The Aging Brain Care Medical Home: Preliminary Data

Michael A. LaMantia, MD, MPH,[abc] Catherine A. Alder, JD, MSW,[d] Christopher M. Callahan, MD,[abc] Sujuan Gao, PhD,[bc] Dustin D. French, PhD,[ef] Mary G. Austrom, PhD,[cg] Karim Boustany, PhD,[d] Lee Livin, MBA,[d] Bharath Bynagari, MS,[b] and Malaz A. Boustani, MD, MPH[abc]

The Aging Brain Care (ABC) Medical Home aims to improve the care, health outcomes, and medical costs of Medicare beneficiaries with dementia or depression across central Indiana. This population health management program, funded by the Centers for Medicare and Medicaid Services Innovation Center, expanded an existing collaborative dementia and depression care program to serve 1,650 older adults in a local safety-net hospital system. During the first year, 20 full-time clinical staff were hired, trained, and deployed to deliver a collaborative care intervention. In the first 18 months, an average of 13 visits was provided per person. Thirty percent of the sample had a diagnosis of dementia, and 77% had a diagnosis of depression. Sixty-six percent of participants with high depression scores (Patient Health Questionnaire-9 score ≥14) had at least a 50% reduction in their depressive symptoms. Fifty-one percent of caregivers of individuals with dementia had at least a 50% reduction in caregiver stress symptoms (measured by the Healthy Aging Brain Care Monitor-Caregiver Version). After 18 months, the ABC Medical Home has demonstrated progress toward improving the health of older adults with dementia and depression. Scalable and practical models like this show initial promise for answering the challenges posed by the nation's rapidly aging population. **J Am Geriatr Soc 63:1209–1213, 2015.**

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From the [a]Center for Aging Research, Indiana University; [b]Regenstrief Institute, Inc.; [c]Indiana University School of Medicine; [d]Eskenazi Health, Indianapolis, Indiana; [e]Feinberg School of Medicine, Northwestern University; [f]Veterans Affairs Health Services Research and Development Service, Chicago, Illinois; [g]Alzheimer's Disease Center, Indiana University, Indianapolis, Indiana; and [h]Mavensphere, Inc., Carmel, Indiana.

Address correspondence to Michael A. LaMantia, Indiana University Center for Aging Research, 410 West 10th Street, Suite 2000, Indianapolis, IN 46202. E-mail: malamant@iu.edu

Medicare beneficiaries with dementia or depression are cared for in primary care settings and have complex yet unmet biopsychosocial needs.[1–4] In 2008, Indiana University (IU) and Eskenazi-based implementation scientists modified the memory care clinic at Eskenazi Health, a safety-net integrated healthcare system in Indianapolis, to deliver a collaborative care model for dementia and depression and demonstrated its ability to accomplish the triple aims of better health and better care at lower cost.[5–8] Nevertheless, this collaborative memory care clinic had limited public health effect because of its limited capacity to serve the large number of people with dementia or depression receiving care at Eskenazi Health, its requirement that individuals and family come to the clinic, and its incomplete integration with primary care providers. Therefore, the clinic could not deliver a scalable population health management program. In response to these limitations and with support from a Health Care Innovation Award from the Centers for Medicare and Medicaid Services (CMS) Innovation Center, the collaborative care model for dementia and depression was converted into a scalable population health management program called the Aging Brain Care Medical Home (ABC MedHome), which assumed accountability for the care and cost of the entire cohort of Medicare beneficiaries with dementia or depression receiving care in any primary care clinic in Eskenazi Health. This report describes the ABC MedHome and its role in reducing dementia and depression symptoms and discusses several implementation challenges and early lessons learned.

METHODS

Description of the Program

Program Staffing

The ABC MedHome is designed to care for 1,500 people with two care teams. Each team is responsible for the care of 750 individuals and is led by a full-time equivalent (FTE) registered nurse who serves as a care coordinator (CC). Each CC supervises a group of five FTE care coordinator assistants (CCAs), who have at least a high school

degree, have been chosen for their aptitude for working with vulnerable older adults,[9] and were provided additional training in dementia and depression care. An administrator (1.0 FTE), two social workers (1.5 FTE), and a medical director (0.3 FTE) support the two teams.

Enrollment of Subjects

As a population health management program,[10] the ABC MedHome created a registry that included every Medicare beneficiary aged 65 and older with an *International Classification of Diseases, Ninth Revision* (ICD-9) code of dementia or depression who had had at least one visit within the previous 24 months to any primary care practice affiliated with Eskenazi Health. Physicians were given the option of excluding any of their patients from the ABC MedHome program. Individuals were retained in the program registry unless they or their informal caregiver asked for the program not to contact them, they died, or they moved into long-term institutional care. If the clinical team doubted the accuracy of an individual's dementia diagnosis, a referral was made to the local memory care clinic for clarification. Because depression in older adults is a chronic illness,[11] individuals with low-level depressive symptoms at enrollment were not excluded from the program. Newly referred individuals who met program eligibility requirements were continuously enrolled in the program to replace individuals who died, with the goal of maintaining a constant population of at least 1,500 participants. By this mechanism, it is believed that nearly every individual with dementia and more than 95% of the older adults with ICD-9-identified depression diagnoses at Eskenazi Health were enrolled.

Intervention

Each ABC MedHome team provides the following service for each individual. During the initial assessment phase, the CCA conducts a first visit with the individual, informal caregiver, or both at the individual's home or preferred meeting place. This assessment includes staging of the individual's cognitive deficit using the Mini-Mental State Examination; standardized and valid measurement of the individual's and informal caregiver's reported cognitive, functional, behavioral, and psychological symptoms using the Healthy Aging Brain Care Monitor (HABC-M) and the Patient Health Questionnaire (PHQ-9);[12,13] and listing of current medications. After the initial assessment, the CCA meets with the CC and the social worker to develop an individualized care plan that includes a set of pharmacological and psychosocial protocols (for more information on ABC-MedHome protocols, login to www.agingbraincare.com) targeting the individual and the informal caregivers. Such protocols are based on the collaborative care models for dementia and depression.[5,6] If necessary, the individual is referred for a more-extensive cognitive and mental health evaluation at the local memory care practice or mental health practice. Within 2 to 4 weeks of the development of the care plan, the CCA schedules a home visit to review the individualized care plan with the individual and the informal caregiver, provides them with the necessary self-management educational materials, and connects them with appropriate community-based and in-home services. If appropriate, individuals with major depressive symptoms are offered problem-solving therapy led by the CC. If they have low-level depressive symptoms (PHQ-9 score <10), the CCA delivers behavioral activation and relapse prevention activities. During the follow-up phase, the team maintains contact with the individual in person, over the telephone, or by e-mail. The CCA aims to meet with each individual once monthly for the first 3 months and every 3 months thereafter. In these visits, CCAs measure the individual's and caregiver's response to treatment using the PHQ-9 and HABC-M, follow care protocols based on responses to these instruments, and answer questions. The team continuously adjusts the individualized care plan based on information that CCAs collect during the visits at the weekly team meetings. If an individual develops an acute illness that requires hospitalization, the team activates the Acute Care Transition phase, in which the CC contacts the hospital team and provides them with relevant information about the individual's cognitive, functional, behavioral, and psychological symptoms and updated medication list. After hospital discharge, the CC conducts a home visit within 72 hours to reconcile medications and coordinates any postdischarge care plan. Throughout the course of the team's care of the individual, the team also seeks to support the primary care providers in the management of the individual's other comorbid conditions. Although these conditions are not the program's main focus, the teams are aware of these other conditions, facilitate early communication with primary care providers of emerging concerns related to these conditions, and assist in setting up follow-up appointments with providers for management of these comorbidities when needed.

The Support Tools of the ABC MedHome Program

The team uses a "mobile office" in its day-to-day work that allows it to meet individuals at home, their primary care doctor's office, or any other safe location of their choosing. To facilitate such mobility, each team member has a smartphone, a tablet computer, and mobile Internet access. The team has been trained to use the PHQ-9 and HABC-M to monitor individuals' and caregivers' symptoms and response to treatment. Finally, the team uses a population health management software, the enhanced medical record for aging brain care (eMR-ABC),[14] which facilitates the tracking of individual- and population-level outcomes, assists the team members in selecting care protocols, and alerts them of an individual's admission to any hospital or emergency department visits in the entire state of Indiana using the Indiana Network for Patient Care.[15]

RESULTS

Between October 1, 2012, and March 31, 2014, 1,650 individuals with dementia, depression, or both were enrolled in the ABC MedHome Registry. Of the 361 discharged from the program over this 18-month period, five refused services, 190 died, six left Eskenazi Health or moved out of the area, 27 entered long-term care, and 37 were found to be in long-term care. As seen in Table 1,

Table 1. Baseline Characteristics of Individuals Enrolled in Aging Brain Care Medical Program at Eskenazi Health From October 1, to March 31, 2014

Characteristic	All Subjects, N = 1,650	Dementia Only, n = 378	Depression Only, n = 1,155	Dementia and Depression, n = 117	P-Value
Demographic					
Age, mean ± SD	74.6 ± 8.3	79.8 ± 8.2	72.7 ± 7.0	75.8 ± 12.0	<.001
Female, n (%)	754 (77.7)	152 (66.4)	526 (83.1)	76 (70.4)	<.001
Black, n (%)	767 (46.5)	237 (62.7)	468 (40.5)	62 (53.0)	<.001
Comorbid conditions, n (%)					
Arthritis	109 (6.6)	14 (3.7)	87 (7.5)	8 (6.8)	.03
Cancer	447 (27.1)	102 (27.0)	320 (27.7)	25 (21.4)	.34
Coronary artery disease	644 (39)	136 (36)	456 (39.5)	52 (44.4)	.22
Congestive heart failure	510 (30.9)	120 (31.7)	356 (30.8)	34 (29.1)	.85
Chronic obstructive pulmonary disease	503 (30.5)	87 (23.0)	384 (33.2)	32 (27.4)	<.001
Diabetes mellitus	909 (55.1)	194 (51.3)	654 (56.6)	61 (52.1)	.16
Hypertension	1,532 (92.8)	345 (91.3)	1,084 (93.9)	103 (88.0)	.03
Liver disease	66 (4.0)	13 (3.4)	45 (3.9)	8 (6.8)	.25
Renal disease	303 (18.4)	82 (21.7)	204 (17.7)	17 (14.5)	.12
Stroke	494 (29.9)	135 (35.7)	308 (26.7)	51 (43.6)	<.001
Number of comorbid conditions per person, mean ± SD	3.3 ± 1.8	3.2 ± 1.8	3.4 ± 1.9	3.3 ± 1.9	.51
Measurement of disease					
Participants with baseline MMSE, n	529	90	385	54	
Mean MMSE score, mean ± SD	25.5 ± 4.9	21.2 ± 5.5	27.0 ± 3.4	21.7 ± 6.3	<.001
Participants with baseline PHQ-9, n	877	173	608	96	
Mean PHQ-9 score, mean ± SD	5.5 ± 5.2	3 ± 3.3	6.2 ± 5.4	5.7 ± 5.7	<.001
Participants with PHQ-9 ≥14, n (%)	79 (9.0)	2 (1.2)	67 (11.0)	10 (10.4)	<.001
Participants with baseline HABC-M, n	382	169	151	62	
Mean HABC-M score, mean ± SD	20.6 ± 16.8	23.7 ± 18.1	14.8 ± 12.6	26.1 ± 18.3	<.001
Participants with HABC-M ≥14, n (%)	217 (56.8)	106 (62.7)	69 (45.7)	42 (67.7)	.001

SD = standard deviation; MMSE = Mini-Mental State Examination; PHQ-9 = Patient Health Questionnaire; HABC-M = Healthy Aging Brain Care Monitor–Caregiver Version.

the mean age of these individuals was 74.6 ± 8.3, 77.7% were women, and 46.5% were African American. Participants had a high degree of medical comorbidity, with a mean of 3.3 ± 1.8 conditions. Individuals with a dementia diagnosis had a mean Mini-Mental State Examination (MMSE) score of 21.2, and those with dementia and depression diagnoses had a mean MMSE score of 21.7. Participants had a mean of 13 visits, with a mean of 3.2 home visits and 0.5 clinic visits. For participants with dementia and with dementia and depression (for whom these data were recorded), a mean of 1.6 protocols of care were triggered, and a mean of 4.1 care handouts were distributed in each group. In participants with depression (for whom these data were recorded), a mean of 1.6 protocols of care were triggered, and 3.5 care handouts were distributed.

The ABC MedHome was able to reduce dementia and depression symptoms (Table 2). In participants with depression, PHQ-9 scores decreased 1.7 points per year. Of the 59 individuals with ICD-9 codes of depression and an initial PHQ-9 score of 14 or greater, indicating moderately severe depressive symptoms, 66% had at least a 50% reduction in PHQ-9 score within 6 months. In individuals with dementia, HABC-M scores decreased 5.8 points per year. Of the 70 individuals with ICD-9 codes of dementia and a baseline HABC-M score of 14 or greater, indicating high levels of symptoms burden, 51% had at least a 50% reduction in HABC-M score within 6 months.

DISCUSSION

Challenges and Lessons Learned

Although the program has enrolled more than 1,500 older adults, the team was able to obtain a baseline PHQ-9 score for 608 individuals with depression diagnoses and a baseline HABC-M score for 169 individuals with dementia. The team continues to try to connect with enrolled individuals wherever possible, including their primary care doctor's office or the hospital when they present for care. As anticipated in any population health management program of chronic disease, the severity of symptoms varies. Eighty-nine percent of individuals with history of depression and 36% of those with dementia had mild symptoms (PHQ-9 score <14 and HABC-M <14, respectively). For these individuals, the team monitored their symptom burden, coached individuals with history of depression on implementing behavioral activation and relapse prevention activities, and coached informal caregivers of those with dementia on implementing caregiver stress prevention strategies such as attending monthly support groups, creating crisis plans, taking regular weekly time off from caregiving tasks, and enhancing their self-management and problem-solving capacity related to their loved one's dementia symptoms. Using the eMR-ABC software, the team dynamically stratified the ABC MedHome population into those with major, moderate, and mild needs. Such

Table 2. Types of Services Provided, Changes in Disease Severity, and Remission of Disease

Characteristic	All Subjects, N = 1,650	Dementia Only, n = 378	Depression Only, n = 1,155	Dementia and Depression, n = 117	P-Value
Number of visits, mean ± SD	13.0 ± 15.6	12.6 ± 15.4	12.0 ± 13.2	25.2 ± 28.4	<.001
Coordination of care	4.8 ± 6.5	4.6 ± 6.4	4.4 ± 5.5	8.9 ± 12	<.001
Home	3.2 ± 4.3	3.0 ± 4.0	3.0 ± 4.2	6.0 ± 5.8	<.001
Telephone	3.5 ± 4.6	3.2 ± 3.9	3.4 ± 4.2	6.1 ± 8.3	<.001
Clinic	0.5 ± 1.3	0.8 ± 1.5	0.3 ± 0.9	1.7 ± 2.3	<.001
Months of observation, mean, n	11.8 ± 8.7	13.5 ± 10.2	10.5 ± 7.3	15.4 ± 11.1	<.001
Annual change					
PHQ-9 slope, mean ± SD	−1.4 ± 1.5	−0.8 ± 1.0	−1.7 ± 1.5	−1.3 ± 1.4	<.001
HABC-M slope, mean ± SD	−4.9 ± 4.5	−5.8 ± 5.4	−3.7 ± 3.1	−5.3 ± 4.8	<.001
Remission of disease					
Participants with baseline PHQ-9 score ≥14, n			59	8	
Full responders, n (%)			39 (66.1)	5 (62.5)	
Partial responders, n (%)			12 (20.3)	2 (25.0)	
Participants with baseline HABC-M score ≥14, n		70		29	
Full responders, n (%)		36 (51.4)		15 (51.7)	
Partial responders, n (%)		12 (17.1)		9 (31.0)	

SD = standard deviation; PHQ = Patient Health Questionnaire; HABC-M = Healthy Aging Brain Care Monitor–Caregiver Version.

stratification allowed the team to expand its panel size from 500 to 750 individuals and to reallocate its resources based on the personalized needs of individuals, which facilitated conducting more visits and contacts during episodes of acute illness or care transition. Furthermore, the team frequently encountered other pressing social issues when meeting individuals in their homes (e.g., no heat in the winter, difficulty with access to food) that had to be addressed before the individual or informal caregiver could focus on dementia or depression care. In these circumstances, the teams relied on developed relationships with existing local community organizations, including the Central Indiana Council on Aging, various adult day care facilities, senior care centers, churches, and other community resources.

Over 18 months, the ABC MedHome team identified several lessons learned. First, the program would not have been as successful if it were not for strong working relationships and open channels of communication between the program staff, primary care providers, and the hospital system's leadership. These ingredients enabled the team to identify and enroll eligible individuals quickly; interview, hire, and train the team's members on an expedited timeline; and respond quickly to changes in the local environment that might have otherwise affected program implementation (e.g., movement of the healthcare system to a new hospital campus in December 2013). Second, outreach to individuals with diagnoses of dementia or depression to participate in the program can be challenging, even with acceptance from primary care physicians. The team worked extensively on the manner in which members introduce the program and tried to meet individuals at their primary care doctors' offices to explain the services, if the individuals expressed any initial hesitancy to accept the program's help. Finally, the team found that the population health management software (eMR-ABC) was indispensable, allowing them to track the health of the entire population and quickly switch lenses to explore the care of individuals. Such a zoom-in, zoom-out functionality is essential in producing effective population health management.

This work has several limitations. First, the implementation of a clinical care program was being studied in an active healthcare system rather than an intervention being tested under the stable conditions of a randomized control trial. The models of care that the program are based upon have been tested rigorously in randomized trials and shown to be efficacious.[5,6] As described earlier, it was not possible to contact or collect baseline PHQ-9 or HABC monitor scores from all participants. These circumstances may introduce a potential selection bias into the findings, because people who could not be contacted may have differed from and responded differently to the intervention than those who were reached. Additionally, because this is a clinical program, the persons making the assessments of response to the intervention were the same persons who were administering the intervention, which may have introduced an assessment bias into the work. In addition, there was not a natural comparison group with whom participants' response to the intervention could be compared, and the natural course of symptoms for these two conditions without the intervention in the population is not known. Finally, the fact that not all participants were reached may also have important implications for the dissemination of the program; future dissemination sites may need to consider alternate strategies for identifying and enrolling people in the program.

In summary, initial data on the progress of the ABC MedHome program toward accomplishing its stated goals are promising. The program demonstrates early evidence of improving the health of a very vulnerable population of older adults with depression or dementia. Ultimately, the program's success and sustainability will be judged on its ability to meet the triple aims in an independent evalua-

tion. If successful, the ABC MedHome may prove to be a scalable model to provide high-quality care to some of the most vulnerable individuals.

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