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Implementing Innovative Models of Dementia Care: The Healthy Aging Brain Center

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Abstract

BACKGROUND—Recent randomized controlled trials have demonstrated the effectiveness of the collaborative dementia care model targeting both patients suffering from dementia and their informal caregivers.

OBJECTIVE—To implement a sustainable collaborative dementia care program in a public health care system in Indianapolis.

METHODS—We used the framework of Complex Adaptive System and the tool of the Reflective Adaptive Process to translate the results of the dementia care trial into the Healthy Aging Brain Center (HABC).

RESULTS—Within its first year of operation, the HABC delivered 528 visits to serve 208 patients and 176 informal caregivers. The mean age of HABC patients was 73.8 (SD 9.5), 40% were African Americans, 42% had less than high school education, 14% had normal cognitive status, 39% received a diagnosis of mild cognitive impairment, and 46% were diagnosed with dementia. Within 12 months of the initial HABC visit, 28% of patients had at least one visit to an emergency room (ER) and 14% were hospitalized with a mean length of stay of five days. The rate of a one-week ER revisit was 14% and the 30-day re-hospitalization rate was 11%. Only 5% of HABC patients received an order for neuroleptics and only 16% had simultaneous orders for both definite anticholinergic and anti-dementia drugs.

CONCLUSION—The tools of “implementation science” can be utilized to translate a health care delivery model developed in the research laboratory to a practical, operational, health care delivery program.

Keywords

dementia care; memory care practice; implementation science; complex adaptive system; informal caregiver

INTRODUCTION

Despite quality improvement efforts, evidence-based practice guidelines, and clinical research activities over the past three decades, Americans spend more than \$100 billion per year providing care for three million Americans and their family caregivers affected by dementia. (Sloane, Zimmerman & Suchindran, 2002; The Lewin Group, 2004) Despite this financial investment, current dementia care suffers from numerous quality problems. (Schubert et al, 2006; Schubert et al, 2008; Callahan et al 2006; Boustani et al 2005; Chodosh et al, 2007; Alzheimer's Association, 2009) At least 50% of these patients are taking psychoactive medications that have known deleterious effects on cognition and another 20% are taking medications that do not have an FDA-approved indication in dementia. (Schubert et al, 2006) One in three patients with dementia utilizes acute care services at least once every six months and as a result of caring for patients with dementia, 24% of family caregivers seek acute care every six months. (Schubert et al, 2008)

Over the past decade, two randomized controlled trials demonstrated the effectiveness of a collaborative dementia care model that delivered biopsychosocial interventions for patients suffering from dementia *and* their family caregivers. (Callahan et al, 2006; Vickrey et al, 2006) This delivery model improved quality of care, quality of life, and the behavioral and psychological symptoms of dementia for both the patient and the caregiver within a research environment. (Callahan et al, 2006; Vickrey et al, 2006) The collaborative dementia care model includes a care manager to coordinate care, standardized protocols for care delivery and ongoing follow-up, and access to information technology to help support care management. (Callahan et al, 2006; Vickrey et al, 2006;) However, implementing this innovative care delivery model requires significant clinical practice redesign.

Using the method of implementation science, the geriatric medicine program at Wishard Health Services (WHS) developed and implemented a locally sensitive collaborative dementia care delivery model, called the Healthy Aging Brain Center (HABC). This paper describes the development, the operation, and the performance of this center within its first year of operation. The Aging Brain Care Medical Home described in a separate paper is (Callahan, et al, 2010 under review), in a sense, a mobile memory care practice with a major emphasis on outreach and integration within the primary care practice. The Healthy Aging Brain Center is in a single location with a suite of examination rooms and offices constituting a distinct memory care clinic.

IMPLEMENTATION AND EVALUATION METHOD

The Healthy Aging Brain Center (HABC) is a clinical program providing care within WHS to patients and family caregiver with concerns about the emotional and cognitive health of the aging brain. HABC is not supported by research funding to deliver care but it has standardized manual and electronic assessment, management, and performance data that facilitate access to research projects.

Wishard Health Service (WHS)

WHS is a safety net health care system that serves the residents of Marion County in Indiana, including Indianapolis. It is comprised of Wishard Memorial Hospital, 11

community primary care health centers, a center for senior care, and mental health services. The hospital is a 450 bed, university affiliated urban public hospital that serves a population of approximately 750,000 in greater Indianapolis. The community health centers are located within 5 miles of the hospital in a distribution specifically designed to serve distinct communities. Nine of these health centers serve typical urban populations with predominantly African American patients with a low socioeconomic status and two health centers serve a typical non-minority population with a high socioeconomic status. All general internists providing care in these facilities are either faculty in the Division of General Medicine and Geriatrics or house-staff within the department of medicine at Indiana University School of Medicine. In 2007, WHS served approximately 11 thousand patients aged 65 and older via more than 87 thousand visits to any WHS site. Nearly all of these patients have at least one visit to their primary care physician in a given year with an average of about 4 visits per year. It is estimated that 69% of this older cohort are women, 54% are African-American, and 44% have less than 8 years of education. Through the local electronic Regenstrief Medical Record System (RMRS), we have access to data about process of care and comorbid conditions. We have used these data in multiple previous studies. Chronic medical illnesses are common including hypertension (63%), arthritis (30%), diabetes mellitus (25%), chronic obstructive lung disease (18%), coronary artery disease (15%), severe obesity (14%), cancer (10%), congestive heart failure (8%), mild cognitive impairment (MCI) (13%), dementia (6%), and depression (7%).

Implementing the Collaborative Care Model for Dementia within WHS

Traditional conceptual models portray the health care delivery system as a machine-like system with replaceable parts and predictable behaviors that can be changed and reproduced based on financial incentives, regulatory policies, national guidelines, and best practice initiatives. (Boustani et al, 2010; Institute of Medicine & Committee on Quality of Health Care in America, 2001) However, the assembly line conceptual model does not fit health care systems. Health care delivery organizations are more accurately conceptualized as a complex adaptive system with local critical nonlinear relationships that produce unpredictable behavioral patterns or dynamics. (Anderson et al, 2005; Boustani et al, 2007; Crabtree et al, 2001; Hagedorn et al, 2006; Institute of Medicine & Committee on Quality of Health Care in America, 2001; McDaniel et al, 2003) Using the lens of the complex adaptive system and the five principles of the reflective adaptive process (Stroebel et al, 2005), we implemented the Healthy Aging Brain Center as the local collaborative dementia care model within WHS (see Table 1).

As a first step in the implementation process, we established an implementation team of representatives from the various disciplines involved in delivering dementia care at WHS. This team included a primary care physician; three memory care physicians; a nurse provider; a social worker; a clinic administrator; two neuropsychologists; a social psychologist; and a local representative of the Alzheimer's Association. Over a four-month period and in the presence of internal facilitator, the team met every two weeks for two hours to transform the protocols of the collaborative dementia care model into locally sensitive minimum care delivery specifications for HABC. A smaller operational team initiated monthly meetings to monitor the progress of the HABC in order to make small but timely modifications based on incoming data. The core components of the HABC care model are shown in Table 2 and a detailed manual of HABC standard operation is available online, including the HABC initial diagnostic assessment, the biopsychosocial need monitor, and non-pharmacological management protocols for dementia symptoms (www.indydiscoverynetwork.com).

Evaluation Platform for HABC Performance

Using the conceptual model of Complex Adaptive Systems and the electronic Regenstrief medical record system (RMRS), we developed an evaluation matrix that provides timely periodic data relevant to the HABC performance for the leadership of WHS.

The RMRS is the primary instrument for processing data and monitoring patient and physician activity for WHS. It is a modular system, composed of Registration and Scheduling, Laboratory, Pharmacy, and Database modules. The Laboratory module handles all inpatient and outpatient data, all lab reports and data used for billing. In addition, this module stores coded results and full text interpretations of all imaging studies and special procedures. The Pharmacy module contains information on dispensing and charges of all medications by the inpatient and outpatient pharmacy. The Database module stores all the above data by date in a fully coded form. Data for large numbers of patients are retrievable using a locally developed English-like language called CARE. Patients can be identified either by a certain restriction list or by clinical criteria. The RMRS maintains a number of other databases including diagnoses, vital signs, results of laboratory tests and diagnostic tests, full-text discharge summaries, preventive health maneuvers, and detailed information on all inpatient and outpatient charges. It also contains death certificate information from the Indiana State Board of Health for all registered patients who die in, or outside of, Indiana. Thus, the RMRS collects and monitors a broad array of physician and patient activity, practice patterns, utilization, diagnostic test finding, and outcomes.

Since 1984, the Medical Gopher system, a network of microcomputer workstations, has allowed physician order entry and other direct interactions between computer and physician. The Medical Gopher is linked to the RMRS and is used by physicians to write all orders at WHS. Physicians in WHS enter all inpatient and outpatient orders directly into physician workstations. They have access to more than 70 personal computer (PC) workstations distributed around the hospital, the emergency rooms, and the community centers. The workstations are linked via a network to a central file server and a cluster of Digital Equipment Corporation's VAX computers. Less than 5% of orders are entered by nursing staff as verbal orders from physicians and these must be entered into the computer within 24 hours.

The WHS leadership agreed upon an evaluation platform to monitor HABC performance that includes ambulatory care utilization, acute care utilization, and a set of quality indicators. The HABC directors use the RMRS system to collect the necessary data for HABC evaluation platform. Based on our previous geriatric health services research activities within WHS and as benchmarking for HABC performance, the WHS leadership requested a side-by-side reporting of similar performance matrix for older adults with a comparable medical and psychiatric comorbidity profile of HABC patients but receiving care within the primary care health centers at WHS. This request contrasts the HABC performance with the performance of primary care clinics (PCC) that delivered care for patients with dementia or depression within the same time period. This PCC cohort was identified using the International Clinical Diagnosis codes (ICD-9) for dementia, MCI, or depression or receiving antidementia or antidepressant medications. Only 21 patients from the PCC cohort had one visit to HABC in 2008 (See table 4). The WHS leadership is currently monitor HABC performance on an ongoing quarterly base but in this paper we report the performance within the first year of HABC (January 1 to December 31 of 2008). The leadership is not interested in evaluating the statistical significance of the difference between HABC and PCC performances. The leadership uses these data as a decision support for their resource reallocation, future planning, and evaluation of the utility and impact of HABC as a clinical program on the entire system.

RESULTS

The Operation of the Healthy Aging Brain Center

The goal of the HABC is to help the health care system achieve the recommended standard of care in the diagnosis, evaluation and management of patients with dementia and thereby to improve the outcomes of dementia care. Much of the care, while facilitated by HABC interdisciplinary team, is designed in a co-management framework to support the care provided by primary care clinicians, enhance the self-management skills of both the care recipient and the informal caregiver, and maximize their coping behaviors. By design, the HABC standardized protocols lead to individualized and patient-centered profiles of actual interventions.

The HABC program has two main phases: the initial assessment phase and the follow-up phase. During the initial assessment, the HABC team summarizes all relevant data and formulates an individualized care plan. Within 2–3 days following this initial assessment, the HABC medical assistant communicates the team's recommendations to the primary care physician and thereby finalizes a collaborative plan of action. Within the follow-up phase and using face-to-face, telephone, and/or email interactions with the patient-caregiver dyad, the HABC Dementia Care Coordinator and the HABC physician monitor and modify the implementation of the HABC individualized care plan.

The Initial Assessment Phase: HABC receives referrals from multiple sources including primary care providers, specialists, family (informal) caregivers, or directly from the patient. The initial assessment includes:

1. Pre-visit structured caregiver/care-recipient need assessments via mail, phone or in the waiting area.
2. First visit: face-to-face – full diagnostic work-up, including medical assessment, neuropsychological profiling, structured neurological and physical examination, blood work, and brain imaging.
3. Second visit: face-to-face - initiation of personalized care plan that includes sensitive diagnosis and prognosis disclosure, direct clarification of patient and family questions, customized medical condition-related, self-management training manual, care recipient pharmacological prescriptions, care recipient non-pharmacological prescriptions, pro-active referral(s) to community resources and/or caregiver pharmacological or non-pharmacological prescriptions.

The Follow-Up Phase: The follow-up phase of the HABC program includes:

1. Telephone follow-up: The HABC Dementia Care Coordinator contacts the patient/caregiver within 1–2 weeks of the initial care plan visit and as needed. At each of these contacts, the HABC Dementia Care Coordinator monitors the success of the dyad efforts in implementing the individualized care plan and at the same time modifies the plan if necessary.
2. Face-to-face visits to the HABC: The frequency of these follow-up visits is based on each care plan and varies from once per month to once per year. During this visit, the HABC team evaluates for cognitive, functional, behavioral and psychological symptoms of the patient and stress and burden of the caregiver. In addition, the HABC team may modify the individualized care plan and initiate new protocols or prescriptions. Although the actual content will vary for each patient, eight main components of the individualized care plan are described below.

1) Enrollment in patient and caregiver education, self-management and support program—This program includes four major components:

- A. Self Management/Caregiver Skills Enhancement Counseling Sessions. Within two weeks of the initial HABC face-to-face visit, a patient/spouse/family counseling session takes place at HABC to offer education and support regarding the diagnosis and prognosis. *A critical aspect of the HABC program is that it is tailored to the specific needs of the family.* Prior to this meeting, the HABC Dementia Care Coordinator prepares the various relevant materials for this session. These sessions (depending on the density and complexity of materials) can include: information on legal and financial planning with referrals made to elder law specialists and legal services programs in the community; specific behavioral interventions techniques to help manage, reduce or avoid problem patient behaviors; and/or coping strategies to ensure the caregivers' emotional and physical health remain intact. (Austrom et al, 2004) The session may also include education on the patient's comorbid conditions that may be contributing to the patient's disability. If the patient's or caregiver's needs are particularly complex, this conference can take place over more than one face-to-face and/or telephone sessions.
- B. HABC Support group participation. In collaboration with the Alzheimer's Association of Greater Indiana, HABC organizes a monthly support group facilitated by the HABC Dementia Care Coordinator and located at the Indianapolis Senior Center. While support groups are available in the metropolitan area through the Alzheimer's Association, the HABC support group is specifically designed to give the HABC dyads tailored information to meet their needs within the WHS. While participation cannot be required, the HABC physician and staff encourage participation by everyone seen by the HABC team and by stressing the importance of the support group for the overall health of both the patient and the caregiver. The HABC support group meets on the fourth Friday of each month at the local Senior Center for two hours. In cases that the HABC dyad cannot make the HABC support group due to access and distance, the HABC team writes a pro-active prescription to connect the HABC dyad with their local Alzheimer's Association and specifies the type of support requested from the local chapter such as belonging to a monthly support group, specific educational material, or case management. HABC obtains permission from the caregiver/patient to be proactively contacted by their local Association chapter.
- C. Informal telephone support. The HABC dyads have access to telephone consultation by the HABC coordinator at any time. The spouse or any other family member participating in the patient's care can initiate telephone contact. Offering access to an HABC Dementia Care Coordinator to have their questions answered makes caregivers feel more empowered and willing to try different interventions more readily as they feel they can contact an expert for help.
- D. Consideration for specialty referral: Complex patients and patients with diseases that may benefit from specialty care may be recommended for specialty evaluation and co-management. This decision is jointly reached by the HABC team and the primary care physician.

2) Active case-finding and treatment for depression, psychoses, behavioral disturbances, and hazardous activities in patients—Using data collected from the structured caregiver interview or obtained during face-to-face visits, the HABC team identifies and diagnoses depression, delirium, psychosis, or aggression superimposed on the underlying dementia, Alzheimer's disease, or mild cognitive impairment. The HABC

physician uses the standardized non-pharmacological interventions to manage these co-existent syndromes or symptoms (see www.indydiscoverynetwork.com for access to the Standardized Protocols). The HABC Dementia Care Coordinator educates the caregiver on implementing these protocols and monitors the success of such implementation via face-to-face or telephone follow-up interactions. In addition, the HABC physician initiates the addition of any pharmacological interventions to reduce the burden of these comorbid syndromes, diseases, or symptoms. These pharmacological interventions may include stopping or reducing any dosages of psychotropics or anticholinergics.

3) Reducing the Anticholinergic Cognitive Burden—Using the Anticholinergic Cognitive Burden Scale developed by our Aging Brain group (Campbell et al 2009; Boustani, Campbell, Munger, Maidment & Fox, 2008), the HABC physician reviews the over-the-counter and prescribed medications taken by the patient and works with the primary care clinician to balance the benefit and harms of these anticholinergics with specific focus on medications with definite anticholinergic properties.

4) Prescribing FDA-Approved Alzheimer Disease Medications—The HABC physician discusses the indications, the benefits and the expectations of using FDA-approved medications for AD and other related dementing disorders.

5) Managing High Vascular Burden—The HABC physician reviews the presence of vascular risk factors such as diabetes, hypertension, or hyperlipidemia and works with the primary care clinician on reducing such a burden using both pharmacological and non-pharmacological interventions.

6) Active Monitoring and Support of the Caregiver's Emotional and Physical Health—Surveillance for the caregiver's well being is accomplished by the HABC team during the initial assessment, throughout the follow-up visits, and as discovered during various interaction between the HABC team and the dyads. The HABC team uses a structured biopsychosocial needs assessment to monitor the cognitive, functional, behavioral and psychological symptoms of patients and the caregiver stress (HABC-Monitor). The HABC monitor contains 32 items tapping the previous four constructs. While the total HABC Monitor score is helpful to monitor the biopsychosocial needs of the dyads, each question also indicates a specific care area where help or coping strategies might be indicated. The HABC Monitor also includes questions on falls, home safety, automobile driving and other behaviors that may become dangerous as dementia progresses. When these functional, cognitive, behavioral, psychological, or psychiatric conditions (for either the patient or the caregiver) are identified, the HABC Dementia Care Coordinator works with the primary care clinician, the HABC physician, and other providers to begin initial pharmacological and non-pharmacological management. This may also include working with the caregiver's primary care physician. Consistent with current recommendations, protocols for patient management emphasize non-pharmacologic treatment at the outset. This is followed by pharmacologic treatment where appropriate.

7) Active Case Findings and Treatment for Excess Disability Due to Comorbid Medical Conditions—Most of the patients with cognitive impairment in primary care and memory care clinics have multiple comorbid chronic conditions. These conditions themselves often require complex combinations of medications, self-management, and regular follow-up. The HABC team is aware of the complexity of managing these comorbid conditions in the presence of cognitive impairment and works with the primary care clinicians and other providers on reducing excess disability from these comorbid conditions. The HABC team's goal is to simplify the patient's medical regimen, provide maximum

assistance with self-management, and provide consistent monitoring of the patient's progress. It is not the intention or goal of the HABC team to "take over" the care of the patient from the primary care physician. The goal is to provide an additional resource to improve the primary care clinicians' and other providers' capacity to deliver excellent care tailored to the special need of the patients suffering from cognitive deficits and their informal caregivers.

8) Facilitated Communication among the Care Providers both Within the Health Care System and the Community—One of the HABC Dementia Care Coordinator's important roles is to facilitate communication among all those involved in the care of the patient and the caregiver. This includes communication between the health care team and the community agencies involved in the patient's care. Our primary care clinicians recognize this "facilitator of communication and care" role as a major benefit of the referring their patients into our HABC.

The Performance of the Healthy Aging Brain Center

On January 7, 2008, the HABC began delivering care in three half-day clinic sessions per week. The HABC has three patient examination rooms, one family conference room, two research rooms, one team room with one computerized working station, and three cubicles for HABC staff. The HABC staff includes two memory care geriatricians (total 33% FTE), two dementia care coordinators (total 140% FTE), and one medical assistant (66% FTE) who are supported by WHS, the sponsoring health care system.

Table 3 describes the initial assessment characteristics of the patients who were managed by the HABC team. Between January and December 2008, the HABC delivered care for 208 patients via 528 clinic visits with an average of three visits per patient. Evaluation for memory problems was the most common reason (81%) for referring the patients to HABC followed by behavioral problems (12%). HABC patients also had common geriatric syndromes, with more than 55% having a history of depression, 44% having urinary incontinence, and 44% reporting a gait problem. Using the results of the structured caregiver interview, the physical and neurological examination, the neuropsychological testing, as well as the laboratory and imaging diagnostic tests, the HABC physicians diagnosed dementia or mild cognitive impairment (MCI) in 85% of the patients. Among patients with a dementia diagnosis, patients showed one or more of the following: 78% had possible or probable Alzheimer disease, 40% had possible or probable vascular dementia, and 27% of dementia patients having mixed dementia. Among patients with MCI, 38% had multi-domain amnesic MCI, 11% had single domain amnesic MCI, 16% had multi-domain non-amnesic MCI, and 16% had single domain non-amnesic MCI. Attempting to identify the contributing factors to MCI, HABC physicians identified depression in 65% of patients, cerebrovascular disease in 40% of patients, prodromal Alzheimer disease in 30% of patients, and medications with negative cognitive effects in 13% of patients.

Table 4 contrast the performance of the HABC and PCC in 2008 (See table 4). Across the three evaluation platform domains, the HABC cohort had lower acute utilization and higher quality indicator patterns. The majority of the HABC patients have undergone work-up for reversible causes of cognitive impairment with 82% (22% at PCC) of the patients having an order for brain imaging. Within the first year of HABC operation, 28% (49% at PCC) of the patients had at least one emergency room visit and 14% (26% at PCC) had one hospitalization with a mean hospital length of stay of 5 days (7 days at PCC). Even though HABC operates as a special consult service that supports the primary care services, the quality of dementia care improved among primary care patients who had at least one visit to HABC. Only 14% (15% at PCC) of HABC patients with emergency room visits returned to

the emergency room within one week, and only 11% (20% at PCC) of hospitalized patients were readmitted within 30 days. Furthermore, 19% of (40% at PCC) HABC patients had one order of anticholinergic medication by any providers and only 5% (5% at PCC) had an order for neuroleptics. In collaboration with primary care teams, HABC patients with high vascular burden reached their target goal for hyperlipidemia controls 45% (23% at PCC) of the time and 78% (62% at PCC) reached their targeted level of diabetes control. (See table 4).

DISCUSSION

Within its first year of operation, HABC implemented the content and the protocols of the collaborative dementia care model and demonstrated a positive impact on the quality of dementia care within WHS. The HABC model of dementia care was able to develop self-sustaining clinical service to support the care for patients presenting with cognitive problems and their informal caregivers. HABC expands the definition of patients to include the family caregiver and provides collaborative and coordinated care inside and outside the clinical, face-to-face encounter with patients, thus offering an innovative solution to reduce dementia related burden.

Unfortunately, translating and disseminating new models of care into usual clinical practice often takes more than 17 years. New memory care practices will require a substantial investment in developing a work-force of clinicians with sufficient expertise in providing dementia care. (Westfall, 2007; Institute of Medicine Committee of the Future Health Care Workforce for Older Americans & Board on Health Care Services, 2008) The Institute of Medicine (IOM) and the National Institutes of Health (NIH) Roadmap recognize the long delay in translating research innovations from discovery to delivery and recommended urgent "Re-Engineering of the Clinical Research Enterprise." (Institute of Medicine Committee of the Future Health Care Workforce for Older Americans & Board on Health Care Services, 2008; Institute of Medicine & Committee on Quality of Health Care in America, 2001; NIH Roadmap for Clinical Research: Clinical Networks and NECTAR, 2007; Zerhouni, 2003) The unique features of WHS may limit the generalizability of the HABC into other health care systems. First, WHS is urban and county supported integrated health care system provides care to under-served and minority dominant population in Indianapolis. Thus, generalizability to rural and solo memory care practices is limited. Second, WHS has been the recruitment site of the randomized trial of the collaborative dementia care model and the buy-in of the leadership and the clinicians of the efficacy of HABC was already established. As a matter of fact, the WHS leadership was very proactive in pursuing the implementation of the collaborative dementia care model. Third, WHS is served by a locally developed and controlled comprehensive electronic medical records that easily captures the necessary data to populate the HABC evaluation platform and thus capture the positive impact of HABC on the performance and reputation of WHS. Thus, health care systems that do not have similar electronic systems may struggle in providing ongoing data to demonstrate for financial and positive impacts of similar memory care practices.

We are now exploring a mechanism to expand the HABC and ABC-Medical Home to other regional health care systems. In early 2006, the Indiana University Center for Aging Research, the Regenstrief Institute, and the Indiana Alzheimer Disease Center initiated the development of a community-based participatory "think-tank, called the **Indianapolis Discovery Network for Dementia (IDND)**. (Boustani, Healey, Senour & Munger, 2007; Guerriero Austrom et al, in press) The social network incorporates both leadership and "front-line" representatives from the local chapter of the Alzheimer's Association, the Indiana Minority Health Coalition, and the major health care systems in Indianapolis.

(Boustani, Healey, Sennour & Munger, 2007) IDND has created an environment that supports information and idea exchange among its diverse, autonomous, and collaborative individuals. The next phase of the HABC is to exploit the resources of this dementia care network to disseminate HABC into other local health care systems. However, such a dissemination process depends not only on sharing lessons learned from implementing HABC at WHS but also a specific understanding of the nature and culture of each health care system and the process of introducing a locally sensitive change into the already complex interactions among health care providers. Transforming local memory care practices within IDND into localized HABC models of memory care would upgrade IDND into an ideal testing ground for innovative ideas and continuous improvement of dementia care within Indianapolis.

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Table 1

Using the reflective adaptive process to develop the Healthy Aging Brain Center.

General Principle	Local application	Delivery process
Complex adaptive systems need a mission, shared value, or a vision to implement change	Implementing guideline based dementia care	A series of seminars on the process of working together on a shared vision as well as technical training on the opportunities to improve care through collaborative care models
Complex adaptive systems need time and space to adapt and plan change	The implementation teams need support for regular meetings and retreats.	Eight biweekly face-to-face meetings with time provided by WHS, IUCAR, and IADC. Followed by quarterly ongoing meetings
Tension and discomfort are normal in implementing change within complex adaptive systems	The reflective adaptive process provides a structure to facilitate discussion, feedback, and review.	The meetings are based on a shared process and guide by a facilitator.
Implementation design must incorporate the diversity of people and program affected by the change	Implementation teams are comprised of a matrix of people with the relevant roles, expertise, skills, and perspectives	Deliberate construction of diverse teams including front-line clinicians who are provided with resources and facilitator to implement sustainable change
System change requires supportive leadership	WHS leadership is actively involved in the change process, ensuring full participation from all members and protecting time for reflection	A quarterly update of the implementation process to the leadership and quarterly review of the evaluation matrix.

WHS: Wishard Health Services; IUCAR: Indiana University Center for Aging Research; IADC: Indiana Alzheimer Disease Center.

Table 2

The Standardized Minimum Care Delivery Components of the HABC.

1	A reliable tool for periodic needs assessment and evaluation of ongoing therapy.
2	Pharmacological and psychosocial interventions that prevent or reduce the family caregiver's psychological and physical burden.
3	Self-management tools to enhance the patient and the caregiver skills in managing dementia / depression disability and navigating the health care system.
4	Pharmacological interventions for care-recipients that target the cognitive, functional, and behavioral and psychological symptoms <ul style="list-style-type: none"> • Enhancement of the patient's cholinergic system <ul style="list-style-type: none"> – prescribing cholinesterase inhibitors – decreasing exposure to anticholinergics • Improvement in medication adherence • Reduction in cerebrovascular risk factors • Antidepressants with no anticholinergic properties for major depression
5	Prevention and management of syndromes super-imposed on dementia / depression (delirium, pain, and psychosis)
6	Case management and coordination with community resources: <ul style="list-style-type: none"> • Adult day care, • Respite care, and • Support groups.
7	Modification of the patient's physical home environment to compensate for dementia related disability.

Table 3

Initial Assessment Characteristics of the Patients seen at the Healthy Aging Brain Center between January 7 and December 31, 2008 (N = 208)

Variable	Mean (SD) / %	Variable	Mean (SD) / %
Age	73.8 (9.5)	MMSE	21.9(6.5)
Female	67%	GDS	10.2 (6.9)
African American	40%	Interested in Research	60%
Less than HS education	42%	Caregiver Burden **	4.0 (4.0)
Caregiver types		Comorbidity ***:	
- Spouse	29%	- Hypertension	63%
- daughter	35%	- Depression	55%
- other caregivers	18%	- Urinary Incontinence	44%
- None	18%	- Diabetes	28%
		- Cardiac disease	26%
		- Cancer	21%
Reasons for referral*		Cognitive Status	
- Memory problem	81%	- Normal Cognition	14%
- Behavioral problem	12%	- MCI	39%
- Physical problem	6%	- Dementia	46%
- Other	19%		

* could be multiple reasons;

** Caregiver burden Index range from 0 to 14 points with high score indicating more stress;

*** based on self report, caregiver report and medical record review;

MMSE: Mini Mental Status Examination; GDS: 30 items of the Geriatric Depression Scale; MCI: Mild Cognitive Impairment.

Table 4

The performance and impact of the Healthy Aging Brain Center (HABC) and the Primary Care Center (PCC) in Wishard Health Services (WHS) between January 7 and December 31, 2008*

The Ambulatory Care Service Utility Domain	HABC	PCC**
Total Number of patients seen at least once	208	1008
Total Number of patients seen at site who were new to WHS	52	N/A
Total Number of visits	528	3568
Total Number of any outpatient visits patients who were new to WHS	194	N/ A
Total number of brain imaging orders at site	171	217
Total number of Comprehensive Metabolic Profile orders	125	671
Total number of TSH orders	123	496
Total number vitamin B12 orders	175	178
Total number of CBC orders	153	N/A
The Acute Care Service Utility Domain		
Total number of patients with at least one ER visit	59	497
Total number of ER visits	124	1143
Total number of patients with at least one hospitalization	28	259
Total number of hospitalizations	45	438
Mean / Median length of hospital stay	5 / 4	7 / 4
The Quality of Care Indicator Domain		
Among patients with ER visit, % seen at ER again within one week	14%	15%
Among patients with hospitalization, % re-hospitalized within 30 days of discharge	11%	20%
Among patients, % with at least one order of definite anticholinergics	19%	40%
Among patients, % with at least one order of neuroleptics	5%	5%
Among patients with dementia, % with at least one order of Anti-dementia drugs	55%	13%
Among patients with depression, % with at least one order of antidepressant drugs	68%	48%
Among patients with at least one Anti-dementia drug order, % with at least one order of definite anticholinergics	16%	32%
Among patients with hyperlipidemia, % with at least one LDL order	82%	72%
Among patients with at hyperlipidemia, % of patients with LDL < 130	45%	23%
Among patients with Diabetes, % with at least one HbA1c order	78%	62%
Among patients with Diabetes, % of patients with HbA1c < 8	78%	51%
Among patients with HTN, % with last systolic BP < 160	27%	24%

* Based on data collected by the Regenstrief Medical Record System that is used by Wishard Health Services.

N/A: not available

** Performance of PCC delivering care for patients with dementia or depression documented in the medical records.