Brain Health Evidence-Based Interventions

Background

Approximately 6.9 million Americans aged 65 and older currently live with Alzheimer's disease. This number is projected to increase to nearly 13 million by 2050 (Alzheimer's Association). Enhancing services for older adults, including integration of brain health into primary care, is essential for the economic, emotional, and physical wellbeing of our rapidly aging American society.

Our nation's 1400 health centers offer care in over 15,000 sites, reaching deeply into American communities. Their highly skilled health center staff are accustomed to delivering comprehensive care based on individual needs. With access to information, training, and resources on evidence-based strategies and resources related to brain health, health centers can achieve improved health outcomes, improved patient experiences, improved staff experiences, reduced costs, and equity (the Quintuple Aim).

A review of the literature to identify evidence-based strategies for brain health as part of a systems approach to care was conducted. This review is organized by the Value Transformation Framework (VTF), an organizing framework for health center systems change. The VTF takes the multi-faceted health center system and breaks it down into three functional Domains: Infrastructure, Care Delivery, and People, and 15 Change Areas which health centers can target to improve performance. This evidence review assists NACHC's efforts to further advance programs and training across the care cascade of brain health from risk reduction to treatment. NACHC's national health center learning forum, called Elevate, is well positioned to provide health centers with training and peer engagement to improve systems and processes that support implementation of many of the evidence-based practices outlined in this review.

INFRASTRUCTURE:

Health Information Technology

- Use of EHR to **track symptoms** and changes and to **detect cognitive impairment.**
    - **Barrier:** Current landscape includes poor integration of cognitive assessments with Electronic Health Record (EHR) systems creates significant administrative burden, and lack of proper integration with EHR system limits the ability to track an individual's cognition over time, which in turn limits the utility of cognitive evaluation[1]
    - **Opportunity**: EHR Risk of Alzheimer's and Dementia Assessment Rule (**eRADAR**): tool developed to help detect patients with unrecognized dementia using information readily available in EHR, with healthcare utilization, dementia-related symptoms, and dementia risk factors being key predictors.[2] eRADAR has performed consistently over multiyear periods of study, and analysis has shown that

performance of the model "excellent and similar across different racial and ethnic groups" [3]

- Use of technology to strengthen **cognitive assessment**.
    - Authors of Montreal Cognitive Assessment (MoCA) developed **eMOCA**, an electronic version administered on a tablet computer. A study comparing two versions demonstrated adequate convergent validity among adult population who presented with memory concerns. Further study needed, but use of tablet-based assessments has the potential to facilitate electronic data capture and increase reliability and clinical efficiency with automated scoring[4]
    - **Self-Administered Gerocognitive Examination (SAGE)** can help overcome obstacles related to time or personnel resources. Study found paper-based SAGE and tablet-based **eSAGE** scores highly correlated with each other and have similar correlation values with the Mini Mental Status Exam (MMSE) and MoCA[5]
    - Review of **mobile technologies** for cognitive assessment: the portability of mobile technologies can reduce time, frequency, and place barriers for cognitive assessment, and allow short- or long-term monitoring through repeated assessment outside the clinic for insight into day-to-day variations in cognition, emotion, and stress, as opposed to the snapshot given by tests administered in clinics[6]
- **Computer-based cognitive training:** While there is currently insufficient evidence that cognitive training prevents cognitive decline, there is promise that training interventions can improve performance in the specific domain of focus, such as **reasoning, executive functioning, attention, memory, or verbal skills**.
    - **Advanced Cognitive Training for Independent and Vital Elderly (ACTIVE) study**[7] RCT with three treatment groups (one each for memory, reasoning, and speed of processing). Speed of processing training involved identifying an object on a computer screen at increasingly brief exposures followed by dividing attention between two search tasks. Participants who completed training experienced improvements in attention, depressive symptoms and feelings of control, health-related quality of life, and real-world measures such as driving and predicted health care costs[8]
    - **Iowa Healthy and Active Minds Study (IHAMS)**[9]: Visual speed of processing training delivered on-site or at-home to middle-aged or older adults using standard home computers resulted in stabilization or improvement in several cognitive function tests, as compared to an active control group using computerized crossword puzzles.
    - **Brain Fitness program**[10]: older adults without dementia (convenience sample from local retirement communities) assigned to computerized brain exercise program over 6 months and evaluated on immediate memory, delayed memory, and language vs. a waitlist control group, with results showing group differences in delayed memory
- **Social engagement**
    - **The Health and Retirement Study** suggests that technology use predicted lower loneliness which predicted better physical and mental health.[11]
    - **Evaluation of the Personal Reminder Information and Social Management 2.0 (PRISM 2.0) software** was conducted to assess the impact of psychosocial outcomes. The study demonstrated incorporating technology improved loneliness,

but there was no difference in the PRISM 2.0 software. versus utilization of a standard tablet.[12]

- **Emerging technology for Caregiver support**
    - The Regenstrief institute is conducting a large clinical trial investigating the role an app can decrease health care utilization and decrease care burden and depression for caregivers: Brain CareNotes

CARE DELIVERY:

Evidence Based Care

Screening

- **USPTF:** Insufficient evidence to recommend **universal screening**:
    - US Preventive Services Task Force recommendation for community-dwelling older adults 65 or older without recognized signs or symptoms of cognitive impairment with an "I" rating for Insufficient evidence to assess balance of benefits & harms of screening[13]
    - RCT of primary care patients 65 years or older randomized to screening of Alzheimer disease and related dementias found no difference in health-related quality of life, but also found no harm, as measured by symptoms of depression or anxiety[14]
- **Alzheimer's Association Recommendations:** Alzheimer's Association Medicare Annual Wellness Visit algorithm for assessment of cognition + (Medicare Annual Wellness Visit: HCPCS codes G0438 or G0439)
    - **Early detection through observation or reported concerns.**
        - Signs and symptoms recognized by patients, caregivers, or clinicians; questions and discussion of change in memory, language, and ability to complete routine tasks.
        - **USPSTF:** "Clinicians should remain alert to early signs or symptoms of cognitive impairment (e.g. problems with memory and language) and evaluate as appropriate"[15] similar guidance from American Academy of Neurology, American Geriatrics Society, American Medical Association, American Association of Family Practitioners[16]
        - **Alzheimer's Association: "Review Health Risk Assessment** (especially reports of functional deficits), clinician observations, and self-reported concerns; and query patient and, if available, informant"[17]
        - Expert panel of clinicians and cognitive neuroscientists: "Given the enduring uncertainty around whether universal screening is beneficial, this group recognized that the most valuable early detection pathway would begin with individuals who already have a cognitive performance concern (initiated either by the individual themselves, a family member, or the healthcare provider) or individuals who actively opt-in to cognitive assessment."[18]
    - **Structured assessment**
        - If signs/symptoms of cognitive impairment are present, brief, structured cognitive assessment, combined with informant-reported data if possible[19]
        - No single tool or instrument recognized/accepted/recommended as ideal.
        - Brief, structured assessment tools "correctly classify patients with dementia or mild cognitive impairment more often than spontaneous

detection by the patients' own primary care physicians" and can "provide either a baseline for cognitive surveillance or a trigger for further evaluation."[20]

- Patient: GPCOG, Mini-Cog, MIS
- Informants: AD8, GPCOG, Short IQCODE

- **Full dementia evaluation**
  - Full evaluation either in separate visit on same day, during newly scheduled visit, or through a referral to a specialist such as a geriatrician, geriatric psychiatrist, neurologist, or neuropsychologist.[21]
    - Alzheimer's diagnostic criteria and guidelines issued by Alzheimer's Assocation and National Institute on Aging
  - Cognitive impairment and dementia "may result from vascular disease, Parkinson's disease or Lewy body accumulation, major depressive disorder, sleep disorders, substance abuse, polypharmacy, other etiologies or a combination of etiologies—instead of, or in addition to, [Alzheimer's disease] neuropathologic changes[22]
  - American Academy of Neurology: Appropriate diagnosis of MCI important to assess for reversible causes, to help patients and families understand the causes of their cognitive concerns, and to discuss the prognostic possibilities with the provider so they can plan accordingly[23]

Interventions

- Addressing **risk factors associated with cognitive impairment and/or dementia**
  - Systolic Blood Pressure Intervention Trial (**SPRINT**) Study: RCT of adults 50 or older with systolic **blood pressure** of 130 mm Hg or higher and at least one additional cardiovascular disease risk factor; 4,678 randomized to systolic blood pressure goal of less than 120 mm Hg, and 4,683 randomized to less than 140 mm Hg.[24] No significant reduction in risk of probable dementia, but those in former had 19% lower risk for developing mild cognitive impairment and "reduced development of abnormal white matter lesions in their brains, indicating a possible mechanism for the observed preservation of cognitive function"[25]
  - **Piedmont Aging Cognition, and Exercise Study 2 (PACE-2**): 33 adults between 55 and 85 with mild cognitive impairment randomized to **high-intensity aerobic exercise** or stretching control group for six months[26]; treatment group had better executive function, but not better short-term memory; blood flow increased in brain regions affected by aging and Alzheimer's[27]
  - Findings from seven-year cohort study of 1,433 people over 65 suggests that **eliminating diabetes (specifically insulin resistance) and depression** and increasing fruit and vegetable consumption could maximize reduction in the incidence of dementia[28]
  - Finnish Geriatric Intervention Study to Prevent Cognitive Impairment and Disability (**FINGER**): **multidomain intervention** including diet, exercise, cognitive training, and vascular risk monitoring could improve or maintain cognitive functioning in at-risk elderly individuals[29]
- Addressing cognitive impairment due to **treatable conditions**
  - Mild Cognitive Impairment can be caused by a variety of factors, such as medication side effects, sleep deprivation, or anxiety.[30] Upon evaluation, clinicians

can take measures to treat the underlying causes, such as weaning patients from medications that may be contributing to cognitive impairment.[31]

- Addressing cognitive impairment caused by **neurogenerative dementias**
    - Although there are no cures for neurogenerative dementias, such as dementia with Lewy bodies, Parkinson's disease dementia, or Alzheimer's disease, there are some interventions that may help manage symptoms
        - Pharmacologic interventions: Cholinesterase inhibitors, also called acetylcholinesterase inhibitors, and memantine are two FDA-approved treatments aimed at symptoms related to memory and cognition for those with Alzheimer's.[32] While there is evidence that cholinesterase inhibitors can result in small improvements in cognitive function for those with mild to moderate Alzheimer's, there is also adequate evidence that their use is associated with small, but occasionally serious, adverse effects.[33] Memantine may be offered to those with moderate to severe Alzheimer's or vascular dementia, but not those with Lewy Body dementia.[34]
        - Nonpharmacologic interventions: although there is no clear evidence that nonpharmacologic interventions can lead to improvements in cognitive function—and the harms are assumed to be small—there are options such as cognitive training, exercise, peer support, and care management[35]

PEOPLE:

Patients - Patient Engagement

- Educating patients and caregivers on **warning signs**: Alzheimer's Association's 10 Early Signs and Symptoms of Alzheimer's and Dementia, which also includes descriptions of typical age-related changes to compare against
- **Lowering risk of cognitive impairment** through lifestyle changes/addressing modifiable risk factors: Although some of the strongest risk factors for cognitive impairment such as increasing age, family history, and genetics are unmodifiable, there is growing evidence on the relationship between cognitive impairment and some modifiable risk factors.[36] Based on the existing research, organizations and agencies offer different recommendations and guidelines on lifestyle and behavioral changes that individuals can make to lower their risk of developing cognitive impairment.
    - **Staying physically active:** Preliminary evidence, particularly from observational studies, suggests that high-intensity aerobic exercise has positive effects on cognition, brain structure and function, and Alzheimer's disease biomarkers.[37] Although there is still uncertainty around whether physical activity can prevent, delay, or slow cognitive decline, MCI, or Alzheimer's, and the duration and frequency required to do so, experts recommend exercise for older adults, as it reduces the risk of depression, diabetes, high blood pressure, and stroke, all of which can also impact cognitive health.[38]
    - **Managing high blood pressure:** Most of the modifiable risk factors for Alzheimer's and related dementias have a cardiovascular component, including hypertension.[39] Midlife hypertension in particular is strongly associated with later cognitive deficits, and treating hypertension is an effective means of reducing the risk of cognitive impairment in older age.[40] The aforementioned SPRINT study found that lowering

blood pressure significantly reduced risk of MCI and slowed the buildup of white matter lesions, or abnormal changes in the brain associated with dementia.[41]

- **Quitting smoking:** There is evidence that quitting smoking at any age can reduce the risk of cognitive decline, with the Public Center of Excellence on Dementia Risk Reduction suggesting that it may be "one of the best ways to reduce the risk of dementia in later life." Current smoking increases the risk of cognitive decline and dementia, and heavy smoking in middle age may as much as double a person's risk of dementia in later life.[42] Given the large body of observational evidence and the substantial established harm of tobacco use, the World Health Organization also makes a strong recommendation that interventions for tobacco cessation be offered to adults who use tobacco as they may reduce the risk of cognitive decline.[43]
- **Eating a healthy diet:** Certain nutrients could either directly affect cognitive health through their effects on antioxidation, anti-inflammation, and endometrial and mitochondrial function, or indirectly "influence dementia risk by protecting from excess risk of cardiovascular risk factors."[44] The US Preventive Services Task Force lists several dietary and lifestyle factors as having been reported as associated with decreased risk of cognitive impairment, such as adequate folic acid intake, low saturated fat intake, higher longer-chain omega-3 fatty acid intake, and high fruit and vegetable intake.[45] The WHO guidelines recommend a Mediterranean diet as its benefits outweigh the harms.[46]
- **Maintaining a healthy weight and preventing or controlling diabetes:** Both obesity and diabetes increase the risk of cognitive decline and dementia, as well as other health problems.[47] Evidence suggests that preventing obesity and type 2 diabetes is much more promising as a method of reducing the risk of cognitive decline, as opposed to treating, managing, and controlling the two after their occurrence.[48]
- **Protecting against traumatic brain injury:** Traumatic brain injury, which can happen from falls or accidents, in older adults is linked to increased risk of dementia. With older adults particularly susceptible to serious injury from falls, steps such as using a walker for mobility problems, muscle weakness, or poor balance; using glasses or contact lenses to correct for any vision issues or changes; and working with a doctor to monitor and address any medication side effects or interactions can help reduce the risk of falls and related head injuries.[49]
- **Education:** Higher childhood education levels and lifelong higher educational attainment reduce dementia risk. Researchers believe the lack of secondary school education can lead to increased risk of cognitive decline due to a lack of cognitive reserve and that ongoing education may continue to increase cognitive reserve.[50]

Care Teams - Care Team Interventions/Engagement

- Managing care team roles particularly in the context of the Medicare Annual Wellness Visit
  - Screenings can be completed by a Medical Assistant, Registered Nurse, Community Health Worker, or other care team members to focus the provider role to services that require provider-level management.
  - Completing some components "outside" of time with the provider, with phone or video calls, or electronic forms and kiosks for patients to self-complete screenings

- Cognitive assessments:
    - BOLD Public Health Center of Excellence on Early Detection of Dementia's resource on Navigating Pre-Screening Conversations: steps to handle conversations in preparation for cognitive screening + examples of short, simple statements to ease concerns for patients
    - Qualitative study found simplicity, ease, and efficiency critical for implementation of a cognitive assessment toolkit[51]
    - "In some medical systems, creation of embedded nursing personnel trained to carry out cognitive evaluations on an as-needed basis have been well received. Creation of primary care clinicians with special training and expertise in this area, coupled with specific memory teams in primary care, has received wide-spread endorsement."[52]

Partnerships - PACE (Program of All-Inclusive Care for the Elderly) or LIFE (Living Independence for the Elderly) in some states

- PACE organizations coordinate care and provide services while keeping individuals in their homes, so they can live as independently as possible for as long as possible, as opposed to moving to a nursing home or other care facility[53]
- PACE organizations can offer adult day care to allow informal caregivers to continue to work during the day and provide training and support groups for caregivers[54]
- InnovAge's PACE includes primary care, social work, and physical and occupational therapy, as well as home care, dietary support, and transportation; the program also has access to local community-based networks of specialty providers and facilities
- Piedmont Health SeniorCare is both a certified FQHC and authorized PACE facility with an interdisciplinary care team that provides patients with an individualized plan of care managed daily
- For health centers interested in becoming a PACE center, the National Pace Association (NPA) has a collection of resources to help navigate the application process
- Health centers that may not have the resources to apply to become a PACE center or are operating in an area in which a PACE provider already exists may partner with an existing PACE organization[55]
    - Physicians, nurse practitioners, or physician assistants of community health centers can contract with PACE to be a member of the interdisciplinary care team and fulfill the role of the PACE Primary Care Provider
    - If the CHC has additional space to provide services, it can be designated as an Alternative Care Site (ACS) for the PACE program to help increase access to services for PACE enrollees
    - CHCs can directly contract with the PACE organization to specialty services to PACE participants
    - LifeLong Medical Care, a community health center, has partnered with a local hospital, adult day health centers, independent living centers, and multiple PACE organizations in nearby cities[56]

Conclusion

Health centers are well positioned to offer many of the evidence-based interventions outlined in this review. As NACHC considers future brain health initiatives, the evidence-based interventions and programs outlined in this review will inform the development of programs and training across the care cascade of brain health. NACHC's Elevate learning forum, and its focus on a systems approach to improvement, is well positioned to support health centers in integrating brain health into primary care.

---

[1] Sabbagh MN, Boada M, Borson S, Chilukuri M, Dubois B, Ingram J, Iwata A, Porsteinsson AP, Possin KL, Rabinovici GD, Vellas B, Chao S, Vergallo A, Hampel H. Early Detection of Mild Cognitive Impairment (MCI) in Primary Care. J Prev Alzheimers Dis. 2020;7(2):81-90. doi:10.14283/jpad.2020.21

[2] Barnes, D. E., Zhou, J., Walker, R. L., Larson, E. B., Lee, S. J., Boscardin, W. J., Marcum, Z. A., & Dublin, S. (2019). Development and validation of eradar: A tool using EHR data to detect unrecognized dementia. *Journal of the American Geriatrics Society*, *68*(1), 103–111. https://doi.org/10.1111/jgs.16182

[3] Kaiser Permanente Washington Health Research Institute. (2022, August 1). Dementia risk screening tool shows promise in health care setting. https://www.kpwashingtonresearch.org/news-and-events/recent-news/news-2022/dementia-risk-screening-tool-shows-promise-health-care-setting

[4] Berg, J.-L., Durant, J., Léger, G. C., Cummings, J. L., Nasreddine, Z., & Miller, J. B. (2018). Comparing the electronic and standard versions of the Montreal Cognitive Assessment in an outpatient memory disorders clinic: A validation study. Journal of Alzheimer's Disease, 62(1), 93–97. https://doi.org/10.3233/jad-170896

[5] Scharre, D. W., Chang, S. ing, Nagaraja, H. N., Vrettos, N. E., & Bornstein, R. A. (2017). Digitally translated self-administered Gerocognitive Examination (esage): Relationship with its validated paper version, Neuropsychological Evaluations, and clinical assessments. Alzheimer's Research & Therapy, 9(1). https://doi.org/10.1186/s13195-017-0269-3

[6] Koo, B. M., & Vizer, L. M. (2019). Mobile technology for Cognitive Assessment of Older Adults: A scoping review. Innovation in Aging, 3(1). https://doi.org/10.1093/geroni/igy038

[7] Tennstedt, S. L., & Unverzagt, F. W. (2013a). The Active Study. Journal of Aging and Health, 25(8_suppl). https://doi.org/10.1177/0898264313518133

[8] American Psychological Association. (2016). Brain training reduces dementia risk across 10 years. American Psychological Association. https://www.apa.org/news/press/releases/2016/08/brain-training-dementia

[9] Wolinsky, F. D., Vander Weg, M. W., Howren, M. B., Jones, M. P., & Dotson, M. M. (2013). A randomized controlled trial of cognitive training using a visual speed of processing intervention in middle aged and older adults. PLoS ONE, 8(5). https://doi.org/10.1371/journal.pone.0061624

[10] Miller, K. J., Dye, R. V., Kim, J., Jennings, J. L., O'Toole, E., Wong, J., & Siddarth, P. (2013). Effect of a computerized brain exercise program on cognitive performance in older adults. The American Journal of Geriatric Psychiatry, 21(7), 655–663. https://doi.org/10.1016/j.jagp.2013.01.077

[11] Chopik WJ. The Benefits of Social Technology Use Among Older Adults Are Mediated by Reduced Loneliness. Cyberpsychol Behav Soc Netw. 2016 Sep;19(9):551-6. doi: 10.1089/cyber.2016.0151. Epub 2016 Aug 19. PMID: 27541746; PMCID: PMC5312603.

[12] Czaja SJ, Charness N, Rogers WA, Sharit J, Moxley JH, Boot WR. The Benefits of Technology for Engaging Aging Adults: Findings From the PRISM 2.0 Trial. Innov Aging. 2024 Apr 25;8(6):igae042. doi: 10.1093/geroni/igae042. PMID: 38854853; PMCID: PMC11154146.

[13] US Preventive Services Taskforce. (2020, February 25). Cognitive impairment in older adults: Screening. Recommendation: Cognitive Impairment in Older Adults: Screening | United States Preventive Services Taskforce. https://www.uspreventiveservicestaskforce.org/uspstf/recommendation/cognitive-impairment-in-older-adults-screening

[14] Fowler, N. R., Perkins, A. J., Gao, S., Sachs, G. A., & Boustani, M. A. (2019). Risks and benefits of screening for dementia in primary care: The Indiana University Cognitive Health Outcomes Investigation of the comparative effectiveness of dementia screening (IU choice)trial. Journal of the American Geriatrics Society, 68(3), 535–543. https://doi.org/10.1111/jgs.16247

[15] US Preventive Services Taskforce. (2020, February 25). Cognitive impairment in older adults: Screening. Recommendation: Cognitive Impairment in Older Adults: Screening | United States Preventive Services Taskforce. https://www.uspreventiveservicestaskforce.org/uspstf/recommendation/cognitive-impairment-in-older-adults-screening

[16] Galvin, J. E., & Sadowsky, C. H. (2012). Practical guidelines for the recognition and diagnosis of dementia. The Journal of the American Board of Family Medicine, 25(3), 367–382. https://doi.org/10.3122/jabfm.2012.03.100181

[17] Cordell, C. B., Borson, S., Boustani, M., Chodosh, J., Reuben, D., Verghese, J., Thies, W., & Fried, L. B. (2012). Alzheimer's association recommendations for operationalizing the detection of cognitive impairment during the Medicare annual wellness visit in a primary care setting. Alzheimer's & Dementia, 9(2), 141–150. https://doi.org/10.1016/j.jalz.2012.09.011

[18] Sabbagh MN, Boada M, Borson S, Chilukuri M, Dubois B, Ingram J, Iwata A, Porsteinsson AP, Possin KL, Rabinovici GD, Vellas B, Chao S, Vergallo A, Hampel H. Early Detection of Mild Cognitive Impairment (MCI) in Primary Care. J Prev Alzheimers Dis. 2020;7(2):81-90. doi:10.14283/jpad.2020.21

[19] Cordell, C. B., Borson, S., Boustani, M., Chodosh, J., Reuben, D., Verghese, J., Thies, W., & Fried, L. B. (2012). Alzheimer's association recommendations for operationalizing the detection of cognitive impairment during the Medicare annual wellness visit in a primary care setting. Alzheimer's & Dementia, 9(2), 141–150. https://doi.org/10.1016/j.jalz.2012.09.011

[20] Cordell, C. B., Borson, S., Boustani, M., Chodosh, J., Reuben, D., Verghese, J., Thies, W., & Fried, L. B. (2012). Alzheimer's association recommendations for operationalizing the detection of cognitive impairment during the Medicare annual wellness visit in a primary care setting. Alzheimer's & Dementia, 9(2), 141–150. https://doi.org/10.1016/j.jalz.2012.09.011

[21] Cordell, C. B., Borson, S., Boustani, M., Chodosh, J., Reuben, D., Verghese, J., Thies, W., & Fried, L. B. (2012). Alzheimer's association recommendations for operationalizing the detection of cognitive impairment during the Medicare annual wellness visit in a primary care setting. Alzheimer's & Dementia, 9(2), 141–150. https://doi.org/10.1016/j.jalz.2012.09.011

[22] Liss JL, Seleri Assunção SS, Cummings J, et al. Practical recommendations for timely, accurate diagnosis of symptomatic Alzheimer's disease (MCI and dementia) in primary care: a review and synthesis. JAMA Intern Med. 2021;181(6):804-813. doi:10.1111/joim.13244

[23] Petersen, R. C., Lopez, O., Armstrong, M. J., Getchius, T. S. D., Ganguli, M., Gloss, D., Gronseth, G. S., Marson, D., Pringsheim, T., Day, G. S., Sager, M., Stevens, J., & Rae-Grant, A. (2018). Practice guideline update summary: Mild cognitive impairment: Report of the Guideline Development, Dissemination, and Implementation Subcommittee of the American Academy of Neurology. Neurology, 90(3), 126–135. https://doi.org/10.1212/WNL.0000000000004826

[24] Williamson, J. D., Pajewski, N. M., Auchus, A. P., Bryan, R. N., Chelune, G., Cheung, A. K., Cleveland, M. L., Coker, L. H., Crowe, M. G., Cushman, W. C., Cutler, J. A., Davatzikos, C., Desiderio, L., Erus, G., Fine, L. J., Gaussoin, S. A., Harris, D., Hsieh, M.-K., Johnson, K. C., … Wright, C. B. (2019). Effect of intensive vs standard blood pressure control on probable dementia. *JAMA*, *321*(6), 553. https://doi.org/10.1001/jama.2018.21442

[25] Alzheimer's Association Public Health Center of Excellence on Dementia Risk Reduction. (n.d.). (rep.). *Reducing Dementia: A Summary of the Science and Public Health Impact*. Retrieved May 31, 2024, from https://www.alz.org/media/Documents/compiled-evidence-based-reports.pdf.

[26] Baker, L. D., Frank, L. L., Foster-Schubert, K., Green, P. S., Wilkinson, C. W., McTiernan, A., Plymate, S. R., Fishel, M. A., Watson, G. S., Cholerton, B. A., Duncan, G. E., Mehta, P. D., & Craft, S. (2010). Effects of aerobic exercise on mild cognitive impairment. Archives of Neurology, 67(1). https://doi.org/10.1001/archneurol.2009.307

[27] NIH National Institute on Aging. (2017, February 6). Putting exercise to the test in people at risk for Alzheimer's. National Institute on Aging. https://www.nia.nih.gov/news/putting-exercise-test-people-risk-alzheimers

[28] Ritchie, K., Carriere, I., Ritchie, C. W., Berr, C., Artero, S., & Ancelin, M.-L. (2010). Designing prevention programmes to reduce incidence of dementia: Prospective cohort study of modifiable risk factors. *BMJ*, *341*(aug05 2), c3885–c3885. https://doi.org/10.1136/bmj.c3885

[29] Ngandu, T., Lehtisalo, J., Solomon, A., Levälahti, E., Ahtiluoto, S., Antikainen, R., Bäckman, L., Hänninen,T., Jula, A., Laatikainen, T., Lindström, J., Mangialasche, F., Paajanen, T., Pajala, S., Peltonen, M., Rauramaa, R., Stigsdotter-Neely, A., Strandberg, T., Tuomilehto, J., … Kivipelto, M. (2015). A 2 year multidomain intervention of diet, exercise, cognitive training, and vascular risk monitoring versus control to prevent cognitive decline in at-risk elderly people (finger): A randomised controlled trial. *The Lancet*, *385*(9984), 2255–2263. https://doi.org/10.1016/s0140-6736(15)60461-5

[30] Alzheimer's Association. 2022 Alzheimer's disease facts and figures. Alzheimers Dement. 2022;18(4):700-789. doi:10.102/alz.12638

[31] Petersen, R. C., Lopez, O., Armstrong, M. J., Getchius, T. S. D., Ganguli, M., Gloss, D., Gronseth, G. S., Marson, D., Pringsheim, T., Day, G. S., Sager, M., Stevens, J., & Rae-Grant, A. (2018). Practice guideline update summary: Mild cognitive impairment: Report of the Guideline Development, Dissemination, and Implementation Subcommittee of the American Academy of Neurology. Neurology, 90(3), 126–135. https://doi.org/10.1212/WNL.0000000000004826

[32] Alzheimer's Association. (n.d.). Medications for memory, cognition and dementia-related behaviors. Alzheimer's Disease and Dementia. https://www.alz.org/alzheimers-dementia/treatments/medications-for-memory

[33] US Preventive Services Taskforce. (2020, February 25). Cognitive impairment in older adults: Screening. Recommendation: Cognitive Impairment in Older Adults: Screening | United States Preventive Services Taskforce. https://www.uspreventiveservicestaskforce.org/uspstf/recommendation/cognitive-impairment-in-older-adults-screening

[34] World Health Organization. (2015). Cholinesterase inhibitors and memantine for treatment of dementia. World Health Organization. https://www.who.int/teams/mental-health-and-substance-use/treatment-care/mental-health-gap-action-programme/evidence-centre/dementia/cholinesterase-inhibitors-and-memantine-for-treatment-of-dementia

[35] US Preventive Services Taskforce. (2020, February 25). Cognitive impairment in older adults: Screening. Recommendation: Cognitive Impairment in Older Adults: Screening | United States Preventive Services Taskforce. https://www.uspreventiveservicestaskforce.org/uspstf/recommendation/cognitive-impairment-in-older-adults-screening

[36] Centers for Disease Control and Prevention. (2011, February). Cognitive impairment: A call for action, now! https://www.cdc.gov/aging/pdf/cognitive_impairment/cogimp_poilicy_final.pdf

[37] Alzheimer's Association Public Health Center of Excellence on Dementia Risk Reduction. (n.d.). (rep.). Reducing Dementia: A Summary of the Science and Public Health Impact. Retrieved May 31, 2024, from https://www.alz.org/media/Documents/compiled-evidence-based-reports.pdf.

[38] NIH National Institute on Aging. (2023, October 10). Preventing Alzheimer's disease: What do we know? National Institute on Aging. https://www.nia.nih.gov/health/alzheimers-and-dementia/preventing-alzheimers-disease-what-do-we-know

[39] Centers for Disease Control and Prevention. (2022, August 23). Dementia risk reduction. Alzheimer's Disease and Healthy Aging. https://www.cdc.gov/aging/publications/features/dementia-risk-reduction-june-2022/index.html

[40] Alzheimer's Association Public Health Center of Excellence on Dementia Risk Reduction. (n.d.). (rep.). Reducing Dementia: A Summary of the Science and Public Health Impact. Retrieved May 31, 2024, from https://www.alz.org/media/Documents/compiled-evidence-based-reports.pdf.

[41] Alzheimer's Association Public Health Center of Excellence on Dementia Risk Reduction. (n.d.). (rep.). Reducing Dementia: A Summary of the Science and Public Health Impact. Retrieved May 31, 2024, from https://www.alz.org/media/Documents/compiled-evidence-based-reports.pdf.

[42] Alzheimer's Association Public Health Center of Excellence on Dementia Risk Reduction. (n.d.). (rep.). Reducing Dementia: A Summary of the Science and Public Health Impact. Retrieved May 31, 2024, from https://www.alz.org/media/Documents/compiled-evidence-based-reports.pdf.

[43] World Health Organization. (2019). Risk Reduction of cognitive decline and dementia: WHO guidelines. Retrieved May 31, 2024, from https://iris.who.int/bitstream/handle/10665/312180/9789241550543-eng.pdf.

[44] Alzheimer's Association Public Health Center of Excellence on Dementia Risk Reduction. (n.d.). (rep.). Reducing Dementia: A Summary of the Science and Public Health Impact. Retrieved May 31, 2024, from https://www.alz.org/media/Documents/compiled-evidence-based-reports.pdf.

[45] US Preventive Services Taskforce. (2020, February 25). Cognitive impairment in older adults: Screening. Recommendation: Cognitive Impairment in Older Adults: Screening | United States Preventive Services Taskforce. https://www.uspreventiveservicestaskforce.org/uspstf/recommendation/cognitive-impairment-in-older-adults-screening

[46] World Health Organization. (2019). Risk Reduction of cognitive decline and dementia: WHO guidelines. Retrieved May 31, 2024, from https://iris.who.int/bitstream/handle/10665/312180/9789241550543-eng.pdf.

[47] Alzheimer's Association Public Health Center of Excellence on Dementia Risk Reduction. (n.d.). (rep.). Reducing Dementia: A Summary of the Science and Public Health Impact. Retrieved May 31, 2024, from https://www.alz.org/media/Documents/compiled-evidence-based-reports.pdf.

[48] Livingston, G., Huntley, J., Sommerlad, A., Ames, D., Ballard, C., Banerjee, S., Brayne, C., Burns, A., Cohen-Mansfield, J., Cooper, C., Costafreda, S. G., Dias, A., Fox, N., Gitlin, L. N., Howard, R., Kales, H. C., Kivimäki, M., Larson, E. B., Ogunniyi, A., … Mukadam, N. (2020). Dementia prevention, intervention, and care: 2020 report of The Lancet Commission. The Lancet, 396(10248), 413–446. https://doi.org/10.1016/s0140-6736(20)30367-6

[49] Alzheimer's Association. (n.d.). Traumatic brain injury (TBI). Alzheimer's Disease and Dementia. https://www.alz.org/alzheimers-dementia/what-is-dementia/related_conditions/traumatic-brain-injury

[50] Livingston, G., Sommerlad, A., Orgeta, V., Costafreda, S. G., Huntley, J., Ames, D., Ballard, C., Banerjee, S., Burns, A., Cohen-Mansfield, J., Cooper, C., Fox, N., Gitlin, L. N., Howard, R., Kales, H. C., Larson, E. B., Ritchie, K., Rockwood, K., Sampson, E. L., … Mukadam, N. (2017). Dementia prevention, intervention, and care. The Lancet, 390(10113), 2673–2734. https://doi.org/10.1016/s0140-6736(17)31363-6

[51] Suchsland, M. Z., Gaster, B., Raetz, J., Belza, B., McGuire, L., Olivari, B., Tracy, K., & Fitzpatrick, A. L. (2023). Developing a cognitive assessment toolkit for primary care: Qualitative assessment of providers' needs and perceptions of usability in clinical practice. *BMC Health Services Research*, *23*(1). https://doi.org/10.1186/s12913-023-09991-7

[52] Sabbagh MN, Boada M, Borson S, Chilukuri M, Dubois B, Ingram J, Iwata A, Porsteinsson AP, Possin KL, Rabinovici GD, Vellas B, Chao S, Vergallo A, Hampel H. Early Detection of Mild Cognitive Impairment (MCI) in Primary Care. J Prev Alzheimers Dis. 2020;7(2):81-90. doi:10.14283/jpad.2020.21

[53] National PACE Association. (n.d.). What is pace care?. National PACE Association. https://www.npaonline.org/what-is-pace-care

[54] Centers for Medicare & Medicaid Services. (n.d.). Programs of all-inclusive care for the elderly benefits. Medicaid. https://www.medicaid.gov/medicaid/long-term-services-supports/pace/programs-all-inclusive-care-elderly-benefits/index.html

[55] Levinson, J, & Cradock, J. (2021, August 21). Establishing PACE sites through health centers: Community-based provider models for PACE at community health centers [Webinar]. The Galway Group. https://rise.articulate.com/share/7Le6-ECCCCY7C5qCyWE9s9KRsNFWBdPE#/lessons/TKw-oX1DwtzGmUmNNBxu_eztz7EClsg_

[56] Carr, E. (2016, October 21). Caring for an aging population. Stanford Social Innovation Review: Informing and Inspiring Leaders of Social Change. https://ssir.org/articles/entry/caring_for_an_aging_population