



CAMBRIDGE
BRAIN SCIENCES



CONNECTING CARE AND COGNITION:

Using Cognitive Assessments for
Improved Clinical Decision-Making

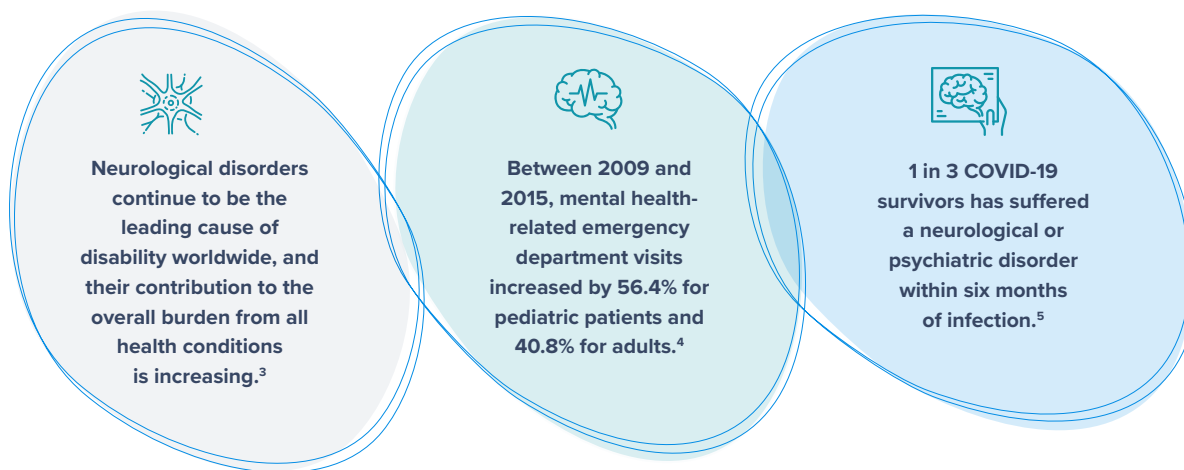
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Important Information Before You Read This Document

CBS Health provides a scientifically-validated and objective measure of an individual's cognition, however, it is not a diagnostic tool. CBS Health should be used in conjunction with other information and clinical judgment to reach conclusions regarding an individual's health. Ultimately, CBS Health does not replace the judgment of a practitioner and Cambridge Brain Sciences does not assume responsibility for the outcome of decisions made based on CBS Health data.

Over the last few decades, there have been incredible advancements in healthcare—from minimally invasive procedures to life saving cardiac implants to low-dose CT scans detecting the early signs of lung cancer.^{1,2} While these advancements have resulted in people living longer, the human brain—the organ that effectively governs our quality of life—just isn’t keeping up. Given the onslaught of technology and the “always-on” mentality of today’s generation, brain and mental health disorders are rising, affecting millions of people globally with no relief in sight.



Healthcare providers are here to help, and the diagnosis and treatment of conditions that affect cognitive health are important steps in improving the lives of their patients. However, clinicians are often stuck using tools that have not taken advantage of the advancements seen in other areas of healthcare. Subjective reports are not designed to provide accurate insights into a patient’s cognition, and many current assessment tools are rudimentary, too specialized, difficult and expensive to administer, or not sensitive to changes.

Patients who suffer from physical or mental health conditions often exhibit cognitive symptoms.

Unfortunately, brain health issues can go undiagnosed and unaddressed by healthcare providers, as these critical cognitive symptoms are self-reported and difficult to quantify.

The limitations of current tools stand in the way of the crucial step of measuring cognition. Nearly any physical or mental health challenge has cognitive consequences—what neurologist, psychiatrist, or clinical psychologist goes through a day without hearing about a patient suffering from “brain fog”? Yet these symptoms are never properly quantified unless a full neuropsychological examination is deemed necessary, leaving most clinicians lacking important objective data that can inform diagnosis, treatment planning, evaluation of outcomes, and clear communication with patients.

Challenges remain, but improvements in technology and scientific methods have led to advanced tools that can help meet the growing demand for better brain health. In this ebook, the specific challenges associated with current tools will be reviewed before exploring a better option for measuring cognitive function.

Clinicians need an accessible way to easily collect objective cognitive data that complements subjective findings to provide their patients with the best care.

¹Abbott, [Life Changing Advancements in Cardiac Care](#), July 2020

²National Cancer Institute, [Advances in Lung Cancer Research](#), August 2020

³The Lancet Neurology, [The global burden of neurological disorders](#), March 2019

⁴The American Journal of Emergency Medicine, [National trends in mental health-related emergency department visits by children and adults, 2009–2015](#), December 2020

⁵The Lancet Psychiatry, [6-month neurological and psychiatric outcomes in 236,379 survivors of COVID-19: a retrospective cohort study using electronic health records](#), May 2021

Current Challenges in Cognitive Assessments and Care

1. DIAGNOSING AND ESTABLISHING A RELIABLE BASELINE

Making an initial diagnosis is often the first and most critical part of the patient care journey—and, unsurprisingly, also often the most complex. One study found that about 20 percent—or 900,000—of the 4.5 million children currently identified as having Attention-deficit/hyperactivity disorder (ADHD) likely have been misdiagnosed, possibly due to current testing methods, which may not include any neurological markers.⁶ Today, individualized-care approaches (i.e., patient-centered care model where the unique needs of individual patients are being assessed) are becoming increasingly more accepted and commonplace due to the many benefits they offer.⁷ However, obtaining a diagnosis informed by individual data can be difficult, inconvenient, time-consuming, or expensive, and traditional assessment tools have lacked the ability to directly connect the condition in question to brain health and its impact on cognitive function.

Having tools to supplement self-reported data with more complete objective data can help a clinician confirm or rule out diagnostic hypotheses and ensure a more complete view of the patient's health. Mental disorders or injuries can significantly impact cognitive functioning. For example, consider a neurologist with a patient who has just suffered a head injury. Self-report measures do not fully describe symptoms, so supplementing them with objective cognitive function measures allows the neurologist to confirm or rule out cognitive consequences of the injury. The same applies to mental health professionals treating disorders with known cognitive consequences, such as depression, anxiety, and ADHD. Since diagnosing a patient is one of the more significant decisions clinicians are charged with making, better diagnostic aids are needed to support these potentially life-changing determinations.

Furthermore, cognitive function is complex and made up of multiple components, and an informed diagnosis may require measuring specific areas of cognition rather than broad composite measures or categories. For example, someone may have perfectly normal reasoning skills, but their memory skills are being affected by a condition for which they are seeking treatment. Depression is known to affect some aspects of short-term memory and reasoning, but broad measures of cognitive function can miss specific deficits that could have aided a diagnosis and accurately measured the symptoms of the diagnosed condition.

WHAT IS “NORMAL”?

Self-reported measures are subjective, and, therefore, patients can only provide insight into their own unique experience. They may be able to identify their general symptoms such as “brain fog” on a checklist but don't have the means to compare themselves to a “normal” population.

Objective cognitive tasks and measures help fill in the gaps left by self-report scales and patient interviews.

⁶Michigan State University, [Nearly 1 Million Children Potentially Misdiagnosed with ADHD](#), August 2010

⁷Annals of Internal Medicine, [Patient-Centered Decision Making and Healthcare Outcomes](#), April 2013

Collecting an accurate baseline measurement can complement a diagnosis and provide a starting point for measuring change over time. For example, cognitive deficits due to a neurological condition may be missed if a patient's cognitive function is in a normal range for their age—but showed a significant drop in function over the past year. An accurate cognitive function baseline provides a comparison point for the individual patient that can be used to measure improvements due to treatment, or to monitor for concerning changes.

Despite their importance, many measures of cognitive function are rarely used or are skipped entirely due to being resource-intensive (e.g., three to six hours of neuropsychological exams or expensive brain scans), making them impractical for everyday use as a diagnostic aid or baseline measurement. Quicker screening tools are often highly specialized for specific conditions or administered when it's too late to reverse the condition's course of action (e.g., the MoCA). Due to these constraints, clinicians must rely largely on subjective patient interviews or templated self-report checklists and rating scales, which are helpful but can potentially be influenced by biases. These tools alone cannot provide a fully objective view of cognitive function, and biases may ultimately impact diagnosis and treatment. Without enhanced solutions and more reliable data, care teams wage an uphill battle to determine a precise diagnosis and gain an accurate baseline.

Clinicians need an accessible solution to objectively evaluate their patients' cognitive function at baseline and on an ongoing basis.



2. TRACKING IMPROVEMENT AND ADJUSTING TREATMENT

Once an accurate diagnosis is made, the path to a superior patient outcome lies in the effectiveness of the treatment plan. However, how can a healthcare provider determine whether a treatment is having the desired effect, quickly and efficiently?

Today, most practitioners rely on subjective information from patients and family members to gauge progress. While clinicians know that this information is some of the most valuable, a sensitive and objective measure can provide greater confidence on how interventions are impacting cognitive function. Without objective measurements, reports may contain biases, placebo effects, and a lack of specificity about the areas of brain health that have changed. More accurate information may help adjust or plan additional treatment, predict adherence to treatment programs, avoid costly mistakes, and monitor for signs of relapse.

Current cognitive function assessments tend to be too time-consuming to perform regularly or unsuitable for administering multiple times due to limited forms and practice effects. Designed for one-time assessment, they may also lack sensitivity to the subtle changes that can result from treating mental or physical health conditions that have cognitive consequences.

Understanding the strengths and weaknesses of a specific patient matters in the context of adjusting a care plan. Treatment may not be aiming to improve brain health across the board but instead to address particular weaknesses or deficits connected to a disorder, which many tools are not equipped to measure.

For example, in treating a cognitive or mental health disorder, certain interventions like weaning off medication, making sure therapy is on track, or choosing the suitable form of rehab involve big decisions that can enormously impact a patient's life. Assessing interventions and tracking the impact on cognition are currently accomplished through:

- Self-reported information from the patient, parent, or caregiver
- Symptom checklists and rating scales
- Pen and paper tests like the MoCA, MMSE, WAIS

These tools have the same limitations as they do for diagnosis, multiplied when they are required to be administered several times. It is often impractical to ask a patient to physically visit a clinic after treatment is completed or to refer to a neuropsychologist multiple times for a quick progress report.

Without quick, automatically administered, objective clinical assessment tools that are highly sensitive to change, clinicians are missing out on the ability to collect valuable progress data.

Traditional methods for evaluating changes due to treatment are resource-intensive and rely on subjective data and templated checklists.

3. COMMUNICATING RESULTS TO PATIENTS


Properly communicating symptoms and demonstrating progress are critical next steps that allow clinicians to not only understand a patient's cognition themselves but help the patient understand it in a clear and digestible way.

Clinicians often find it difficult to communicate results from solely subjective information. This can make it particularly difficult to demonstrate to the patient that there are specific brain health concerns to work on or that there has been a meaningful change that may affect their quality of life. Patients are often going through treatments for the first time and have only subjective feelings to indicate if cognitive symptoms are getting better.

When cognition is measured via a neuropsychological examination, the results may be comprehensive enough to inform clinicians but require advanced training and hours of time to translate the numerical results into a written report for the patient, family members, or other parties. At the other extreme, a quick MoCA or other specialized screening tools may provide a simple yes or no answer regarding severe overall impairment but lack specificity about which areas of cognition could be impaired and may only provide information about extreme impairment. Many patients are dealing with only mild cognitive symptoms and may have weaknesses that can inform diagnosis, be impaired relative to their own baseline, or have measurable improvements due to treatment, even if their scores are not low enough to reach a screening cutoff.

Feeling better is part of the picture, but today, clinicians rarely have examples of how measurable cognitive function may translate to deficits or improvements in a patient's everyday life. That information can keep patients engaged and motivated throughout their programs and highlight the benefits provided by healthcare providers.

Clinicians need an easy way to communicate information about patient cognition.



There is a clear need for more objective, reliable cognitive data to supplement the gaps inherent in subjective measures and traditional assessment methods. Access to this critical data can support a new diagnosis, be tracked over time to understand treatment effectiveness, and communicate important information to patients.

Clinicians need a modernized, comprehensive tool that can obtain a reliable and objective baseline assessment, while easily tracking cognition regularly to help providers generate post-treatment longitudinal data. This makes it possible to create an effective treatment plan to improve or maintain cognitive functionality, monitor intervention effectiveness, and clearly communicate with patients.

Online Cognitive Assessment Solution: CBS Health

CAMBRIDGE BRAIN SCIENCES: A BRIEF HISTORY

Cambridge Brain Sciences offers a scientifically validated and easy-to-use digital platform for assessing cognitive and behavioral health, giving clinicians the additional insights they need to deliver superior patient care. Over 25 years of research have led to the creation of the CBS Health online cognitive assessment platform.

Rooted in Academia

The Cambridge Brain Sciences tasks were developed in the lab of Dr. Adrian Owen, Canada Excellence Research Chair in Cognitive Neuroscience and Imaging. Dr. Owen is a pioneer in neuroscience, having combined neuroimaging and neurophysiological studies to unravel the secrets of the human brain over the last 25 years. He was one of the first clinicians to develop digital versions of decades-established and trusted neuropsych tasks to evaluate reasoning, memory, attention, and verbal ability. His work has been published in numerous academic journals covering topics ranging from focal lesions to awareness in persistent vegetative states to mental health.



Trusted and Validated Cognitive Assessments

The tasks have been scientifically validated and repeated over 10 million times to create an extensive normative database of over 85,000 people ages 6 to 99—and these numbers continue to grow. The tasks are proven to be efficient and provide accurate measures of cognitive capacity based on validation from:

- Patient studies
- Brain imaging studies of healthy volunteers
- Several large-scale public studies using tens of thousands of volunteers

The tasks themselves have been modified over time to take advantage of newly available technologies, like brain scanning and internet-based assessments. However, every iteration is designed to maintain neuroscientific validity.

Cambridge Brain Sciences by the Numbers:



Over **10 million tasks**
(and counting)
completed globally



Backed by
25+ years
of scientific research



Tasks used in more than
300 peer-reviewed
studies



References a normative
database of **85,000**
participants (ages 6-99)



*Today, thousands
of healthcare
practitioners have
used CBS Health
tasks to accurately
quantify and
monitor cognitive
function over time.*

THE CBS HEALTH PLATFORM

Comprehensive Assessments to Easily Assist in Diagnosis and Establish a Baseline

CBS Health allows clinicians the ability to administer 12 core tasks of cognitive function as well as many standard questionnaires such as the Patient-Health Questionnaire (PHQ-9), General Anxiety Disorder (GAD-7) questionnaire, Perceived Stress Scale (PSS), Rivermead Post-Concussion Syndrome Scale (RPQ), and many more.

Assessments are easy to administer and don't require clinical supervision. This means they can be performed in the traditional clinic setting or sent electronically to be self-administered by the patient in the comfort of their home. The tasks are highly gamified and engaging and take only 1.5 to 3 minutes to complete. They also adapt to the patient's abilities, becoming easier or harder depending on patient performance. In addition, there are near-infinite problem sets within each task such that no attempt is ever the same, leading to strong test-retest reliability metrics and minimal practice effects. With a set baseline, clinicians can monitor patients consistently for performance stability and begin to track an objective indicator for cognitive change. Numerous brain imaging studies have directly linked neural activity in specific regions with each task, giving clinicians the tools needed to connect performance with brain disorders and deficits.

CBS Health is an online brain health assessment platform that takes seconds to set up, is engaging and enjoyable for patients, and produces a reliable and scientifically validated cognitive assessment report in as little as 15 minutes.

CBS Health is an objective supplementary tool that does not require clinicians to change or replace anything they're already doing. It serves as a diagnostic aid to confirm, validate, and strengthen diagnostic decisions. In addition, due to the sensitivity of the tests, CBS Health gives healthcare providers a way to detect cognitive change much earlier by establishing a personalized baseline measure that is consistently referred to as patients move through their treatment.

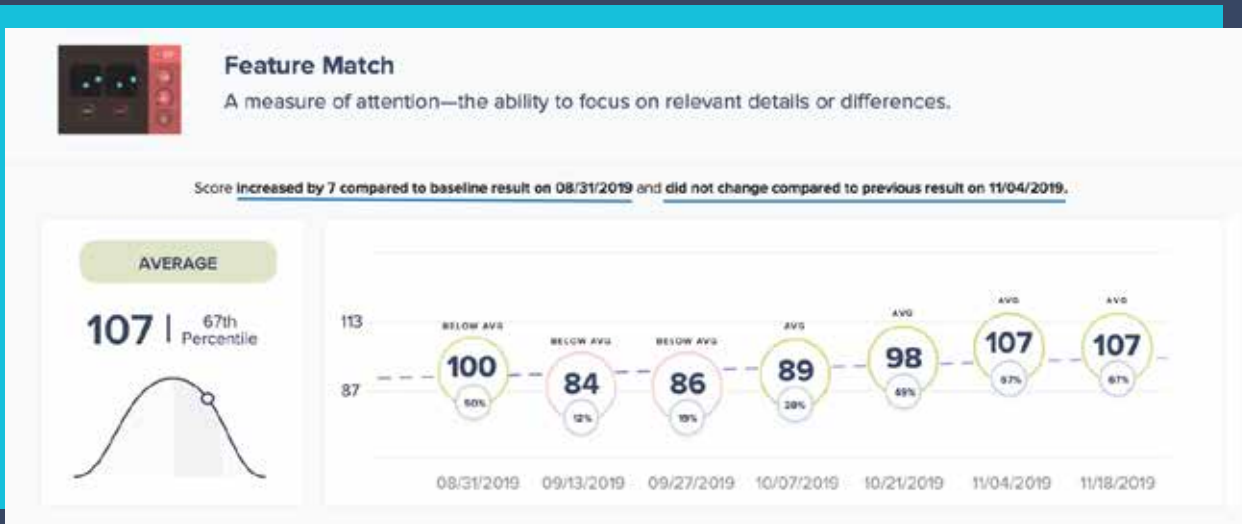
CBS Health offers a centralized platform for clinicians to offer standardized cognitive and behavioral health assessments for patients diagnosed with:

- ADHD
- Anxiety
- Autism
- Concussion/mTBI
- Depression
- Epilepsy
- MS
- Post-concussion syndrome
- PTSD
- Sleep disorders
- Stroke
- Substance abuse

The CBS Health objective cognition tasks provide a comprehensive evaluation that fills the gaps left by patient interviews, self-report scales, and full neuropsychological exams.

Longitudinal Monitoring to Track Improvement and Adjust Treatment

CBS Health includes reports that objectively track a patient's cognitive function longitudinally. Monitoring over time gives clinicians the ability to measure the effects of interventions like medication, psychotherapy, sleep, or lifestyle changes to see if the patient is improving or maintaining their cognitive function in the target domains based on meaningful, data-driven change indicators. The reports show each patient's results plotted over time to track changes easily. For example, this feature can help monitor a stroke patient's recovery after six months in rehab or be used on an ongoing basis as a patient completes cognitive behavioral therapy exercises.

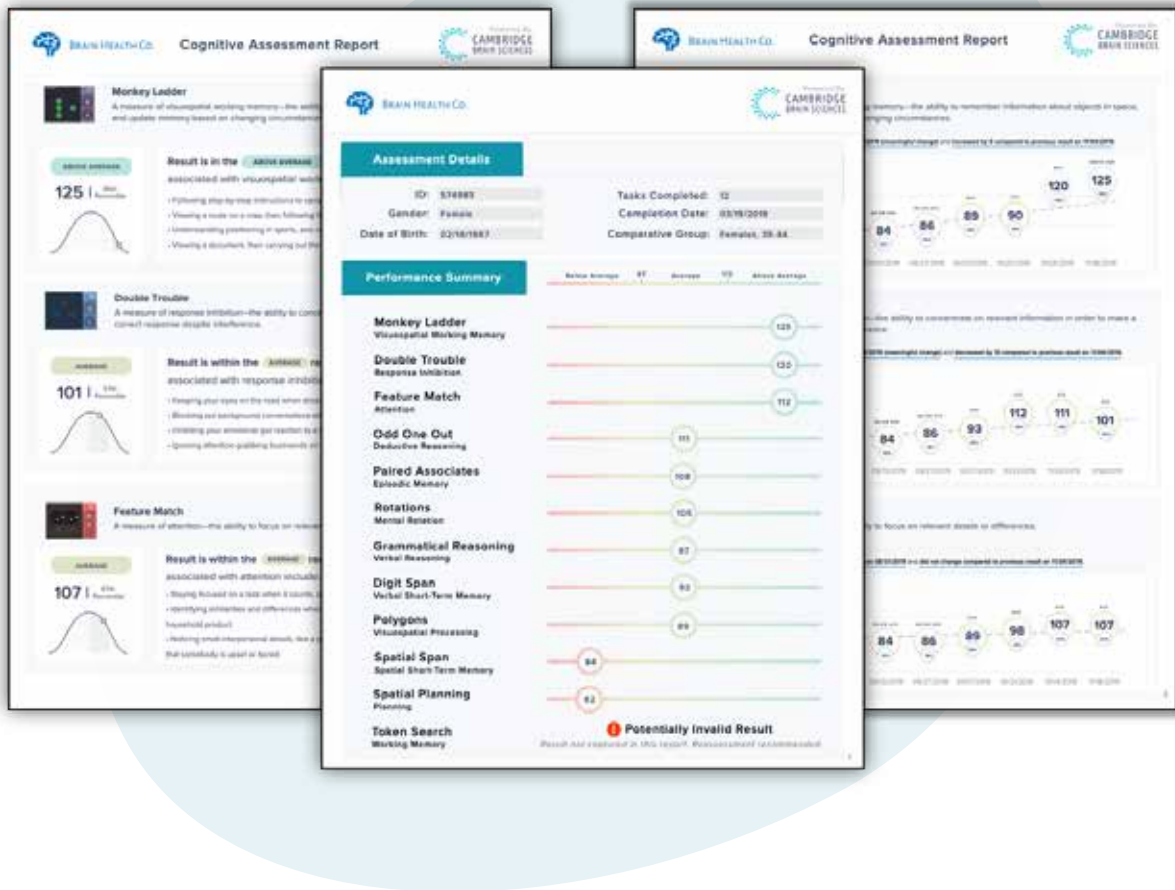


Longitudinal monitoring and interval testing are made more accessible than ever, with the ability to schedule regular assessments far into the future via email. Specialists can determine the intervals at which assessments should be completed, automatically schedule the tests for sending, customize intervals of reminder emails, and even change all elements remotely to pause the process if the tests aren't completed on time. This makes long-term care planning more manageable with the ability to let protocols run automatically in the background.

A meaningful change indicator will alert you to a degree of change from baseline that would not be expected by chance. This information may assist in evaluating the success of an intervention, the need for a change in treatment, or provide data-driven insights to spark patient conversations about symptoms and how they are feeling.

Simple Reporting to Communicate Results with Patients

Upon completing an assessment, a comprehensive report is immediately generated. These easy-to-read reports are valuable tools in understanding a patient's brain health and facilitating conversations with patients, family members, and caregivers. CBS Health is designed with accessibility in mind. Clear reports ensure that lay audiences or other staff who are not well-versed in the details of cognitive function can understand the results.



Leveraging objective and quantitative data strengthens diagnostic decision-making and facilitates conversations with patients and families. Thus, clinicians use CBS Health not as a replacement for a complete neuropsychological evaluation but rather to complement patient self-reporting, serving as an additional tool to validate or rule out the need for further investigation.

A diagnosis plays a significant role in decision-making. Treatment planning, time away from work, education, and lawsuits are all impacted by a diagnosis. Communicating to family members and lawyers can be difficult when only using subjective data. Outside of a clinical diagnosis, parents, lawyers, and other parties need more objective evidence and ways to further validate a diagnosis before making any significant decisions.

CBS Health reporting is simple, making it easy for everyone—from patients to family members to lawyers—to understand.

BEYOND CLINICAL VALUE: THE BENEFITS OF CBS HEALTH TO THE PRACTICE

Reduced Administrative Burden

A complete neuropsychological evaluation takes a lot of time, money, and resources. CBS Health offers many of the same tests that are administered by a neuropsychologist and provides much of the same valuable information—results from a 30-minute battery of computerized tests are highly correlated with results from a two- to three-hour neuropsychological battery.⁸ CBS Health measures many of the same core cognitive domains essential to a patient's quality of life—such as effectiveness at work—but it takes only minutes to complete. While the assessments will not replace an in-depth evaluation, they can be used as a starting point and can test out those who may not require a more comprehensive evaluation.

Easy-to-Use Provider Portal

Clinicians who use CBS Health gain access to a secure HIPAA-compliant and easy-to-use platform. Practitioners can add patients, administer assessments, and create pre-saved configurations of cognitive assessments and/or questionnaires for easy one-click administration. Protocols are easy to administer and can be completed by the patient in the office or sent via email for the patient to complete in the comfort of their own home. These telehealth options allow clinicians to optimize and modernize their practice, saving valuable time for specialists and staff. With the rise of telehealth, CBS Health offers an opportunity for specialists to continue business operations even when patients cannot be seen in person. The tests have been validated for in-person and at-home administration—with no significant difference detected in results.⁹

Simple Pricing and Reimbursable Assessments

CBS Health makes it easy to add new services and reach new patients. Most clinicians receive reimbursement for services, including:

- **Establishing a reliable baseline** by leveraging assessments for patient intake and treatment planning
- **Determining a diagnosis** to begin establishing an appropriate treatment plan
- **Telehealth services** to provide consultations and other remote services
- **Add-on services** like rehabilitation programs and lifestyle optimization follow-up services

⁸Canadian Stroke Congress Conference, [Validation of a novel computerized test battery for automated testing](#), December 2013

⁹Diagnostics, [Thirty-Five Years of Computerized Cognitive Assessment of Aging—Where Are We Now?](#) September 2019

CBS Health is a subscription-based platform with a flat annual fee, which works whether you are operating a small private practice or an extensive group practice. There are no additional fees to add practitioners, so colleagues and others in the clinic can use the same subscription.

Plus, cognitive testing through the CBS Health platform is reimbursable through various CPT testing codes (96132, 96133, etc.) for administering the assessment and interpreting the results. Thus, combining the benefits of reimbursement and the reduced administrative burden associated with cognitive testing, implementing CBS Health has the potential to be a revenue generator.

Curious about costs and reimbursement with CBS Health?

Try our revenue calculator.

LAUNCH NOW →



Innovative Solutions for Improved Patient Care

Adoption of digital technology in healthcare is on the rise. A report by the American Medical Association revealed that increased efficiency, flexibility, and patient safety have been driving a rapid increase in adoption of digital technology in healthcare from 2016 to 2019 across all physician specialties.¹⁰ That trend was accelerated even further by the COVID-19 pandemic in 2020 and 2021.¹¹ Practitioners today want and need a modern solution for evaluating cognitive care.

CBS Health streamlines ongoing cognitive care with comprehensive, easy-to-administer assessments. Initial baseline evaluations provide objective data for initial diagnostics, longitudinal comparisons make it easy to evaluate the effectiveness of ongoing treatment, and simple reporting makes it easy to communicate results to patients. Thus, CBS Health gives practitioners the ability to generate critical insights and provide improved cognitive care with modern digital tools.

CBS Health allows specialists to easily assess and monitor potential cognitive deficits for the entire patient population, improving patient care while driving practice revenue.

Interested in learning more
about how CBS Health can
help improve cognitive care
for your patients?

SCHEDULE A DEMO →

¹⁰American Medical Association, [AMA Digital Health Research](#), February 2020

¹¹Accenture, [Digital Adoption: Reaction or Revolution?](#), August 2020

About Cambridge Brain Sciences

Cambridge Brain Sciences is a leading online brain health assessment platform that accurately quantifies cognitive function and health. Our assessments have been taken millions of times and used in over 300 studies published in leading academic journals over the last 30 years. Owing to its years of rigorous academic development, CBS possesses one of the world's largest normative databases on cognitive function developed from a database of over 10 million cognitive task scores. Our proprietary assessments are used by healthcare practitioners treating mental health conditions, brain injuries, and aging patient populations throughout the world, as well as by leading academics and research institutions.