The impact of disease severity on the psychological well-being of youth affected by an IEM and their families: a one-year longitudinal study

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Background

Inborn errors of metabolism (IEMs) are rare genetic diseases that can lead to decompensation, pathological storage or energy failure. IEMs require systematic medical monitoring along with a restrictive diet and/or drug treatment in a majority of these disorders. Such constraints likely decrease health-related quality of life (HR-QoL) and psychosocial functioning of patients with an IEM and their families. Therefore, it is important to examine the HR-QoL and psychological well-being in pediatric patients affected by an IEM and their parents. Existing studies on HR-QoL in pediatric IEM patients and their families are inconclusive. Differences in outcomes are likely due to the clinical heterogeneity of IEMs. Moreover, existing studies have primarily focused on HR-QOL and no study has examined the it’s evolution over time so far.

Objectives

To examine:
• The impact of IEM severity on HR-QoL and psychological functioning of patients and their parents:
  • At baseline (T1)
  • After one year (T2)
• The relationship between patient’s and parents’ perspectives
Measures at T1 and T2

- **IEM severity**: scale adapted from INTERMED, biological domain scale (Stiefel & Guex, 2001) evaluated by treating physician:
  - 5 domains, 0-3 points each, max. 15 points: Chronicity; Diagnostic dilemma; Symptom severity/impairment; Diagnostic/therapeutic challenge; Complication and life threat.
  - Low severity: 0-5 points; moderate/high severity: 6-15 points.
- **HR-QoL**: adaptation from Phenylketonuria Quality of Life questionnaire (QoL; Bosch et al., 2015);
- **Strengths and Difficulties Questionnaire** (SDQ; Ravens-Sieberer et al., 2008);
- **Coping strategies**: Cognitive Emotion Regulation Questionnaire (CERQ; Jermann et al., 2006);
- **Health-related stress**: Pediatric Inventory for Parents (PIP; Streisand et al., 2001);
- **Mental health**: Hospital Anxiety and Depression Scale (HADS; Ravazi et al., 1989).

### Results 1

#### Sample characteristics (n = 69)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Overall sample</th>
<th>Low severity</th>
<th>Moderate/high severity</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex, Girls % (n)</td>
<td>49.28 (29)</td>
<td>45.16 (14)</td>
<td>36.59 (15)</td>
<td>0.4625</td>
</tr>
<tr>
<td>Age (years)</td>
<td>7.90 (4.80)</td>
<td>5.79 (4.05)</td>
<td>9.49 (4.75)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Age at diagnosis (years)</td>
<td>1.65 (3.28)</td>
<td>0.55 (1.69)</td>
<td>2.61 (3.97)</td>
<td>0.0068</td>
</tr>
<tr>
<td>Diet, % (n)</td>
<td>20.29 (14)</td>
<td>3.23 (1)</td>
<td>34.21 (13)</td>
<td>0.0018</td>
</tr>
<tr>
<td>Treatment, % (n)</td>
<td>78.26 (54)</td>
<td>83.87 (26)</td>
<td>73.68 (28)</td>
<td>0.3075</td>
</tr>
<tr>
<td>Supplement, % (n)</td>
<td>18.84 (13)</td>
<td>3.23 (1)</td>
<td>31.58 (12)</td>
<td>0.0040</td>
</tr>
<tr>
<td>Time since diagnosis (months)</td>
<td>74.43 (47.05)</td>
<td>66.94 (46.83)</td>
<td>80.89 (46.93)</td>
<td>0.2289</td>
</tr>
</tbody>
</table>
Results 2

**HR-QOL**

- Low IEM severity: 54% no/little symptoms, 39% moderate symptoms, 7% major impact.
- Moderate/high IEM severity: 55% no impact/very limited symptoms, 39% moderate impact, 6% major impact.

**SDQ**

- Low IEM severity: 71% no symptoms, 14.5% suspicion for symptoms, 14.5% emotional and/or behavioral symptoms.
- Moderate/high IEM severity: 22% anxiety/depression.

**HADS**

- Low IEM severity: *p*-value < .05; **p*-value < .01; ***p*-value < .001; p-values resulting from the multivariate analyses of variance controlling for age, sex, and time since diagnosis.
Results 3

Effect of time on children’s and parental dimensions

Children’s versus parental perspectives

<table>
<thead>
<tr>
<th>Children / Parent</th>
<th>HR-QoL impact</th>
<th>Parental stress</th>
<th>Depressive symptoms</th>
<th>Anxiety symptoms</th>
<th>Adapative ER</th>
<th>Maladaptive ER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>.100</td>
<td>.238</td>
<td>.106</td>
<td>.039</td>
<td>.016</td>
<td>-.107</td>
</tr>
<tr>
<td>Time since diagnosis</td>
<td>.122</td>
<td>.194</td>
<td>.125</td>
<td>.021</td>
<td>.056</td>
<td>-.054</td>
</tr>
<tr>
<td>HR-QoL symptoms</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Behavioral symptoms</td>
<td>.592**</td>
<td>.640**</td>
<td>.621**</td>
<td>.526**</td>
<td>.086</td>
<td>.344**</td>
</tr>
<tr>
<td>Emotional symptoms</td>
<td>.356**</td>
<td>.341**</td>
<td>.428**</td>
<td>.258*</td>
<td>.138</td>
<td>.273*</td>
</tr>
<tr>
<td></td>
<td>.433**</td>
<td>.575**</td>
<td>.506**</td>
<td>.398**</td>
<td>.045</td>
<td>.430**</td>
</tr>
</tbody>
</table>

No differences between children’s and parental perspectives.

Summary

- Impact of IEM severity on children and parents’ psychological well-being at T1 (HR-QoL, behavioral symptoms and parental stress)
- HR-QoL improved at T2 in patients affected by IEMs with moderate/high severity
- Children’s dimensions correlated positively with parental dimensions

Conclusions

Our findings suggest that patients with moderate/high IEM severity and their families benefit from the care of an interdisciplinary team including a child psychologist specialized in IEMs. Moreover, in patients with higher IEM severity there may be more room for improvement compared to patients with low IEM severity.
Outlook

Future studies should focus on observations over a larger time span, particularly during adolescence, and should include objective measurements.

Publication

For further details of this study see our article:

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