Evaluating Cognitive-Linguistic Deficits After Treatment for Primary Brain Tumors

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BACKGROUND
Individuals experience a variety of impairments impacting quality of life and daily functioning. Prior to treatment, more than 90% of individuals with brain tumors experience at least one cognitive or linguistic deficit and 71% will experience three or more (Tucha et al., 2009). Individuals diagnosed with brain tumors may encounter treatments including: tumor resection and/or biopsy, steroids, anti-epileptic medication, radiation therapy, and chemotherapy.
Post-treatment, 74.5% of individuals with brain tumors experience three or more neurological deficits and 39.2% report five or more (Mukand, Blackeinstein, Crincoll, Lee, & Santos, 2003). 80% of individuals experience difficulty with cognition (Mukand et al., 2001).
As survival rates improve, there is increased need for assessment and treatment for cognitive-linguistic deficits which hinder an individual's activity and participation (Liu et al., 2009). The purpose of this study was to document the self-reported and objective cognitive-linguistic deficits experienced by the brain tumor population.

1. What are the most commonly experienced cognitive-linguistic symptoms?
2. What is the self-reported impact of cognitive-linguistic symptoms on functional daily activities after treatment?
3. What correlations exist among self-reported data and standardized assessments?

METHODS
Participants
- 18 male, 12 females
- Age: 21 - 62 years (M = 44.87, SD = 11.04)
- Previous tumor treatment (e.g., surgery, chemotherapy, radiation)
- Currently enrolled in radiation therapy

Tumor Types
- Glioblastoma (n = 4)
- Meningioma (n = 6)
- Astrocytoma (n = 7)
- Oligodendroglioma (n = 8)
- Other (n = 5)

SCREENING
- Functional Assessment of Cancer Therapy – Brain (FACT-Br)
  - Five questions related to cognitive-communication deficits
  - Positive screen if indicated anything other than “not at all”

RESULTS
Cognitive-Communication Survey
- A conditional logic survey was created and distributed via the Qualtrics® software platform.
- Questions related to: (a) demographic, social, and medical history; (b) current living status; (c) symptomology including frequency and severity; (d) change in function during daily activities since brain tumor treatment.

<table>
<thead>
<tr>
<th>Domain</th>
<th># of Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>44</td>
</tr>
<tr>
<td>Physiological</td>
<td>12</td>
</tr>
<tr>
<td>Linguistic</td>
<td>11</td>
</tr>
<tr>
<td>Cognitive</td>
<td>10</td>
</tr>
<tr>
<td>Socio-Emotional</td>
<td>11</td>
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</tbody>
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- Incorporated portions of the Mayo-Portland Adaptability Inventory-4 (MPAI-4)
  1. Mild problem, does not interfere with activities
  2. Mild problem, interferes with activities <25% of the time
  3. Moderate problem, interferes with activities 25-75% of the time
  4. Severe problem, interferes with activities >75% of the time

Standardized Assessments
- Cognitive-Linguistic Quick Test (CLQT)
  - Briefly assess major cognitive domains, severity of each domain, and overall severity rating.
- Comprehensive Aphasia Test (CAT)
  - Determine areas of strength and weakness in different language tasks

RESULTS
Cognitive-Communication Survey
- An average of 7.93 symptoms were endorsed (SD = 6.17; range: 0 - 21)
- Cognitive and neurological domains were most frequently endorsed
  - Most commonly endorsed symptoms were: anxiety (47%), difficulty expressing words or phrases (47%), difficulty keeping track of multiple activities at one time (43%), and headaches (43%).
- Physiological symptoms were endorsed as the most severe, followed by cognitive, linguistic, and socio-emotional respectively.
- MPAL-4 Scores: All participants obtained scores consistent with mild deficits (i.e., scores <40)
  - Range: 1 - 36, M = 12.77, SD = 9.69

- Qualitative analysis was completed on the data regarding functional impact of symptoms on daily life. Three primary themes were identified:
  1. Theme 1: Significant changes in participant’s daily roles, responsibilities, and personal relationships.
  2. Theme 2: Emotional response to symptoms’ impact on daily functioning.
  3. Theme 3: Health-related plans of care relative to need for increased care in the future, fear of symptoms returning or worsening, and uncertainty in how to communicate with physicians as the disease progresses.

DISCUSSION
- Neither self-reported symptoms, CLQT domains, or CAT domains correlated with post-diagnostic diagnosis nor tumor size.
- Exceptions:
  - tumor size and CLQT composite score, r = -0.524, p = 0.026
  - time-post onset and CAT writing, r = 0.490, p = 0.039
- No significant differences among individuals with left, right, or midbrain tumors relative to tumor grade to self-reported symptoms, CLQT, or CAT domains.

- Results support the need for a holistic assessment at the functional level, yet current assessments likely do not adequately identify the subtle changes experienced by the brain tumor population.
- Commonly reported symptoms and subsequent impacts on daily life within the brain tumor population are frequently seen within other etiologies (e.g., TBI, stroke, and MCI).
- Participants exhibited deficits in spoken and written picture description tasks.
  - Deficits in: Organization of language; Narrative discourse (e.g., coherence and cohesions); Limited microlinguistic variation; Use of indefinite terms; Decreased syntactic complexity.
- Important next steps include development and further study of appropriate, efficacious assessment and treatment methods to alleviate these deficits.