LIVE

Webinar

GLOBAL CEOINITIATIVE
—ON ALZHEIMER'S DISEASE—

Acceptable Standards for Digital Cognitive Assessments: A Framework for Clinicians

PRESENTED BY: DUSTIN HAMMERS, PHD


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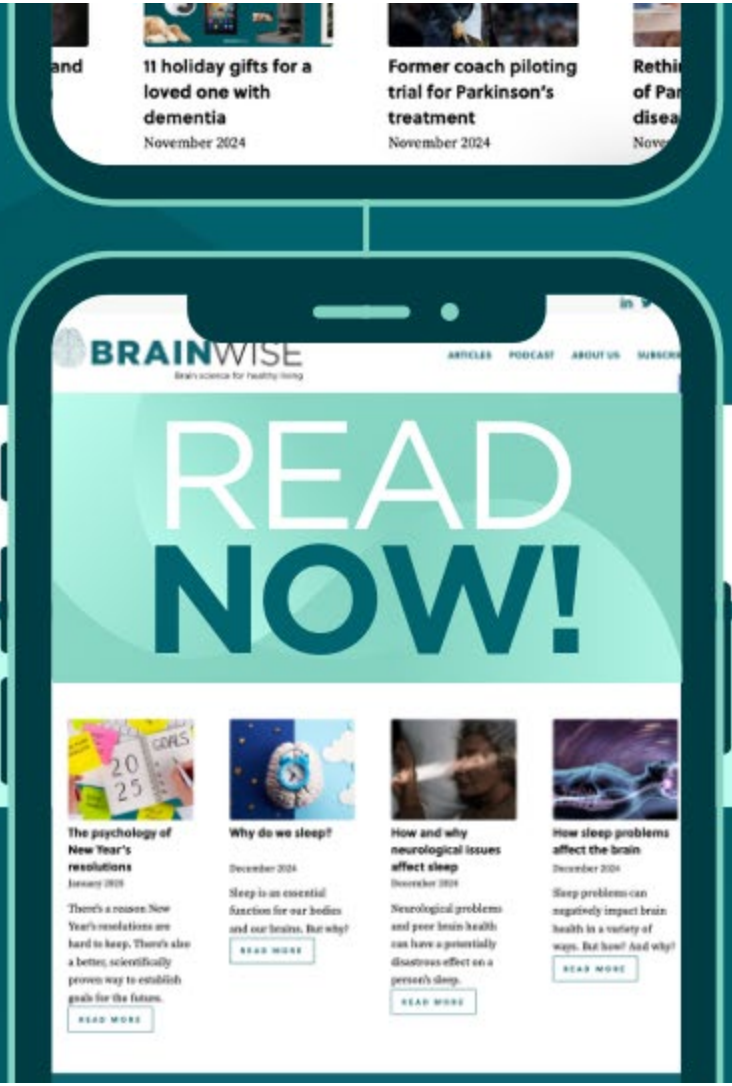

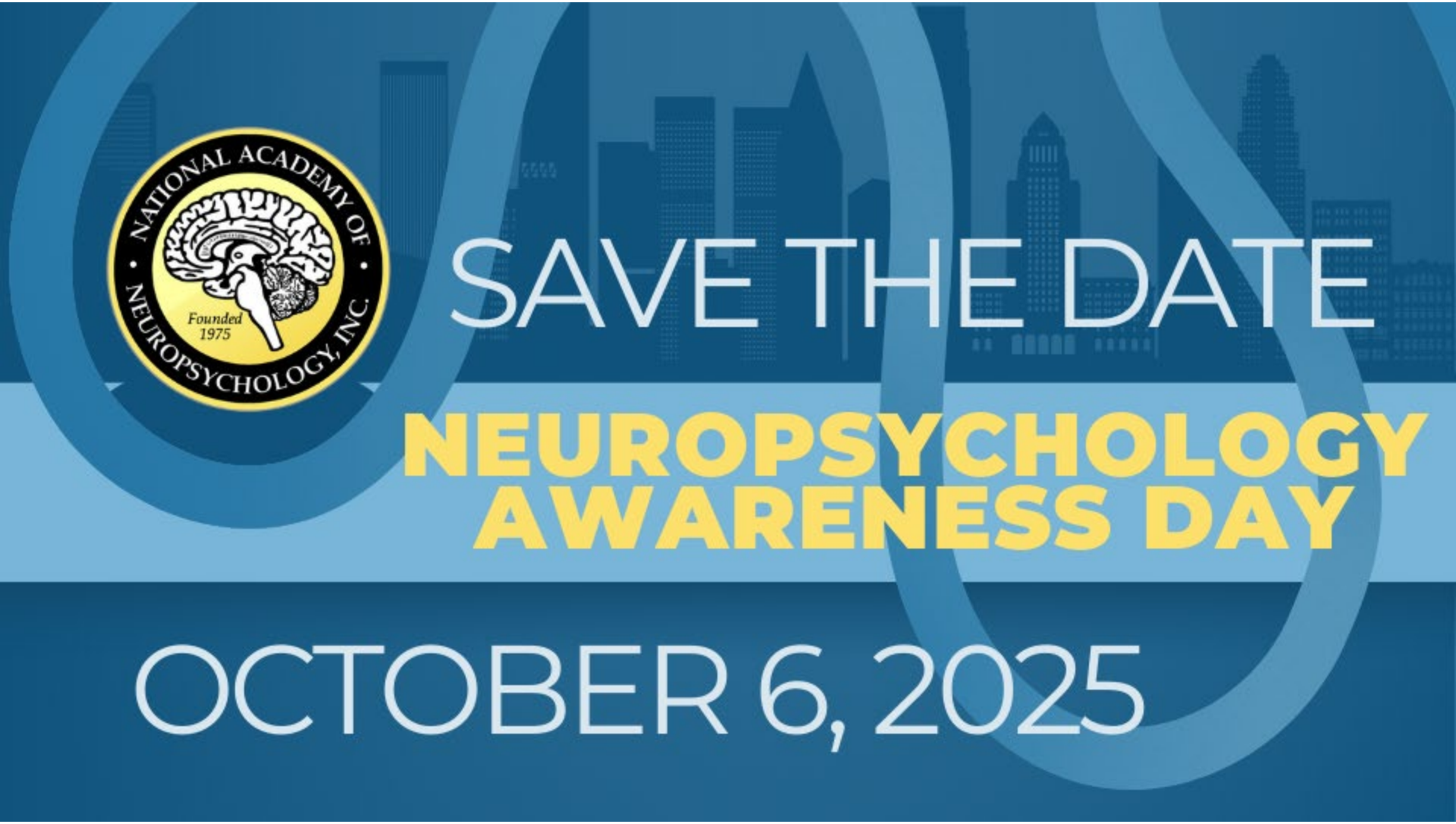
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Our Members & Collaborators

The Global CEOi on Alzheimer's Disease is focused on convening and identifying and addressing barriers to care, diagnosis, and prevention

CEOi Areas of Focus

- Blood-Based Diagnostics
- Digital Cognitive Assessments
- Prevention and Preclinical

- Convening and Consensus
- Education and Awareness
- Problem Solving

National Academy of Neuropsychology DCA Series

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Acceptable Standards for Digital Cognitive Assessments: A Framework for Clinicians

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- **I have financial relationships to disclose:**

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- Inclusion of digital devices in this talk does not imply endorsement of any device

Objectives

After the completion of this presentation, the audience will:

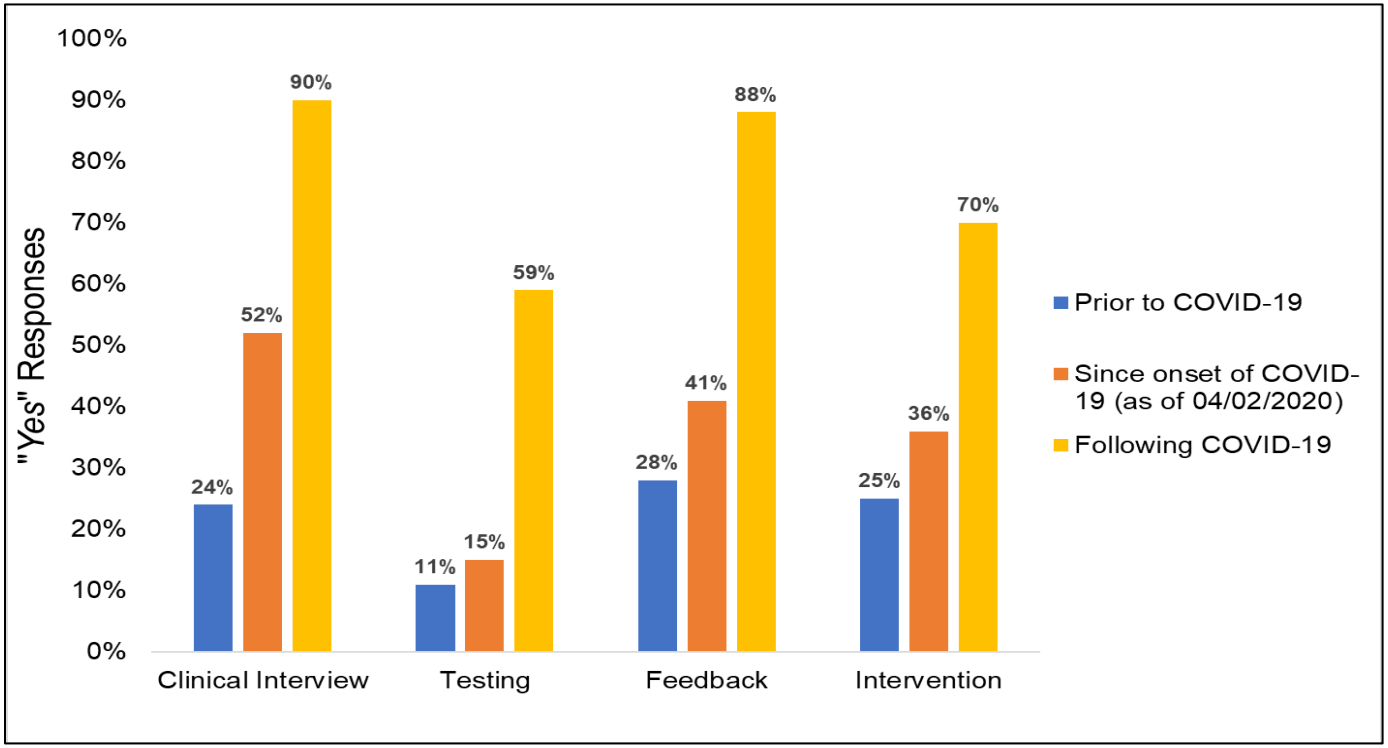
1) Understand the current landscape of digital cognitive assessments for cognitive decline, including their clinical value and key barriers to integration into routine care
2) Differentiate among recommended use cases, test characteristics, and performance standards outlined in the CEOi DCA Workgroup framework
3) Assess the broader implications of digital cognitive assessments for clinical practice, patient outcomes, and the role of neuropsychologists in shaping standards of care

My Experience with Digital Technology in Neuropsychology

- TeleNeuropsychology (TeleNP)
  - University of Utah TeleNP Program from 2012 to 2020
  - various CE courses and topic-related lectures
  - Survey of 2020 technology usage in NP among neuropsychologists

- Digital Cognitive Assessments (DCAs)
  - 2022 – Present: IUSM partnership with DAC

Use of Technology in Neuropsych



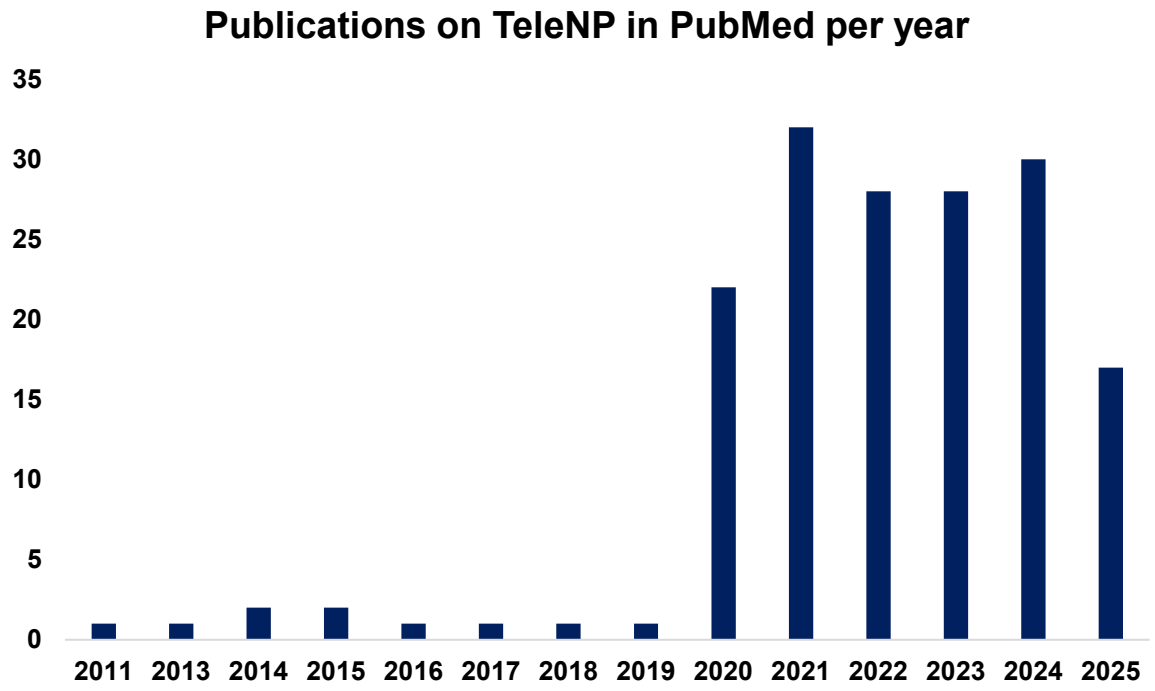
"Have you ever used video technology to conduct psychological, neuropsychological, or medical services?"

- Results coincide with other surveys on service provision rates conducted around that same time,[2,3] with a consistent trend towards lower utilization of TeleNP for testing than other aspects of the clinical evaluation

1. *Hammers et al., 2020. TCN*
2. *Rochette, Rahman-Filipiak, Spencer, Marshall, & Stelmokas, 2022*
3. *Zane, Thaler, Reilly, Mahoney, & Scarisbrick, 2021*

Increase Post-COVID

- Systematic Reviews/ Meta Analyses showing equivalence of clinic-based TeleNP in adults[1] and children[2] – variable reliability for processing speed and visuospatial tests

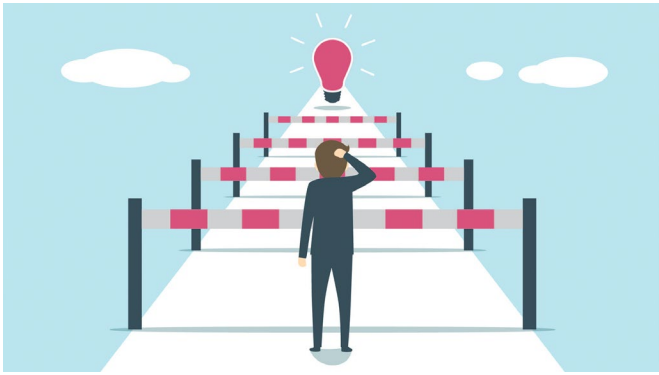


Rate of publications declined by about 26% after the first year of the pandemic and plateaued the following year[3]

1. *Marra et al., 2020. TCN*
2. *Walker et al., 2023. JPN*
3. *Sperling et al., 2024. ACN.*

Present Day Technology Use

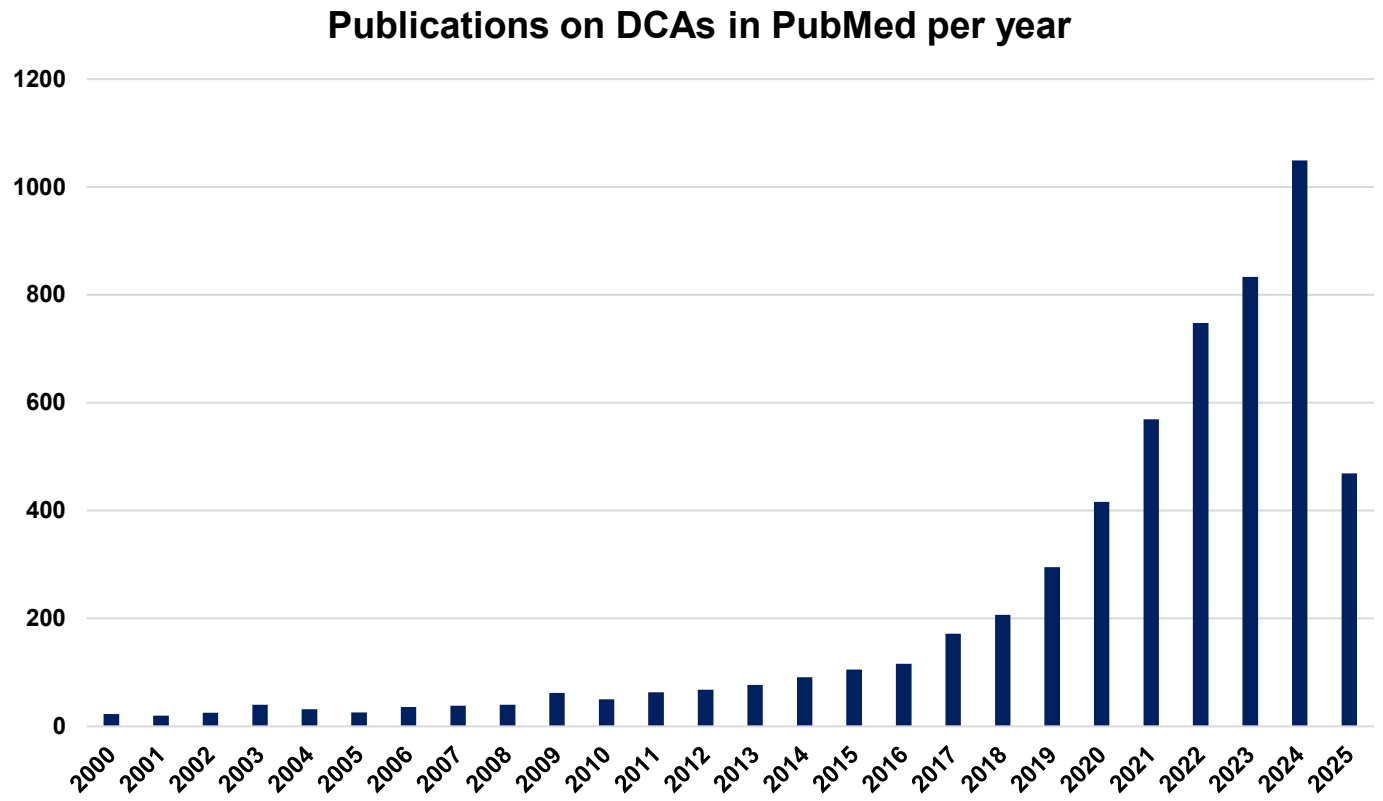
- TeleNP has remained a permanent feature of practice *for* a *segment of neuropsychologists* (46% of those surveyed 1-year post-lockdown)[1]
- However, the incorporation of tele-technology for cognitive assessment continues to lag behind other aspects of the clinical evaluation
- Multiple contributors, including questions of equivalence limiting the number of neuropsychological measures available for use
- Has opened the door for other forms of digital technology in cognitive assessment



1. *Messler, Hargrave, Trittschuh, & Sordahl, 2023*

Digital Cognitive Assessments (DCAs)

- Massive growth recently in computerized cognitive assessments using proprietary and stand-alone tests



Some Benefits of DCAs

- DCAs may overcome some obstacles to traditional neuropsychological assessment, particularly in primary care
  - Objective results without the need for specialty-trained technicians[1]
  - Incorporated into electronic medical records (no hand entering)[2]
  - Frequently shorter and less costly to administer than paper-and-pencil counterparts[3]
  - May permit greater frequency of longitudinal assessment given their generally lower susceptibility towards practice effects[4]
  - Potential to be adaptive to the test taker's level of ability[5]
  - Ability to automatically update normative comparisons

1. *Zygouris & Tsolaki, 2015*
2. *Staffaroni, et al., 2020*
3. *Koo & Vizer, 2019*
4. *Hammers et al., 2011*
5. *Wild, et al., 2008*

Some Cons of DCAs

- DCAs are far from a panacea, and possess their own unique obstacles
  - Variable participant engagement and test validity (for both the measure and the environment) [1]
  - Technological savvy requirements for both the patient and provider[2]
  - Potential security issues for the resultant data[3]
  - Ensuring that the individual taking the test is the patient

1. *Öhman, Hassenstab, Berron, Schöll, & Papp, 2021*
2. *van der Landen et al., 2025*
3. *Bush, 2004*

Common DCAs

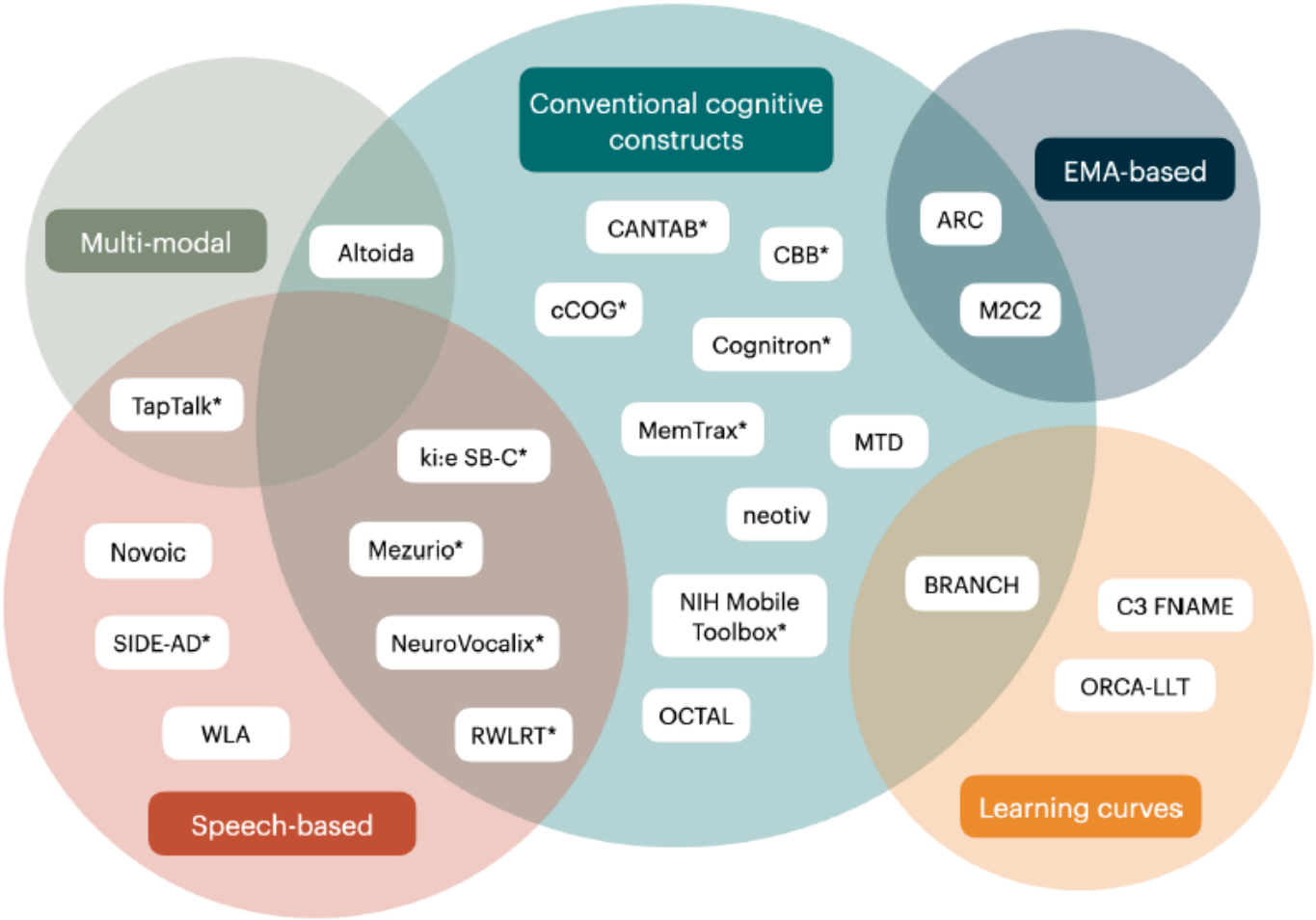
- The FDA has authorized a handful of DCAs for marketing to the public:
  - ImPACT
  - Automated Neuropsychological Assessment Metrics (ANAM)
  - Cambridge Neuropsychological Test Automated Battery (CANTAB)
  - Cognigram (CogState Brief Battery)
  - CognICA - rapid visual categorization task
  - Cognivue - visuomotor and visual salience, perceptual and memory processing (letters, words, shapes, and motion)

Others

- Common DCAs that are not currently FDA authorized:
  - Linus Digital Health Digital Clock and Recall Test
  - MOCA XpressO
  - Tablet-Based Cognitive Assessment Tools Brain Health Assessment
  - NIH Toolbox Cognitive Health Battery

- This list is *not exhaustive*

Modalities of DCAs



Courtesy of Polk et al., 2025. npj Digital Medicine

Modality Specific

- Ecological Momentary Assessments (EMAs)
  - Variability within in-the-moment performances in a natural setting (i.e., home) used as clinical marker to better understand the relationship between cognitive abilities and state-like factors in daily life[1]
  - E.g., women undergoing treatment for breast cancer experienced worsening processing speed skills at times that their fatigue was highest[2]

- Speech-based biomarkers rely on machine learning and/or natural language processing analyses of multiple linguistic/acoustic dimensions of speech
  - E.g., ki:elements

1. *Schmitter-Edgecombe, Sumida, Cook, 2020*
2. *Small, Jim, Eisel, Jacobsen, & Scott, 2019*

Future Considerations on DCAs

- Much focus has been paid recently towards aiding clinical decision making by using DCAs given:
  1. the potential change on clinical practice landscape
  2. the intense focus on the development of new tools on the market
  3. the pros and cons of DCAs

- Focus groups at Amsterdam University Medical Center have been established to understand barriers to use by patients with AD[1]

- Alzheimer's Association's Workgroup on Clinical Practice Recommendations for use of DCA

- **Global CEO-Initiative on Alzheimer's Disease Working Groups**

1. *van der Landen et al., 2025*

Phase 1:
~200 Experts Engaged on DCA Workgroup for Supervised Testing

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Work Group A:

Define **use cases**, **test characteristics** and acceptable and ideal performance standards

Work Group B:

Identify barriers and facilitators to DCA adoption in routine care and define **implementations** pathways

Outputs: Publish actionable recommendations on adopting DCAs across care settings & inform the development of educational materials for practicing clinicians and patients

Phase 1: Standards for Clinical DCAs

Clinical Contexts of Use
Detection DCA: Detect any possible cognitive impairment as an initial first step to gauge whether further evaluation is needed
Diagnostic Aid DCA: Aid in the diagnosis of a cognitive syndrome (i.e., MCI or dementia) by providing an assessment tool that characterizes the degree of impairment
Profile Characterization Aid DCA: Aid in differential considerations of underlying disease etiology following an MCI or dementia diagnosis by providing information on the cognitive profile

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	DCAs for Detecting Cognitive Impairment (Detection DCA)
What is the test measuring?*	Single or multidomain cognitive function to discriminate cognitive impairment from cognitively unimpaired
Target population	Older adult (aged 65 or older) without a recognized cognitive concern May be initiated in younger individuals with a family history of dementia and/or known genetic risk factors
Target use settings	Most often used in primary care as part of an evaluation by a PCP or trained HCP‡ Infrequently used in specialty care
Administration time	Short (~3–5 minutes)
Comparative non-digital tool	Mini-Cog or similar test
Intended use	**Abnormal test result** indicates concern for cognitive impairment, evaluate further for confirmation **Normal test result** indicates lower probability of cognitive impairment, continue to follow and focus on brain health interventions

	DCAs to Aid in the Diagnosis of MCI or Dementia (Diagnostic Aid DCA)
What is the test measuring?*	Multi-domain cognitive function to characterize severity of impairment; e.g., distinguishing MCI from dementia
Target population	Individual who tested positive on a Cognitive Impairment Detection DCA (or similar tool) Individual with a recognized cognitive concern†
Target use settings	Oftentimes used in primary care as part of an evaluation by a PCP Oftentimes used in specialty care as part of an evaluation by a specialist
Administration time	Medium (~10–20 minutes)
Comparative non-digital tool	MoCA or similar test
Intended use	**Abnormal result** prompts a treatment plan including treatable causes and interventions to promote brain health; primary care consider referring to specialty care **Normal result** indicates low likelihood of cognitive impairment, continue to follow and focus on brain health interventions

	DCAs for Cognitive Profile Characterization to Aid Etiological Workgroup (Profile Characterization Aid DCA)
What is the test measuring?*	Discrimination among cognitive domains to characterize the profile of affected domains
Target population	Individual with a diagnosis of MCI or dementia, or whose prior evaluation (including an MCI/Dementia Diagnostic Aid DCA) yielded inconclusive results
Target use settings	Infrequently used in primary care Most often used in specialty care
Administration time	~40 minutes or more to cover multiple cognitive domains
Comparative non-digital tool	Testing from specialist neuropsychological evaluation
Intended use	**Abnormal result** suggests MCI due to AD as the primary etiology, consider AD treatments and support plan **Normal result** suggests no cognitive impairment, proceed with further diagnostic evaluation if clinically indicated, continue to follow and focus on brain health interventions

PERFORMANCE STANDARDS AND VALIDATION OF DCA			
	Cognitive Impairment Detection DCA	**MCI/Dementia Diagnostic Aid DCA**	**Cognitive Profile Characterization Aid DCA**
Benchmark	Neuropsychological test battery	Neuropsychological test battery	Neuropsychological test battery
Acceptable performance for accuracy	Sensitivity: 80% to detect cognitive impairment Specificity: 85%	Sensitivity: 85% to detect MCI Specificity: 90%	Sensitivity: 85% to detect MCI due to AD[#] Specificity: 90%

Ideal DCA Characteristics		
Validation	**Normative measures**	• Normative measures should be based on large samples broadly representative of the general population. • Neuropsychological test batteries are recommended as the reference standard for DCAs and should be validated in demographically representative, longitudinal cohorts that reflect the DCA's intended use.
	Diverse adaptation	• Validation should encompass diverse cultures, geographic regions, languages, socioeconomic backgrounds, education levels, risk factors, and varying degrees of technological familiarity, using culturally appropriate presentation and stimuli.
	Reliability	• Test-retest reliability should be established for all DCAs to ensure results are not confounded by environmental factors or random error.
	Evaluation	• Implementation and dissemination studies represent best practices for assessing real-world performance.

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Ideal DCA Characteristics		
Scalability	**Device platform/ technology being used**	• The primary priority is for the DCA to meet performance criteria, regardless of platform. • Web browser compatibility is recommended to ensure the test can be administered on any device available to healthcare professionals. • DCAs are actively being developed for smartphone use. As more data emerges, smartphones are expected to meet performance standards in the near future, with some potentially already suitable for detecting cognitive impairment.
	Cost	• Developers should clearly define the intended user—whether an individual clinician, health system, academic/research institution, or home user—and outline the DCA's objectives and cost to ensure users can assess its suitability and affordability.

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Ideal DCA Characteristics		
Scalability	**Accessibility**	• Tests should accommodate sensory and motor impairments by offering alternative administration methods. • A minimum accessibility standard that assesses for hearing, functional vision, language, and hand coordination should be established prior to DCA administration.
	Usability	• Co-design methodologies, such as focus groups that include healthcare professionals and patients involved in the use of DCAs, should be implemented to involve end users in test development.

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Ideal DCA Characteristics		
Results Report	**Detection DCA**	• Automated report for provider should clearly indicate whether cognitive impairment is a concern or unlikely, with recommendations for continued monitoring following a normal result. • EHR integration/templating of results is encouraged. • Sharing patient results through EHR integration is a desirable capability, to be implemented at the discretion of the healthcare system or provider.
	Diagnostic Aid DCA & Profile Characterization Aid DCA	• Automated report for provider should include information on severity of impairment (Diagnostic Aid DCA) or the pattern and severity of impairment in different cognitive domains (Profile Characterization Aid DCA). • EHR integration/templating of results is encouraged. • Test results should be contextualized relative to the normative benchmarks applied. • Providers should interpret and communicate results directly to patients. • Shared decision-making and discussions throughout the diagnostic process should be promoted, recognizing variations in clinical approaches.

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The next Great Divide: Supervised vs. Unsupervised Testing

- Focus of CEO-I Appropriate Use Recommendations was on *supervised* assessments for established patients
- Unsupervised assessment possesses unique risks, especially related to validity of results
- As the acceptance of supervised DCAs continues, neuropsychology has **an opportunity to shape the discussion on use of unsupervised DCAs – particularly in public screening settings**
- New CEO-I Work Group established for unsupervised assessments

Phase 2: Remote (Unsupervised) DCAs

Objective: Prepare for the adoption of remote and unsupervised DCAs by providing recommendations on **use cases, test characteristics, and implementation pathways**

Scope: remote and unsupervised tests to support the patient at ***various stages of their journey toward a diagnosis***

- ✓ Patient and clinician initiated
- ✓ Active monitoring

- x No hybrids that combine in-person and remote elements or telehealth (e.g., video-based assessments administered by an HCP)
- x Passive monitoring as future directions
- x Contexts of use post diagnosis are OOS and may be considered as future direction (aligned with in-clinic DCA scope)

Output:

- Publish recommendations and critical considerations in peer review journal for the use of remote and unsupervised DCAs
- Inform the development of educational materials for clinicians and patients

In progress, recommendations target release for Q1 2026

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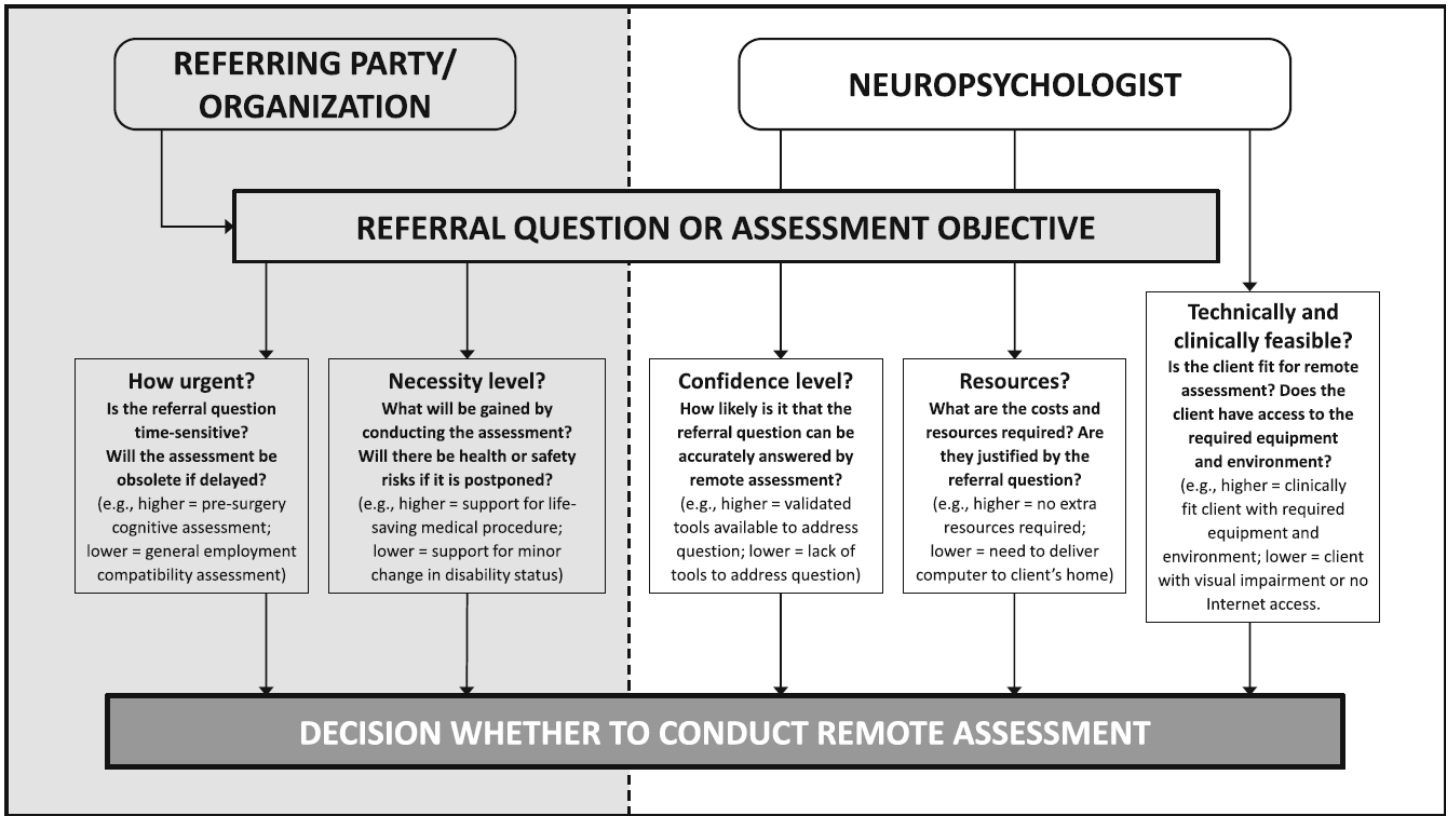
Considerations on When to Conduct Remote or Digital Assessment



- Decision-tree for both referring parties and neuropsychologists as to whether the decision to utilize remote assessment is appropriate

Bloch, Maril, & Kavé, 2021

Considerations on Training

- These type of decisions require thorough consideration of multiple aspects of patient care

- Encouraged that post-doctoral training programs incorporate training in TeleNP and DCAs to ensure that future generations of clinical neuropsychologists have the competency required for the use of such technology in everyday practice

Thank you and Questions?

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