

Reimagining Dementia Screening: A Stakeholder-Informed Perspective on Innovation Opportunities

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Reimagining Dementia Screening: A Stakeholder-Informed Perspective on Innovation Opportunities

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Abstract

The recent advent of disease-modifying treatments for Alzheimer's disease (AD) demands a transformation in our approach to cognitive screening. Drawing from 123 stakeholder interviews conducted through the NSF I-Corps program, we examine the limitations of current screening practices and explore emerging opportunities for innovation. Our analysis reveals systemic challenges in current practice, including time constraints in primary care, learning effects in long-term care settings, and widespread staffing shortages across the care continuum. We identify several promising pathways for innovation, including AI-powered speech analysis for rapid screening and monitoring, differential diagnosis tools, and automated care planning solutions. The convergence of new treatments, technological capabilities, and pressing clinical needs creates an unprecedented opportunity to reimagine dementia screening. This viewpoint synthesizes insights from frontline healthcare providers and presents a vision for next-generation screening approaches that could significantly improve early detection and continuous monitoring of cognitive decline across care settings.

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Original Manuscript

Reimagining Dementia Screening: A Stakeholder-Informed Perspective on Innovation Opportunities

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Abstract

The recent advent of disease-modifying treatments for Alzheimer's disease (AD) demands a

transformation in our approach to cognitive screening. Drawing from 180 stakeholder interviews conducted through the NSF I-Corps program, we examine the limitations of current screening practices and explore emerging opportunities for innovation. Our analysis reveals systemic challenges in current practice, including time constraints in primary care, learning effects in long-term care settings, and widespread staffing shortages across the care continuum. We identify several promising pathways for innovation, including AI-powered speech analysis for rapid screening and monitoring, differential diagnosis tools, and automated care planning solutions. The convergence of new treatments, technological capabilities, and pressing clinical needs creates an unprecedented opportunity to reimagine dementia screening. This viewpoint synthesizes insights from frontline healthcare providers and presents a vision for next-generation screening approaches that could significantly improve early detection and continuous monitoring of cognitive decline across care settings.

Viewpoint

Overview

The landscape of AD treatment has fundamentally changed with the FDA approval of lecanemab and

donanemab [1], [2]. These breakthrough treatments offer unprecedented opportunities for early intervention, yet our healthcare system's capacity to identify suitable candidates remains constrained by outdated screening approaches. Through extensive stakeholder engagement, we identify critical gaps in current practice and outline pathways for innovation that could revolutionize cognitive screening across care settings.

Current Challenges and Stakeholder Perspectives

Our engagement with 180 healthcare professionals revealed systemic challenges across the care continuum. Primary care providers, facing significant time constraints, struggle with traditional tools that can consume up to half of a patient visit. The problem extends beyond time limitations – approximately 40% of providers report low confidence in their screening results [3], highlighting a crucial need for more objective assessment methods.

Long-term care facilities face their own critical challenges with current screening approaches. Traditional assessment tools suffer from significant learning effects, where residents become familiar with the tests over repeated administrations (every quarter), compromising the validity of longitudinal monitoring. This challenge is particularly acute in memory care units and skilled nursing facilities, where continuous monitoring of disease progression is essential. These issues are further compounded by widespread staffing shortages and high turnover rates, which affect the consistency and quality of assessments.

Cost barriers create additional complications across settings. While PET scans offer diagnostic precision, their high cost limits accessibility, particularly during early stages when treatments prove most effective. As one neurologist emphasized, "The best treatments work when patients are in a very mild state, but not everyone can get PET scans due to pricing issues." This challenge is compounded by the fact that approximately two-thirds of Alzheimer's patients experience "denial of illness," making early detection and intervention even more crucial [4].

Innovation Opportunities

Artificial Intelligence and Digital Biomarkers

The convergence of AI capabilities with healthcare needs presents several promising opportunities. Healthcare providers emphasized the critical need for tools that can differentiate between various types of dementia (frontotemporal, Huntington's, vascular, AD, etc.). While current screening tools like the AD8 demonstrate sensitivity and specificity around 80% for general cognitive impairment [4], neurologists in our study indicated that an AUC of 70% would be clinically acceptable for an AI-based differential diagnosis tool.

Digital speech analysis emerges as a particularly promising approach for both early detection and continuous monitoring [5]. In independent and assisted living settings, these tools could detect subtle cognitive changes through natural conversations. In memory care units and skilled nursing facilities, they offer a way to track disease progression while avoiding the learning effects of traditional tests. For primary care settings, where rapid assessment is crucial, speech analysis could provide quick (under 5 minutes), sensitive, and specific screening results while maintaining natural patient interaction. This approach is particularly relevant now that cognitive screening is supported by CPT codes (#99483), offering a practical path to implementation in primary care workflows.

Care Delivery Innovation

Beyond screening tools, stakeholders identified opportunities for broader care improvement. Generative AI could help address staffing challenges by streamlining care plan development while maintaining personalization. In skilled nursing facilities and memory care units, administrators emphasized the need for technologies that enhance residents' comfort and joy while addressing practical concerns like fall prevention, which was identified as the greatest risk in these settings. As one administrator noted, "We need solutions that make residents comfortable and bring joy to their

lives."

Educational platforms represent another critical opportunity, with stakeholders highlighting the importance of increasing public awareness and understanding of cognitive decline [6].

Implementation Considerations

Successful implementation of these technologies requires careful attention to several critical factors:

EHR Integration and Workflow

Solutions must integrate seamlessly with existing Electronic Health Record (EHR) systems and clinical workflows. While EHR integration challenges are well-documented in healthcare innovation [7], our stakeholders consistently emphasized that new screening tools must avoid creating additional documentation burden and instead work within existing EHR infrastructure. This integration is particularly crucial in time-constrained settings like primary care, where efficiency and accessibility of information directly impact adoption rates.

Setting-Specific Design

Tools must adapt to the unique constraints and objectives of different care environments. Independent and assisted living facilities require solutions focused on early detection and subtle changes, while memory care and skilled nursing facilities need robust disease progression monitoring capabilities. Primary care settings demand rapid, efficient tools that can seamlessly integrate into brief patient visits while maintaining high sensitivity and specificity.

Staff Engagement and Training

While new technologies can reduce overall burden, they require thoughtful implementation and training programs to ensure effective adoption. This is particularly important given the widespread staffing challenges across care settings. Implementation strategies must account for varying levels of technological expertise and high staff turnover rates, emphasizing intuitive interfaces and

streamlined training processes.

Path Forward

The transformation of dementia screening requires coordinated effort across several dimensions:

Technology Development

Development efforts should focus on validated digital biomarkers and integrated assessment approaches that can provide objective, continuous assessment of cognitive function. Particular attention should be paid to ensuring high sensitivity and specificity while maintaining practical usability across care settings.

Clinical Validation

Clear evidence must be established for the sensitivity, specificity, and clinical utility of new screening approaches. This includes validation across different patient populations and care settings, with careful attention to factors that could affect performance and reliability. Multi-center studies will be needed to validate these tools across diverse healthcare settings with particular emphasis on establishing appropriate clinical thresholds and understanding potential confounding factors.

Implementation Research

Best practices for technology adoption must be developed and refined across different care settings, taking into account workflow integration, staff training needs, and setting-specific requirements.

Conclusion

The imperative for better dementia screening tools has never been stronger. Our stakeholder analysis reveals both significant challenges in current practice and promising opportunities for innovation. By leveraging emerging technologies like AI-powered speech analysis and automated personalized care planning, we can create more effective, efficient, and accessible screening approaches. Success will

require careful attention to implementation considerations and close collaboration with frontline healthcare providers.

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Conflicts of Interest

None declared.

Abbreviations

AD: Alzheimer's disease
AI: Artificial intelligence
AUC: Area under the curve
CPT: Current Procedural Terminology
EHR: Electronic health record
FDA: Food and Drug Administration
MCI: Mild cognitive impairment
NSF: National Science Foundation

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