Comparing medication regimen complexity & polypharmacy in people with Intellectual Disability

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IDS-TILDA - Observational cohort
Wave 1: 753 participants, random sample, 10% representative of ≥40yrs people with ID, Questionnaire followed up with Interview, Medicines classified - Anatomical Therapeutic Chemical system
Wave 2: 95% retention rate
MRCI: Medication Regimen Complexity Index

- Tool to quantify the complexity of prescribed medication regimens (*Mansur et al, 2012*)
- Three aspects;

<table>
<thead>
<tr>
<th>Section A</th>
<th>Section B</th>
<th>Section C</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of dosage forms</td>
<td>Dosing frequency</td>
<td>Additional directions</td>
</tr>
</tbody>
</table>

- Weighted averages of the number of drugs, dosage forms, dosing frequencies, and additional instructions eg. Crushing/breaking tablets – explicit guidelines with examples of regimens aid users
- Validated
- 3-10 min per regimen
- Data was collected from 276 patients in *Residential Care* settings across the country as part of the IDS TILDA *Wave 2* Study
- A total MRCI for each participant was calculated: (*George et al, 2004*)
  Total (A) + Total (B) + Total (C)
Research Questions

• How complex are these regimens compared to others?

• What factors appear to influence that complexity? – Wave 1 = Age, Level of ID, Residential setting

• Does the MRCI tell us more than counting the number of medicines?
Previous MRCI Studies

Ambulatory Care Patients at the Department of Veterans Affairs, USA ‘16
- MRCI Median = 25
- Med Count Median = 8

Acute Geriatric Ward (65+ years and Hospitalized), Israel ‘12
- MRCI Mean (@ discharge) = 30.3
- Med Count Mean = 6

Swedish National Study of Aging and Care (60+ years), Sweden ‘15
- MRCI Median = 9
- Med Count Median = 3

University of Colorado Study (65+ years), USA
- MRCI Mean= 19.36
- Med Count Mean= 8

University of San Diego Study (65+ years), USA
- MRCI Mean= 17.62
- Med Count Mean= 7.1

Compare With IDS-TILDA Data*
- MRCI Mean= 22.5, Median = 19
- Med Count Median= 6
- Med + Supplement Count Median = 7

*MRCI Calculation techniques and weightings may differ between studies
## Type of Residence vs. MRCI

<table>
<thead>
<tr>
<th>Type of Residence</th>
<th>Mean MRCI (±SD)</th>
<th>Significant Difference (p&lt;0.05)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Independent/Family</td>
<td>9.75 ± 10.8</td>
<td>All</td>
</tr>
<tr>
<td>Community Group Home</td>
<td>21.9 ± 17.3</td>
<td>All</td>
</tr>
<tr>
<td>Residential Home</td>
<td>27.8 ± 16.5</td>
<td>All</td>
</tr>
</tbody>
</table>

- Participants with Intellectual Disabilities have significantly more complex medication regimens when living in Residential Care than Community Group Homes or with family, and those living in Group Homes have significantly more complex regimens than those living at home.
- Confounding factors may contribute to differences e.g. Residential Care tends to have residents with more severe levels of ID.
  - 44.5% have severe/profound ID in Residential vs. only 8.2% of severe/profound ID participants living independently/with family.
MRCI scores compared across Settings

Note: The Histogram for Residential Provides the most normally distributed MRCI frequencies
The Vertical lines mark the median MRCI for each setting
MRCI vs. Age

MRCI and Level of ID

Error Bars: 95% CI
Estimated Marginal Means of MRCI Looking at Age and Level of ID, Controlled for Morbidity

### Descriptive Statistics

<table>
<thead>
<tr>
<th>Dependent Variable:</th>
<th>MRCI</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age_range_w2</strong></td>
<td><strong>ID</strong></td>
<td><strong>Mean</strong></td>
<td><strong>Std. Deviation</strong></td>
<td><strong>N</strong></td>
</tr>
<tr>
<td>44 - 49 years</td>
<td>Mild</td>
<td>8.1429</td>
<td>9.18170</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
<td>20.2143</td>
<td>17.02600</td>
<td>63</td>
</tr>
<tr>
<td></td>
<td>Severe\Profound</td>
<td>26.1875</td>
<td>17.57647</td>
<td>48</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>20.4659</td>
<td>17.24168</td>
<td>132</td>
</tr>
<tr>
<td>50 - 64 years</td>
<td>Mild</td>
<td>18.5071</td>
<td>14.91364</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
<td>22.3964</td>
<td>16.75575</td>
<td>111</td>
</tr>
<tr>
<td></td>
<td>Severe\Profound</td>
<td>28.4815</td>
<td>15.68368</td>
<td>81</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>23.2385</td>
<td>16.35107</td>
<td>262</td>
</tr>
<tr>
<td>65+ years</td>
<td>Mild</td>
<td>30.2778</td>
<td>19.47640</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
<td>27.1579</td>
<td>17.68301</td>
<td>57</td>
</tr>
<tr>
<td></td>
<td>Severe\Profound</td>
<td>30.4800</td>
<td>10.52525</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>28.5500</td>
<td>16.47626</td>
<td>100</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>Mild</td>
<td>18.4541</td>
<td>16.16775</td>
<td>109</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
<td>22.9762</td>
<td>17.17950</td>
<td>231</td>
</tr>
<tr>
<td></td>
<td>Severe\Profound</td>
<td>28.0909</td>
<td>15.58987</td>
<td>154</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>23.5729</td>
<td>16.81418</td>
<td>494</td>
</tr>
</tbody>
</table>

Covariates appearing in the model are evaluated at the following values: FCI SCORE if we exclude those with 2 or more missing values (+ exclude BP/chol from CHF variable) = 3.9630
MRCI and,
(a) Number of Medications + Supplements
(b) Number of Routes of Administration

\[ y = 3.1433x - 1.2418 \]
\[ R^2 = 0.9108 \]

\[ y = 11.791x + 4.0767 \]
\[ R^2 = 0.4946 \]
Relationship between MRCI & Total Medications & Setting

- Data controlled for morbidity
- Colour identifies the residential setting matching the MRCI-Total Med Predicted Value
- Residential Care is at the higher end of the spectrum, while Independent/Family is low
Correlations/Regressions

Strong, Positive correlation between MRCI and Total Number of Medications

- \( r = 0.997 \)
- \( p = 0.000 \)

Predicted Values recorded from multiple regression of each dependent variable (Total Meds and MRCI) with the same independent values (Age, Level of ID, Type of Residence, Gender, FCI Score)
Comparison

Table 1
Predictors of MRCI and Number of Medications

<table>
<thead>
<tr>
<th>Variable</th>
<th>MRCI B</th>
<th>S.E.</th>
<th>Beta</th>
<th>Sig</th>
<th>Lower Bound</th>
<th>Upper Bound</th>
<th>Part</th>
<th>Number of Medications B</th>
<th>S.E.</th>
<th>Beta</th>
<th>Sig</th>
<th>Lower Bound</th>
<th>Upper Bound</th>
<th>Part</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>0.217</td>
<td>1.391</td>
<td>0.006</td>
<td>0.876</td>
<td>-2.517</td>
<td>2.951</td>
<td>0.006</td>
<td>-0.085</td>
<td>0.375</td>
<td>-0.009</td>
<td>0.818</td>
<td>-0.823</td>
<td>0.650</td>
<td>-0.009</td>
</tr>
<tr>
<td>Level of ID</td>
<td>4.369</td>
<td>1.030</td>
<td>0.186</td>
<td>0.000</td>
<td>2.346</td>
<td>6.393</td>
<td>0.170</td>
<td>1.094</td>
<td>0.277</td>
<td>0.170</td>
<td>0.000</td>
<td>0.549</td>
<td>1.639</td>
<td>0.155</td>
</tr>
<tr>
<td>Age Range</td>
<td>3.107</td>
<td>1.013</td>
<td>0.126</td>
<td>0.002</td>
<td>1.116</td>
<td>5.098</td>
<td>0.123</td>
<td>0.843</td>
<td>0.273</td>
<td>0.125</td>
<td>0.002</td>
<td>0.307</td>
<td>1.380</td>
<td>0.121</td>
</tr>
<tr>
<td>Type of Residence</td>
<td>5.625</td>
<td>1.069</td>
<td>0.230</td>
<td>0.000</td>
<td>3.525</td>
<td>7.726</td>
<td>0.210</td>
<td>1.625</td>
<td>0.288</td>
<td>0.243</td>
<td>0.000</td>
<td>1.059</td>
<td>2.191</td>
<td>0.222</td>
</tr>
<tr>
<td>FCI Score</td>
<td>3.177</td>
<td>0.474</td>
<td>0.280</td>
<td>0.000</td>
<td>2.246</td>
<td>4.108</td>
<td>0.268</td>
<td>0.994</td>
<td>0.128</td>
<td>0.320</td>
<td>0.000</td>
<td>0.743</td>
<td>1.245</td>
<td>0.306</td>
</tr>
</tbody>
</table>

Significance level: p<0.05
MRCI R² = 0.223
Number of Medications R² = 0.248
Conclusions

• MRCI is a feasible & useful tool for quantifying complexity of medicines use and administration

• Burden is related to number of medicines & routes of administration

• MRCI could be used to highlight circumstances in which additional training of carers is required

• MRCI does not tell us more than the number of medicines

• Additional measures of burden needed – time taken, perceived difficulty, mistakes
The components of complexity of medicines use

- Number of medicines
- Number of High Risk medicines
- Number of doses
- Number of dose forms
- Additional administration instructions
- Clinical state-dependent variation of regimen

- Risks - ADRs, DDIs, DDSIs, Administration
- Burden – Patient, Carer
- System
  - Limited access to pharmacists
  - Insufficient numbers of nurses
  - Inadequate training in medicines use for carers
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thank you