Prognostic factors of cyanide poisoning. A systemic modeling analysis from 283 cases using adapted Poison Severity Score

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Data Management

- Retrospective Collection
- Recoding open-label variables
- Grouping similar variables
- Calibrating similar continuous variables
- Internal Validation: Test-Retest on PSS by 2 x 2 independent raters

Variables which were used for the validation

- Sex and age
- Approximate amount
- Conditions of intoxication
- Route of exposure
- Delay
- General condition and temperature
- Neurological condition (GCS)
- Pupils
- Cardiovascular condition
- Respiratory condition
- PSS

Statistical analysis : Main Analysis

- Linear Stepwise Model with PSS as the dependent variable on all the available characteristics
- Based on Akaike Information Criterion
- Sensitivity analysis by Bootstrap
- Confirmed by Logistic Regression and Ordinal regression

Statistical Analysis

- Missing Data Handled by Full Information Maximum Likelihood (Anderson)
- Hypothesis : Missing at random
- Sensitivity: comparison with deletewise selection.

Distribution (%) of Cyanide Poisoning according to the three different ways of exposure n = 281

- CN Salt: 30.0%
- Cyanogen: 31.8%
- Gas: 38.2%
**Determinants of PSS severity**

(R²=.373)

<table>
<thead>
<tr>
<th>Linear Model Coef</th>
<th>95%CI</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dose (mg)</td>
<td>1.076</td>
<td>0.896,1.256</td>
</tr>
<tr>
<td>Delay till treatment (hours)</td>
<td>0.172</td>
<td>0.122,0.222</td>
</tr>
<tr>
<td>Age (linear effect)</td>
<td>-0.052</td>
<td>-0.068,-0.037</td>
</tr>
<tr>
<td>Age2 (quadratic effect)</td>
<td>0.001</td>
<td>0.000,0.001</td>
</tr>
<tr>
<td>Gender (Female)</td>
<td>0.268</td>
<td>0.092,0.445</td>
</tr>
<tr>
<td>HCN vs cyanogens</td>
<td>1.361</td>
<td>1.063,1.883</td>
</tr>
<tr>
<td>HCN vs CN salt</td>
<td>4.80</td>
<td>2.369,9.005</td>
</tr>
</tbody>
</table>

**Predicting Mortality (logistic regression)**

<table>
<thead>
<tr>
<th>OR</th>
<th>95%CI</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dose (mg)</td>
<td>1.350</td>
<td>1.221,1.490</td>
</tr>
<tr>
<td>Delay (hours)</td>
<td>2.250</td>
<td>1.438,3.520</td>
</tr>
<tr>
<td>Age (linear effect)</td>
<td>0.843</td>
<td>0.772,0.920</td>
</tr>
<tr>
<td>Age2 (quadratic effect)</td>
<td>1.002</td>
<td>1.001,1.003</td>
</tr>
<tr>
<td>Gender (Female)</td>
<td>5.966</td>
<td>1.937,18.378</td>
</tr>
<tr>
<td>CN vs cyanogens</td>
<td>16.129</td>
<td>76.923,1.626</td>
</tr>
<tr>
<td>HCN vs CN salts</td>
<td>1.626</td>
<td>4.926,0.536</td>
</tr>
</tbody>
</table>

ROC Curve : C =0.91 95%CI=0.87,0.94

**Conclusion**

- Children, elderly persons and women are more susceptible to cyanide poisoning
- Dose below 100 mg is not fatal
- Dose between 100-500 mg shows a moderate mortality
- Dose above 500 mg shows a high mortality
- A delay before presentation more than 3 hours shows a high mortality
- Shorter delays have a low mortality
- Intentional poisoning have a higher mortality than accidents
- We seem to have all known this but now it is proven by a sophisticated statistics