평가도구를 중심으로 한 소아물리치료

Pediatric clinical decision making based on standardized tools

고주연
PT, PhD, RPT in NY, USA

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Introduction

Understanding of assessment tools
Practical application of assessment tools
Conclusion
Contents background

Pediatric Physical Therapist

- Subjective
- Objective
- Assessment
- Plan
- Examination
- Evaluation
- Diagnosis
- Prognosis (POC)
- Intervention
- Outcomes

S.O.A.P

Pediatric PT model

ICF frame

Pedi PT: Tools

Evidence-based practice

Practice-based evidence

Hypothesis-oriented algorithm

Theories: 치료적 원칙이 기반
High-quality papers - tools
PT’s experiences
Child/parent values

Children/Parents

Family-centered care
Satisfaction
Participation
Collaboration

Identification of problem(s)

Tools
Disability understanding
- body function & structure impairment
- activity limitation
- participation restriction

Clinical questions for solving problem(s)

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Understanding of assessment tools
What is standardized assessment tools?

- Manual: stopwatch vs. smartphone
- High quality research papers
  - Reliability: ICC, Kappa, r, p, %, SEM...
  - Validity: ICC, Kappa, r, p, %...
  - Responsiveness: ES, SRM, MCDI...

- Characteristics of standardized tools
  - Specific
  - Measurable
  - Achievable = GOAL SETTING
  - Realistic ( Relevant)
  - Timed
What is the purpose of using assessment tools?

- Role of assessment tools
  - Identification and goal setting: examination-evaluation-diagnosis, Prognosis
  - Intervention planning: intervention
  - Monitoring: outcomes

- Types of assessment tools

<table>
<thead>
<tr>
<th>Criterion-oriented tools</th>
<th>Norm-referenced tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Cut-off scores</td>
<td>- Standard point scores</td>
</tr>
<tr>
<td>- Compares performance against described criteria</td>
<td>- Compares individual performance against good performance</td>
</tr>
<tr>
<td>- Discriminates between successive performances of one individual</td>
<td>- Normal distribution of scores desired</td>
</tr>
<tr>
<td>- Provides information to plan therapy/instruction <strong>(Goal-setting)</strong></td>
<td>- Maximizes differences among individuals</td>
</tr>
<tr>
<td>- <strong>Sensitive</strong> to effects of intervention</td>
<td>- Not sensitive to effects of therapy or instruction</td>
</tr>
<tr>
<td>- Depends on <strong>task analysis</strong></td>
<td>- Not concerned with task analysis</td>
</tr>
<tr>
<td>- <strong>GMFM, PBS, GAS, PEDI, Behavioral objectives</strong></td>
<td>- <strong>TIMP, AIMS, PEDI</strong> (normative score like T-score and age percentile range)</td>
</tr>
</tbody>
</table>
# Competence of the Pedi PT

Tab. 1. Frequency of administration of tests and measures over 2-month interval

<table>
<thead>
<tr>
<th>Measure</th>
<th>2-Mo. baseline prior to KT workshops</th>
<th>0-2 Mo. After workshops</th>
<th>2-4 Mo. After workshops</th>
<th>4-6 Mo. After workshops</th>
<th>6-8 Mo. After workshops</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEDI</td>
<td>0</td>
<td>89</td>
<td>69</td>
<td>31</td>
<td>82</td>
</tr>
<tr>
<td>GMFM</td>
<td>6</td>
<td>7</td>
<td>15</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>TUG</td>
<td>12</td>
<td>70</td>
<td>47</td>
<td>38</td>
<td>24</td>
</tr>
<tr>
<td>TUDS</td>
<td>1</td>
<td>126</td>
<td>92</td>
<td>72</td>
<td>70</td>
</tr>
<tr>
<td>30-s walk test</td>
<td>0</td>
<td>60</td>
<td>57</td>
<td>40</td>
<td>32</td>
</tr>
</tbody>
</table>

KT: Knowledge Translation, TUDS: Timed Up and Down Stair Test

Tab. 2. Frequency of administration of standardized pediatric outcome measures

<table>
<thead>
<tr>
<th>Measure</th>
<th>Baseline: 2-month Time period Prior to KT program</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEDI</td>
<td>0</td>
</tr>
<tr>
<td>GMFM</td>
<td>6</td>
</tr>
<tr>
<td>TUG</td>
<td>12</td>
</tr>
<tr>
<td>TUDS</td>
<td>1</td>
</tr>
<tr>
<td>30-s walk test</td>
<td>0</td>
</tr>
</tbody>
</table>
“Think about myself”
‘Am I prepared to use assessment tool?’

- Basic **competence** of the Pediatric Physical Therapist
  - Skills in **selecting** appropriate standardized measures
  - Skills in **administrating** standardized tests and measures
  - Skills in **interpreting** standardized tests and measures
  - Skills in **sharing** information gained from standardized tests and measures
Practical application of assessment tools

Introduction
Understanding of assessment tools
Practical application of assessment tools
Conclusion
What is the timing to use assessment tools?

ICF disablement model: **Language**

- **Examination**
- **Evaluation**
- **Diagnosis**
- **Prognosis (Plan of care)**
- **Intervention**
- **Outcomes**

**Standardized Assessment Tools**

1. Problem identification
2. 6 each stage = 3 purposes of tools

**ICF disablement model: Problems identification**

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What is the timing to use assessment tools?

- Examination
- Evaluation
- Diagnosis
- Prognosis (Plan of care) - Goal setting
- Intervention - Intervention planning
- Outcomes - Monitoring

Comprehensive understanding of disability
Comparing relation among domains
Determining problem(s)
Formulating hypothesis (clinical question)
Tools selection by problem(s)

ICF disablement model

PT’s Focus point
**Example of CP**

- 17-month-old, 31wks, 1,570g, level II
- Goal: prognosis for walking

**Clinical question**

**Health condition:** Cerebral palsy

**Body function & structures**
- Skeletal alignment
- ROM
- Muscle performance

**Activities**
- Mobility
- Sitting
- Standing
- Manipulation

**Participation**
- Self-exploration & play
- Play with siblings
- Interaction with parents
- Family routines & outings

**Home environment**
- Mother primary caregiver
- Father supportive
- 3 siblings
- Child oriented

**Personal**
- Curious
- Easily frustrated
Example of CP

- 4 years old
- Goal: walking at school

**Health condition:** Cerebral palsy

**Body function & structures**
- Skeletal alignment
- Muscle performance
- Balance

**Activities**
- Standing
- Walking indoors
- Walking outdoors
- Up/down stairs

**Participation**
- Self-care & independence at home (safety)
- Inclusion in kindergarten

**School environment**
- Attitude of school staff
- Location of classroom
- Class routine
- Features of playground

**Personal**
- Self-efficacy
- Insightful
- Avoids tasks if not successful

Clinical question
Example of CP

10 years old
Goal: To cope difficulty in physically keeping up with classmate at school and friends during leisure activities

Health condition:
Cerebral palsy

Body function & structures
- Skeletal alignment
- Muscle performance
- Balance

(Functional) MMT, K-PBS

Activities
- Standing
- Walking indoors
- Walking outdoors
- Up/down stairs

K-GMFM, PEDI, SFA

Participation
- Going places and doing things with classmates and friends

CAPE/PAC

Community environment
- Distances
- Time restrictions
- Crowds

Distance, time

Personal
- Self-efficacy
- Awareness of limitations
- Ask for help

K-CP-Qol
## Assessment Tools for Children with Disabilities

<table>
<thead>
<tr>
<th>Assessment Tools</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross Motor Function Classification System (GMFCS)</td>
<td></td>
</tr>
<tr>
<td>Functional Mobility Scale (FMS)</td>
<td></td>
</tr>
<tr>
<td>Manual Ability Classification System (MACS)</td>
<td></td>
</tr>
<tr>
<td>Communication Function Classification System (CFCS)</td>
<td></td>
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<tr>
<td>IQ screening</td>
<td></td>
</tr>
<tr>
<td>TIMP (Test of Infant Motor Performance)</td>
<td></td>
</tr>
<tr>
<td>AIMS (Alberta Infant Motor Scale)</td>
<td></td>
</tr>
<tr>
<td>General Movement (GM)</td>
<td></td>
</tr>
<tr>
<td>Gross Motor Function Measure (GMFM)</td>
<td></td>
</tr>
<tr>
<td>Pediatric Evaluation of Disability Inventory (PEDI)</td>
<td></td>
</tr>
<tr>
<td>Quality FM</td>
<td></td>
</tr>
<tr>
<td>Challenge Modules</td>
<td></td>
</tr>
<tr>
<td>Pediatric Balance Scale (PBS)</td>
<td></td>
</tr>
<tr>
<td>Trunk Control Measurement Scale (TCMS)</td>
<td></td>
</tr>
<tr>
<td>Five time sit to stand test (FTSST)</td>
<td></td>
</tr>
<tr>
<td>Timed “Up &amp; Go” test (TUG)</td>
<td></td>
</tr>
<tr>
<td>Timed Up and Down Stairs test (TUDS)</td>
<td></td>
</tr>
<tr>
<td>30 seconds walk test</td>
<td></td>
</tr>
<tr>
<td>ROM</td>
<td></td>
</tr>
<tr>
<td>Functional MMT</td>
<td></td>
</tr>
<tr>
<td>Accelerometer</td>
<td></td>
</tr>
<tr>
<td>Behavioral objective and Goal Attainment Scaling (GAS)</td>
<td></td>
</tr>
<tr>
<td>Canadian Occupational Performance Measure (COPM)</td>
<td></td>
</tr>
</tbody>
</table>
What is the timing to use assessment tools?

- **Goal setting**
  
  **Activity oriented** goal setting using behavioral objectives and/or criterion-base assessment tools

  1) *Interviewing with parent about daily routine* >> *set the goals*
     
     ex) walk about 10 steps inside house – intervention – success or fail

  2) *Interviewing with parent about daily routine* >> *set the goals*
     
     ex) walk about ten steps inside house – explain using of the GAS to check satisfaction after intervention – intervention – grading using GAS scales

  3) *Interviewing with parent on daily routine RELATED TO GMFM items* >> *set the goals using the item itself or FUNCTIONAL qualities of it*

  □ GMFCS levels I, II, or III – *calculating responsiveness*
    
    △ Goal dimensions: D and E
    △ Target goal items: 54, 55, 63, 78, 79, 84, and 85

  □ GMFCS levels IV and V – *calculating responsiveness*
    
    △ Goal dimensions: A and B
    △ Target goal items: 8, 9, 10, 21, 22, and 34
Sensitivity to Functional Improvements of GMFM-88, GMFM-66, and PEDI Mobility Scores in Young Children with Cerebral Palsy

Jooyeon Ko

<table>
<thead>
<tr>
<th>GMFCS Level</th>
<th>n</th>
<th>&lt;2 years</th>
<th>2–4 years</th>
<th>4–6 years</th>
<th>&gt;6 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>I/II</td>
<td>24</td>
<td>B, C (2)</td>
<td>B, C (1)</td>
<td>C+D (2)</td>
<td>D+E (1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C+D (2)</td>
<td>C, D (3)</td>
<td>D (1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>D (1)</td>
<td>D (6)</td>
<td>D+E (1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>D+E (4)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>III</td>
<td>17</td>
<td>A+B (1)</td>
<td>A+B (6)</td>
<td>B+C (2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>B+C (1)</td>
<td>B+C (5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>C+D (2)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV/V</td>
<td>23</td>
<td>A (3)</td>
<td>A (1)</td>
<td>A (2)</td>
<td>A+B (2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A+B (2)</td>
<td>A+B (5)</td>
<td>A+B (2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>B (4)</td>
<td>B+C (3)</td>
<td>C (1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
What is the timing to use assessment tools?

- Outcomes: using **responsiveness** of the tools
  - Using responsiveness or sensitivity to change of the assessment tools

### Table 4.
Effect Size (ES) and Standardized Response Mean (SRM) for the Gross Motor Function Measure (GMFM-88) According to the GMFCS levels I and II\(^a\) and III to V\(^d\) (n=60)

<table>
<thead>
<tr>
<th>Measure</th>
<th>Baseline-1 Month</th>
<th>Baseline-3 Months</th>
<th>Baseline-6 Months</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean Change (SD)</td>
<td>ES</td>
<td>SRM</td>
</tr>
<tr>
<td>GMFCS I-II (n=16)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lying and rolling</td>
<td>1.0 (2.1)</td>
<td>0.4</td>
<td>0.5</td>
</tr>
<tr>
<td>Sitting</td>
<td>2.4 (3.2)</td>
<td>0.4</td>
<td>0.8</td>
</tr>
<tr>
<td>Crawling and kneeling</td>
<td>4.0 (4.6)</td>
<td>0.4</td>
<td>0.9</td>
</tr>
<tr>
<td>Standing</td>
<td>7.1 (6.0)</td>
<td>0.3</td>
<td>1.2</td>
</tr>
<tr>
<td>Walking, running, and jumping</td>
<td>6.3 (6.9)</td>
<td>0.2</td>
<td>1.0</td>
</tr>
<tr>
<td>Goal total</td>
<td>7.3 (5.6)</td>
<td>0.5</td>
<td>1.3</td>
</tr>
<tr>
<td>Total</td>
<td>4.1 (3.2)</td>
<td>0.3</td>
<td>1.3</td>
</tr>
</tbody>
</table>

| GMFCS III-IV (n=44)            |                  |       |       |                  |       |       |                  |       |       |
| Lying and rolling              | 6.2 (5.9)        | 0.3   | 1.1   | 9.3 (8.3)        | 0.4   | 1.1   | 12.1 (9.3)       | 0.5   | 1.3   |
| Sitting                         | 6.9 (7.0)        | 0.3   | 1.0   | 11.8 (8.9)       | 0.4   | 1.3   | 16.4 (12.5)      | 0.6   | 1.3   |
| Crawling and kneeling          | 4.0 (3.2)        | 0.1   | 0.8   | 10.2 (11.9)      | 0.4   | 0.9   | 12.6 (14.1)      | 0.4   | 0.9   |
| Standing                        | 4.8 (8.3)        | 0.5   | 0.6   | 6.8 (11.6)       | 0.7   | 0.6   | 7.1 (10.9)       | 0.7   | 0.7   |
| Walking, running, and jumping  | 0.7 (1.7)        | 0.1   | 0.4   | 1.7 (3.0)        | 0.3   | 0.6   | 2.1 (3.7)        | 0.4   | 0.6   |
| Goal total                      | 7.4 (5.1)        | 0.4   | 1.5   | 12.7 (7.4)       | 0.7   | 1.7   | 16.4 (8.4)       | 0.9   | 2.0   |
| Total                           | 4.5 (3.2)        | 0.3   | 1.4   | 8.3 (6.3)        | 0.5   | 1.3   | 10.1 (6.8)       | 0.6   | 1.5   |

\(\text{a} \) GMFCS— Gross Motor Function Classification System.  
\(\text{b} \) One child was not tested at 3 and 6 months after admission due to health problems of the child.  
\(\text{c} \) One child was not tested at 6 months after admission due to parental reasons.  
\(\text{d} \) One child was not tested at 6 months after admission due to health problems of the child.
Conclusion
Bottom line

- Scientific attitudes
- Updated Knowledges
- Critical thinking

- Helpful use of assessment tools in each step of Pediatric Physical Therapy
- Numeric data based documentation using excel