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Cognitive Issues in Childhood Cancer Survivors and Related Parental Perceptions and Behaviors: An Integrative Review of Literature

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Cognitive Issues in Childhood Cancer Survivors and Related Parental Perceptions and Behaviors

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Background

• Childhood cancer is the leading cause of death among pediatric populations
• Mortality has been steadily declining due to improvements in treatments, with the five-year survival rate at 80%
• The majority of survivors are children that had acute lymphoblastic leukemia (ALL), brain/central nervous system (CNS) tumors, and Hodgkin lymphoma
• Therefore, many children enter into a survivorship phase
• Survivorship is accompanied by neurocognitive late-effects (NCLE) or cognitive deficits resulting from cancer and/or its treatments
• Parents play a vital role in the follow-up care of their children in the post-cancer phase
• To date, limited studies have reviewed the NCLE in pediatric cancer survivors and identified linkage to parental perceptions and behaviors

Purpose of Study

1) To examine neurocognitive late-effect measurement tools and associated deficits in pediatric cancer survivors.
2) To identify parental perceptions and behaviors that correlate to cognitive dysfunction in their children.

Research Questions

1) What are the predominant characteristics of neurocognitive late-effect measurement tools and associated deficits in childhood cancer survivors?
2) How does such cognitive dysfunction correlate to perceptions and behaviors in parents?

Methods

Integrative review of literature (Whitemore & Knaff, 2005) search terms: cancer, childhood cancer, survivor, cognition, cognitive disorder, cognitive illness, neurocognitive late-effects, treatment, child(ren), parent(s), perception, viewpoint, perspective(s), and opinion(s).

<table>
<thead>
<tr>
<th>Research Question #1</th>
<th>Research Question #2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data subgroups by NCLE measurement tools and deficit</td>
<td>NCLE severity coding as 1-not severe; 2-moderately severe; or 3-very severe</td>
</tr>
<tr>
<td>NCLE severity coding as 1-not severe; 2-moderately severe; or 3-very severe</td>
<td>Data reduction into matrix that features most common NCLE measurement tools, cognitive deficits, and respective mean severity indices</td>
</tr>
</tbody>
</table>

Results

Research Question #1 Results:

Study Demographic:
• 3,551 children total
• 1,855 children with age data
• Mean age at the time of study: 12.3 years, SD=3.1 (Range=7.8-23.5)
• Mean age at diagnosis: 5.5 years, SD=1.5 (Range=2.6-7.9)

Neurocognitive Deficits Reported by Studies of Pediatric Cancer Survivors:

Table 1. Neurocognitive Deficit Frequency and Severity

<table>
<thead>
<tr>
<th>Primary Areas of Neurocognitive Deficit</th>
<th>Frequency (Number of times used in 20 Articles)</th>
<th>Mean Deficit Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working memory</td>
<td>12</td>
<td>1.75</td>
</tr>
<tr>
<td>Attention</td>
<td>10</td>
<td>2.2</td>
</tr>
<tr>
<td>Full Scale IQ</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>Processing speed</td>
<td>9</td>
<td>2.3</td>
</tr>
<tr>
<td>Academic success</td>
<td>7</td>
<td>2.1</td>
</tr>
</tbody>
</table>

Neurocognitive Late-Effects (NCLE) Evaluation Tools:

Table 2. NCLE Measurement Tool Utilization Frequencies

<table>
<thead>
<tr>
<th>Neurocognitive Deficit Measurement Tool</th>
<th>Frequency (Percentage of times used in 20 selected articles)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wechsler Intelligence Scale for Children-4th Edition (WISC-IV)</td>
<td>45%</td>
</tr>
<tr>
<td>Wechsler Adult Intelligence Scales-4th Edition (WASI-IV)</td>
<td>25%</td>
</tr>
<tr>
<td>Parent Report and Questionnaires</td>
<td>25%</td>
</tr>
<tr>
<td>Conners Rating Scales-Revised: Short Forms</td>
<td>25%</td>
</tr>
<tr>
<td>Conners Continuous Performance Test-2nd Edition</td>
<td>10%</td>
</tr>
<tr>
<td>Beery Test of Visual-Motor Integration</td>
<td>10%</td>
</tr>
<tr>
<td>Wechsler Individual Achievement Test-2nd Edition (WAI-II)</td>
<td>10%</td>
</tr>
<tr>
<td>Wechsler Abbreviated Scale of Intelligence</td>
<td>10%</td>
</tr>
<tr>
<td>Wide Range Achievement Test</td>
<td>10%</td>
</tr>
<tr>
<td>Delis-Kaplan Executive Function System (D-KEFS)</td>
<td>10%</td>
</tr>
</tbody>
</table>

Results (cont.)

Research Question #2 Results:

Parental Perceptions and Behaviors Related to NCLE

1) Negative parental outcomes due to NCLE:
• Increased parental stress and burnout
• Poor family functioning correlated with child deficits

2) Parental Perceptions of NCLE:
• Parents can identify cognitive delays, learning disabilities, academic difficulties, and diminished quality of life in children with NCLE
• Prioritization of adverse effects

3) Parental Perceptions of NCLE for treating NCLE:
• Validation of positive/negative effects of treatments

4) Utility of parental perception of NCLE:
• Parental report determined an effective method of data collection on NCLE in 4/5 studies

5) Parental engagement in influencing NCLE:
• Interplay between knowledge and behavior in parents and NCLE of children
• Pre-learning and pro-knowledge behaviors correlate with benefit to child’s condition

Discussion

Research Question #1

• There is a complex array of neurocognitive measurement tools used for a diverse range of cognitive deficits in pediatric cancer survivors
• Executive functioning (processing speed, attention, working memory) plays a major role in determining level of deficit
• Deficits in executive function impact other facets of life: daily function, academic achievement, employment, quality of life, and social skills
• Lowest measurements of deficit severity in this study are still moderate in severity
• The causal relationships between deficit severity and mechanistic aspects of cancer/treatments have yet to be determined

Research Question #2

• There is significant impact of a child’s neurocognitive state on the familial setting
• Parental perceptions can be used as an evaluative tool and concurrently evaluated for utility in research
• This dual nature of evaluation creates medium for discrepancy when determining the nature of NCLE via parental report
• A child’s cognitive state can influence parental behavior in maladaptive ways
• Parental involvement in post-cancer care can complement cognitive advancement

Limitations

• Biased nature of integrative literature review analysis
• Arbitrary standards for data inclusion

Future Research

• These findings support the need for clinical research to understand NCLE within the familial dynamic
• NCLE trends in post-cancer children, parental perceptions as an efficacious evaluation tool, and the range of parental reactions and roles
• Future interventions utilized by nurses, physicians, and therapists

Conclusions

Although the overall conclusions of this integrative review are based upon a limited number of studies with specific inclusion data, the necessity for familial involvement in care for childhood cancer survivors is heavily implicated.

References