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Taking Care of Older Adults with Mild Cognitive Impairment: An Update for Nurses Journal of Gerontological Nursing (in press)

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Abstract

Mild cognitive impairment (MCI) is a mild decline in single or multiple cognitive domains, while global cognition and basic activities of daily living remain intact. Nurses play an important role in early detection of MCI and providing care to maintain maximum independence for persons with MCI. This update seeks to provide nurses with a review of the most recent research regarding the etiology and diagnosis of MCI, risk and protective factors related to MCI, patients and their families' experience of MCI, and current interventions for persons with MCI. This update provides research evidence to inform nursing practice of MCI care.

Keywords

Mild Cognitive Impairment; Alzheimer's disease; Instrumental Activities of Daily Living; Cognition; Risk factors; Non-pharmacological interventions

Introduction

Mild cognitive impairment (MCI) is diagnosed when there is a mild decline in either single or multiple cognitive domains — such as memory, executive functioning, attention, or visuospatial abilities — while global cognition and basic activities of daily living (BADLs) remain intact (Albert et al. 2011; Gauthier et al., 2006). According to the most recently developed diagnostic criteria for MCI, MCI is considered to be a “symptomatic predementia phase of Alzheimer's disease (AD)” (Albert et al. 2011). Persons with MCI often have more difficulty or may take longer than their normal counterparts in performing more cognitively-demanding instrumental activities of daily living (IADLs) such as driving, telephone use, finding belongings, grocery shopping, medication management, food preparation, traveling alone, and handling finances (Aretouli & Brandt, 2009; Wadley, Okonkwo, Crowe, & Ross-Meadows, 2008). In older adults with MCI, even subtle declines in cognitive abilities or everyday functioning are associated with decreased independence and safety, caregiver

burden (Gauthier et al., 2006), a reduced chance of reverting to normal cognitive status (Peres et al., 2006), and an increased likelihood of developing dementia (Farias, Mungas, Reed, Harvey, & DeCarli, 2009).

In spite of these impairments, older adults with MCI generally live independently in the community. The impairments they report do not interfere with their ability to adequately carry out important social, family, and occupational roles (Aretouli & Brandt, 2009; Wadley, Okonkwo, Crowe, & Ross-Meadows, 2008). It is important to understand both the challenges these individuals face as well as how to assist them in meeting the challenges in order to assist older adults with MCI maintain their independence.

The most recent National Institute of Health statement has emphasized the importance of understanding and providing better care to individuals diagnosed with MCI (Daviglus et al., 2010). A recent review found that primary care providers have difficulty identifying MCI in their patients and recording the diagnosis in the medical record (Mitchell, Meader, & Pentzek, 2011). Most persons with MCI are community-dwelling; thus, primary care providers, including nurses, play an important role in early detection of MCI and in providing evidence-based care to persons with MCI. Since January 2011, Medicare has started reimbursing primary care providers to perform a more complete “Welcome to Medicare” visit with newly eligible members and a complete “Wellness Visit” on an annual basis. Both types of visit include “detection of cognitive impairment,” which further supports the importance of developing expertise in detecting MCI for primary care providers. The purpose of this article is to provide an update of current research on the diagnosis, prevention, and treatment of MCI. The goals are to assist nurses in primary care settings to understand the challenges persons with MCI face, examine ways to help older adults overcome these challenges, and to discuss the relevance for future nursing research. This update was based on published studies using the most recent standardized diagnostic criteria for MCI (Albert et al. 2011; Winblad et al., 2004). Published studies using other diagnostic criteria (e.g., stage 3 of Reisberg's Global Deterioration Scale, or Clinical Dementia Rating 0.5), were not used in this review.

Clinical Diagnosis of MCI

Historically, confusion and lack of precision surrounded the diagnosis of MCI. Terms and concepts such as Amnestic MCI, Aging-Associated Cognitive Decline (AACD), Cognitive Impairment No Dementia (CIND) and other such designations were used interchangeably (Ganguli, 2006). At the 2004 Stockholm International Workshop on Mild Cognitive Impairment, standard diagnostic criteria for MCI were established (Winblad et al., 2004). In October, 2008, a billing code for MCI (331.83) was established in the International Classification of Diseases, 9th Edition, Clinical Modification (ICD-9-CM). In April 2011, the diagnostic criteria of MCI due to AD were first added into the diagnostic guidelines for Alzheimer's disease dementia as one of the phases of AD, although mainly for research purposes (Albert et al., 2011).

The prevalence of MCI varies depending on the population in which it has been studied Using Windblad's 2004 diagnostic criteria, the prevalence of MCI was 42% in France (Artero et al., 2008), 28.3% in the United States (Manly et al., 2005), 24.3% in Austria (Fischer et al., 2007), 17.2% in Germany (Busse et al., 2006), and 12.7% in China (Nie et al., 2011). According to a recent review of population and community-based studies, the annual incidence rate of MCI ranged from 51 to 77 per 1,000 persons in those 60 years or older (Luck, Luppa, Briel, & Riedel-Heller, 2010). A review of forty-one cohort studies with a maximum follow-up of ten years suggests that, on average, only 32% of people with MCI progress to dementia (Mitchell & Shiri-Feshki, 2009). In a multiethnic community-based

study of 2,364 participants, the investigators specifically examined the reversion rate of MCI and found that 47% remained unchanged, and 31% reverted to normal within an average of 4.7 years follow-up (Manly et al., 2008). The reasons for these different outcomes remain unknown. The risk of mortality increased by 50% to 150% in persons with MCI compared to those without MCI (Guehne, Luck, Busse, Angermeyer, & Riedel-Heller, 2007; Hunderfund et al., 2006; Wilson et al., 2009).

A key recommendation arising from the National Institute on Aging and Alzheimer's Association Workgroup (Albert et al. 2011) was that MCI should be diagnosed based on the following procedure: patient/family interview, physical examination (including laboratory tests) and neuropsychological testing. In many primary care settings, however, a diagnosis of MCI is made on fewer criteria because the full range of diagnostic services is not available (Kaduszkiewicz et al., 2010).

In general a diagnosis of MCI is made if there is an objectively measured decline (1 to 1.5 *Standard Deviation* below the population norms) in one or more cognitive domains over time OR a subjective report of decline by self-report or by an informant (e.g., family member) in conjunction with observed cognitive deficits. Basic ADLs (BADLs)are preserved, and IADLs are either intact or minimally impaired. There are four subtypes of MCI: amnestic single-domain, amnestic multiple-domain, non-amnestic single-domain, and non-amnestic multiple-domain. The subtypes are based on the number of cognitive domains affected and whether memory is one of the domains affected (i.e., amnestic) (Winblad et al., 2004).

Patient/family interview

It is essential to obtain the person's health history to elicit information regarding the person's impairment in relation to his or her functional and cognitive status. Open-ended questions should cover the person's cognition, social life, hobbies and interests, IADLs, BADLs such as bathing and dressing, and family history of cognitive impairment. Some semi-structured interview checklists, such as the Total Box Score (Daly et al., 2000) can also assist in obtaining a comprehensive background of the patient. Structured assessments of daily functioning are useful in determining the status of BADL and IADL. Persons with MCI may or may not have the insight to provide information on their own health history, including cognitive decline and the status of BADL and IADLs (Roberts, Clare, & Woods, 2009). On the other hand, caregiver or other family members' emotional state and stress encountered during caregiving may interfere with their judgment of the person's actual function or ability (Bruce, McQuiggan, Williams, Westervelt, & Tremont, 2008). Thus, it is important to obtain the person's health history through interviewing both the person and the caregiver or other family members. Table 1 describes some of the instruments that have been used to assess BADL and IADL in persons with MCI.

Physical examination (including regular laboratory tests)

A thorough physical examination assists in identifying the etiology of symptoms of cognitive impairment in order to rule out other illnesses or conditions that can mimic MCI. For example, a thiamine deficiency can mimic symptoms of MCI (Sechi & Serra, 2007) as can physical trauma, dehydration, and malnutrition. In addition to a general physical examination and routine lab tests (e.g., B_{12}, folic acid, thyroid-stimulating hormone, electrolytes, blood pressure, Rapid Plasma Reagin, etc.), clinicians should particularly assess for neurological changes in gait, balance, sensory function, and motor ability (Scherder et al., 2007) as well as signs of parkinsonism, among other neurological abnormalities. In addition, self-care capacity and compliance with treatment should be assessed.

Neuropsychological tests

Neuropsychological tests used in the diagnosis of MCI include numerous tests of cognitive function and assessments of behavioral or neuropsychiatric symptoms. For cognitive functioning, a comprehensive examination of memory, language, reasoning, executive function, attention, and mental status adjusted for age and education, by a trained neuropsychologist is ideal. In these assessments, numerous tests are used to evaluate specific domain(s) of cognition and global cognition (see Table 1).

Behavioral and neuropsychiatric assessments are not a required component when diagnosing MCI. However, around 35 – 75% of persons with MCI have behavioral or neuropsychiatric abnormalities (e.g., depression, anxiety, apathy), and individuals with such abnormalities are more prone to develop AD (Apostolova & Cummings, 2008). Thus, it is important to assess these domains when MCI is being diagnosed. It is important to note that these assessments are not diagnostic tests per se (e.g., for clinical depression) but rather provide further information about risk factors in persons with MCI.

Biomarker and neuroimaging tests

Tests for biomarkers and neuroimaging are not yet accepted as standard diagnostic tests; they are still considered experimental and are typically used only in research settings. However, some of these tests/measurements, such as some CSF and neuroimaging tests, have provided a better prediction of the course of MCI and may be adopted in the near future (Albert et al., 2011). Biomarkers can be categorized as three types: biomarkers of amyloid beta (Aβ) deposition, biomarkers of neuronal injury, and biomarkers of associated biochemical change.

Biomarkers for Aβ deposition—The accumulation of amyloid plaques in the brain is a hallmark indicator of the pathological change in AD. The protein can be directly detected in cerebral spinal fluid (CSF), such as CSF $A\beta_{42}$ which reflects the presence and level of amyloid plaques in the brain. In addition, a newly developed Positron Emission Tomography (PET) amyloid imaging test (e.g., Pittsburgh compound B PET) can bind to Aβ, and is being studied as a tool for this biomarker from a molecular image approach (Wolk & Klunk, 2009).

Biomarkers related to neuronal injury—Tau deposition in the brain is associated with AD pathology generally known as neurofibrillary tangles. Tau (total tau or phosphorylated-tau) can be measured in CSF and elevated levels indicate neuronal injury.

Neuronal injury in neurogenerative diseases also results in structural and functional change in the brain. These structural changes may be detected by structural magnetic resonance imaging (MRI), the most widely used neuroimaging technique. Some structural changes in the brain are potentially related to neuronal injury in persons with MCI. Specifically, hippocampal volume loss appears to be associated with MCI (Geuze, Vermetten, & Bremner, 2005). Functional neuroimaging, such as fluorodeoxyglucose (FDG) PET or single photon emission tomography (SPECT) perfusion imaging, also offers diagnostic clarification, such as in detecting glucose hypometabolism in the hippocampus (Noble & Scarmeas, 2009) or the regional cerebral hypoperfusion (Austin et al., 2011). While still controversial, functional MRI techniques that measure abnormalities in blood oxygenation levels in the active brain indicate different activation in the medial temporal and other regions between healthy older adults and those with MCI (Dickerson & Sperling, 2009).

The combination of low CSF $A\beta_{42}$ and elevated CSF tau provides a high likelihood of developing AD in persons with MCI (van Rossum, Vos, Handels, & Visser, 2010). Thus,

recently, biomarkers of Aβ and tau have been incorporated into categorizing different levels of MCI to facilitate their use in clinical research. Based on the presence and consistency of the two biomarkers, the diagnosis of MCI can be classified into four categories of diagnostic certainty: “MCI – core clinical criteria” (uninformative/conflicting biomarkers), “MCI – unlikely due to AD” (negative biomarkers), “MCI due to AD – intermediate likelihood” (intermediate biomarkers), and “MCI due to AD – high likelihood” (positive biomarkers) (Albert et al. 2011). However, this classification is in an early stage and not yet incorporated into the clinical diagnosis.

Biomarkers of associated biochemical change—A number of biomarkers are available that indicate physiological stress or damage in the organism. These include markers of oxidative stress (e. g., Malondialdehyde and thiobarbituric acid-reactive substances), pro-inflammatory cytokines (e.g., interleukin-6, tumor necrosis factor alpha), and markers of synaptic damage (e.g., dynamin-related protein 1) (Albert et al., 2011; Mangialasche et al., 2009).

Controversies in the diagnosis of MCI

Few studies have examined neurologists' and geriatricians' experiences in diagnosing and providing treatments for MCI. Although there is agreement regarding the importance of identifying the stage between normal aging and dementia, disparities exist in how MCI is diagnosed and how it is treated (Mitchell, Woodward, & Hirose, 2008; Roberts, Karlawish, Uhlmann, Petersen, & Green, 2010). Admittedly, there are still gaps in operationalizing the recommended diagnostic procedures for MCI, which may explain the discrepant prevalence rates reported in the literature. For example, there has never been a consensus about which or how many neuropsychological tests are needed when diagnosing MCI (Lonie, Tierney, & Ebmeier, 2009) or what cutoff scores (e.g., 1.5 *SD* versus 1 *SD*) for each test should be used to indicate impairment (Artero et al., 2006; Busse et al., 2006; Larrieu et al., 2002; Plassman et al., 2008). Some brief screening assessments, for example, Mini-Cog, Mini Mental State Examination (MMSE), and Montreal Cognitive Assessment (MoCA), can help nurses differentiate between older adults who have suspected clinically meaningful cognitive impairment and those who do not, and be easily adopted by nurses without extensive training. However, none of these screening instruments can be used to differentiate between MCI and other cognitive impairment. Education- and age-matched normative data are not available for some screening assessments (e.g., Mini-Cog) (Lonie et al., 2009). The SLUMS (The Saint Louis University Mental Status Examination) needs further validation in persons with MCI, although it provides cut-off scores for mild neurocognitive disorders (Tariq, Tumosa, Chibnall, Perry, & Morley, 2006). Race/ethnicity norms are also needed for existing neuropsychological tests (Gasquoine, 2009). Similarly, no standard, such as a cutoff score, has been set for defining “minimal impairment” in IADLs. This is further complicated by physical comorbidities that may impair IADL function. At the same time, the traditional self-report IADLs instruments have been reported to be insensitive in detecting early subtle symptoms of cognitive changes in MCI (Jefferson et al., 2008). New instruments are needed that can capture MCI-produced subtle changes in daily functioning (e.g., IADL) as well as exclude those changes that are due to comorbidities. Finally, neuroimaging techniques are still in their early development. Although these techniques, especially the amyloid image, show potential in the evaluation of mildly affected, clinically atypical patients, they should be used as a supplemental to a clinical evaluation, not a replacement.

Etiological, Risk, and Protective Factors Related to MCI

Etiological factors related to MCI

The course of MCI may depend on its etiology and how the etiology is related to specific brain pathology. Markesbery (2010) reviewed nine longitudinal studies that followed persons with MCI for 3 to 4 years and provided some evidence about the etiology and course of MCI. Patients with amnestic MCI, who are likely to develop AD, most commonly had neurofibrillary tangles in the amygdala and the entorhinal cortex of the hippocampus and a greater medial temporal lobe atrophy than healthy controls. For non-amnestic MCI patients and some amnestic MCI patients with parkinsonism who are likely to develop dementia with Lewy bodies, argyrophilic grains and Lewy body neuropathology is common. Finally, for amnestic or non-amnestic MCI patients with readily observed small strokes and reduced cerebral blood flow, progression to vascular dementia was more likely.

Risk and protective factors related to MCI

A recent National Institutes of Health State-of-the-Science Conference Panel provided a comprehensive review of protective and risk factors related to general cognitive decline, including MCI (Daviglus et al., 2010). Given the overall low quality or lack of evidence from observational studies and randomized controlled trials, no firm conclusion about any risk or protective factors for cognitive decline can be drawn. Only a few factors have been associated consistently with increased or decreased risk of cognitive decline. Decreased risk has been associated with longer chain omega-3 fatty acids in the diet. Increased risk has been associated with high blood pressure, depression, current smoking, and APOE-ε4 allele genotype (Daviglus et al., 2010).

Four systematic reviews have reported on the risk and protective factors specifically related to the incidence of MCI, however these reviews were based on a small number (≤ 15) of observational prospective studies (Beaulieu-Bonneau & Hudon, 2009; Luck et al., 2010; Monastero, Mangialasche, Camarda, Ercolani, & Camarda, 2009; Sofi, Abbate, Gensini, & Casini, 2010). A number of non-modifiable risk factors were found: older age, APOE-ε4 allele genotype, low education, and race/ethnicity (Black and Hispanic). A number of potentially modifiable risk factors were also found: hypertension, history of heart disease, depression, and sleep disturbances. One protective factor identified was following a Mediterranean diet (characterized by consuming fish, vegetables, and red wine, etc.). Evidence for other potential risk/protective factors are preliminary or controversial and based on individual prospective observational studies (e.g., Geda et al., 2010; Petersen et al., 2010), not systematic reviews. Preliminary risk factors include cardiovascular risk factors (e.g., diabetes, metabolic syndrome), alcohol intake, and being male. Preliminary protective factors include physical exercise, cognitive activities, and social engagement.

Overall, there is still very little known about the etiology of MCI or the factors that increase or decrease the risk of MCI (Daviglus et al., 2010). Most of the current data were based on retrospective data and before the current diagnostic criteria for MCI were adopted. The Cardiovascular Health Cognition Study has proposed the “late-life dementia risk index”; an effort to stratify older adults into low, moderate, and high risk of developing dementia (Barnes et al., 2009). With ongoing accumulated evidence, this index may provide a diagnostic index for patients at risk for dementia. It may hold potential to help primary care providers and the public detect MCI more easily as well as develop interventions to prevent MCI or predict further decline from MCI.

Living with MCI

Historically, the diagnosis of MCI has been more meaningful to the research community than to the lay public. This can make the diagnosis of MCI confusing to older adults and families. The diagnosis does not inform the patient in the same way a diagnosis of dementia does. For example, having the diagnosis of MCI neither predicts whether the person will develop dementia, nor what type of dementia this might be. Because the cognitive and functional changes associated with MCI are more subtle than those associated with dementia, the diagnosis is often missed, but patients and families may be left wondering what their “memory problems” might mean. Finally, there is less certainty in making a MCI diagnosis than in making a dementia diagnosis. Indeed, a relatively substantial proportion (31%) of individuals diagnosed with MCI revert to `normal' over 18 to 24 months (Manly, et al., 2008). Older adults and their families may be understandably confused about the implications of being diagnosed with MCI.

Given the level of confusion, older adults' reactions to being diagnosed with MCI are not well understood. This issue has rarely been explored from the patient's perspective even though people in an early stage of cognitive decline, including MCI, are able to express their own views and needs (Aalten, van Valen, Clare, Kenny, & Verhey, 2005). A few descriptive and qualitative studies have examined the patient's experience of MCI (Frank, et al., 2006; Joosten-Weyn Banningh, Vernooij-Dassen, Rikkert, & Teunisse, 2008; Lin, Gleason, & Heidrich, in press; Lin & Heidrich, 2012; Lingler et al., 2006; Lu, Haase, & Farran, 2007; McIlvane, Popa, Robinson, Houseweart, & Haley, 2008). Persons with MCI were able to accurately identify their cognitive symptoms, described negative consequences of MCI (such as loss of self-confidence), had diverse emotional responses to their diagnosis (e.g., anxiety, relief that it was not AD), and felt uncertain whether they would progress to AD. Only two studies have examined the coping and self-care behaviors or strategies of persons with MCI (Joosten-Weyn Banningh et al., 2008; Lin & Heidrich, 2012; McIlvane et al., 2008). Persons with MCI engaged in self-care behaviors, such as use of supportive services (e.g., legal services, support groups) and strategies to prevent AD (e.g., mental exercise, physical exercise). They also used coping strategies to reduce stress and cope with memory loss.

In terms of physical and psychological health, a number of studies have examined functional, social, and psychological variables in persons with MCI. In general, persons with MCI report more difficulties than healthy elderly individuals with engaging in social conversation, telephone use, finding belongings, grocery shopping, driving, and medication management (Aretouli & Brandt, 2009; Muangpaisan, Assantachai, Intalapaporn, & Pisansalakij, 2008; Kim et al., 2009; Peres et al., 2006; Ryu, Ha, Park, Yu, & Livingston, 2010; Schmitter-Edgecombe, Woo, & Greeley, 2009; Wadley et al., 2008). Psychological well-being has been examined in four studies of people with MCI and has included measures of life satisfaction, mastery, affect, and social interaction (Ready, Ott, & Grace, 2004). In general, no differences have been found between persons with MCI and healthy elderly in their psychological well-being (see Table 2 for description of individual studies).

Interventions for Persons with MCI

Interventions for MCI have been proposed to prevent, slow down, and even reverse the progression of AD. Proposed Interventions that have been suggested or studied can be grouped into the following categories: pharmacological (medication), physical training/ exercise, cognitive interventions, and psychotherapy. In general, recommendations focus on on non-pharmacological interventions, such as physical or cognitive training, that rarely produce adverse events (Daviglus et al., 2010)..

Medications

Currently, there is no Food and Drug Administration (FDA)-approved pharmacological treatment for MCI. Cerebral-enhancing and cerebral-protective agents have been studied for their efficacy in preventing cognitive decline. Cerebral enhancing (e.g., cholinesterase inhibitors) agents are hypothesized to counteract potential neuropathological changes in the brain. Cerebral protective agents – such as antioxidants and omega-3 fatty acids – might increase neurotransmitters, hormones, or cerebral blood flow and slow or halt pathological processes. Some agents also may have both cerebral-enhancing and protective properties: B vitamins, ginseng, ginkgo biloba, and acetyl-L-carnitine (Daffner, 2010). However, to date, there is not sufficient evidence that any of these affect either the onset or progression of MCI (Daviglus et al., 2010). Statins, which were considered to be cerebral protective, were recently reported by the FDA to increase the risk of cognitive impairment (Rojas-Fernandez, & Cameron, 2012).

Physical training

Research on physical training/exercise programs targeting persons with MCI are rare. Two topical reviews summarized five clinical trials of physical training programs targeting persons with MCI (Lautenschlager, Cox, & Kurz, 2010; Teixeira et al., 2011). They found moderate-intensity physical training programs, such as walking, may improve cognitive functions (e.g., executive function, memory, attention). Women seemed to benefit more from physical exercise than men, and higher attendance and adherence rates in the programs predicted more improvement on cognitive outcomes (Lautenschlager et al., 2010; Teixeira et al., 2011).

There is considerable diversity in the intensity and format of physical exercise interventions. Standardizing physical activity interventions for older adults would help clinicians translate the research findings to community settings (Elsawy & Higgins, 2010). Further research is needed to clarify which cognitive domain(s) benefit from physical exercise, the underlying neuronal- or vascular-protective mechanisms that occur due to physical exercise, the comparability of different types of physical exercise, and whether combining physical exercise with other types of non-pharmacological interventions is more effective than exercise alone in persons with MCI.

Cognitive interventions

Cognitive interventions based on neuroplasticity theory have been widely applied to improve cognitive abilities in a wide range of patient populations and ages. Two distinct approaches have been applied: Processing efficiency training (e.g., speed of processing training, dual tasks) aims to improve the broad capacity for fluid mental processing, whereas teaching cognitive strategies (e.g., teaching reasoning strategies, mnemonics) aims to compensate for the loss of specific higher order cognitive abilities. Both approaches have shown medium to large targeted training effects in older adults without cognitive impairment or with mild cognitive symptoms (Lovden, Backman, Lindenberger, Schaefer, & Schmiedek, 2011). However, a truly successful cognitive intervention must also show transferrable (improvements from a particular training domain are generalizable to other untrained domains and daily functions) and sustainable (training effects last beyond the proximal post-training period) effects (Lovden et al. 2011). According to the most recent systematic review of 15 group- or individual-based cognitive interventions targeting patients with amnestic MCI (sample sizes ranged from 1 to 193), 44% of the objective measures of memory and 49% of the subjective measures of memory, quality of life, or mood significantly improved after interventions, while only 19% of objective measures of cognition other than memory improved (Jean, Bergeron, Thivierge, & Simard, 2010).

Other cognitive training studies might benefit from moving to a real-world context, such as managing finances and medication, driving, and grocery shopping. The Advanced Cognitive Training for Independent and Vital Elderly (ACTIVE) study of 2,802 participants (M_{age} = 74) used this approach. One of the treatment arms in the ACTIVE, reasoning training, added content such as learning how to identify patterns related to real life situations, including identifying medication dosing patterns and filling a pill reminder case. The group that received reasoning training reported significantly less difficulty in overall IADLs than the control group, and the subgroup of MCI participants also benefited from this training (Unverzagt et al., 2009).

Psychotherapy

Psychotherapy interventions have been tested for their impact on coping with a diagnosis in MCI patients and caregivers. One single-group study of cognitive-behavioral therapy of 22 participants with MCI and their caregivers found a significant effect on the patients' levels of acceptance of their diagnosis (Joosten-Weyn Banningh, Kessels, Olde Rikkert, Geleijns-Lanting, & Kraaimaat, 2008). In another study of 93 persons with MCI that included a wait-list control group, MCI patients that received therapy had significantly greater acceptance of their diagnosis and better management of memory problems, but overall levels of psychological distress and well-being did not differ between the groups (Joosten-Weyn Banningh, et al., 2010).

Around 35% to 85% of persons with MCI have neuropsychiatric symptoms, and the most common ones are depression, anxiety, and irritability (Monastero et al., 2009). There are relatively few psychotherapies trials targeting persons with MCI. The role of psychotherapy for MCI symptoms and adaptation should be studied because it has potential to help improve awareness of and confidence in using cognitive strategies and also possibly improve social connections and overall well-being in persons with MCI. This approach also holds the potential to help persons with cognitive decline effectively manage their non-cognitive symptoms, such as depression or anxiety, and improve the communication between patients and their caregivers. Moreover, as found in a previous study of older cancer survivors (Campbell et al., 2009), psychotherapy may also improve motivation in older adults with MCI to engage in healthy lifestyles which may also have a positive effect on the underlying neurobiology of cognition.

Overcoming the Challenges of Taking Care of Persons with MCI

One challenge in the care of persons with MCI is that they may not be aware of or underestimate their deficits in either memory or IADLs (Roberts, Clare, & Woods, 2009). For example, some persons with MCI tend to overestimate their driving abilities (Okonkwo et al., 2009). In fact, reduced awareness of cognitive deficits might prevent community-dwelling older adults from seeking early cognitive assessment (Lin et al., 2010). Even spouses and family members may be unaware of patients' subtle changes in cognition or behaviors at the beginning of their cognitive decline (Lu & Haase, 2009). A well validated informant-based cognitive screening tool, such as the Informant Questionnaire on Cognitive Decline in the Elderly (Jorm & Jacomb, 1989) can help elicit family members' awareness of patients' cognitive impairment. It is important to obtain information regarding the person's health history from both the person with MCI and the caregiver. This will ensure more comprehensive and accurate health information and potentially help identify persons with impaired awareness. Subtle cognitive impairment can easily be overlooked or misinterpreted even by primary care providers, especially in persons with a high level of education or those with several comorbid conditions (Kaduszkiewicz et al., 2010). Thus, it is important for nurses to be able to recognize early signs of cognitive deficits and help family members recognize the importance of early detection of emerging cognitive problems. Education

programs on early detection and management of cognitive decline that directly target older adults who may lack insight into their own cognitive decline are needed.

Another challenge is whether, when, and how to disclose a diagnosis of MCI to patients and their families (Duara, Barker, Loewenstein, & Bain, 2009). Although the most recent consensus paper defines MCI as the symptomatic predementia phase of AD (Albert et al. 2011), persons with MCI should not be labeled as “having MCI of AD” or “prodromal AD”. Instead, clinicians should clarify that MCI is a health problem that is characterized by impaired cognitive function but whose outcomes are uncertain (Petersen, 2011). Nurses may encounter patients with suspected cognitive impairment who do not mention a cognitive problem as a purpose for their visit. When these concerns are not raised by a patient during a visit, it may be useful for nurses to use some short screening assessments (e.g., Mini-Cog) to identify individuals who need further assessment and promote a conversation with the primary care provider. In addition, scheduling regular periodical follow-up will help monitor any cognitive or functional changes.

From a patient-centered perspective, it is important to tailor a discussion of MCI to the person's values, beliefs, and culture. For older adults in general, there are diverse beliefs about the causes, controllability, and consequences of MCI (see Table 2). For older adults with MCI, being diagnosed with MCI does not always result in psychological distress. According to a recent systematic review of patients with dementia, members of some minority groups, for example, do not conceptualize dementia as an illness. They may perceive it as a normal consequence of aging or attribute it to spiritual, psychological, or social causes. They may have little faith in strategies to manage cognitive problems suggested by health care providers or may not wish to use healthcare services (Mukadam, Cooper, & Livingston, 2011). It is important for nurses to explore each individual's beliefs about MCI and address the individuals' unique concerns. Some of these concerns may be related to the potential stigma or uncertainty attached to the diagnosis. Other concerns may be due to unfamiliarity with the diagnostic tests being conducted and the interpretation of the results. To better assist persons with MCI and their families, nurses need to be familiar with those various neuropsychological, behavioral, and functional assessments and to understand the shortcomings inherent in the. Nurses can also provide information about resources including support groups that are specifically developed for individuals at the very early stage of cognitive impairment, services or programs that teach how to maintain or enhance memory or other cognitive skills, and stress-reduction techniques (e.g., relaxation, meditation) for patients and their families.

Given the preliminary and controversial results on the risks and protective factors related to MCI, it is premature to recommend pharmaceutical or dietary agents to slow cognitive decline. However, smoking cessation, managing hypertension, cholesterol levels, and diabetes, physical exercise, and cognitive activities are healthy lifestyle or behaviors that are associated with overall better health outcomes, pose little risk in old age and for persons with MCI, and address potential risk factors that are modifiable. Nurses can play a key role in helping patients adopt these healthy lifestyle changes and supporting their continued engagement in these activities using monitoring tools such as logs or diaries.

Further research is needed to examine the impact of specific lifestyle strategies on cognitive function and MCI. Three important questions for future research are: 1) Although multi-modal interventions for protecting cognition are recommended, what are the appropriate combinations that have the greatest effect on patient's cognitive and quality of life outcomes?; 2) What are the minimal amounts of healthy lifestyle interventions such as physical exercise, cognitively stimulating activities, and diet that nurses should recommend

to patients?; and, 3) Are there any factors (e.g., barriers, benefits) that influence the likelihood that patients will sustain the engagement of these activities?

Conclusion

In the past 40 years of the Medicare program, given the high out-of-pocket costs for some cognitive screening tests and well-being maintenance programs, if a patient or family member did not raise a specific memory complaint, an older adult might never receive a cognitive screening test or preventive care. In addition, primary care providers are often hesitant about making a diagnosis of cognitive impairment or disclosing the diagnosis to the patient because of the fear and stigma surrounding a diagnosis of dementia. Both situations create barriers to preventive services for older adults with suspected MCI. Changes in Medicare policy now make it possible for primary care providers to provide cognitive screening and patient-centered lifestyle education with older adults with suspected MCI.

Although the course of MCI is not clearly understood, in some cases MCI may be a critical stage during which the progression to dementia could be slowed and independence for older adults prolonged. With the aging of the population and the increase in longevity, the number of older persons being diagnosed with MCI will increase. It is important that nurses understand the controversies and challenges associated with MCI in order to provide the best nursing care to patients and their families.

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Table 1

Examples of Neuropsychological Tests and tests of Daily Functioning Commonly Used in the assessment of Mild Cognitive Impairment

Tests		Required time, minutes	Scoring or psychometric properties related to MCI
Cognitive function [a]			
• Executive Function	• Stroop Color-Word Test (Jensen & Rohwer, 1966)	• 5	• T scores are used with higher scores indicating better performance. [†]
	• Trail Making Test (Reitan, 1958)	• 3 – 5	• Maximum time for each test (A and B) is 300 seconds. Lower scores mean better performance.
	• Clock Drawing Test (Sunderland, Hill, Mellow, & Lawlor, 1989)	• 5	• Different ways of scoring. The quickest way to score is to divide the clock into four quadrants and counting the numbers in the correct quadrant. A total score of 7, with >3 indicating impaired performance.
• Language	• The Semantic and Letter Verbal Fluency tests (Butters, Wolfe, Granholm, & Martone, 1986)	• 3 – 5	• Items named within one minute are counted. Higher scores mean better performance.
• Memory and Learning	• CERAD Word-list Learning Test (Morris, et al., 1989)	• 15	• Items recalled are counted with higher scores indicating better performance.
	• Rey Auditory Verbal Learning Test (Schmidt, 1996)	• 15	• T scores are used with higher scores indicating better performance. [†]
• Multiple Domains [b]	• ACE-R (Mioshi, Dawson, Mitchell, Arnold, & Hodges, 2006)	• 12 – 20	• The total score is 100. ACE-R < 82: possible MCI. Sensitivity = 0.84, Specificity = 1.00.
	• MoCA (Nasreddine, et al., 2005)	• 10 – 12	• The total score is 30. MoCA < 26: possible MCI. Sensitivity = 0.90, Specificity = 0.87
	• MMSE (Folstein, Folstein, & McHugh, 1975)	• 10	• The total score is 30. MMSE ≥ 24: possible MCI Sensitivity = 0.45, Specificity = 0.69.

Tests		Required time, minutes	Scoring or psychometric properties related to MCI
	• Mini-Cog (includes the Clock-Draw Test) (Borson, Scanlan, Brush, Vitaliano, & Dokmak, 2000)	• 3	• The total score is 3. Mini-Cog < 3: possible MCI. Sensitivity = 0.58.
	• SLUMS (Tariq et al., 2006)	• 4 – 10	• The total score is 30. Less than high school education: 19.5 – 23.5: mild neurocognitive disorder. Sensitivity = 0.92, Specificity = 1
			• High school education or higher: 21.5 – 25.5: mild neurocognitive disorder. Sensitivity = 0.95, Specificity = 0.98.
Behavioral and Neuropsychiatric symptoms [c]			
• Depression	• CES-D (Radloff, 1977)	• 5	• The total score is 60 of 12 items. A score ≥ 16: depression.
	• GDS (Yesavage, 1988)	• 5 – 10	• The total score of 15 of 15 items. A score ≥ 5: depression
• Apathy	• Apathy inventory (Robert, et al., 2002)	• N/A	• The total score is 36 of 3 dimensions. A score > 2: potentially cognitively impaired
• Multiple Domains	• NPI (Cummings, et al., 1994)	• 10 – 15	• The total score of 12 measuring the frequency of the symptoms. A score > 0: having neuropsychiatric symptoms, and increased risk of dementia.
	• BSRS (Rabins, 1994)	• 10 – 15	• The total of 12 items higher scores indicating more symptoms.
	• CBRSD (Tariot, Mack, Patterson, & Edland, 1995)	• 20 – 30	• 5 items are rated by present, absent, or having occurred since the illness began but not in the past month. The other 46 items are rated by frequency of occurrence from 0 (has not occurred since illness began) to 9 (unable to rate). A total score is calculated with higher scores indicating more symptoms.

	Tests	Required time, minutes	Scoring or psychometric properties related to MCI
Daily Functioning [d]			
• IADL	• TIADL (Owsley, Sloane, McGwin, & Ball, 2002)	• 10 – 15	• For each task, there is a required completion time and an error code. Participants with a major error on a given task are scored with the maximum time for that task. Participants with a minor error are scored with their actual completion time plus a "time penalty" defined as 1 standard deviation of the time data of all participants who completed that particular task with no error. Those with no error are scored with their actual completion time. A mean Z score for time on 5 tasks is computed with higher scores indicating lower performance. Compared to controls, persons with MCI had similar accuracy but took significantly longer to complete the functional activities.
	• SIB-R (Bruininks, 1996)	• 15 – 20 for short-form; 45 – 60 for full form	• Age and education matched norm data is available. [†] Compared to controls, persons with MCI had significantly poorer IADL functioning.
	• ECog (Farias, et al., 2008)	• 20	• Summary scores for each dimension in ECog are developed. Mean of summary scores is computed with higher score indicating poorer performance. At a specificity value of . 80, the ECog had a sensitivity of 0.75 in discriminating MCI from dementia, and 0.67 in discriminating normal controls from MCI.
• Multiple domains (BADL and IADL)	• Bayer-ADL (Hindmarch, Lehfeld, de Jongh, & Erzigkeit, 1998)	• 15 – 20	• The mean score from 25 items is computed with higher score indicating better performance. Distinguish MCI from mild dementia with a cutoff at 3.3,

Tests	Required time, minutes	Scoring or psychometric properties related to MCI
		sensitivity = 0.81, specificity = 0.72.
• ADCS-ADL (Galasko, et al., 1997)	• 10	• The mean score from 23 items is computed with higher score indicating better performance. Distinguish MCI from controls with an optimal cutoff at 52, sensitivity = 0.89, specificity = 0.97.
• Total Box Score (Daly, et al., 2000)[e]	• 5 – 10	• A score summarizes 6 CDR ratings with higher scores indicating better performance. MCI group with a Total Box Score ≥ 1.5 exhibited amyloid-beta level similar to controls; MCI group with a Total Box Score < 1.5 exhibited amyloid-beta level similar to AD.

Note: CERAD = The Consortium to Establish a Registry for Alzheimer's Disease. ACE-R = Addenbrooke's Cognitive Examination Revised. MoCA = Montreal Cognitive Assessment. CAMCOG = the cognitive and self-contained part of the Cambridge Examination for Mental Disorders of the Elderly. MMSE = Mini Mental State Examination. SLUMS = The Saint Louis University Mental Status Examination. CES-D = Center for Epidemiological Studies Depression Scale. GDS = Geriatric Depression Scale. NPI = Neuropsychiatric Inventory. CBRSD = Consortium to Establish a Registry for Alzheimer's Disease Behavioral Rating Scale for Dementia. BSRS = Behavior Symptom Rating Scale. BADL = Basic Activities of Daily Living. IADL = Instrumental Activities of Daily Living. MDS = Minimum Data Set. TIADL = Timed Instrumental Activities of Daily Living. SIB-R = Scales of Independent Behavior-Revised. ECog = Everyday Cognition. ADCS-ADL = the Alzheimer's Disease Cooperative Study-Activities of Daily Living Inventory. CDR = Clinical Dementia Rating.

[a] 1 or 1.5 SD below age- and education-matched norm data indicate deficit in respective cognitive domain.

[b] Information from systematic review (Lonie, et al., 2009);

[c] Information from systematic reviews (Apostolova & Cummings, 2008; Monastero, et al., 2009); all instruments have been validated in persons with MCI. Because these are not diagnostic tests, sensitivity and specificity are not available.

[d] Information from systematic review (Gold);

[e] Information from individual study (Maccioni, et al., 2006).

[†] Copyright is reserved for algorithms involved.

Table 2

Individual Studies of Patients' Experience with MCI

Description of the Study	Results of the Study
	Understanding MCI
12 persons with MCI (age range: 65 – 86) (Lingler, et al., 2006)	Participants understood the symptoms of MCI and reacted differently to the diagnosis, in terms of positive (n = 5, e.g., participants felt relief that it was not a diagnosis of AD), negative (n = 2, e.g., participants worried that the diagnosis may progress to dementia), or neutral (n = 4, e.g., participants perceived cognitive decline, but were fine with the diagnosis).
30 persons with MCI (age range: 60 – 87) (Lin et al., in press)	Participants correctly identified symptoms related to MCI; generally attributed MCI to aging, heredity, and abnormal brain changes; and believed MCI to be chronic, predictable, and controllable, causing little emotional distress. However, there were no consistent beliefs regarding the negative consequences of MCI or whether MCI was understandable.
63 persons with MCI (M_{age} = 81) (Lin & Heidrich, 2012)	Participants endorsed an average of 7 symptoms that they experienced and believed were related to MCI and an average of 7 potential causes of MCI. Participants tended to believe MCI was chronic, not cyclic, and controllable, but they differed in their beliefs about the consequences, understandability and emotional impact of MCI.
8 persons with MCI (age range: 58 – 83) (Joosten-Weyn Banningh et al., 2007)	Participants identified changes related to their cognitive abilities, mobility, affect, vitality and somatic complaints as symptoms caused by MCI. They also considered negative consequences such as anxiety and the loss of self-confidence.
11 persons with MCI (age > 60) (Lu et al., 2007)	Participants were aware of their cognitive impairment in their daily lives, but they expected to maintain the ability to live independently. However, they also experienced uncertainty about the disease progression.
Persons with MCI (n = 20, M_{age} = 72) and AD patients (n = 20, M_{age} = 77) (Frank et al., 2006b)	Participants were aware of cognitive impairment and their changing role in social/ family activities, and also felt uncertain about disease progression.
Persons with MCI (n = 46, M_{age} = 77) and caregivers (n = 29, M_{age} = 70) (McIlvane et al., 2008)	Forty percent of participants believed that their disease was unlikely to convert to AD, and 76% of the participants perceived that the disease process was controllable through practical strategies (e.g., staying optimistic, mental and physical exercises).
	Coping with MCI
63 persons with MCI (M_{age} = 81) (Lin & Heidrich, 2012)	Participants used many dementia prevention behaviors and memory aids, some problem-focused and emotion-focused coping strategies, and few dysfunctional coping strategies.
Persons with MCI (n = 46, M_{age} = 77) and caregivers (n = 29, M_{age} = 70) (McIlvane et al., 2008), using the brief COPE scale and a service use checklist.	Participants engaged in a high frequency of coping such as use of support services (e.g., using legal services, financial planning, housekeeping, support groups), and management of daily living (e.g., planning daily tasks, making notes). Although less frequently reported than other strategies, some participants used strategies such as denial and substance use.
Persons with MCI (age = 58 – 83) (Joosten-Weyn Banningh et al., 2007)	Participants utilized several coping strategies, including stress reduction (e.g. "I tell myself: what I can do, I will do; if I can't, I just leave it"), managing daily living (e.g. "I make notes," "I repeat the information I want to remember"), medical care (e.g., "I visited my GP (general practitioner)"), and
	Functional Health
Cross-sectional comparison of the four subtypes of persons with MCI (amnestic single domain: n = 36, M_{age} = 75.08; amnestic multiple domain: n = 45, M_{age} = 78.36; non-amnestic single domain: n = 26, M_{age} = 74.81; non-amnestic multiple domain: n = 17, M_{age} = 75.59) and healthy control (n = 68, M_{age} = 72.41) (Aretouli & Brandt, 2009).	Regardless of subtype of MCI, participants reported more difficulties in instrumental activities of daily lives than healthy elderly.
	Functional Health (Continued)

Description of the Study	Results of the Study
Two cross-sectional studies of persons with MCI (n = 50, M_{age} = 70.01) and healthy control (n = 59, M_{age} = 67.76) (Wadley et al., 2008) (Wadley et al., 2009)	Participants were slower than healthy elderly in activities such as telephone use, finding belongings, grocery shopping, and medication management and had worse performance on global and discrete driving maneuvers.
Cross-sectional comparison of persons with amnestic MCI (n = 27, M_{age} = 71.33), persons with non-amnestic MCI (n = 15, M_{age} = 72.20), and healthy control (n = 42, M_{age} = 72.45) (Schmitter-Edgecombe et al., 2009)	Participants had significantly more difficulties than healthy elderly in social functioning, general activities, conversations, household activities, taking medications, telephone use, and food preparation.
A 10-year French longitudinal study of healthy control (n = 828) and persons with MCI (n = 285) (The whole sample: M_{age} = 80.8) (Peres et al., 2006)	Participants had more trouble taking medication, using the telephone, travelling alone, and handling finances.
A cross-sectional study of healthy controls (n = 311) and persons with MCI (n = 255) in Korean older adults (age range: 60 – 94) (Kim et al., 2009)	Participants had significantly worse everyday functioning than healthy elderly in using household appliances and the telephone, transportation, and handling finances.
	Mental Well-being
Persons with MCI (n = 46, M_{age} = 77) and caregivers (n = 29, M_{age} = 70) (McIlvane et al., 2008)	Participants reported relatively typical levels of mental well-being using measures of depression, life satisfaction, mastery, and mental quality of life.
In two studies comparing dementia patients (n = 357, M_{age} = 65.77), persons with MCI (n = 36, M_{age} = 82.11), and a healthy control (n = 72, M_{age} = 79.75) (Missotten et al., 2008) or comparing mild AD (n = 26, M_{age} = 78.2), MCI (n = 30, M_{age} = 77.4), and elderly controls (n = 23, M_{age} = 74.7) (Ready et al., 2004),	Participants with MCI also reported a similar overall quality of life compared to healthy elderly, and significantly higher levels of quality of life than participants with dementia.
In a study of 255 persons with MCI (M_{age} = 71.98) and 311 healthy controls (M_{age} = 70.66) in Korea, (Ryu et al., 2010).	Participants and their caregivers both reported significantly lower levels of quality of life if the participant had any neuropsychiatric symptoms.
In a study of persons with MCI (n = 85, M_{age} = 66.7) and healthy control (n = 37, M_{age} = 63.9) in a Thai community (Muangpaisan et al., 2008).	Participants were found to have significantly lower psychological well-being than that of the healthy elderly.

Note. AD = Alzheimer's disease; MCI = Mild Cognitive Impairment.