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Bonnie L. Rogulj

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The Importance of Cognitive Screening to Promote Clinical Decision-Making Skills

Presented By:

Bonnie L. Rogulj, PT, DPT

Board-Certified Geriatric Clinical Specialist



UNIVERSITY OF ST. AUGUSTINE
FOR HEALTH SCIENCES

Objectives

- Understand **cognitive changes associated with aging** including normal aging, mild, and major neurocognitive disorder.
- Identify **tools commonly used for cognitive screening** and analyze findings to promote clinical decision-making skills by the physical therapist
- Discuss the **clinical significance for cognitive screening** by the physical therapist for patient-centered care/management and early intervention

Part I

Mild Cognitive Impairment^{1,4}

- **Mild Cognitive Impairment (MCI)** is an *intermediate clinical state* between normal cognitive aging and dementia.
 - It often proceeds and leads to dementia
- The definition of MCI included the presence of...
 - **Subjective complaints** of gradual memory loss **over at least 6 months** reported by the patient or family
 - **Objective evidence** of memory loss demonstrated on clinical memory tests administered
 - General preservation of other cognitive domains
 - **Preserved functioning of ADLs** (with only mild impairment in IADLs)
 - **Absence of other explanation** for the memory loss and insufficient findings to warrant diagnosis of dementia

Dementia^{1,3,7}

Due to the aging population, the number of older adults living with dementia is predicted to increase...

- **In 2020, more than 50 million people worldwide were living with dementia**
- **Every 3 seconds, someone develops dementia**
- **Annually, there are over 9.9 million new cases of dementia worldwide**

Older age is the strongest predictor for developing dementia.

ALZHEIMER'S DISEASE^{1,3}

Alzheimer's disease was named after a German physician, Alois Alzheimer, in 1907.

- Alois identified that initially only memory loss was noticeable, followed by difficulties with language, word findings, and the ability to learn new skills.
 - As time progresses, so does the lack of motor control....

In general, changes related to the onset of AD are noted over a **6-month to 1-year period** and **lasts approximately 8-12 years**.

- However, some individuals may progress quickly, or slowly with plateaus throughout

Part II

Article: Blackwood J, Martin A. Screening for Cognitive Impairment as a Part of Fall Risk Assessment in Physical Therapy Practice. *J Geriatr Phys Ther.* 2017; 40(4): 197-203.

Purpose: The purpose of this study was to examine physical therapist practice patterns of screening older adults' cognition as part of falls risk assessment.

Article Discussion⁶

The study revealed Physical Therapists routinely used clinical screening tools to assess balance and quantify fall risk...

- However, **over 2/3 of respondents did not screen cognition** as a part of their practice.

Participants who did use cognitive screening tools...

- **Either 1 domain (eg, orientation) was screened or a tool to screen for dementia (MMSE) was performed**
 - Other cognitive components reported to influence fall risk, like **executive function, were *rarely* screened** with measures (such as the TMT-A and/or TMT-B (4.3%))

(Blackwood, et al., 2017)

Article Discussion⁶

Collectively, these results indicate that PTs who spend an increased amount of their practice time evaluating fall risk are *more likely* to adopt **best practices in fall risk assessments**, which includes...

- **Screening of all older adults for fall risk**
- **Screening cognition, and**
- **Using objective measures to quantify fall risk**

(Blackwood, et al., 2017)

Article Discussion⁶

These practice patterns indicate that the **influence of cognitive dysfunction on falls risk is not commonly considered as a part of falls risk assessments** in older adults.

Mild changes in cognition (which are associated with falls risk) are believed to be **present in 22-39% of those 71- 90 years of age**.

- Older adults who exhibit both cognitive loss and physical decline may be referred to physical therapy services.

(Blackwood, et al., 2017)

Article Discussion⁶

Early screening of cognitive function and physical mobility is **critical** in the symptomatic, predementia phase of cognitive loss, where declines in physical function and an increased fall risk have been reported....

Lack of cognitive screening limits the potential to discern whether **cognitive function is contributing** to falls risk.

- Consequently, opportunities to create client-specific treatments to reduce falls risk for older adults on the basis of their cognitive and physical function may be missed.

(Blackwood, et al., 2017)

Cognitive Screening⁶

Physical Therapists may not be familiar with the available screening tools and how the tools can be used to screen the specific cognitive functions reported to be associated with changes in gait and increased fall risk.

Screenings...

- Detect whether cognitive dysfunction is contributing to falls risk to create an individualized plan of care (POC)
- Generate objective data
 - Which can be shared with appropriate providers to manage cognitive decline

(Blackwood, et al., 2017)

MMSE ⁶

MMSE assesses global cognitive function in multiple domains, including

- Verbal fluency, recall, registration, numeracy, orientation, and visuospatial ability

MMSE is a valid and reliable screening tool for dementia

- However, it does not discriminate between those with MCI or those in the early stages of AD and their cognitively intact peers.

(Blackwood, et al., 2017)

MMSE ⁶

Using the MMSE as a primary cognitive measure will not detect mild deficits in cognition that influence fall risk.

Examples of screening tools **sensitive to detecting mild cognitive impairment** available with provided standardized instructions

- **Saint Louis University Mental Status Examination (SLUMS)**
- **Montreal Cognitive Assessment tool (MoCA)**

(Blackwood, et al., 2017)

SLUMS:

<https://www.sralab.org/rehabilitation-measures/saint-louis-university-mental-status-exam>

Part III

Montreal Cognitive Assessment⁴

The Montreal Cognitive Assessment (MoCA) was developed based on the clinical intuition of one of the authors (Nasreddine) regarding domains of impairment commonly encountered in MCI and adapted to a screening test.

- An initial version covered 10 cognitive domains.
- The revised version of the MoCA now covers 8 cognitive domains
 - The final version is a 1-page, 30-point test, administered in 10 minutes

(Nasreddine, et al., 2005)

MoCA⁴

- **Short term memory recall** task (5) points involves two learning trials of (5) nouns and delayed recall after ~ 5 minutes
- **Visuospatial abilities** are assessed using a clock-drawing task (3 points) and a 3-D cube drawing copy (1 point)
- Multiple aspects of **executive functioning (EF)** using adapted tasks from the Trail Making Test - B task (1 point), a phonemic fluency task (1 point), and a 2-item verbal abstraction task (2 points)
- **Attention, concentration, and working memory** are evaluated using a sustained attention task (target detection using tapping; 1 point), serial subtraction task (3 points), and digits forward and backward (1 point each)
- **Language** is assessed using a 3-item confrontation with low-familiarity animals (3 points), repetition of only 2 syntactically complex sentences (2 points), and the aforementioned fluency test.
- **Orientation** to time and place is evaluated (6 points)

(Nasreddine, et al., 2005)

Montreal Cognitive Assessment⁴

The **Montreal Cognitive Assessment (MoCA)** was developed as a tool to screen patients who presented with mild cognitive complaints and usually perform in the normal range on the Mini-Mental State Examination (MMSE)

- Most individuals meeting the clinical criteria for MCI **score above 26/30 on the MMSE**, which is considered the normal range for older individuals.

(Nasreddine, et al., 2005)

MoCA⁴

A cut-off score of **26/30 points** (**scores of 25 points or below indicate impairment**) yielded the best balance for sensitivity and specificity for the MCI and AD groups.

- MoCA exhibited excellent sensitivity in **identifying MCI and AD** (90%, 100%)
 - **MMSE (18%, 78%)**
- MoCA also **detected mild AD** with high specificity (87%)

Item analysis revealed **delayed recall** was the most impaired item in MCI patients.

(Nasreddine, et al., 2005)

MOCA vs. MMSE^{4,8}

Patients who present with **cognitive complaints and NO functional impairment** are likely to experience normal aging or have MCI.

- The patient should be administered the MoCA first (because the MMSE will most likely produce a normal score)

Patients who present with **cognitive complaints AND functional impairment** are most likely to be diagnosed with **dementia**.

- MMSE should be administered first because it is likely to be abnormal
 - If the MMSE is normal (>26/30), the MoCA should then be administered (100% of those with mild AD had an abnormal MoCA score)

(Nasreddine, et al., 2005)

Part IV

Background^{5,6}

Falls are a risk of a ***combination*** of extrinsic & intrinsic factors

- Factors may include decreased strength, balance deficits, slowed reaction time, and **decreased cognitive function**.

(Blackwood, et al., 2017)

Cognitive Processes^{5,6}

Imaging studies have identified **specific areas within the brain** associated with an increased risk of falls

- **Left Frontal Orbital Cortex**
- **Dorsal Lateral Prefrontal Cortex** (changes in gait)

(Blackwood, et al., 2017)

Executive Functioning⁵

Researchers have reported an **association between declines in executive function (EF) and an increased risk of falling** after controlling for age, sex, health status, and prior history of falls.

- In addition, **decreases in gait speed and increased frequency of falling and mobility limitations** have been reported in older adults with **deficits in EF**.

(Blackwood, et al., 2016)

Executive Functioning⁵

Executive Functioning (EF): The ability to control, integrate, organize and maintain information when continuously presented.

- The majority of EF activities are based in the **prefrontal cortex**
- Intact EF is **necessary to complete complex tasks** that require coordination of various subcomponents of cognition (eg, attention, working memory, set shifting).

(Blackwood, et al., 2016)

Executive Functioning⁵

Different measures of EF have been utilized within the literature to examine how decreased EF impacts physical performance prior to a diagnosis of dementia....

- However, because of the complexity of the cognitive processes that comprise EF, **no single measure can adequately assess EF in its entirety.**

(Blackwood, et al., 2016)

Trail Making Test (TMT)⁵

The **Trail Making Test (TMT)** is a neuropsychological screening tool with high validity and reliability used in clinical practice settings to detect deficits in EF.

Composed of Parts A & B:

- **TMT-A** is a measure of visual search and motor speed,
- **TMT-B** assess attention, visual scanning, motor speed and coordination, mental flexibility, and working memory.

(Blackwood, et al., 2016)

- **Article:** Blackwood J, Shubert T, Forgarty K, Chase, C. Relationships Between Performance on Assessment on Assessment of Physical Function and Fall Risk Screening Measures in Community-Dwelling Older Adults. *J Geriatr Phys Ther.* 2016; 39(2): 89-96.

Purpose: To determine whether Executive Function (TMT-B) was associated with performance on (3) fall risk screening tools commonly used by Physical Therapists (FTSTS, TUG, gait speed) in a group of community dwelling older adults.

Article Discussion⁵

The results of this study are consistent with previous studies that have demonstrated that **older adults with limitations in EF walk slower and perform worse on mobility tasks.**

- Deficits in EF increase the risk for functional decline and disability
- Utilizing clinically relevant measures that are easy to use will assist in detecting those risks in community-dwelling older adults.

(Blackwood, et al., 2016)

Article Conclusion⁵

For the functional mobility measures of gait speed and the TUG, the cognitive processes required to adequately control, integrate, and coordinate (ie, EF) were associated with overall performance in CDOA, but to a greater extent in those with mild, yet distinguishable changes in cognition (MCI).

- **Clinicians who examine fall risk in CDOA should consider the assessment of EF using the TMT-B** when measures of usual gait speed are performed in the general population of older adults and the TUG test OR usual gait speed measurements in those with MCI.

(Blackwood, et al., 2016)

Cognitive Screening^{5,6}

- Examining the relationship between a simple measure of EF and valid measures of fall risk can help clinicians understand how mild cognitive loss impacts physical function.
- In conclusion, the influence of cognition on falls is not isolated to those with advanced cognitive loss (ie, dementia)
 - **Mild deficits in cognition have also been associated with an increased fall risk**, further highlighting relationships between cognitive function and falls *throughout* the aging process.

(Blackwood, et al., 2016)

Thank You!!!

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