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# SPARK Scan: Helping Solve the Undiagnosed-Dementia Problem



# Yearly cognitive screening is recommended but skipped

The Centers for Medicaid and Medicare Services (CMS) and the American Academy of Neurology (AAN) recommend cognitive screening for all adults aged 65 and older; however, the execution of this recommendation is fraught with challenges.

82% of seniors expect regular cognitive assessment but only 16% report receiving it. The result: **40% of dementia goes undiagnosed.**

Data from the Alzheimer's Association reveal a disconnect: while 94% of primary care providers acknowledge the importance of screening for cognitive impairment in seniors, less than half (47%) routinely perform such assessments<sup>1</sup>. This discrepancy extends to patient experiences as well. Despite 82% of patients valuing the importance of cognitive screenings, a mere 16% report actually undergoing such assessments<sup>1</sup>. This gap highlights a critical issue in the current healthcare approach to cognitive health.

The result: About 40% of dementia goes undiagnosed<sup>2</sup>.

## Current tools make screening impractical

The healthcare landscape reveals that despite the potential benefits—enhanced member satisfaction, improved cognitive health outcomes, and a notable increase in revenue for value-based care payers and providers (e.g. Medicare Advantage)—widespread screening has not been adopted. The reasons are multifaceted, and include the impracticality of standard cognitive assessment tools and their impact on provider efficiency.

Commonly used tools like the Mini-Mental State Exam (MMSE) and the Montreal Cognitive Assessment (MoCA) can be effective in some contexts; however, they exhibit notably low positive predictive value when used for screening<sup>3</sup>. About half of the time (details below), these assessments falsely indicate dementia (false positive) in a screening context. This

leads to unnecessary resource expenditure as healthcare providers pursue a full diagnostic process on these false leads.

While dementia screening holds potential for numerous benefits, the efficacy of these assessments (and their digital adaptations) is not reliable enough to use for screening. The relative scarcity of neurologists (and other specialists) and the time constraints of primary care providers (PCPs) make further evaluation of so many false positives impractical and adds to the existing strain on providers.

Moreover, subjecting healthy patients and their families to further diagnostic procedures is not only expensive, but stressful and inconvenient. This challenge helps to explain that despite the best of intentions, dementia screening does not consistently take place today.

## **Catching undiagnosed dementia while reducing provider burden**

In order to make screening for dementia more practical and more reliable, while reducing the burden on providers, SPARK Neuro has developed a turn-key screening service with very high positive predictive value: the SPARK Scan.

SPARK Neuro provides all of the necessary personnel and resources to conduct screening such that providers don't need to spend precious time nor disrupt their current clinical workflow. The SPARK Scan more accurately identifies patients who are highly likely to receive a dementia diagnosis, and advances the patient to a full diagnostic assessment.

The screening and diagnostic process consists of three stages. In Stage 1, SPARK Neuro conducts a tele-screener with a short, standard cognitive-functional assessment. Patients who score below a threshold during this first stage move on to Stage 2: They receive an in-person brain scan with SPARK's FDA-cleared electroencephalography (EEG) software. Artificial intelligence developed by SPARK Neuro analyzes the EEG to identify who should continue on to Stage 3, a clinical diagnosis.

## SPARK Scan Screening

SPARK MAs without added provider responsibility

## Provider Diagnosis

SPARK Clinician or In-Network



### Tele-Screener

**15-minute** tele-screener identifies members for SPARK Scan



### EEG Brain Scan

**30-minute** in-person non-invasive brain scan evaluates dementia



### Clinical Diagnosis

Telemedicine visit with SPARK clinician to diagnose dementia  
→**RAF Score Adjusted**

The tele-screener threshold is validated to have a specificity over 90%, minimizing the number of healthy members that move on to the second step and receive an EEG. The EEG data is then evaluated with a machine-learning algorithm for neural activity associated with dementia. The SPARK Scan EEG picks up on unique biological information about brain health that is unavailable to standard screening instruments. By combining the cognitive-functional tele-screener with the biological information in the EEG, the SPARK Scan service achieves very high specificity; if the SPARK Scan service evaluates a member without dementia, more than 99% of the time it will indicate they do not need further evaluation.



## SPARK Scan Performance in the Clinic

In a registered clinical trial involving 272 adults, of whom 124 were diagnosed with dementia, we evaluated the performance of the SPARK Scan service compared to traditional approaches. Specifically, we examined scenarios where PCPs initiate conventional screenings using standard tools like the MMSE vs. assessments based solely on SPARK Scan results. This assessment focused on Medicare beneficiaries — 65 and older.

The findings indicate that with standard tools, 56% of evaluations yield true positives, while the remaining 44% are false positives. These numbers represent the proportion of patients accurately vs. inaccurately referred by the screening procedure for a full diagnostic

evaluation. In other words, 56% of currently performed evaluations would lead to correctly identified dementia diagnoses, whereas 44% of the patients referred would be the wrong patients, wasting time, money, and creating unnecessary stress.

Comparatively, the SPARK Scan has a much higher true positive rate (86%) and significantly reduced false positive rate (14%), indicating a substantial increase in screening efficiency. This means that 86% of the patients referred to our clinicians to complete the diagnostic workup are positive for dementia, ensuring we spend time diagnosing the right patients. Once SPARK clinicians then provide the ultimate diagnosis and code for dementia, results are over 98% accurate, efficiently enabled by the high true positive rate of our screening process.

<b>Standard Screening Tool Accuracy</b> Pen & paper or digitized screeners	<b>SPARK Scan Accuracy</b> EEG-based SPARK Scan
	
<p style="text-align: center;"> <span style="font-size: 2em; color: teal;">56%</span>   <span style="font-size: 2em; color: red;">44%</span>  <span style="color: teal;">TRUE POSITIVES</span>   <span style="color: red;">FALSE POSITIVES</span> </p>	<p style="text-align: center;"> <span style="font-size: 2em; color: teal;">86%</span>   <span style="font-size: 2em; color: red;">14%</span>  <span style="color: teal;">TRUE POSITIVES</span>   <span style="color: red;">FALSE POSITIVES</span> </p>
<p style="text-align: center;">More false positives create undue burden on the clinician and cost for the payer</p>	<p style="text-align: center;">Fewer false positives ensure clinician time is spent on the right patients</p>

## The SPARK Scan makes annual dementia screening practical

Reducing the amount of undiagnosed dementia yields significant benefits to payers, providers, patients, and their families. However, it has been impractical to screen for dementia due to the wasteful resource costs incurred by using current standard screening assessments. The SPARK Scan service addresses the challenges of accuracy and provider workload, creating a pragmatic pathway to efficiently improve quality of care and the associated financial implications.

1. Alzheimer's Association. 2019 Alzheimer's disease facts and figures. *Alzheimer's & Dementia*. 2019;15(3):321-387. doi:10.1016/j.jalz.2019.01.010  
 2. Amjad H, Roth DL, Sheehan OC, Lyketsos CG, Wolff JL, Samus QM. Underdiagnosis of Dementia: an Observational Study of Patterns in Diagnosis and Awareness in US Older Adults. *J Gen Intern Med*. 2018;33(7):1131-1138. doi:10.1007/s11606-018-4377-y  
 3. Mitchell AJ. A meta-analysis of the accuracy of the mini-mental state examination in the detection of dementia and mild cognitive impairment. *Journal of Psychiatric Research*. 2009;43(4):411-431. doi:10.1016/j.jpsychires.2008.04.014