Epidemiology, treatment and outcome after severe traumatic brain injury in European regions with different economic status

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Hypothesis

the economic status of a region influences quality of the health care system

quality of care influences the outcome of patients with severe brain trauma
Goals

to check mortality rates of patients with severe TBI from centres of varying economic status

to identify factors that may contribute to differences in mortality

to quantify quality of TBI care
INRO Projects

✓ “Reducing mortality and long-term disability of TBI victims through research into treatment procedures used in Bosnia-Herzegovina, Macedonia and Croatia”

✓ “Effects of the use of guidelines for the treatment of patients with severe TBI” - in Austria

✓ An International Health Care Initiative: Improving Patient Outcome from Head Injury in Central and Eastern Europe

✓ Sources of support: grants from European Union, Austrian National Bank (Jubilee Fund), Austrian Worker’s Compensation Board, Ala and Ralph Isham and other private donors
Methods

- Between 01/2001 and 12/2005, 13 centres enrolled patients with severe brain trauma – 1172 patients.

- Three regions (according to GDP)
  - “high income” (Austria, 5 centres)
  - “upper middle income” (Croatia, Slovakia, 6 centres)
  - “lower middle income” (Bosnia, Macedonia, 2 centres).
Life expectancy

LE (male) vs LE (female)

- HI (A)
- UMI (SK)
- UMI (CRO)
- LMI (MAC)
- LMI (B&H)
Total Health Expenditure (USD per capita per year)
Methods: Data collection

✓ Inclusion criteria:

- “severe TBI” - GCS score of 8 or less following resuscitation, or a GCS score deteriorating to 8 or less within 48 hours of injury
- only patients who survived at least until admission to ICU
Methods: ITCP database

✓ International Traumatic Coma Project database
✓ Data submission over the internet
✓ demographic data, cause, location, mechanism and severity of trauma, prehospital status and treatment, results of CT scans, results of lab testing, data on surgical procedures, duration of various treatments, complications, outcome at discharge from ICU, and information on status and location at 3, 6 and 12 months after injury
✓ Personal data protection was observed and the identifiers were kept separately from the data
**Methods: Quality of Care Scoring**

<table>
<thead>
<tr>
<th>Location</th>
<th>Status</th>
<th>Indicator of quality</th>
<th>done</th>
<th>not done</th>
</tr>
</thead>
<tbody>
<tr>
<td>prehospital</td>
<td>GCS&lt;9</td>
<td>ET / other airway</td>
<td>+5 / +3</td>
<td>-5</td>
</tr>
<tr>
<td>prehospital</td>
<td>SBP&lt;130</td>
<td>&lt;1000 / 1000 – 2000 mL</td>
<td>+5 / +3</td>
<td>-3</td>
</tr>
<tr>
<td>prehospital</td>
<td></td>
<td>Direct transport</td>
<td>+3</td>
<td>-3</td>
</tr>
<tr>
<td>prehospital</td>
<td></td>
<td>Helicopter transport</td>
<td>+2</td>
<td>0</td>
</tr>
<tr>
<td>hospital</td>
<td></td>
<td>Time adm-CT &lt;60 min</td>
<td>+3</td>
<td>-3</td>
</tr>
<tr>
<td>hospital</td>
<td></td>
<td>ICP monitoring placed</td>
<td>+3</td>
<td>-3</td>
</tr>
<tr>
<td>hospital</td>
<td></td>
<td>Steroids used</td>
<td>-5</td>
<td>+5</td>
</tr>
<tr>
<td>ICU</td>
<td></td>
<td>$BT_{max} &lt; 38.5 , ^\circ C$</td>
<td>+3</td>
<td>-3</td>
</tr>
<tr>
<td>ICU</td>
<td></td>
<td>$40 &lt; pCO_2 , \text{mean} &lt; 32 , \text{mmHg}$</td>
<td>+3</td>
<td>-3</td>
</tr>
</tbody>
</table>

Total score (sum of all points) was divided by number of entries for each patient.
Results: Outcomes
Observed versus expected (TRISS) mortality rates
“Centre Effect”

✓ compared to the “HI” centres, admission to a “middle income” centre was associated with lower odds ratios for survival (logistic regression):
LMI: OR 0.13 (0.08-0.20) p < 0.00001
UMI: OR 0.74 (0.50-1.10) p = 0.1399
Possible Factor: Mean age
Possible Factor: Trauma Mechanism
Possible Factor: preh. Intubation
Possible Factor: preh. IV volume
Possible Factor: Transport
Possible Factor: Steroids used
Possible Factor: ICP monitoring
We were not able to identify associations between survival and single factors:
- Gender, age, trauma mechanism
- Number of available ICU nurses
- Rates of MRSA infections
- Rates of prehospital intubations
- Direct transfer
- ICP monitoring
Quality Score

- HI
- UMI
- LMI

- total
- hospital
- prehospital
Summary

BUT:
there is a clear association between
- economic status
- quality of care, and
- outcomes of patients with severe TBI

THANK YOU FOR YOUR ATTENTION!