Development and validation of a prediction model to estimate the probability of post-traumatic headache 6 months after a motor vehicle collision in adults

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Rationale

How long will my headache last?

What will improve/delay my recovery?
Methods

Design:
Secondary analyses of incidence cohort studies of adults injured in MVCs in Saskatchewan (development) and Sweden (validation)

Participants:
Dec. 1997 – Nov. 1999 (Saskatchewan, population-based, N=8,634)
Jan. 2004 – Jan. 2005 (Sweden, insurance claimants, N=1,946)

Included:
• Occupied motor vehicle
• Made injury claim or treated for injury within 30 d of MVC
• Reported “accident caused” average headache intensity ≥3 (NRS)
Methods (cont’d)

Excluded:
• Hospitalized >2 d
• LOC > 30 min

Outcome:

**PTH at 6 months**
“In the past week have you had headaches as a result of the accident?” “Please rate your headache pain.” Reported headache intensity ≥3.

Analysis:
Logistic regression with backward elimination (p=.01) for removal
Key Findings

Participants:
Saskatchewan (development): N=4,162
Sweden (validation): N=379

- 64-68% female
- Median age 36-38 y

Outcomes:
*PTH at 6 months:* n=980 (32%) (Saskatchewan)
  n=142 (47%) (Sweden)
### Key Findings - Prediction Model

<table>
<thead>
<tr>
<th>PTH</th>
<th>Predictors</th>
<th>P-value</th>
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<tbody>
<tr>
<td>Age</td>
<td></td>
<td>&lt;.0001</td>
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<tr>
<td>Health status</td>
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<td>.0002</td>
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<tr>
<td>Prior headache</td>
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<td>&lt;.0001</td>
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<tr>
<td>Recovery expectations</td>
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<td>&lt;.0001</td>
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<tr>
<td>Symptoms in arms/hands</td>
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<td>.0002</td>
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<tr>
<td>Midback pain</td>
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<td>.001</td>
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<tr>
<td>Unusual fatigue</td>
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<td>.0008</td>
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<tr>
<td>Work status</td>
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<td>.0003</td>
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<tr>
<td>Severe PTH</td>
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<td>Face pain</td>
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<td>.002</td>
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<td>Dizziness</td>
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<td>.005</td>
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<tr>
<td>Neck stiffness</td>
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<td>.0003</td>
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</tbody>
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Mix of biopsychosocial factors

**C-statistic:**
0.73, 95% CI 0.71-0.75

LOC, PTA not in model
Future Research

1. Improve prediction of models
   • Assess additional participant characteristics (e.g., self-efficacy, lifestyle)
   • Different PTH outcome (e.g., impact, recovery)
2. Impact studies: Better than clinical judgement?
3. Decision rules:
   • Identify patients with low probability of recovery
     ➢ determine effective treatments
4. Assess PTH after other injury mechanisms
   ➢ Falls, sports concussion
5. PTH diagnostic classification
Conclusions

Implications

**Clinical**
- Preliminary evidence for patient management (modifiable predictors)
- Clinicians should assess sociodemographic, injury, pre-injury, and comorbid patient characteristics

**Insurer**
- Significant proportion of adults have unresolved injuries at 6 months
- Resource planning
Thank You

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