhu, Jeremy Mak, Kyle Diab |
| Type of Outcome Measure: Craig Handicap Assessment and Reporting Technique (CHART) | Total articles: 10 |
| <strong>Author ID</strong> | <strong>Study Design</strong> | <strong>Setting</strong> | <strong>Population (sample size, age) and Group</strong> |
| Cusick 2001 | Reliability study: level of agreement between proxies and persons with disabilities in reporting on CHART | Participants living in the community 6 months after onset of disability or completion of rehab. | N=983 and their proxies 57% participants were men 61% of proxies were women (43% of proxies were participant’s spouse) | Disabilities (reported separately) resulting from: SCI (224), MS (235), Traumatic brain injury (199) Stroke (177), Amputation (83), Burn (65), |
| Dijkers 1999 | Follow-up survey comparing CHART to Satisfaction with Life Scale (SWLS) | 1-20 years post-injury Followed up with SCI care | N=2183 (1766M, 417F) 19% &lt;19 years 37% 20-29 years 20% 30-39 12% 40-49 12% &gt;50yrs. | Records from the National SCI database, containing entries since 1973. |
| Golhasani-Keshtan et al. 2013 | Cross-sectional validation of Persian Version of CHART | Janbazan Clinic of Mashhad, northeast of Iran | N=52, 52M 0F Mean age 49.3, SD=7.9, 38<del>80 | Iran-Iraq war veterans with long-term spinal cord injuries (23</del>31 years post-injury), 46 paraplegia, 6 tetraplegia 76.9% unemployed |
| Hall et al. 1998 | Analysis of SCI Model Systems database: CHART follow-up at 1, 2, 5 years post-injury | No data available | N=1,998 81.5% males 67% &lt;31 years of age 21% 21-40 22% &gt;41 | Traumatic Spinal Cord Injury with inpatient rehabilitation services: 18% high tetraplegia 34% low tetraplegia 48% paraplegia |
| Johnston et al. 2005 | Cross-sectional survey | New Jersey Outpatient SCI Center | N=107 (88M, 19F) Mean age 39.1(11.16) Median age 38.0 | Mean post-injury time: 11.36(9.56) yrs Median post-injury time: 8.71 yrs Community-living traumatic SCI individuals AIS-A/B/C/D: 56.4%/20.2%/14.9%/8.5% Neurologic Category: |</p>
<table>
<thead>
<tr>
<th>Masedo et al. 2005</th>
<th>Reliability and validity (comparison to the self-report Functional Independence Measure (FIM)) studied: double blind/randomized trials.</th>
<th>Harborview Medical Center and University of Washington’s Northwest Regional SCI System</th>
<th>SCI clinical trial of amitriptyline for pain: n=84 subjects; 44 given amitriptyline, 40 given an active placebo. Avg. age; 41.43±10.02 years, 80% Men. Mean time since injury was 13.96 yrs (SD = 9.36 yrs) Neurological level of injury: 53.6% cervical 38.1% thoracic 7.1% lumbar/sacral</th>
</tr>
</thead>
<tbody>
<tr>
<td>Middleton et al. 2003</td>
<td>Descriptive, correlational study, validation study of a new instrument</td>
<td>Moorong Spinal Unit of the Royal Rehabilitation Centre Sydney, Sydney, New South Wales, Australia.</td>
<td>Sample 1: People with SCI living in the community who previously were at in-patient rehabilitation N=36, 28 male Mean age 36.33 (SD = 9.52) Mean time post-trauma 11.23 (SD = 9.67) years 11 paraplegia, 25 tetraplegia 15 incomplete, 21 complete Sample 2: People who had recently sustained a SCI and were currently enrolled at in-patient rehabilitation N=31, 23 male Mean age 31.48 (SD = 10.46) Mean time post-trauma 2.01 (SD = 2.50) months 21 paraplegia, 10 tetraplegia 13 incomplete, 18 complete Sample 3: People with SCI living in the community who previously were at in-patient rehabilitation N=108, 30 male Mean age 45.26 (SD = 15.99) Mean time post-trauma 7.92 (SD = 9.83) years 66 paraplegia, 42 tetraplegia 58 incomplete, 49 complete</td>
</tr>
<tr>
<td>Tozato 2005</td>
<td>Test-retest and discriminative validity study.</td>
<td>NRCD, Japan</td>
<td>293 participants in validity study; upper age limit =60 years old; 246M, 47F, avg. age = 38.3 years 54 participants in test-retest measure; 45M, 9F; avg. age = 42.5 years mean time since injury = 8.7 (SD = 6.6) 926 SCI discharged from the National Rehabilitation Center for the Disabled (NRCD) between 1992 – 2001 meant</td>
</tr>
<tr>
<td>Whiteneck 1992</td>
<td>Design and development of CHART: psychometric evaluation. &amp; weighting scheme</td>
<td>2-35 years post recovery living in the community</td>
<td>135 SCI individuals; 16% Women Avg. age = 33. range 16-74 41 complete quadriplegia, 38, incomplete quadriplegia, 42 complete paraplegia, 14 incomplete paraplegia</td>
</tr>
</tbody>
</table>
Rehab professional rating  
65 low level handicap  
70 high handicap  

<table>
<thead>
<tr>
<th>Author ID</th>
<th>Internal Consistency</th>
<th>Test-retest, Inter-rater, Intra-rater, Other</th>
</tr>
</thead>
</table>
| de Wolf et al. 2010 | Longitudinal study exploring reliability, validity, sensitivity to change and clinical usefulness of the CHART | Three SCI rehabilitation units in Sydney, Australia (Royal Rehabilitation Centre Sydney; Royal North Shore Hospital; and Prince of Wales Hospital) | N=58 (control n=29; intervention n=29)  
(45 male, 13 female)  
Mean age: 35.3±15.2y  
Traumatic SCI  
Lesion Level  
Paraplegia: 25  
Tetraplegia: 33  
Impairment Grade  
AIS A: 33  
AIS B: 4  
AIS C: 5  
AIS D: 16 |
| Cusick 2001 | No data available | Participant-proxy Total CHART: ICC =0.84  
Physical Independence: ICC=0.69  
Cognitive Independence: ICC=0.34  
Mobility: ICC=0.86  
Occupation: ICC=0.60  
Social Integration: ICC=0.57  
Economic Independence: ICC=0.59 |
| Golhasani-Keshtan et al. 2013 | Cronbach’s alpha:  
Physical Independence: 0.385  
Mobility: 0.236  
Occupation: 0.293  
Cognitive Independence: 0.562  
Social Integration: 0.351 | Test-retest reliability with 21-25 day interval (Pearson's r):  
CHART-J total score r=0.78, p<0.001;  
Physical independence r=0.53, p<0.001;  
Mobility r=0.96, p<0.001;  
Occupation r=0.86, p<0.001  
Social Integration r=0.78, p<0.001  
Economy r=1.00, p<0.001 |
| Tozato 2005 | No data available | CHART-J total score r=0.78, p<0.001;  
Physical independence r=0.53, p<0.001;  
Mobility r=0.96, p<0.001;  
Occupation r=0.86, p<0.001  
Social Integration r=0.78, p<0.001  
Economy r=1.00, p<0.001 |
| Whiteneck 1992 | No data available | CHART administered by same examiner twice (1 week apart) to each subject  
**test-retest reliability** coefficient = 0.93 for overall CHART score.  
Individual dimensions:  
• physical dimensions 0.92  
• mobility 0.95,  
• occupation 0.89  
• economic self-sufficiency 0.80, |
2. VALIDITY

<table>
<thead>
<tr>
<th>Author ID</th>
<th>Validity</th>
</tr>
</thead>
<tbody>
<tr>
<td>De Wolf et al. 2010</td>
<td>Spearman rank-order correlation coefficients between CHART domains and SPRS &amp; SF-6D domains:</td>
</tr>
</tbody>
</table>

**Sydney Psychosocial Reintegration Scale (SPRS)**

- **SPRS Occupation with CHART:**
  - Physical: 0.34**
  - Mobility: 0.64**
  - Occupation: 0.57**
  - Social: 0.36**
  - Cognitive: 0.09

- **SPRS Relationships with CHART:**
  - Physical: 0.22
  - Mobility: 0.23
  - Occupation: 0.28*
  - Social: 0.17
  - Cognitive: 0.13

- **SPRS Living skills with CHART:**
  - Physical: 0.70**
  - Mobility: 0.64**
  - Occupation: 0.50**
  - Social: 0.28*
  - Cognitive: 0.12

**Short Form-6D**

- **CHART Physical with SF-6D:**
  - Physical: -0.71**
  - Role: -0.23
  - Social: -0.22
  - Pain: -0.17
  - Mental: -0.19
  - Vitality: -0.22

- **CHART Mobility with SF-6D:**
  - Physical: -0.46**
  - Role: -0.19
  - Social: -0.25
  - Pain: -0.21
  - Mental: -0.27*
  - Vitality: -0.33*

- **CHART Occupation with SF-6D:**
  - Physical: -0.46**
  - Role: -0.06
  - Social: -0.25
  - Pain: -0.12
  - Mental: -0.18
  - Vitality: -0.33*

- **CHART Social with SF-6D:**
  - Physical: -0.19
  - Role: 0.06
  - Social: 0.00
  - Pain: 0.08
  - Mental: 0.04
  - Vitality: 0.04

- **CHART Cognitive with SF-6D:**
  - Physical: -0.22
  - Role: -0.12
  - Social: -0.03
  - Pain: -0.31*
  - Mental: -0.13
  - Vitality: 0.04

*p<0.05, **p<0.001

SPRS showed significant correlation coefficients with CHART (r=0.72, p<0.001).
A moderate and statistically significant correlation coefficient was found between the Community Integration Measure (CIM) and CHART total (r=0.47, p<0.001).

Time 1 = 6 weeks post-discharge from inpatient rehabilitation
Time 2 = 1 year post-discharge
Intervention = Received support from a coordinator to improve community reintegration after SCI. Used a whole of life approach which incorporated individualised support, liaising on behalf of the individual, and planning for the future.

Sensitivity to change of CHART (intervention group):
Time 1: 408.2±50.1
Time 2: 431.6±57.4

Results showed a statistically significant improvement between Time 1 and Time 2 for CHART (p=0.002).

Dijkers 1999

CHART scores were associated with those for the Satisfaction With Life Scale (SWLS).

ANOVA and $\eta^2$.
All four CHART subscales were significantly correlated to SLWS scores
- Physical independence score
  $\eta^2=0.14, F=85.17, df=4 (p<0.001)$
- Mobility score
  $\eta^2=0.11, F=159.18, df=3 (p<0.001)$
- Social integration score
  $\eta^2=0.11, F=84.3, df=3 (p<0.001)$
- Occupation score
  $\eta^2=0.14, F=85.18, df=4 (p<0.001)$

Golhasani-Keshtan et al. 2013

Pearson’s correlations:
CHART Mobility & SF36 Role Physical: 0.322, p=0.020
CHART Cognitive Independence & SF36 Physical Component Summary: 0.276, p=0.047
CHART Social Integration & SF36 Vitality: -0.429, p=0.002
CHART Social Integration & SF36 Social Functioning: 0.287, p=0.039

Hall et al. 1998

Correlations:
GENDER
- Gender and Mobility Subscales was significant $r=-0.06 (p\leq0.05)$
- Males were significantly more mobile than Females $t=2.998 (p<0.01)$

AGE
- Age and all Subscales were significant $r= -0.20$ to $-0.10 (p<0.0001)$

INJURY
- Injury level and all Subscales, except economic self-sufficiency, were significant $r=0.11$ to $0.45, (p\leq0.0001)$
- Completeness of injury and all Subscales, except social integration, were significant $r=0.07$ to $0.17 (p\leq0.05)$
- Years since injury and Subscales $r=0.09$ to $0.21 (p<0.0001)$

RACE/ETHNICITY
- Race/ethnicity and all Subscales $r=0.12$ to $0.34 (p<0.0001)$

EDUCATION/OCCUPATION
- Education and Subscales $r=0.12$ to $0.33 (p<0.0001)$
- Occupation and Subscales $r=0.24$ to $0.60 (p<0.0001)$

MARITAL STATUS
- Marital status and all Subscales, except physical independence and mobility, were significant $r=0.08$ to $0.32 (p<0.05)$

Johnston et al. 2005

Pearson’s correlation between ASIA Motor Score and:
CHART Total: 0.07 (P=0.54)
CHART Physical Total: 0.46 (P=0.001)
CHART Mobility Total: 0.04 (P=0.75)
CHART Occupational Total: -0.11 (P=0.37)
CHART Social Interaction Total: -0.22 (P=0.06)
CHART Economic Total: -0.04 (P=0.72)

Masedo et al. 2005

Correlations of the CHART with FIM-SR were positive, as expected:
CHART total score: $r=0.26 (p<0.01)$
CHART mobility subscale: $r=0.30 (p<0.01)$
CHART physical subscale: $r=0.49 (p<0.01)$

Almost all subscales of the FIM-SR had moderate and significant correlations ($p<0.005, p<0.001$) with CHART
subscale; support provided for the motor scales of FIM-SR, with the exception of locomotion subscale of FIM-SR which did not correlate significantly with the Physical Independence subscale of the CHART.

### Articles up-to-date as of: July 2015

#### Tozato 2005

Validity (compared score differences between employed and unemployed) acceptable in all domains, with exception of Social integration. Employed respondents exhibited significantly higher sub scores than unemployed respondents in all CHART subscales except Social Integration

- CHART-J total score $t=11.39$, $p<0.0001$
- Physical independence $t=4.795$, $p<0.0001$
- Mobility $t=11.092$, $p<0.0001$
- Occupation $t=15.030$, $p<0.0001$
- Social Integration $t=0.997$, $p=0.319$
- Economy $t=3.799$, $p<0.0001$

#### Whiteneck 1992

Significantly different CHART scores between high & low level of handicap groups support the validity of the CHART

- CHART total score $t=6.36$, $p<0.001$

#### Middleton et al. 2003

<table>
<thead>
<tr>
<th>Subscale</th>
<th>AIS A, B, or C</th>
<th>AIS D</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High tetra % (n)</td>
<td>Low tetra % (n)</td>
</tr>
<tr>
<td>Physical Independence</td>
<td>6 (14)</td>
<td>18 (89)</td>
</tr>
<tr>
<td>Mobility</td>
<td>13 (34)</td>
<td>34 (172)</td>
</tr>
<tr>
<td>Occupational status</td>
<td>10 (27)</td>
<td>23 (117)</td>
</tr>
<tr>
<td>Social integration</td>
<td>39 (103)</td>
<td>45 (224)</td>
</tr>
<tr>
<td>Economic self-sufficiency</td>
<td>44 (56)</td>
<td>41 (113)</td>
</tr>
</tbody>
</table>

### 3. RESPONSIVENESS – no data available

### 4. FLOOR/CEILING EFFECT

#### Author ID Floor/Ceiling Effect

<table>
<thead>
<tr>
<th>Author ID</th>
<th>Floor/Ceiling Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>De Wolf et al. 2010</td>
<td>No floor effects. Ceiling effects occurred for the Social and Cognitive dimensions at both 6 weeks post-discharge from inpatient rehabilitation (57-66% and 65-66%, respectively) and 1-year post discharge (44-66% and 84-86%, respectively).</td>
</tr>
</tbody>
</table>

#### Hall et al. 1998

Percentage of sample who received maximum score on CHART subscales

#### 5. INTERPRETABILITY

<table>
<thead>
<tr>
<th>Author ID</th>
<th>Interpretability</th>
</tr>
</thead>
<tbody>
<tr>
<td>De Wolf et al. 2010</td>
<td>MDC = 53.3 between Time 1 (6 weeks post-discharge from inpatient rehabilitation) and Time 2 (1 year post-discharge) The percentage of participants that met the minimum difference for CHART: 14%</td>
</tr>
</tbody>
</table>
### Hall et al. 1998

<table>
<thead>
<tr>
<th>Subscale</th>
<th>AIS A, B, or C</th>
<th>AIS A, B, or C</th>
<th>AIS A, B, or C</th>
<th>AIS D All:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High tetraplegia:</td>
<td>Low tetraplegia:</td>
<td>Paraplegia:</td>
<td>Mean (SD) [n]</td>
</tr>
<tr>
<td>Physical Independence</td>
<td>49.9 (30.4) [253]</td>
<td>71.8 (28.3) [498]</td>
<td>90.3 (19.8) [787]</td>
<td>90.7 (20.6) [340]</td>
</tr>
<tr>
<td>Mobility</td>
<td>58.5 (28.0) [267]</td>
<td>76.0 (25.6) [513]</td>
<td>85.5 (21.0) [804]</td>
<td>86.2 (22.4) [346]</td>
</tr>
<tr>
<td>Occupational status</td>
<td>34.5 (32.9) [270]</td>
<td>51.0 (36.9) [512]</td>
<td>61.8 (35.5) [793]</td>
<td>62.1 (36.5) [347]</td>
</tr>
<tr>
<td>Social integration</td>
<td>78.7 (25.6) [261]</td>
<td>83.5 (23.1) [493]</td>
<td>85.6 (20.4) [760]</td>
<td>86.7 (20.2) [331]</td>
</tr>
<tr>
<td>Economic self-sufficiency</td>
<td>59.6 (40.7) [128]</td>
<td>62.0 (36.7) [274]</td>
<td>66.0 (37.6) [460]</td>
<td>77.6 (32.0) [201]</td>
</tr>
<tr>
<td>Total score</td>
<td>294.1 (101.4) [116]</td>
<td>369.2 (89.9) [259]</td>
<td>404.1 (87.5) [419]</td>
<td>420.5 (85.3) [186]</td>
</tr>
</tbody>
</table>

### Tozato et al. 2005

<table>
<thead>
<tr>
<th>CHART-J (Japanese version) mean (SD) scores and SEM:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domain:</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>Physical independence</td>
</tr>
<tr>
<td>Mobility</td>
</tr>
<tr>
<td>Occupation</td>
</tr>
<tr>
<td>Social Integration</td>
</tr>
<tr>
<td>Economy</td>
</tr>
<tr>
<td>CHART-J total score:</td>
</tr>
</tbody>
</table>