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Cognitive and Occupationally-based Assessments in Acute Care: For Individuals with Acquired Brain Injury

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This evidence project, submitted by

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has been approved and accepted
in partial fulfillment of the requirements for the degree of
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Key words: Montreal Cognitive Assessment (MoCA), cognitive assessment, acquired brain injury (ABI), mild cognitive impairment, acute care

Abstract

The student researchers collaborated with Marcy Boschee, OTR/L, an occupational therapist practicing in the acute care unit at St. Joseph's Medical Center in Tacoma, WA to investigate two clinical questions: [1] “What evidence is there for the effectiveness of the Montreal Cognitive Assessment (MoCA) in predicting functional cognitive impairment of patients 18-years-old and older in acute care who have sustained an ABI?” and [2] “Which occupationally-based cognitive assessments, feasible to use in the acute care setting, are most effective at predicting functional impairment in patients 18-years-old and older with mild to severe ABI?” A systematic review was conducted and 29 articles were included. The AOTA levels and the Research Pyramid of categorization were used to determine rigor. The findings indicated that the MoCA is not sensitive enough, nor sufficient, in detecting no or mild cognitive impairment. It is therefore recommended that when the MoCA indicates no cognitive impairment, the OT practitioner should administer an occupationally-based cognitive assessment to fully assess the client’s executive functioning abilities.

The student researchers analyzed the findings and developed an occupationally-based assessment matrix, supplemented by a decision flowchart. These and the research itself were presented to Marcy and her colleagues in the acute rehabilitation unit at St. Joseph’s Medical Center. In order to best support the implementation of the new information into clinical practice, specific knowledge translation products and activities were offered.

The effectiveness of the knowledge translation process was measured through several methods. These included extensive revision processes, post in-service surveys and corresponding analysis, as well as a structured consultation (e.g. follow-up questions) for our collaborating clinician following the in-service itself. It is recommended that St. Joseph’s Medical Center

purchase an occupationally-based assessment, as outlined in the assessment matrix, to improve their ability to adequately and effectively assess mild cognitive impairment.

Executive Summary

Two research questions regarding cognitive assessments administered in acute care setting were developed to meet the informational needs of an occupational therapy practitioner (OT) at St. Joseph Medical Center in Tacoma, WA. The first question examined the sensitivity, specificity, and predictive accuracy of the Montreal Cognitive Assessment (MoCA) regarding cognitive impairment in individuals with an acquired brain injury (ABI), such as a cerebral vascular accident (CVA) or a traumatic brain injury (TBI). The second question went a step further and examined performance/function-based cognitive assessments administered in an acute care setting, with the same population, that will most accurately measure a patient's functional cognitive performance.

The MoCA was found to be sensitive to moderate or severe cognitive impairment (Salvadori et al., 2013) but did not have adequate evidence for detecting mild cognitive impairment (mCI) (Waldron-Perrine et al., 2012). This is partially due to an unclear cut-off score and that the MoCA was developed as a bedside screen-- not an assessment to base a patient's treatment on.

Furthermore, Georgieva et al. (2014) found that individuals with mild cognitive impairment were still experiencing difficulties in processing speed and memory four months post injury. They concluded these areas were the most sensitive cognitive domains affected by a mild cognitive impairment and may not be accurately or fully assessed with the MoCA. It is possible that these individuals could score high on the MoCA, indicating a mild cognitive impairment, or receive a score indicating no cognitive impairment but still have deficits that impact later function. Their scores on the MoCA at admission would result in the determination that they needed minimal or no treatment because this assessment is not sensitive enough to pick up subtler deficits. Research has shown that individuals with a mCI

have difficulty returning to work and participating in IADL. Behavior problems were found to be a possible predictor of this. However, many assessments, including the MoCA, do not address this area (Benedictus et al., 2010). Therefore, there is a need to identify performance/functionally based cognitive assessments that are sensitive to all degrees of cognitive impairment.

CRITICALLY APPRAISED TOPIC (CAT) PAPER

Focused Questions:

Step 1

What evidence is there for the effectiveness of the Montreal Cognitive Assessment (MoCA) in predicting functional cognitive impairment of patients 18-years-old and older in acute care who have sustained an ABI?

Step 2

Which performance-based cognitive assessments, feasible to use in the acute care setting, are most effective at predicting functional impairment in patients 18-years-old and older with mild to severe ABI?

Collaborating Occupational Therapy Practitioner:

Marlisa Boschee, OTR/L

Prepared by:

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Chair:

Tatiana Kaminsky, PhD, OTR/L

Course Mentor:

George Tomlin, PhD, OTR/L, FAOTA

Date Review Completed:

Original review: October 25th, 2016
Most recent review: May 11th, 2017

Clinical Scenario:

Marcy and her colleagues are currently using the MoCA to assess a patient's cognitive impairment. A few reasons for this are: the team is accustomed to this measure, it is free to use, and it can be easily administered in the acute care setting. They would like to know if at admission, the MoCA, when given at admission, is the most accurate assessment in predicting a patient's functional cognitive abilities after discharge or if there are other assessments that would be more effective to use for making discharge recommendations.

Review Process
Procedures for the selection and appraisal of articles

Inclusion Criteria:

Inclusion criteria for the studies in this CAT are clearly articulated and formulated based on the collaborating practitioner's interests. Studies must have a purpose and corresponding methods that focus on identifying the effectiveness of cognitive assessment(s), in assessing/predicting a patient's cognitive status post-discharge from the acute phase within the rehabilitation continuum. The American Occupational Therapy Association defines acute care as an "inpatient hospital setting for individuals with a critical medical condition (AOTA, 2008)." Studies must also pertain to individuals who have sustained a mild to severe ABI and who are 18-years-old or older. Assessment protocol, expense, materials, and length of setup may be additional inclusion factors that are considered, although the priorities of the practitioner and facility will ultimately define the specific selection criteria that will be accepted. Articles themselves should be published in 1990 or more recently to ensure only the most up-to-date and relevant information is appraised.

Exclusion Criteria:

Articles will be excluded from the CAT when any one of the inclusion criteria is not met or if they were published in a non-peer-reviewed journal. Additionally, while certain assessments designed to detect executive functioning skills may be useful for the ABI population, those that aimed to find significance of the assessment using a population with neurodegenerative disorders will be excluded from the CAT due to the differing nature in prognosis of these two conditions. Articles may also be excluded if they examine older versions of assessments that have since then been revised by the originator and have published evidence demonstrating improvement. Meanwhile, research methodology will be considered and articles may potentially be excluded from the CAT if the methodology is determined to be insufficient by these researchers.

Search Strategy: Step 1 & Step 2

Categories	Key Search Terms
Patient/Client Population	CVA, adult, ABI, TBI, cognitive impairment, rehabilitation, trauma, cerebrovascular accident, sub-acute, hospital, skilled nursing, inpatient, mild cognitive impairment
Assessment	MoCA, MMSE, DLOTCA, LOTCA, EFPT, FIM, KELS, NAT, Kettle Test, BEAM, Cooking Task, SAHS, evaluation, appraisal, instrument, tool, estimation, screen, assessment
Comparison	Validity, reliability, dependability, strength, sensitivity, predictability, specificity, inter-rater agreement, test-retest agreement, ease of use, clinical utility
Outcomes	Memory, attention, cognitive flexibility, reasoning, problem-solving, planning, cognition, awareness, thought, reasoning, cerebral, rational, activities of daily living, instrumental activities of daily living, ADL, IADL, functional performance
Databases and Sites Searched	
PubMed	
CINAHL	
Google scholar	
Elsevier ScienceDirect	
AJOT	
BJOT	
Primo	

Quality Control/Review Process:

The search began with a strategic selection of keywords that were entered in the respective databases. Combinations of words were chosen based on their relation to our step 1 question regarding ABI and/or TBI and the MoCA and our step 2 question on other cognitive assessments and the prediction of functional outcomes following discharge. Criteria were ultimately refined on the relevancy of results. Many of the database searches turned up a great number of potentially useful pieces of literature, however, most were rejected due to publication date outside of inclusion criteria cutoff (1990 or more recent), non-ABI diagnosis, neurodegenerative disorders, pediatric cases, or focus on other outcomes not directly relevant to our research question. For example, in a preliminary search, of over 1000 initial hits 17 articles were selected for brief review. Fourteen of those were subsequently dismissed due to other research question/outcome measures (seven), past the cutoff date (three), and non-ABI/TBI related diagnoses (four). The remaining three endured further analyses and were ultimately included in the CAT.

As our search developed and progressed further, it also underwent several peer and faculty reviews that provided us with additional feedback about how to further refine our questions and the criteria that outlined them. After the peer and faculty reviews were completed and the necessary changes were made, we scheduled an appointment to meet with our collaborating clinician. She provided us with her professional opinion of the direction our research was going and gave approval to move forward with step 2: knowledge translation.

Results of Search

Table 1. Search Strategy of databases. (Step 1 & Step 2)

Search Terms	Date	Database	Initial hits	Selected
"Acute care" "cognitive assessments"	10/9/16	AJOT	133	1
(MoCA) AND (occupational therapy) AND (TBI)	10/19/16	Google Scholar	605	1
(MoCA) AND (function)	10/19/16	Elsevier Science Direct	21	1
"Montreal Cognitive Assessment"	10/20/16	Primo	2,076	1

Toglia	10/15/16	AJOT	36	1
(MoCA) AND (prediction of ADL)	10/21/16	Google Scholar	1,100	2
MoCA AND discharge outcomes	10/21/16	Google Scholar	2,710	2
MoCA AND OT Functional Outcomes	10/21/16	Google Scholar	1,260	3
Montreal Cognitive Assessment cut-off score	10/18/16	Primo	44	1
Allen Cognitive Assessment	10/22/16	CINAHL	5	1
“Mini mental state examination” “systematic review”	10/22/16	PubMed	261	1
(Occupational therapy) AND (mild cognitive impairment)	11/5/16	Primo	74	1
Cognitive impairment assessments	11/7/16	AJOT	387	1
Assessments AND executive function AND Stroke	11/1/16	Google Scholar	84,500	1
Stroke-specific executive function assessment	11/1/16	Primo	40	1

OT AND (executive function assessment)	11/8/16	Primo	4,013	4
(Cooking task) AND reliability	11/6/16	Primo	9	1
ABI AND assessment AND occupational therapy AND cognition	11/8/16	Google Scholar	3,150	1
EFPT AND clinical utility	11/9/16	Google Scholar	128	1
Functional Cognitive Assessment for stroke	11/10/16	Google Scholar	235,000	1
Naturalistic Action Test	11/10/16	Google Scholar	156	1
(cognitive functional performance)	11/13/16	AJOT	493	1
Total number of articles used in review from database searches: 29				

***** Articles excluded because it came up in a different search or was already included in the CAT or did not meet inclusion criteria.

Total number of articles used in review from database searches = 29
Total number of articles used in review from citation tracking = 0
Total number of articles used in review from reference tracking = 0
Total number of articles used in review from UPS Master's Thesis = 0
Total number of articles used in CAT = 29

Summary of Study Designs of Articles Selected for the CAT Table

Pyramid Side	Study Design/Methodology of Selected Articles	Number of Articles Selected
Experimental	___Meta-Analyses of Experimental Trials _1_Individual Randomized Controlled Trials ___Controlled Clinical Trials ___Single Subject Studies	1
Outcome	___Meta-Analyses of Related Outcome Studies ___Individual Quasi-Experimental Studies _5_Case-Control Studies _1_One Group Pre-Post Studies	6
Qualitative	___Meta-Syntheses of Related Qualitative Studies ___Small Group Qualitative Studies ___Brief vs prolonged engagement with participants ___Triangulation of data (multiple sources) ___Interpretation (peer & member-checking) ___A posteriori (exploratory) vs a priori (confirmatory) interpretive scheme ___Qualitative Study on a Single Person	0
Descriptive	_2_Systematic Reviews of Related Descriptive Studies _21_Association, Correlational Studies _1_Multiple Case Studies (Series), ___Normative Studies _1_Individual Case Studies	25
AOTA Levels: 29 articles I- 3 article II- 8 articles III- 0 articles IV- 18 articles V- 0 articles		Total: 29 *Some articles were categorized twice

Author, Year	**Study Objectives**	**Study Design/Level of evidence**	**Participants: Sample size, Description, Inclusion & Exclusion criteria**	**Interventions & Outcome Measures**	**Summary of Results**	**Study Limitations**
Step 1: Montreal Cognitive Assessment studies						
Durant et al. (2016) DADM	Relationship b/w ADL-Q & MoCA	(Correlational) Level IV D2	*N* = 448, OP neurology clinic, female=43.7%, Caucasian=91%, *M* age =71.3. Parkinson's excluded.	Pearson correlation coefficients, ADL-Q, & MoCA	Weak correlation (r = -0.34; p < .001) b/w ADL-Q & MoCA. MoCA visuospatial/executive domain most predictive of ADL-Q score (B=-0.25; p < .001), followed by attention (B=-0.13; p < .001), language (B=-0.11; p < .001), & delayed recall (B=-0.085; p =.001). Naming & abstraction sections not statistically sig.	Low cultural generalizability (majority Caucasian participants) & self-report measures introduce a lower level of evidence.
Lim et al. (2016) BJ	Evaluate temporal stability & responsiveness of MoCA w/ ABI pts.	(Cohort) Level II O3	Chronic group = 40; presumably clinically stable, 1-year s/p ABI, Sub-acute group = 36; undergoing intensive rehab, 30.8 days s/p ABI Inclusion: moderate-severe TBI or CVA, <19 years-old Exclusion: brainstem CVA & psychiatric illness.	MoCA version 1 administered, followed by version 2 six wks later.	MoCA can detect reliable change across multiple administrations in ABI pts. Test-re-test coefficient 0.83. Practice effect (p = 0.009).	Pts who had prior experience w/ the MoCA were not excluded, 17-28% of the participants given English MoCA but English was 2nd language. Chronic group ABI severity was self-report.

Geubbels et al. (2015) JSC	Assess if cog functioning (using MoCA) is a predictive value in determination of d/c destination.	(Correlational) Level IV D2	*N* = 211, First-time CVA survivors, < 1wk post, hospital	Demographic & CVA-specific data, MoCA, BI	Age (B=-.05; $p < .01$) & BI (B=.33; $p < .001$) found significantly related to d/c destination (variance=43%). MoCA scores non-significant to improvement of model (variance=44%).	Limited information on methods/rigor of study in abstract. No mention of limitations in abstract.
Pendlebury et al. (2010) SJ	Examination of MoCA & its ability to pick up more cog abnormalities in pts w/ TIA or CVA.	(Prospective population-based cohort study) Level IV D2	*N* = 413 (223 CVA/190 TIA; *M* age = 69.9; 206 female). All pts w/ TIA or CVA, who were alive & seen for either 6mo or 5yr f/u b/w Nov 2007 until June 2009, were incl. Exclusion criteria incl. dysphagia, dementia, poor vision, poor English, unwell, coexistent neurological disorder, hemiparesis, learning disability, illiteracy, wrist fx, benign tremor, arthritis, deafness.	MMSE & MoCA were administered	291 pts w/ low MoCA (<26). 162 of these had normal MMSE (>27), whereas only 5 pts with normal MoCA (>26) had MMSE <27 (p <0.00001). Rankin scores sig ↓ in pts w/ MMSE >27 & MoCA >26 vs. those MoCA <26 those w/ MMSE <27 ($p < .001$). MoCA more sensitive to cog deficits than MMSE in pts w/ TIA & CVA.	Formal neuropsychological testing not performed, therefore, sensitivity & specificity could not be established. Reproducibility of MoCA not assessed.

Salvadori et al. (2013) JN	Investigate predictive effectiveness of MoCA in acute phase of CVA to diagnosis mid-term cog imp; clinical, cognitive, functional, neuroimaging predictors considered, & sensitivity, specificity, & predictive values MoCA were evaluated to identify pts at risk of cog imp.	(Case-Control) Level IV D2	*N* = 137 given MoCA. 80 followed-up. *M* age of 68.2, 66% male. Inclusion: CVA, 18+, spoke Italian.	MoCA to be administered 5-9 days post CVA in acute care. Clinical, cog, functional, neuroimaging data taken at baseline. Pts had follow-up at 6-9 months: neuropsychological & functional data collected & compared to MoCA score to determine sensitivity, specificity & its prediction of cog imp.	MoCA found to be a predictor of mid-term cog imp w/ 91.4% sensitivity at a cut-off score of 21. Was independent of clinical, neurological & functional characteristics. Was sensitive, specific (75.8%,) & had positive (80%) & negative (89.3%) predictive value.	Majority of sample were pts w/ a mild-to-moderate CVA. Norms for MoCA formed in U.S. Researchers felt they would not apply to Italian population. High dropout rate, primarily of pts w/ worst clinical condition could have changed the cog imp rate.
Toglia et al. (2016) ACRM (Poster Abstract)	Relationship b/w MoCA & IADL. Determine if MoCA at admission is an independent predictor of IADL function at d/c.	(Correlational) Level IV D2	*N* = 134 IP ischemic CVA rehab pts, *M* age = 67.5, NIHSS = 6.3, 9 days post-CVA, LOS = 14.5 days.	MoCA, EFPT-b, AMPAC-AC, FIM, & NIHSS. Spearman correlations b/w MoCA & IADL & logistic & multiple linear regression to predict IADL measures.	EFPT-b & AMPAC-AC moderately correlated (r=-.47, p=.000), admission MoCA moderately associated w/ EFPT-b (r=-.63, p=.000) & AMPAC-AC (r=.48, p=.000). Weaker relationship w/ higher MoCA scores. MoCA & age significant predictors of IADL measures > FIM & NIHSS.	Comparison assessments not interchangeable (EFPT-b & AMPAC-AC). Relationship identified strongest w/ MoCA scores <22 decreases generalizability.

Waldron-Perrine et al. (2012) IJGP	To determine appropriate cut-off score for indication of cog impairment of MoCA.	(Cohort) Level IV D2	*N*= 185 veterans 95% male, 59% white, 41% African American, *M* age = 70	MoCA, MMES, NAART, FSIQ, CVLT-II, COWA & Trails B administered.	Previous score of <26 or 23 may characterize people without cognitive impairment as having deficits. ≤20 more appropriate cutoff score (1SD = 0.843).	May not generalize to other populations. Educational level was not taken into consideration.
Van Der Wijst et al. (2013) BJOT	Explore MoCA & its relationship w/ occupational performance in pts following mild CVA.	(Cross-sectional study) Level IV D2	*N* = 29 (*M* age = 68yo; 19 male). Pts had to have been admitted to neurology ward of hospital & w/ dx of mild CVA (no motor problems due to CVA or independent in personal hygiene) or TIA. Singular exclusion criterion was inability to complete MoCA or AMPS due to an inability to speak Dutch, aphasia, or severe cog deficits.	Pts assessed using MoCA & AMPS.	Mod & sig correlation b/w MoCA & AMPS process skills (r = 0.62; p = 0.000). MoCA identified 4 participants w/o problems in occupational performance correctly & failed to identify 16 (AMPS process skills), 9 (AMPS motor & process skills), or 14 (categories of overall functioning). This indicates it is not possible to use MoCA as screening tool to identify people w/o problems in daily functioning post-mild CVA.	Use of cross-sectional design. Study took place in 1 hospital w/ limited # of participants, which could limit generalizability; bias could have been caused by 1 person classifying participants into categories of overall functioning. All AMPS assessments were done in hospital environment.

Author/Year	Study Objectives	Study Design/Level of evidence	Participants: Sample size, Description, Inclusion & Exclusion criteria	Interventions & Outcome Measures	Summary of Results	Study Limitations
Step 1: Montreal Cognitive Assessment compared to other assessments						
Dong et al. (2013) BMJ-Open	Investigate the prognostic value of neuro cog status measured by MoCA & MMSE individually & in combination w/ NIHSS, obtained @ the sub-acute CVA phase or baseline (≤2 weeks), for functional outcome 3–6mo post.	(Prospective observational study) Level IV D2	*N* = 400 pts (≥ 21 years old) (69.8% male, w/ *M* age of 59.8) admitted to IP hospital unit for recent ischemic CVA or TIA. Pts excluded if they had a major physical disability or active psychiatric disorder.	Measures used were NIHSS, mRS (premorbid & baseline functioning), MMSE & MoCA @ baseline.	MMSE, MoCA &NIHSS individually predicted a small portion of variability in mRS scores @ 3–6mo s/p CVA (R^2 changes of 0.012, 0.007 & 0.043, w/ p = 0.004, 0.029 & <0.001, respectively). Statistically sig baseline MMSE & NIHSS scores contribute a small amt to the prediction of functional outcomes. Baseline MoCA scores did not (MMSE: R^2 changes = 0.006, p = 0.03; MoCA: R^2 changes = 0.004, p = 0.083).	May not generalize as majority of pts had less severe CVA. Employed cog screening tests @ baseline rather than formal neuropsychological assessments. Did not examine rehab services systematically.
Godefroy et al. (2010) SJ	To assess the value of the MoCA & the MMSE to detect post-CVA cog imp.	(Correlational) Level IV D2	*N* = 95 pts w/ acute CVA were included (Males = 60) (infarct = 88, hemorrhage = 7) Exclusion criteria: severe general & neurological conditions including illiteracy, mental retardation, mother tongue other than French, schizophrenia & psychosis, previous severe TBI, & absence of informed consent.	MoCA & MMSE administered during acute phase < 3 wks. s/p CVA. 49 pts administered MMSE first. Comprehensive neuropsychological assessment administered to pts who scored at or below 23 on MMSE.	MoCA good sensitivity (0.94), moderate specificity (0.42), & positive predictive value, 0.77 (negative, 0.76). Opposite found for MMSE: moderate sensitivity (0.66), high specificity (0.97) & a positive predictive value (0.98, negative, 0.58).	Inter-rater reliability/ absent, qualifications of researchers/who provided the assessments absent. No blinding. Authors adjusted recommended cutoff scores for MoCA to accommodate their larger sample size.

Sweet et al. (2011) IP	Eval psychometric characteristics of MoCA as a screening tool w/ pts participating in a specialized IP geriatric rehab program, & association between mental status, as measured by MoCA, & rehab outcome.	(Correlational) Level IV D2	*N* = 47 pts (*M* age = 83.5; 68% female) admitted to geriatric IP rehab unit for neuro conditions (19%), medically complex conditions NOS (11%), & cardiac issues (4%). Pts w/ aphasia, a dx of delirium upon admission, & those who could not effectively communicate in English were excluded.	MoCA, MMSE & cog/motor FIM were administered. Another outcome measures incl. CIRS & GDS.	Results suggest MoCA can have a considerable advantage over MMSE in sensitivity & equivalent specificity if both total score & attention score (β = -0.55, *t* = 2.52, *p* < .05) are used. MoCA may thus be a more useful measure to assess a wide range of cog impairment & predict rehab outcomes in a geriatric rehab pop.	No neuropsychological testing employed. No short/long term f/u @ this time. Potential bias from non-randomization + inclusion of convenience sample.
Toglia et al. (2011) ACRM	Compare MMSE & MoCA in classifying cog impairment & relationship b/t admission & d/c functional status & improvement.	(Retrospective analysis of data) Level IV D2	*N* = 72 inpatient, 53% female, *M* age = 70, median time post-CVA = 8.5 days w/ mild cog deficits (MMSE median score = 25). Inclusion: 18+, tolerates 3hr therapy/day.	MMSE & MoCA used for cog status at admission & mFIM at d/c.	MoCA classified 89% of cog imp individuals vs. MMSE (63%), attained higher internal reliability (*a* =.78), & marginally stronger associations w/ d/c functional status (*r* =.40; *p* <.001) than MMSE (*r* =.30; *p* <.05). MoCA visuo-executive strongest predictor of functional status (*p* =.01) & improvement *p* =.02	Low generalization (majority white individual's w/ high mean education levels) & no neuropsychological testing conducted (limits sensitivity of MoCA).
Wong et al. (2013) PLoS One	Compare MoCA to MMSE in screening for cog imp.	(Correlational) Level IV D4	*N* = 74 (assessed at 2-4wks) *N* = 80 (assessed at 1 year) Inclusion: 21-75 yr., 96 hrs s/p spontaneous ASH, Chinese speaker. Exclusion: previous CVA, or neurological disease.	MoCa & MMSE given 2-4wks & 1 yr. s/p ASH.	MoCA more sensitive to cog imp (92%) than MMSE (77%).	Cog domain was treated as a unitary construct rather that a collection of different cog abilities. Did not address the different number of pts b/w two administrations.

Author, Year, Journal Abbreviation	**Study Objectives**	**Study Design/ Level of Evidence**	**Number of Papers Included, Inclusion and Exclusion Criteria**	**Interventions & Outcome Measures**	**Summary of Results**	**Study Limitations**
Step 2: Systematic Reviews						
Belchior et al. (2015) OJOT	Identify performance-based tools where psychometric properties have been evaluated w/ mild cog imp population.	(Systematic Review) Level I D1	9 performance-based tools assessing functional performance were evaluated. Inclusion: published in English, peer-reviewed, measurement tool in English, ecologically valid performance-based functional tool, & psychometric properties w/ mild cog imp populations.	Reliability and validity of tool, clinical utility & responsiveness to change.	No tool included all requirements of applied error analysis, considered all operations of EF, complex IADL and administered in home/community setting. Thus, no tool recommendations made. Research underway to identify elements that need to be taken into consideration when choosing a tool.	Quality of content or development process not addressed, did not search for unpublished studies, mild cog imp subtypes varied by study, & search may have missed studies.
Van Heugter et al. (2015) CR	Systematically review convergent, criterion, & predictive validity of multi-domain cog screening tools wks. s/p CVA.	(Systematic Review) Level I D1	51 studies investigating 16 cog screening tools Inclusion: CVA population, assessing cog function, less than 4wk s/p, multi-domain, < 1 hr. needed to administer.	ACE-R, AMT-4, ABS, COCONUTS, NCSE, Cog-4, FIM-cog, HCFD, LOTCA, MMSE, 3MS, RBANS, SINS & SPMSQ administer < 4 wks. s/p CVA.	None of existing fill all criteria. MoCA had highest criterion validity when accompanied w/ speed of information measures. MMSE had lowest criterion validity. Resulting in no identifying pts w/ a cog imp.	Excluded subarachnoid hemorrhage, TIAs, lacunar CVA & TBI populations

Author, Year, Journal Abbreviation	**Study Objectives**	**Study Design/ Level of Evidence**	**Participants: Sample Size, Description Inclusion and Exclusion Criteria**	**Interventions & Outcome Measures**	**Summary of Results**	**Study Limitations**
Step 2: Functional/ Performance-based cognitive assessments						
Baum et al. (2016) NR (*Abstract)	Examine relationships b/w EFPT, NIH Toolbox Cognitive Function tests, and neuropsychological EF measures.	(Correlational) Level IV D2	*N* = 182 pt's w/ TBI *N* = 46 healthy control individuals	EFPT, NIH Toolbox Cognitive Function tests, and TBI-QOL administered to both groups.	Construct validity: moderate correlation (composite: $r = -.496$). Discriminant validity: significant differences in EFPT & sequence scores for control, mild/moderate, and severe TBI. TBI and control had lower safety/judgment scores. Predictive validity: EFPT predicted self-perception of I measure by TBI-QOL (beta = −0.49, $p < .001$) for the severe TBI group.	Abstract does not provide sample *N* for each TBI group (complicated mild/moderate & severe).
Baum et al. (2008) AJOT	Examine reliability, validity, & clinical utility of EFPT in pts w/ CVA.	(Cohort Study) Level II D2	CVA: *N* = 73 (18 male; *M* age = 64.36) 6mo post-CVA. Control: *N* = 22 (6 male; *M* age = 59.45). Pts w/ CVA were divided into 2 grps on basis of admission score on NIHSS.	EFPT (cooking, using telephone, medications, paying bills); FIM, FAM, NIHSS, Short Blessed Test. Neuropsychological tests: Animal Naming; Trail making Test; Wechsler Memory Scale–Revised; Logical Memory Total Recall Test.	EFPT is a reliable & valid assessment of executive function abilities in people w/ mild to moderate CVA. (Total EFPT score ICC = .91, & subtest ICC scores = .94 cooking task, .89 paying bills, .87 managing medication & .79 using telephone. Coefficients indicative of high levels of inter-rater reliability.)	No limitations mentioned by authors. Details omitted from write-up (i.e. study design, intervention setting, exclusion criteria, drop outs, limitations).

Bennett et al. (2005a) JINS	Comparison of BADS with other clinical neuropsychological measures of ED.	(Within-subjects design) Level IV D2/O4	*N* = 64 (47 males, *M* age = 32.72, mean education level = 12 years) Inclusion: spoke English, post TBI & able to complete motor/cognitive assessments.	WCST, PORTEUS, TMT & COWAT administered 1-wk after BADS & DEX	No one single test can be used to assess ED. A battery of tests supplemented by qualitative information is recommended. Action program Test predictor of OT administered DEX ($p < 0.001$).	14 additional variables needed to be added to explain DEX variance. Convenience sample might not be representative.
Bennett et al. (2005b) JINS	Analyze the usefulness of FM-DEX (subtest of BADS) ratings as indicator of executive dysfunction in pts w/ TBI. Also, determine sensitivity of BADS to executive dysfunction, as measured using the NP- and OT-DEX scores.	(Cohort Study) Level II D2	*N* = 64 pts w/ TBI. *M* age = 33, 47 male. All but 5 pts seen w/in 1yr post-injury, 48 remained hospitalized @ time of assessment. Tx took place over 10mo. Participants were excluded from study if they did not speak fluent English or were cognitively unable to undertake a formal assessment.	Subjective reports of executive dysfunction: DEX, eDEX (4 respondent groups—pt, family member, neuropsychologist (NP-DEX), OT (OT-DEX)). Neuropsychological measures: SDMT, EST-IQ, NART, BADS (subtests)	All DEX scores were strongly associated (.96–.98) w/ corresponding scores on eDEX. DEX & eDEX ratings from both professional grps were mod associated w/ the duration of post-traumatic amnesia. NP- & OT-DEX ratings were moderately associated w/ impaired processing speed & length of post-traumatic amnesia, both good predictors of outcome following TBI. One/ two subtests from BADS may be just as sensitive to executive function as is the entire battery.	Use of a relatively acute sample and pure TBI dx. No study design, reliability, or other limitations mentioned.

Blake et al. (2002) Age and Ageing	Assess sensitivity & specificity of a screening battery for detecting cognitive impairment after CVA.	(RCT) Level I E2	*N* = 112 (*M* age = 70.8; 64 male) CVA pts were recruited w/in 4wks of admission to hospitals in Nottingham, Derby, & Mansfield UK. Pts excluded if unlikely to survive, could not sit & cooperate w/ assessments for 30min @ a time or had sig visual or hearing impairment. After screening assessment, pts randomly allocated to 1 of 2 grps. Intervention grp received detailed cog assessment.	MMSE, SST, RCPM.	MMSE not a good screening tool to detect memory problems post-CVA. SST is a useful screening measure for language problems. RCPM found to be a sensitive & specific measure of visual inattention & spatial perception deficits.	Pts did not complete all cognitive assessments. Assessments done on pts selected for a RCT & may not be representative of all CVA pts admitted to hospital. Pts excluded if they could not tolerate assessment though may have had cog imp. Unable to tell if all cog deficits were consequence of CVA and not pre-morbid.
Cooke et al. (2006) ScanJOT	Assess construct validity (scale design & convergent validity) & ecological validity of OT-APST.	(Cohort Study) Level II D2	*N* = 208 range 2 – 451d post-CVA, *M* age = 70.4 & 57.7% female. Inclusion criteria: dx of a first/ subsequent CVA. Exclusion criteria: unable to use either hand for assessment task completion; visual impairment, auditory problem(s); limited comprehension of English; dx of dementia, psychosis, depression & neurological event during tx. HC grp: *N* = 356 *M* age = 63.7.	OT-APST, MMSE Functional I measure: MBI, FIM Reference tools: LOTCA, LOTCA-G.	Sig correlations observed b/w six of seven OT-APST subscales & FIM motor scores @ *p* </0.01 level & all seven OT-APST subscales & FIM cog scores @ *p* </0.01. Sig negative correlations (*p* </0.01) were also observed b/w time taken by pts to complete OT-APST & both FIM scores, indicating more severe functional disability associated w/ ↑ length of time to complete OT-APST.	Sample is potentially not representative of total CVA population, limiting generalizability of results. Tests in most instances administered by same examiner who was not blinded to results of the first assessment. The results may therefore include an element of examiner bias.

Demeyere et al. (2015) APA	Examine OCS & its ability to address problems in different cognitive domains as well as to measure deficits that occur after stroke & to avoid confounding effects from cog imp.	(Cohort Study) Level II O3	A consecutive sample of 208 acute-CVA pts (*M* post-CVA = 6.6d; *M* age = 71.1; 94 female; 101 R-side lesion) Inclusion criteria were: pts should be w/in 3wks of CVA & able to concentrate for 15min. 140 neurologically healthy pts were assessed (*M* age = 65; 82 female).	Validation tasks: MOCA picture naming, orientation, clock total, trails; PALPA 47-word picture matching; CAT-calculations page; BDAE reading; BIT star cancellation; BCoS imitation task; Welchsler delayed memory. OCS (14 subtests)	OCS found to have significant test–retest alternate form reliability on all subtests; high sensitivity, except for the basic comprehension task & calculation task. Specificity was high throughout. OCS may also be useful to differentiate different classes of patients even w/in some domains.	Normative data and cut offs for impaired scores on the OCS based on sample of 140 neurologically healthy controls. Some effect of age and years of education may exist. Verbal recall measure of OCS does not have a normative cut-off.
Katz et al. (2012) AJOT	Examine psychometric properties of DLOTCA & identify most frequent level of mediation used for planning for intervention.	(Comparative Study) Level II D2	*N* = 83 pts hospitalized following first CVA entered the study consecutively (*M* age = 57.7). *N* = 45 volunteer healthy control pts (*M* = 62.67). Inclusion criteria: a score above cutoff point of 24 for dementia on MMSE; age <70 yr; for CVA clients, first stroke w/ no previous neurological or psychiatric illness; & for healthy control pts, no previous neurological or psychiatric illness.	DLOTCA	Sig correlation on most subtests before mediation, $p < .05$ = HC pts performed better than CVA pts. Sig differences seen on domains of Orientation, Visual and Spatial Perception, and Praxis @ $p < .05$ before mediation & in Visuomotor Construction & Thinking Operations domains; Time sig @ $p < .01$, showing CVA pts needed ↑time to accomplish tasks. Study provides level of cog performance along different domains & potential for change for each individual & starting point for intervention.	Inter-rater reliability assessed on only 10 pts, & the number could be larger. Sample size is small for test standards, so results have to be regarded as first indications. Healthy control pts had, on average, fewer years of education, a variable that has been found to be sig correlated w/ most of the domains. Therefore, grp is not an ideal control group. The pt population included only people after CVA; thus, data cannot be generalized to other neurological groups.

Hartman-Maeir et al. (2009) AJOT	Examine reliability and validity of Kettle Test.	(Correlational) Level IV D2/O3	Reliability study: *N* = 21 pt's w/ CVA, <1mo post-CVA, >60yo (*M* age = 79.3), lived I before CVA. Validity study: *N* = 36 pt's w/ CVA, <1mo post-CVA, >60yo, lived I before CVA.	Inter-rater reliability: 4 certified and experienced OT practitioners (2 from ea. hospital) rated pt performance on Kettle Test. Validity: battery of standardized measures (MMSE, CDT, Star Cancellation, CognFIM, IADL scale, Safety Rating scale, FMA). Administered w/in last wk. before d/c. 1mo after, caregivers were interviewed on IADL performance.	Inter-rater reliability: (*r* = .851/.916, *p* = .001/.000 in ea. hospital respectively). Construct validity: large significant group effect (*F* [1,60] = 63.53, *p* = .001). Convergent validity: 4 cognitive domains ranged from .478 to .659 (*p* < .01). Ecological validity: significantly correlated w/ 3 outcome measures (FIM motor: *r* = -.759, Safety: *r* = -.571, and IADL 1mo post d/c: *r* = -.505).	Study tested in IP rehab, small sample size (did not enable multiple regression analysis), does not differentiate severity of CVA.
Poncet et al. (2015) NR	Establish internal consistency, inter-rater and test-retest reliability of CT in individual's w/ ABI.	(Correlational) Level IV D2/O3	*N* = 160 pt's w/ ABI involving frontal lobes/pathways, moderate to severe EF deficits. Exclusion: pre-existing psychiatric disorders, intellectual deterioration, and/or sensory motor impairments.	Pt's performed CT w/ 2 raters present. Pt's had max 2 hrs to complete task. Observed errors documented into descriptive categories (Additions, Omissions, Commentary, Inversions, Estimation) & neuropsychological errors.	Mean duration of task: 63.3 minutes. Internal consistency: large correlations b/w "Additions," and "Environmental Adherence," (.85) and "Purposeless Actions" (.71). Inter-rater reliability good (.65) to excellent (.95). Test-retest reliability low (.36) to good (.65/6).	Long administration time for acute care, test-retest portion of study had small sample, potential bias (3 OT practitioners performing intervention designed task), complex scoring system.

Robnett et al. (2016) Occup Ther Health Care	Investigate comparison of SAH outcome scores w/ KELS regarding home safety awareness & capacity of individuals' w/ ABI.	(Correlational) Level IV D2	*N* = 31, ages 18 to 64yo w/ ABI, living in New England. Exclusion: legally blind, severe attentional or behavioral issues, or severe motor impairments.	Prior to testing, OT practitioners predicted outcomes of pt's using two 10-point scales (poor to perfect and dependent to independent). KELS & SAH administered. Participants completed pre/post-test self-prediction measures.	SAH & KELS outcomes moderately correlated (Spearman's *rho* = −.53; *p* = 0.002). OT predictions (assistance & safety level) & SAH outcomes moderately correlated (Spearman's *rho* = .629, *p* = 0.002 and Spearman's *rho* = .583, *p* = 0.004 respectively).	Small sample size, low generalizability, & variety of severities of ABI not distinguished b/w. SAH is not yet widely used & further testing is needed.
Schwartz et al. (2016) AJOT	Assessment of the psychometric properties of the FLOTCA.	(Cohort design) Level II O3	*N* = 25 w/ TBI, *M* age = 25.12. Inclusion: 4 or 5 on each item of DLOTCA, 18-50 yr., ≥8 yr. education & read/write Hebrew. *N* = 25 matched participants, *M* age = 25.28.	FLOTCA administered to TBI & matched pts.	FLOTCA had high inter-rater reliability (0.996) & internal consistency (α = 0.82). Can be used to assess higher cog functioning.	Conflict of interest—Schwartz & Sagiv created the FLOTCA and administered it to the pts. Small sample size.

Schwartz et al. (2002) NR	Part 1: Determine NAT's psychometric properties. Part 2: Assessment of NAT's predictive validity relative to FIM & attention measures.	(Cohort design) Part 1 Level IV D2/O3 Part 2 Level IV D3	*N* = 100 CVA/TBI (25) participants, *N* = 28 controls Inclusion:18-80yo 6mo post L/RCVA or TBI and no psychiatric diagnoses. Part 2: *N* = 48/ initial 100 (CVA = 37 & TBI = 11)	Part 1: NAT, attention battery, SART & Dual Task Tests administered 2-5 prior to inpatient discharge. Part 2: IADL interview	Part 1: NAT correlated with Star Cancellation Test (LCVA: *r* = 0.68, RCVA: *r* = 0.57 &TBI: *r* = .50) & DT Baseline (LCVA: *r* = -0.72, RCVA: *r* = -0.65 & TBI: *r* = -0.48). Did not correlate w/ working memory. Part 2: Discharge NAT score correlated w/ IADL 4-6 post discharge (*r* = 0.58, *p* < 0.001).	Variable *Ns* throughout study due to discharge, medical conditions & scheduling. Younger mean age for TBI participants, more males in TBI group.
Zwecker et al. (2002) ACRM	Compare 3 cog assessments (MMSE, Cog FIM, LOTCA) used @ admission for predicting d/c functional outcome and & assess their efficacy in doing so for CVA pts undergoing rehab.	(Correlational) Level II D2	*N* = 66 pts (49 men; *M* age = 72 +/- 8.9) undergoing acute IP comprehensive rehab after 1st clinical CVA. All pts admitted to CVA unit of geriatric neuro rehab dept from acute care following stabilization, usually w/in 1wk after CVA onset & assumed to be able to benefit from rehab. Pts w/ sig difficulties in language expression/ comprehension/severe dementia excluded.	Cog status assessed w/ LOTCA, MMSE, & cog subscale of the FIM instrument. The FIM motor subscale used to assess functional outcome status.	Sig ↑ in total FIM scores (34.8 points, *p* < .001) occurred during rehab. Sig ↑ in global cog status documented by all 3 tests. Interest correlation coefficients ranged b/w .47 & .67. LOTCA showed somewhat higher correlation coefficients. LOTCA is slightly better than MMSE or FIM cog subscale in predicting functional status change after CVA rehab.	No limitations addressed by authors. Inter-rater reliability & qualifications of researchers who provided assessments absent. No blinding mentioned.

Abbreviations

ACE-R: Addenbrooke's Cognitive Examination Revised

ADL-Q: Activities of Daily Living Questionnaire

AIMPB: Adult Memory and Information Processing Battery

AMPAC-AC: Activity Measure for Post-Acute Care- Applied Cognition

AMT-4: Abbreviated Mental Test-4

ASB: Assessment of Stroke and other Brain damage

ASH: Aneurysmal Subarachnoid Hemorrhage

BADS: Behavioural Assessment of the Dysexecutive Syndrome

BCoS: BCoS Cognitive Screen

BDAE: Boston diagnostic aphasia examination

BI: Barthel Index

BIT: Behavioral Inattention Test

b/w: between

CIRS: Cumulative Illness Rating Scale

COCONUTS: Comprehensive cognitive neurological test in stroke

Cog: cognitive

Cog FIM: cognitive FIM instrument

Cog imp: cognitive impairment

Cog-4: National Institute of Health Stroke Scale

COWA: The Controlled Oral Word Association

COWAT: Controlled Oral Word Association Test

CT: Cooking Task

CVA: cerebral vascular accident

CVLT-II: The California Verbal Learning Test

d/c: discharge

dept: department

DEX: Dysexecutive Questionnaire

DLOTCA: Dynamic Loewenstein Occupational Therapy Cognitive Assessment

EF: executive function

EFPT-b: Executive Function Performance Test- form b

FIM-cog: Functional Independence Measure-cognitive subscale

FLOTCA: Functional Loewenstein Occupational Therapy Cognitive Assessment

Freq: frequency

f/u: follow-up

FSIQ: The Overall Functional Scale IQ

GDS: Geriatric Depression Scale

HC: healthy controls

HCFD: Higher Cortical Function Deficit Tests

hr.: hour(s)

IP: inpatient

LOTCA: Loewenstein Occupational Therapy Cognitive Assessment

LOTCA-G: Loewenstein Occupational Therapy Cognitive Assessment-/Geriatric Version

3MS: Modified Mini-Mental State Examination

MBI: Modified Barthel Index

MCI: Mild Cognitive Impairment

mo: month(s)

MoCA: Montreal Cognitive Assessment

MCET: Modified Cognitive Estimate Test

MMSE: Mini Mental Status Examination

Mod: moderate

MRFS: Montebello Rehabilitation Factor Score

mRS: modified Rankin Scale

NAART: North America Adult Reading Test

NART: Shortened National Adult Reading Test

NAT: Naturalistic Action Test

NCSE: Cognitive Status Examination

Neurorehab: neurologic rehabilitation

NIHSS: NIH Stroke Scale

OCS: Oxford Cognitive Screen

OP: outpatient

OT-APST: Occupational Therapy Adult Perceptual Screening Test

PALPA: Psycholinguistic assessments of language processing in aphasia

PORTEUS: Porteus Maze Test

PSCI: Post-stroke cognitive impairment

RBANS: Repeatable Battery for the Assessment of Neuropsychological Status

RCPM: Raven's Coloured Progressive Matrices

SAH: Safe at Home Screening

Sig: significant

SINS: Screening Instrument for Neuropsychological Impairment in Stroke

SOMSQ: Short Portable Mental Status Questionnaire

SORT: Salford Objective Recognition Test

SST: Sheffield Screening Test for Acquired Language Disorders

s/p: post

TBI: traumatic brain injury

TIA: Transient Ischemic Attack

TMT: Trail Making Test

Trails B: The Trail Making Test

TTT: Tinker Toy Test

Tx: treatment

WCST: Wisconsin Card Sorting Test

Summary of Key Findings:

Summary of Experimental Studies

Step 1

- N/a

Step 2

- Blake et al. (2002) presented moderate evidence to support the statement that the MMSE is not always sensitive and predictive of memory problems post-CVA. SST is a useful screening measure for language problems, though, may be best if used by an SLP. RCPM found to be a sensitive & specific measure of visual inattention and spatial perception deficits.

Summary of Outcome Studies

Step 1

- The MoCA administered during the acute phase was determined to be a better predictor of cognitive impairment than MMSE for individuals 1-year post-stroke and was found to be an adequate assessment to use for test-re-test purposes according to Lim et al. (2016).
- The visuospatial/executive cognitive domain of the MoCA was determined to be the strongest predictor of an individual's ADL-Q total score (Durant et al., 2016).

Step 2

- The FLOTCA, while not commercially available yet, consists of functional activities and is a useful/valid assessment when determining cognitive impairment. Additionally, educational level has no influence on the score of the FLOTCA, where educational level is a factor that influences a person's MoCA score (an additional point is added if the person has 12 years of education or fewer) according to Schwartz et al. (2016).
- OCS is derived to be aphasia friendly, meaning data can be collected even in patients with aphasia (Demeyere et al., 2015).
- NAT discharge score was found to be correlated with IADL function post discharge. Meaning, a higher number of errors is correlated with lower IADL function (Schwartz et al., 2002).
- The LOTCA is slightly better than the MMSE and the FIM cognitive subscale in predicting functional status change in individuals after stroke rehabilitation according to Zwecker et al. (2002).
- Bennett et al. (2005a) determined no single test should be used to determine executive function. The BADS Modified Six Elements Test and Action Program Test are recommended subtests when determining executive function.

Summary of Qualitative Studies

- N/a

Summary of Descriptive Studies

Step 1

- Geubbels et al. (2015) determined that cognitive functioning, as measured by a single screening instrument such as the MoCA, in the acute phase after stroke is not predictive of discharge destination.
- The MoCA is a sensitive and specific predictor of PSCI (Salvadori et al., 2013).
- Brief cognitive screening tests during acute admission in patients with mild stroke can predict significant cognitive impairment 3 to 6 months after stroke (Dong et al., 2013).
- Durant et al. (2016) found that low scores on the MoCA, among patient's presenting for memory complaints, should raise concerns about functional decline and prompt further assessment of functional ability. Additionally, they found the visuospatial/executive functioning domain to be the most predictive of functional ability.
- Pendlebury et al. (2010) concluded the MoCA can identify substantially more cognitive abnormalities after TIAs and CVAs than the MMSE.
- MoCA and age at admission contribute to the prediction of IADL measures and FIM at ISR discharge when stroke severity and disability are controlled (Toglia et al., 2016).
- For individuals who received a MoCA score between 21-25, IADL performance is highly variable and cannot be reliably predicted by the MoCA. Additionally, scores greater than 26 may over pathologize normal individuals as abnormal (Toglia et al., 2011; Waldron-Perrine et al., 2012).
- Adequate performance on the MoCA does not preclude the presence of functional impairments in IADL according to Van Der Wijst et al. (2013).
- Strong evidence supports that the MoCA may be an important cognitive screening tool of moderate cognitive impairment for persons with stroke and other cognitive dysfunctions on an acute rehabilitation unit (Godefroy et al., 2010; Toglia et al., 2011; Van Heugter et al., 2015).
- Cutoff scores determined for the MoCA did not identify individuals who might experience problems in daily functioning after a mild stroke. Therefore, using the MoCA as a screening tool to identify problems in occupational performance after mild stroke may not be appropriate (Godefroy et al., 2010; Van Der Wijst, 2013).
- There is strong evidence to support that the MoCA is more sensitive than the MMSE and may be a more useful measure for detecting cognitive impairment in addition to predicting rehabilitation outcome in a geriatric population (Sweet et al., 2011; Toglia et al., 2011; Van Heugter et al., 2015; Wong et al., 2013).

Step 2

- The EFPT is a reliable and valid assessment of executive function abilities in people w/ mild to moderate CVA. It also found found that individuals w/ mild TBI performed worse on the medication subtask compared to healthy control individuals (Baum et al., 2008).

- The EFPT is moderately correlated to the NIH Toolbox according to Baum et al. (2016).
- The DLOTCA is effective in providing insight into whether participants need services and the level and type of assistance they require. It also provides guidance for planning intervention for people with cognitive disabilities as recognized by Katz et al. (2012).
- Poncet et al. (2015) identified moderate test-retest results of the Cooking Task that recommend the tool to be used to detect executive function disorders during daily life activity, rather than use to document improvement in patients with ABI.
- The OT-APST demonstrates ecological, convergent, and construct validity in the identification of perceptual problem in patients with stroke according to Cooke et al. (2012).
- Robnett et al. (2016) reported outcomes identified by the SAH are moderately correlated with outcomes identified by the KELS related to independent living and home safety post discharge.
- There is not enough evidence to support the recommendation of a performance-based cognitive assessment and no one tool has all the necessary components to identify mild cognitive impairment (Bennett et al., 2005; Belchior et al., 2015).
- Evidence found by Hartman-Maeir et al. (2009) highly supports construct validity, face validity, and inter-rater reliability of the Kettle Test. Additionally, upon admission it was found to be significantly correlated with functional outcomes at the time of discharge. The Kettle Test can be used in diverse settings; it is short, easy to learn and administer, and provides meaningful information regarding independent living.
- DEX can be used in an acute rehabilitation setting with some confidence as a screening instrument to identify executive dysfunction, provided it is completed by professional personnel, trained to be sensitive to the cognitive and behavioral concomitants of this disorder (Bennett et al., 2005b).

Implications for Consumers:

For individuals living with cognitive impairments as a result of ABI, the varying associated deficits can have a lasting impact on their ability to return to complete independence which may, in turn, negatively affect their quality of life. Given the above research highlights the importance of a complete cognitive evaluation, client's and their families should request additional occupation-based assessments if they are told the MoCA score indicated mild or no cognitive impairment. This may seem like an overwhelming request, but it is important to determine if higher level cognitive functions are impaired that could have significant ramifications in the long term. In other words, these milder impairments have the potential to manifest in ways that compromise performance in daily roles and occupations, much like moderate or severe cognitive impairments, even though the MoCA results do not indicate that there is cause for concern. It is for these reasons that upon discharge, the client and their family should be educated and given information on what to look for regarding possible signs of cognitive impairment in the home and community setting. They should also be advised to request a referral to an occupational therapist if they suspect any issues. In many

cases, it is difficult to determine which cognitive deficits will have the greatest impact until a person returns to their daily life at home and at work. Clients and their families should be provided with community resources and information on how to request a referral after discharge if necessary.

Implications for Practitioners:

A patient's cognition is often assessed using the MoCA or MMSE at bedside in the acute care setting. If the results of the screen show that the patient has moderate or severe ABI, the typical treatment plan and interventions for cognitive rehabilitation should be followed. If the screen(s) report no impairment, the OT should complete further testing by administering a more sensitive occupational-based cognitive assessment. This step is recommended based on the assertion that both the MoCA and MMSE have been shown to have limited sensitivity needed to detect mild cognitive impairment. A follow-up assessment can assist the clinician in determining whether or not cognitive impairment is present, as well as its severity. In addition, a clinician utilizing the MoCA should consider evaluating the patient's performance relative to that of other patients of a similar background and educational level. Doing so allows the practitioner to provide a more objective assessment by taking into account the client's prior level of function. Currently, the developers of the MoCA have advised that 26 be the cutoff for determining presence of cognitive impairment, but some researchers have found this score to be too high and suggest that a cutoff score of ≤20 may be more appropriate.

Occupationally-based assessments such as the EFPT, KT, NAT, etc., are appropriate next step assessments. However, although promising, they are accompanied by incomplete psychometric data. The NAT, which assesses learned, sequential, object-oriented behaviors in the service of everyday goals, has been found to be useful because it is scored for steps accomplished (i.e., not omitted) and for recognizing errors. The LOTCA is an acceptable choice for an OT to use to determine a patient's cognitive status. However, it takes around 30-45 minutes to administer the entire test battery, is not truly functional, and cannot easily be done at the patient's bedside. By comparison, the WCPA is a recently developed assessment (2015) by Dr. Joan Toglia that has shown great promise in the identification and measurement of cognitive impairments for individuals with ABI. It is reasonably administered at bedside if needed and time required for completion ranges from 15-45 minutes. Despite this, due to its relative infancy by assessment standards, at this time a significant body of evidence does not yet exist pertaining to validity, reliability, and other psychometrics.

In summation, when evaluating individuals with suspected mild cognitive impairment, an OT should use occupation-based assessments that look at higher cortical executive functions, such as processing speed and memory, if the MoCA indicates no significant cognitive impairment.

Implications for Researchers:

First and foremost, there is a need for more research regarding the evaluation of mild cognitive impairment. Of additional importance, older occupation-based assessments need to be updated to assess more contemporary challenges (e.g. the use of technology for information access), and secondarily, new occupation-based assessments need to be developed to meet the current demand. Currently, occupational therapists in acute care are using assessments that may not be fully applicable to their populations (e.g. using checkbooks in a money management assessment with a client who uses online bill paying), skilled observation, and screens to determine a patient's level of cognitive impairment. This poses several problems. In some cases, it helps to have standardized measurements to determine the best course of treatment while tracking scaled improvements that are made when skilled observation is not enough. Additionally, many assessments may not be flexible enough to be used in a variety of settings, such as acute care where there is limited time and evaluations more commonly need to be completed at bedside.

Additionally, research is needed to compare group outcomes of those who were only assessed with the MoCA/MMSE versus those who were assessed with occupation-based assessments. This would help to provide evidence that the predictive validity occupation-based assessments and their influence on treatment and functional outcomes, including hospital re-admissions.

Bottom Line for Occupational Therapy Practice/ Recommendations for Better Practice:

The goal for occupational therapy should continue to be centered on helping clients return to the highest level of function and independence as possible. However, the failure to identify mild cognitive impairments inherently compromises this ideal outcome. While the MoCA remains an appropriate cognitive screening tool, it is simply not sensitive enough to identify higher-level executive functioning challenges, limiting its ability to aid in determining the best course of treatment and/or discharge location for patients. What may be missed on the MoCA may be more easily identified in the context of functional performance. Occupation-based cognitive assessments should be used as the primary evaluation assessment when the MoCA indicates no cognitive impairment. Although, from the appraisal of phase 2 of the current research, no one occupation-based cognitive assessment can be recommended due to lack of evidence available regarding their psychometrics with this specific population. However, a few assessments have been outlined above that show promise and/or meet the minimum requirements for administration feasibility in acute care.

Additionally, this research also has implications for occupational therapy educators. Professors should continue to expose students to and reinforce best practice for administering assessments, such as the MoCA. They must also emphasize critical thinking, clinical judgment, and general awareness pertaining to its shortcomings. Finally, it is essential to educate students on the importance of using occupation-based assessments and to advocate for such assessments in their future practice.

Involvement Plan

Introduction

Occupational therapy (OT) is a dynamic profession that is, by nature, subject to continual evolution. As a result, it is essential to regularly provide practitioners with the most recent, evidenced-based information regarding this profession and the clients it serves. Through discussions with our clinical collaborator, Marcy Boschee, OTR/L, it was decided that hosting an in-service for the OT department at St. Joseph Medical Center would be the most appropriate method for delivery of our culminated research findings (see Appendix A for KT products and initial anticipated target dates and Appendix E for scheduled interim dates of completion). This approach further enhanced our ability to communicate the significance of our research regarding the use of the Montreal Cognitive Assessment (MoCA) and occupationally-based assessments in the acute care setting. As an addendum to the in-service, the department was provided with a matrix that visually represented the occupationally-based assessments explored and the current evidence available regarding the psychometrics, relative cost, and administration time requirements for each assessment. The matrix also provided the practitioners with an opportunity to compare the different assessments both systematically and efficiently. We supplemented the data matrix with a decision flow chart. The graphical representation will hopefully assist the practitioners in the decision-making process of their selection of the most appropriate occupationally-based assessments to use with patients following acquired brain injury (ABI).

Marcy expressed the necessity of adopting a more fluid albeit comprehensive process for evaluating cognition in patients that present with ABI. Currently, the MoCA, more

appropriately categorized as a screening tool, is the OT practitioners' and physicians' primary outcome measure whereby they assess and quantify varying levels of cognitive impairment in their patients. The outcomes of the MoCA are also used by the St. Joseph's physicians to help make their discharge recommendations. Unfortunately, Marcy's and her colleague's concerns about the limited sensitivity and predictability of the MoCA were validated through our research. That is to say that the MoCA is not designed to be, nor should it be utilized as, a diagnostic test to detect mild cognitive deficits and predict a patient's future functional status at discharge.

Without a shift in the current practice model, patients who are suffering from mild cognitive impairments in acute care, that are undetected, may miss opportunities for further therapeutic intervention. This would directly impact their quality of life and subsequent independence. The in-service, matrix, and decision flow chart helped with this complex evaluation process and will hopefully yield more beneficial outcomes for the patients themselves.

Context

Using the RE-AIM model by Glasgow (2013), there were several contextual factors that were considered during the knowledge translation (KT) process. The most important facilitator for the KT was Marcy's and her colleague's receptiveness and excitement toward the work we produced. The inherent need for more occupationally-based assessments appropriate for utilization in acute care was, of course, another major facilitator in the research and the KT process.

Most immediately, the OT practitioners, program administrators, and physicians played an integral part in the recommended assessment the administration would purchase and utilize

within the department. Their appraisal of benefit-cost ratio, time, and feasibility of each assessment also directly impacted the focus of the KT implementation process. In addition, the nature of the research question in general lends itself to the need for recurrent database searching. New research and literature is continuously being published and in order to create a fully representative flow chart and matrix, we prefaced the KT products with this in mind. It was noted to the users that they should be aware of other promising assessments that may be addressed in emerging literature. Regarding the flow chart itself, therapists will ideally use this product to make clinical decisions with varying margins of risk. This will depend on how much information and evidence is provided in the matrix, as each assessment varies on the amount of information found in the current literature.

Outcomes

The success and effectiveness of the KT regarding the presented research question was evaluated by the research chair, Tatiana Kaminsky, PhD, OTR/L, prior to submitting the information to Marcy and her colleagues. The matrix, flow chart, and presentation were finalized prior to the in-service for the OT practitioners and other rehabilitation staff at St. Joseph Medical Center. We discussed our findings on the MoCA and the occupationally-based assessments as well as implications for future practice. We also evaluated the success of our KT products through a post in-service survey. Lastly, our final evaluative measure was intended to be a meeting with Marcy. However, it was determined that an email composed of a list of post in-service questions would be sufficient to determine the effectiveness of the in-service and the KT products provided. This allowed Marcy to convey her thoughts and offer any suggestions or questions her colleagues might have proposed following the presentation. The ultimate step in appraising the success of the in-service and KT products may involve contacting Marcy in the

fall of 2017 to determine the level of sustained application of our KT process and products, if they have purchased any of the occupationally-based assessments, and if so, have they seen improvements in their treatment of individuals with MCI.

RE-AIM Model of Knowledge Translation

Dissemination or KT step	
Reach - Individual level	An adequate number of clinicians attend the in-service regarding the current evidence surrounding the MoCA and occupationally-based assessments.
Effectiveness - Individual level	A survey was given to clinicians to determine if the KT was clear and could be implemented. This, in addition to, a follow-up questions for Marcy.
Adoption - Setting level	Clinicians determined that the new knowledge could be adopted in their setting from the post in-service surveys.
Implementation - Setting level	Marcy and the other clinicians implemented the flow chart & matrix into their practice in the acute setting by posting them on their bulletin board.
Maintenance - Individual/setting level	Check-in with Marcy after 6 months to determine if the flow chart and matrix are still being utilized.

(Glasgow, 2013)

Knowledge Translation

The knowledge translation process of our research involved preparing and presenting our findings at an in-service for the OT practitioners at St. Joseph's Medical Center. Also presented were an alternative assessment matrix (Appendix B) and decision flowchart (Appendix C) based on the evidence collected and analyzed throughout the initial CAT process. In preparation for the in-service, the researchers took into consideration the target audience, the total time allotted for the presentation, and what equipment would be available for disseminating our information. The researchers also met with the project chair prior to the in-service to receive feedback on the intended structure and information to be

included in the presentation. The assessment matrix and flowchart also went under extensive revision by the project chair.

The in-service itself was structured to be as conversational as possible between the researchers and the clinicians at St. Joseph's. To begin, a brief overview of the thesis project and unique CAT process were discussed. Following the introduction, the main objectives of the in-service were to: discuss overarching issues and implications for clinicians when using the MoCA as their primary tool to assess patients level of cognitive impairment, explain the importance of using additional occupational-based assessments when the MoCA indicates no cognitive impairment, and finally, to introduce the clinicians to a list of alternative assessments and their respective available, supporting psychometric evidence in the current body of literature, that are appropriate for use in the acute-care setting. The assessment matrix also included comments on each tool's testing set-up, required training, administration time, cost, equipment needed, and direct links to the free online manuals when available. Questions and comments from the clinicians throughout the in-service were encouraged. Additionally, three of the six recommended assessments available in the onsite UPS Resource Room would be brought in for the clinicians to skim through and familiarize themselves with tool parameters and relevant equipment. In concluding the in-service, a short survey (Appendix D) was created that was intended to address the perceived effectiveness of the overall presentation and the information that was provided.

The in-service proceeded as intended. A total of four occupational therapists, two certified occupational therapy assistants, and the department supervisor, a Physical Therapist, were present. The project chair was also present and participated appropriately

during the question and answer portion of the in-service, offering invaluable real-life clinical examples and relatable implications. The information planned for discussion at the in-service was presented well within the allotted time frame of one-hour, including completion of the post-presentation survey.

The clinicians appeared engaged, receptive to the information being presented, and asked meaningful questions. Many of the clinicians expressed positive feedback and strong interest in the knowledge translation products that were provided to the collaborating clinician at the end of the in-service. One clinician also proposed an idea for a future thesis project in response to a conversation that took place regarding the importance of patient and family education post-discharge. Each of the in-service attendees, with exception of the department supervisor, completed the survey that we created to gauge the effectiveness of our presentation and the information that was discussed (7 surveys were collected; 88% response rate).

Effectiveness of Products Completed

To comprehensively evaluate the effectiveness of our in-service at St. Joseph's we provided a survey (Appendix D) that was given directly following our presentation and discussion. A few days after the in-service and after preliminarily examining the responses, we asked Marcy some follow-up questions via email. In addition to this, we were able to speak with the rehabilitation department supervisor as he also attended the Student Occupational Therapy Association (SOTA) Job Fair event on April 21st, 2017. He vocalized that he thoroughly enjoyed the presentation and felt the information was important for them as a department. Unfortunately, he had left the in-service early and was not able to complete a survey but indicated the matrix is currently posted on the rehabilitation

department bulletin board as they are in the process of deliberating as a team which assessment(s) to purchase.

Marcy reported that her and her colleagues felt the information was presented clearly and the amount included was appropriate for the time frame allotted. They are currently looking into purchasing the EFPT or the Weekly Calendar, as those generated the most interest. As stated, we were able to speak to her supervisor at the job fair, but he reiterated to Marcy that he was very pleased we included the cost and where to purchase the assessments in the matrix.

Regarding our post in-service surveys, seven surveys were completed in total. However, one survey was completed by a Certified Occupational Therapy Assistant (COTA) who marked 1/5 for all four quantitative questions. She commented, "As a COTA, I will follow the lead of the OTRs and use what they deem appropriate" and "Thanks, very informative—hopefully we can put into practice one (or more) of these in order to provide a holistic approach to acute OT services". Based on the qualitative comments, we feel the 1/5 scores do not in fact reflect her personal view of the in-service. Instead, we hypothesize that, given as a COTA you do not determine assessment(s) to be used, she felt the first four questions did not apply to her. If her scores are not immediately factored into our calculations, our average score is 4.6/5, for the four quantitative questions. When the 1/5 scores are added, our average drops to 4.1/5. Therefore, we feel the scores from this survey are outliers as no other score was marked below a 4/5 for the other six surveys. When we do not include the outlier survey, the following table depicts the average scores on the survey for the quantitative section.

Item:	Average scores: 1 = Strongly Disagree 5 = Strongly Agree
The information presented was articulated clearly	4.6
The information presented is feasible for implementation	4.8
The information presented was applicable to me and /or my interests as a therapist	4.6
I believe the information presented will be beneficial for OT and I intend to use it in practice	4.5

A comment in the qualitative portion regarding question one stated, “Possibly more information about the outcomes of the use of these tests in the field, i.e. how helpful were they in improving/assisting pt recovery & treatment”, and “–now we need to find a way to budget for some of these” in response to question two.

Overall, we feel that based on these findings our knowledge translation tools were effective. Had we not held our in-service the information might have taken much longer to disseminate successfully into clinical practice, resulting in a potential increase in client’s treatment plans being based on the global MoCA score alone. Additionally, to determine the full effectiveness of our knowledge translation tools, a follow-up study would be both necessary and recommended. This would ideally be designed to determine if the implementation of additional occupational-based assessments have reduced the number of re-admitted clients due initial misdiagnosis of cognitive impairment as well as if more

clients are receiving a complete and accurate treatment with the addition of these assessments.

Process Analysis

Upon meeting for the first time to discuss the forthcoming thesis topic and process, Marcy, our collaborating clinician, presented three potential research questions. She hoped they might provide valuable information critical to the field of occupational therapy. After discussion amongst Marcy, our group members, and the designated research professor, the initial question of: "What evidence is there for the effectiveness of the Montreal Cognitive Assessment (MoCA) in predicting functional cognitive impairment of patients 18-years-old and older in acute care who have sustained an ABI?" was decided on. Our group began an extensive literature review relevant to the established research question until we reached a point of saturation.

From that point, the researchers felt there was more that could be offered to substantiate the thesis output accomplished thus far. In the hope of not only presenting Marcy and her colleagues with conclusive information and data regarding the effectiveness, or lack thereof, of the MoCA in detecting cognitive impairment, the researchers additionally sought to answer the question, "what are valuable 'next steps' to augment this body of work?". If the MoCA could not identify individuals with mild cognitive impairment after an ABI, which assessment(s) could? Thus, the second research question of: "Which performance-based cognitive assessments, feasible to use in the acute care setting, are most effective at predicting functional impairment in patients 18-years-old and older with mild to severe ABI?" was implemented. This involved creating a separate CAT in order to keep our findings organized.

The second phase of our research proved to be much more challenging in regard to the collection of evidence than the first phase. In order to give our outcomes depth and to showcase what is currently available for practitioners to use, it was decided that a majority of the research articles found related to establishing psychometrics for occupationally-based assessments used in detecting cognitive impairment in individuals with ABI would be included in the CAT. However, a few of the assessments that were originally deemed promising only had 1-2 published articles on them, making it difficult to assess their true applicability to our research question. Despite this, we worked to attain as much evidence as possible for each of the potential, occupationally-based assessments that were selected. For example, we corresponded with authors of several of the studies, including Joan Toglia (primary author of the WCPA), and Elyssa Scharaga and Roee Holtzer (authors of the BEAM), conducted recurring literature searches for any new publications, and networked at the AOTA conference to gain any information currently available in order to support the findings presented in our phase two CAT.

Following the aforementioned expansion of this project, the knowledge translation phase commenced. It was decided by the researchers and collaborators that the assessments intended to be included in knowledge translation products should be narrowed down to ones that met the majority of criteria deemed necessary for administration in acute care settings. These included both well reputed and established assessments (e.g. KELS and EFPT) as well as newer or less recognized assessments to the market (e.g. Weekly Calendar Planning Activity, Safe at Home Screening, Kettle Test, and Functional Loewenstein Occupational Therapy Cognitive Assessment).

Upon completion of the subsequent matrix and flowchart outlining assessment psychometrics and related information such as cost, populations for administration, and equipment required, the researchers realized significant gaps remain in the evidence available to support the effectiveness of their use in this context. Thus, reinforcing the importance and significance of further exploration in this domain for occupational therapy as a profession. For this reason, when presenting the culminating knowledge translation products to the clinicians at St. Joseph's, we determined it valuable to emphasize the necessity of best clinical judgment in deciding most appropriate assessment implementation into their practice.

Recommendations

Both the collaborating clinician and other OT practitioners who attended the in-service expressed interest in collaborating on a future research project with University of Puget Sound students. Due to the broad nature of the current research question itself, this project could be expanded in a variety of ways that would be beneficial to the supplementation of our initial findings.

Specifically, a perceived area of need was expressed in the form of a handout that could be developed that OT practitioners could give to patients and their family members upon discharge. This handout would be educational in nature and equipped with potential and common patient challenges experienced in the home or with returning to work as a result of mild cognitive impairment. Ideally, it would also provide information regarding when patients or family members should seek a follow-up consultation from an occupational therapist. However, to our knowledge, and that of the OT practitioners at St. Joseph's, while potentially extremely valuable to long-term patient outcomes one such handout does not exist or is not in circulation. Thus, one recommendation would be to have future OT

students search the literature to find commonly impaired higher level cognitive functions experienced by patients with mild cognitive impairment due to ABI, as well as how they impact their ability to successfully engage in all areas of occupation. Using this information, as part of the knowledge translation process, creation could commence on an evidenced-based educational handout could be provided to patients at discharge.

Another potential recommendation for future research could involve the importance of or difference between perceived outcomes when occupationally based assessments are used versus functional and performance-based assessments within occupational therapy practice. There is an ever growing movement within the field of OT to shift back toward, and emphasize the continued importance of, *meaningful occupation,* which lends itself to ensuring the provision of client-centered services. However, many of the assessments currently in use, and that these researchers identified in the literature, have been designed by other disciplines (e.g. neuropsychology) and at times lack a true occupational component, unique to OT's approach and mission. Consequently, future OT students could explore current practice models across settings in order to understand the implications of occupation-based assessments on client outcomes. Beyond this, they could seek to determine if evidence exists to support occupation-based assessment development by and for occupational therapists over other functional and performance based measures.

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To our dedicated occupational therapy professors at the University of Puget Sound: without your passionate commitment to the expansion of knowledge for the profession and your invaluable clinical experience, the completion of this thesis would not have been possible.

Appendix A

Initial Anticipated Tasks/Products and Target Dates

Task/Product	**Deadline Date**	**Steps w/ Dates to achieve the final outcome**
Cognitive assessment decision flow chart	April 20th, 2017	1. Determine which functional cognitive assessments have sufficient evidence to support their use and, which of them will be included in flow chart. **(Achieve by: 2/28/17).** 2. Determine the MoCA scores St. Joseph's currently uses to determine mild, moderate, and severe cognitive impairment in their patients. **(Achieve by: 2/28/17).** 3. Create a draft flow chart and submit to chair and clinician for feedback. **(Achieve by: 3/17/17).** 4. Make flow chart revisions per chair and clinician feedback, and develop the final flow chart product. **(Achieve by: 4/7/17).** 5. Submit final flow chart to chair and clinician for final feedback. **(Achieve by: 4/10/17).**
Cognitive assessment evidence matrix	April 20th, 2017	1. Conduct a final search to locate any newly published articles that support the psychometrics/outcomes of the identified assessments. **(Achieve by: 02/24/17).** 2. Critically appraise any new literature intended to be included in the CAT paper. **(Achieve by: 02/24/17).** 3. Discuss with Marcy and get approval on the key components expected to be included in the data matrix. **(Achieve by: 03/01/17).** 4. Begin formulating and filling in the evidence matrix, including citations whereby each piece of information was obtained. **(Achieve by: 04/20/17).**

In-service for occupational therapy practitioners	April 14th, 2017	1. Inform Marcy of possible dates and times of in-service in order to accommodate for OT department scheduling. **(Achieve by: 02/28/17)**. 2. Create PowerPoint and visual poster for the in-service presentation. **(Achieve by: 04/10/2017).** 3. Prepare talking points and determine who will lead which parts of the presentation. **(Achieve by: 04/10/2017).** 4. If possible, schedule a mock in-service with project chair for practice and to address any final concerns. **(Achieve by: 04/12/2017).**

Appendix B

University of Puget Sound Occupational Therapy Occupationally-Based Assessment Matrix

Description of Tool (Assessment or Screen?)	Study Population	Reliability	Validity	Clinical Utility
The Executive Function Performance Test (EFPT) -Assessment Performance-based assessment addressing cognition and executive function (Hartman-Maeir, 2016; Baum et al., 2008).	Adults with CVA, multiple sclerosis, and other chronic neurological conditions.	**Test-retest** No evidence found **Intra-rater** No evidence found **Inter-rater** *High [Total EFPT score ICC = 0.91. Subtest ICC scores= 0.94 (cooking task), 0.89 (paying bills), 0.87 (managing medication), and .79 (telephone)] (Baum et al., 2008). **Internal Consistency** *High ($\alpha = .94$)	**Content Validity** No evidence found **Construct Validity** $F(2, 93) = 15.49$, $p < .0001$ **Concurrent Validity** No evidence found	**Testing set-up** Table for medication, telephone and bill pay tasks, kitchen area for cooking task. **Additional Therapist Training Required?** None. **Administration Time** 45-60 minutes *some subtests can be administered at bedside within 10 minutes (i.e. medication management and bill-paying tasks). **Cost** Manual is free and can bed downloaded from: http://www.ot.wustl.edu/about/resources/executive-function-performance-test-efpt-308 Must purchase items for each task. Task items are readily available. **Equipment** Manual + test kit (must gather and replenish items).

Functional Loewenstein Occupational Therapy Cognitive Assessment (FLOTCA) -Assessment Assess integrative cognitive abilities using tasks that require a person to perform multiple steps in a sequence and address unfamiliar requirements (Schwartz et al., 2016)	Adults with TBI between 18 and 49-years-old.	**Test-retest** No evidence found **Intra-rater** *High (intra-class correlation = 0.996) **Inter-rater** No evidence found **Internal Consistency** *High (α = 0.82)	**Content Validity** No evidence found **Construct Validity** (large?) * *t* (48) = -5.48, *d* = 1.52 **Concurrent Validity** No evidence found	**Testing set-up** Requires table or counter space. **Additional Therapist Training Required?** None. **Administration Time** 30-60 minutes. **Cost** Not commercially available for purchase at this time. **Equipment** Manual, map, toolbox with compartments and tools, and daily schedule.

Kettle Test (KT) -Assessment The KT requires the individual to prepare a hot beverage. The rater scores the client's performance on 13 discrete steps of the task (Hartman-Maeir, 2009).	Adults over 60-years-old with CVA.	**Test-retest** No evidence found **Intra-rater** No evidence found **Inter-rater** High (Hospital 1: r =.851, p = .001; Hospital 2: r = .916, p = .000) **Internal Consistency** No evidence found	**Content Validity** No evidence found **Construct Validity** Large (F [1, 60] = 63.53, p = .000) **Concurrent Validity** Moderate	**Testing set-up** Beverage tray and dishes/ utensils. **Additional Therapist Training Required?** None. **Administration Time** Approximately 20 minutes. **Cost** Manual is free and can be downloaded from: http://www.rehabmeasures.org/Lists/Admin%20fields/Attachments/939/Kettle%20Test%20Final%20manual.pdf Must purchase and assemble all materials. **Equipment** Manual (online) + purchase and assembly of materials ahead of time (incl. electric kettle, ingredients for beverages presented on a tray with other distractors, and necessary dishes and utensils).

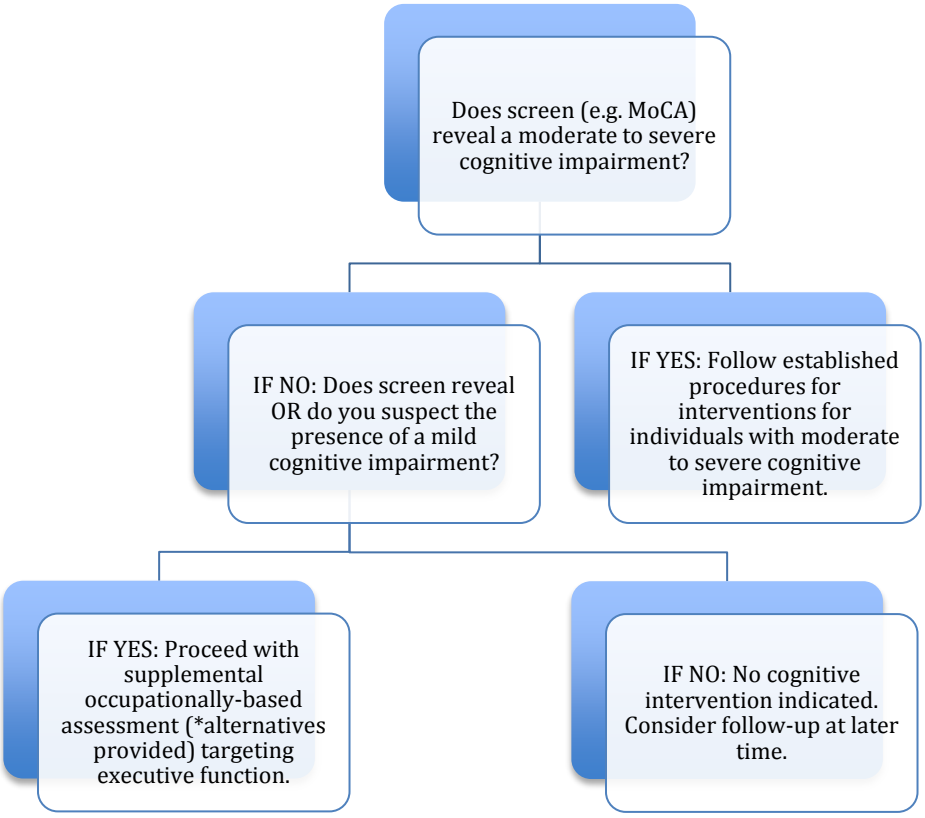
Kohlman Evaluation of Living Skills (KELS) 4th ed. -Assessment The new edition of the classic assessment determines the ability to function in basic living skills in five areas: self-care, safety and health, money management, transportation and telephone, and work and leisure (AOTA, 2016).	Adults with an ABI 18-years-old and older.	**Test-retest** No evidence found **Intra-rater** No evidence found **Inter-rater** *Previous edition: Excellent inter-rater reliability (acute psychiatry, and older adults) **Internal Consistency** No evidence found	**Content Validity** No evidence found **Construct Validity** *Previous edition: Supported; KELS is able to differentiate between different groups of elderly dwelling people (Zimnavoda et al, 2002). **Concurrent Validity** *Previous edition: Excellent concurrent validity with Global Assessment Scale and with BaFPE (population not known); MMSE with older adults; and FIM with an IADL measure with older adults.	**Testing set-up** Requires 5 stations to be set-up. **Additional Therapist Training Required?** None. **Administration Time** 40 minutes to 1 hour. **Cost** AOTA member $99.00. Non-member $140.00. **Equipment** Manual + test kit (with KELS required items).

Safe at Home Screening (SAH) -Screening The SAH screen is conducted by setting up 13 potentially unsafe (mock) situations in a kitchen setting for an individual with suspected cognitive impairments to identify as many hazards as they can and then take measures to correct the problems (Robnett, 2016).	Adults 18 to 64-years-old with ABI.	**Test-retest** No evidence found **Intra-rater** No evidence found **Inter-rater** No evidence found **Internal Consistency** No evidence found	**Content Validity** Moderate **Construct Validity** No evidence found **Concurrent Validity** Moderate	**Testing set-up** 13 mock situations and observation sheet. **Additional Therapist Training Required?** None. **Administration Time** 10-30 minutes (usually under 20 minutes). **Cost** $35.00 + $5.00 shipping (manual with reproducible forms and test kit items). http://www.neattests.com/Disclaimer_SAFE_AT_HOME.html **Equipment** SAH manual + test kit.

Weekly Calendar Planning Activity (WCPA) -Assessment A performance-based measure of executive function. Provides a broad analysis of how a person manages and copes with a complex and cognitively challenging activity (i.e. completing a weekly schedule) (AOTA, 2015).	Adults 12 to 94-years-old with executive function deficits.	**Test-retest** No evidence found **Intra-rater** No evidence found **Inter-rater** No evidence found **Internal Consistency** No evidence found	**Content Validity** No evidence found **Construct Validity** No evidence found **Concurrent Validity** No evidence found	**Testing set-up** A table-top is ideal. **Additional Therapist Training Required?** None. **Administration Time** Variable. 15 minutes to 1 hour. **Cost** AOTA member $99.00. Non-member $140.00. **Equipment** Manual + stopwatch/timer, blank test/recording forms, 2 pieces of paper, 2 colored highlighters, and a pen/pencil.

Appendix C

Flowchart: Cognitive and Functionally Based Assessments in Acute Care following ABI



Appendix D

University of Puget Sound Occupational Therapy
In-Service Follow-up Report
Survey on Delivery of: Cognitive and Occupationally-Based Assessments in Acute Care for Patients with ABI

	1 Strongly Disagree	2 Disagree	3 No Opinion	4 Agree	5 Strongly Agree
The information presented was articulated clearly					
The information presented is feasible for implementation					
The information presented was applicable to me and/or my interests as a therapist					
I believe the information presented will be beneficial for OT and I intend to use it in practice					

In addition to the ratings above, please elaborate further on any of the following:

1. Was there any information you feel was not covered?

_____

_____

_____

2. Do you have unanswered questions that arose during or following the presentation?

_____

_____

_____

Appendix E

Scheduled Interim Dates of Completion

Task	Anticipated date completion	Actual date completion	Notes
Determine which occupationally based cognitive assessments have sufficient evidence to support their use and, which of them will be included in flowchart.	2/28/17	3/5/17	This process took longer than expected. We did not meet our initial date, but in hindsight, this date might have been too ambitious to begin with.
Determine the MoCA scores St. Joseph's currently uses to determine mild, moderate, and severe cognitive impairment in their patients.	2/28/17	2/28/17	Per Marcy, St. Joseph's does not have a policy or procedure regarding this. It is determined by the physician.
Create a draft flow chart and submit to chair and clinician for feedback.	3/17/17	4/12/17	Once we began creating our products, we realized our flow-chart was simpler than we initially expected it to be with quite a few gaps in the evidence. We submitted this to our project chair on
Make flow chart revisions per chair and clinician feedback, and develop the final flowchart product.	4/7/17	4/16/17	

Submit final flow chart to chair and clinician for final feedback.	4/10/17	4/12/17	April 12th, 2017 and made the necessary changes prior to our in-service.
Conduct a final search to locate any newly published articles that support the psychometrics/ outcomes of the previously identified assessments.	2/24/17	2/24/17	We searched the literature and did not find any additional pertinent information regarding the assessments we selected for the purposes of this research.
Critically appraise any new literature intended to be included in the CAT paper.	2/24/17	2/24/17	
Discuss with Marcy and get approval on the key components expected to be included in the data matrix.	3/1/7	3/1/17	Marcy approved the components of our data matrix and felt it would be applicable to her and her colleagues.
Begin formulating and filling in the evidence matrix, including citations whereby each piece of information was obtained.	4/20/17	4/7/17	Our in-service was held prior to our initial date, which required our matrix to be completed earlier.

Inform Marcy of possible dates and times of in-service in order to accommodate for OT department scheduling.	2/28/17	3/1/17	We scheduled our in-service date with Marcy on March 1st, 2017 as she was gone prior to this.
Create PowerPoint and visual poster for the in-service presentation.	4/10/17	3/22/17	We created our Google Slides presentation on March 22nd, 2017.
Prepare talking points and determine who will lead which parts of the presentation.	4/10/17	4/6/17	We began creating our talking points on April 6th, 2017, but finalized them after our meeting with our project chair on April 12th, 2017.
If possible, schedule a mock in-service with project chair for practice and to address any final concerns.	4/12/17	4/12/17	We met with our project chair on April 12th, 2017 to prepare for our in-service.

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Name: _____ Date: _____

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Signature of MSOT Student

Name: _____ Date: _____

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Signature of MSOT Student

Name: _____ Date: _____

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