Predicting Hospitalisations & ER visits:
Comparing 10 risk scores in Care Dependent Elderly from 6 Countries
The IBenC Study
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DISCLOSURE

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interRAI fellow – using specific measurements in studies
Background

• Hospital admissions and ER visits occur frequent
  ~10% any person ~30% frail older. Becker JAMDA 2012

• Hospitals can have considerable iatrogenic impact

• A substantial part of admissions are potentially preventable.
  Nyweide 2013, Costa 2017

• Can we improve community care for high risk groups?

• Several risk scores exist that identify high risk groups.
  Never compared directly, No cross country validations

• What is the best measure to identify high risk groups?
OBJECTIVE

To identify the best performing risk score to predict hospitalisations and emergency department visits among older care dependent home dwelling adults across six countries.
IBenC study: Home care clients in 6 countries with 12 months follow up

2884

38

CGA = interRAI HC

IBenC study: Home care clients in 6 countries with 12 months follow up
POTENTIAL EXISTING RISK INDICATORS FROM REVIEW

SPECIFIC HOSPITALISATIONS RISK SCORES :

1. **CARS** (0-9): Community Assessment Risk Screen
2. **DIVERT** (1-5): Detection of Indicators and Vulnerabilities for Emergency Room Trips Scale
3. **ERA** (-1-26): Elders Risk Assessment Index
4. **EARLI** (0-22): Emergency Admission Risk Likelihood Index

GENERIC FRAILTY RISK SCORES :

1. **Fried’s Frailty Criteria** (0-4): weight loss, exhaustion, slow walking speed, reduced physical activity, and time being physically active (Bandeen-Roche specifications)
2. **Frailty Indicator** (0-1): Accumulation of deficits index (Rockwood)
3. **ISAR-PC** (0-7.5): Identification of Seniors at Risk – Primary Care
4. **CHESS** (0-5): Changes in Health, End-stage disease and Symptoms and Signs
5. **Edmonton Frail Scale** (0-3)
**CARS risk score - Community Assessment Risk Screen (0-9)**

1. Do you have any of the following health conditions?  
   *(if 2 or more conditions ‘YES’ score =2)*

<table>
<thead>
<tr>
<th>Condition</th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart disease</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Diabetes</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Myocardial infarction</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Stroke</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Chronic obstructive pulmonary disease</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Cancer</td>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>

**SCORE:**

2. How many prescriptions of medications do you take?  
   *(if 5 or more, medications score =3)*

**SCORE:**

3. Have you been hospitalised or had to go to an emergency department or urgent care center in the past 6 months?  
   *(if answer is ‘YES’ score = 4)*

**SCORE:**

**TOTAL:**

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Paul Shelton et al. 2000 Am J Man Care
DIVERT- Detection of Indicators and Vulnerabilities for Emergency Room Trips Scale (1-5)

Andrew Costa et al. 2015 JAGS
OUTCOME:

One or more Hospitalisations OR Emergency Department visits during 6 months follow up.

ANALYSIS: Predictive accuracy on admissions or ER visits after 6 months follow up was expressed in the area under the ROC curve (AUC).
<table>
<thead>
<tr>
<th>Category</th>
<th>N=2884</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, 65-105 mean (SD)</td>
<td>82 (7.3)</td>
</tr>
<tr>
<td>Female gender</td>
<td>67%</td>
</tr>
<tr>
<td>Lives alone</td>
<td>57%</td>
</tr>
<tr>
<td>Home health aides – Daily</td>
<td>31%</td>
</tr>
<tr>
<td>Home nurse – Daily</td>
<td>29%</td>
</tr>
<tr>
<td>Cognitive impairment</td>
<td>20%</td>
</tr>
<tr>
<td>Falls last 30 days</td>
<td>7%</td>
</tr>
<tr>
<td>Chronic Heart Failure</td>
<td>25%</td>
</tr>
<tr>
<td>Chronic Heart Disease</td>
<td>23%</td>
</tr>
<tr>
<td>DM II</td>
<td>26%</td>
</tr>
<tr>
<td>COPD</td>
<td>11%</td>
</tr>
</tbody>
</table>
ACCURACY RISK INDICATORS

AUC Area under the Curve

Specific scores
- CARS (0-9)
- DIVERT (1-6)
- ERA (1-26)
- EARLI (0-22)

Generic frailty scores
- CHESS (0-5)
- Fried Frailty criteria (0-5)
- Edmonton Frail Scale (0-3)
- Sherbrooke Postal Questionnaire (0-13)
- Frailty Index Rockwood (0-1)
- ISAR PC (0-7.5)
Distribution and best cut offs DIVERT and CARS

**DIVERT (0-6)**
- Highest risk
- Lowest risk
- Sensitivity: 0.69
- Specificity: 0.74

**CARS (0-9)**
- Highest risk
- Lowest risk
- Sensitivity: 0.41
- Specificity: 0.72

DIVERT Best cutoff 4/5
CARS Best cutoff 6/7
CONCLUSION

• Generic frailty indicators were not predictive for admissions or ER visits.

• Among specific risk scores 2 are promising:
  
  (1) DIVERT (Derivation, and Validation of the Detection of Indicators and Vulnerabilities for Emergency Room Trips Scale)
  
  (2) CARS (Community Assessment Risk Screen)

FUTURE STEPS

• Improvement of risk scores by adding variables that modify accuracy e.g. gender, previous admissions

• Develop and test interventions to prevent hospitalisation and ER visits in high-risk groups > Costa IAGG 2017 !
Thank you

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Questions?