

Cost Evaluation of a Coordinated Care Management Intervention for Dementia

■ eAppendix A. Intervention Costs Over 1 Year for 200 Patients at 1 Site Collaborating With 3 Community Organizations, Assuming a Caseload of 50 Patients per Care Manager

Intervention Component	Cost, \$
Healthcare Organization Costs	
Fixed 1-time start-up costs	
CaseTrakker base license fee	40,000
CaseTrakker licenses for 5 users at \$1500 each, 2 supervisors or administrators at healthcare organization, 3 community organizations	7500
CaseTrakker setup and support services	11,900
2 Servers for CaseTrakker, 2 servers are recommended for added security, could use only 1	4116
Initial IT support within healthcare organization	3100
Physician to update slides for 5 provider education modules	500
Time of person to do care manager 5-day training and to prepare materials for 10-day training, \$43,860/y plus 24% benefits	3140
Total fixed 1-time start-up costs	70,256
Annual fixed costs	
CaseTrakker yearly fee	11,600
IT support within healthcare organization for 1 h/wk	1612
Administrative selection of subjects using <i>International Classification of Diseases</i> codes and medication lists every 6-12 mo, 40 h for IT to pull data, 80 h for data cleaning and organization, \$25/h plus 24% benefits, is \$3720 for 2 times every 6 mo	7440
Physician champion (1.5% over 18 mo) \$200,000/y plus 17% benefits, \$3510/y	3510
Total annual fixed costs	24,162
Total fixed per-patient per-month cost for 200 patients	10.07
Per-patient variable costs, assuming 200 patients	
4 Care managers at \$43,860/y plus 24% benefits ^a	217,546
CaseTrakker licenses for 4 users at \$1500 each, 1 license for each care manager ^b	6000
4 Laptop computers for care management field work, estimate \$1500 each ^b	6000
Telephone line for 4 care managers, estimate \$100/mo ^c	1200
Postage for sending patients information packets ^d	400
Self-management notebook for patients ^e	1920
Care manager travel for a mean 10-mile round trip at \$0.51/m, 1 trip per patient ^f	1020
Variable cost per patient per month	97.54
Ongoing per-patient per-month cost to the healthcare organization, assuming 200 patients receiving intervention	107.61
Community Agency Costs	
Southern Caregiver Resource Center	
Fixed costs	
IT support for initial 40-h setup of software, \$25/h plus 24% benefits	1240
Total fixed costs	1240
Annual fixed costs	
Care coordinator 20% effort, \$17.50/h plus 24% benefits	9027
Liaison to attend monthly meeting for approximately 3 h/mo, \$83,000/y plus 24% benefits	1785
Total annual fixed costs	10,812

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■ **eAppendix A.** Intervention Costs Over 1 Year for 200 Patients at 1 Site Collaborating With 3 Community Organizations, Assuming a Caseload of 50 Patients per Care Manager *(Continued)*

Intervention Component	Cost, \$
<i>(Continued)</i>	
Alzheimer's Association	
Fixed costs	
IT support for initial 40-h setup of software at \$25/h plus 24% benefits	1240
Total fixed costs	1240
Annual fixed costs	
Care coordinator 20% effort	9027
Liaison to attend monthly meeting for approximately 3 h/mo	1785
Total annual fixed costs	10,812
Meals on Wheels	
Fixed costs	
IT support for initial 40-h setup of software at \$25/h plus 24% benefits	1240
Total fixed costs	1240
Annual fixed costs	
Care coordinator 5% effort	2257
Liaison to attend monthly meeting for approximately 3 h/mo	1785
Total annual fixed costs	4042
Ongoing total cost per month to the 3 community organizations (\$10,812 + \$10,812 + \$4042) / 12 mo	2138.83
Ongoing per-patient per-month cost to the community organizations (\$2138.83 / 200 patients)	10.69
IT indicates information technology.	
^a \$90.64 Per patient per month.	
^b \$2.50 Per patient per month.	
^c \$0.50 Per patient per month.	
^d \$0.17 Per patient per month.	
^e \$0.80 Per patient per month.	
^f \$0.43 Per patient per month.	

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■ eAppendix B. Data Sources and Values for Healthcare Utilization and Caregiving Services Costs^a

Item	Source	Cost, \$	
		Social Planner Perspective ^b	Payer Perspective ^c
Emergency department visits	MEPS emergency department visits files, includes all visits (n = 136)	590.34 per visit	546.74 per visit
Hospitalizations	MEPS hospital inpatient stays files, includes overnight stays or longer (n = 117)	7617.79 per night	7313.65 per night
Nursing home stays	CMS (Table 41 in 2002, Table 41 in 2003, Table 6.6 in 2004)	237.33 per day	237.33 per day
Stays in assisted living facilities	CMS (Table 54 in 2002, Table 54 in 2003, Table 8.8 in 2004)	128.41 per day	—
Hospice stays	CMS (Table 54 in 2002, Table 54 in 2003, Table 8.8 in 2004)	128.41 per day	128.41 per day
Geriatricians	MEPS outpatient department visits file, geriatrics specialty (elderly) (n = 25)	264.70 per visit	249.69 per visit
Family physicians or general internal medicine physicians	MEPS outpatient department visits file; family practice, general practice, internal medicine, osteopathy specialties (n = 1813)	129.66 per visit	118.69 per visit
Neurologists	MEPS outpatient department visits file, neurology specialty (n = 44)	329.86 per visit	313.92 per visit
Psychiatrists	MEPS outpatient department visits file, psychiatry specialty (n = 37)	87.31 per visit	75.83 per visit
Other specialty physicians	MEPS outpatient department visits file; allergy/immunology, cardiology, dermatology, endocrinology, gastroenterology, general surgery, gynecology/obstetrics, hematology, nephrology, oncology, ophthalmology, orthopedics, otorhinolaryngology, physical medicine/rehab, plastic surgery, proctology, pulmonary, rheumatology, thoracic surgery, urology, other specialties (n = 1969)	324.61 per visit	305.62 per visit
Other types of primary care providers such as physician assistants or nurse practitioners	MEPS outpatient department visits file; nurse/nurse practitioner, physician assistant specialties (n = 290)	108.95 per visit	101.21 per visit
Mental health or substance abuse providers other than psychiatrists, including psychologists, psychiatric social workers, and substance abuse counselors	MEPS outpatient department visits file, psychologist specialty (n = 17)	93.54 per visit	81.63 per visit
Physical, occupational, or speech therapists	MEPS outpatient department visits file; physical therapist, occupational therapist specialties (n = 253)	153.83 per visit	130.76 per visit
Case managers or social workers	MEPS outpatient department visits file, social worker specialty (n = 8)	135.76 per visit	—
Eye care providers other than physicians, eg, optometrists	MEPS outpatient department visits file, optometrist specialty (n = 71)	189.62 per visit	178.88 per visit
Alternative healthcare providers, eg, healers (<i>curandero</i>), chiropractors, or naturopaths	MEPS outpatient department visits file; chiropractor, acupuncturist, massage therapist, homeopathic/naturopathic/herbalist, other alternative/complementary care professional specialties (n = 100)	86.40 per visit	—
Podiatrists	MEPS outpatient department visits file, podiatrist specialty (n = 427)	108.56 per visit	98.73 per visit

(Continued)

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■ **eAppendix B. Data Sources and Values for Healthcare Utilization and Caregiving Services Costs^a (Continued)**

Item	Source	Cost, \$	
		Social Planner Perspective ^b	Payer Perspective ^c
Home visiting nurses	MEPS home health visits file, CNA type of healthcare worker (n = 3)	65.65 per visit	65.65 per visit
Home health aides	MEPS home health visits file, home health aide type of healthcare worker (n = 11)	167.49 per visit	95.20 per visit
Delivered meals, eg, Meals on Wheels	Personal communication with organization	6.07 per meal	—
Physical, occupational, or speech therapists at home	MEPS home health visits file; physical therapist, occupational therapist, speech therapist types of healthcare worker (n = 18)	153.83 per visit	88.38 per visit
Adult day care center	Survey of 8 San Diego area adult day care centers that are members of the California Association for Adult Day Services	677.60 per day	—
Wheelchair, standard, lightweight, manual	Survey of 3 national medical supply companies	155.47	—
Walker, adult walker, folding 2-button release	Survey of 3 national medical supply companies	48.82	—
Cane, wooden or standard	Survey of 3 national medical supply companies	16.78	—
Out-of-pocket expenditures for taxicabs, ambulances, parking for healthcare visits, medications, and modifications to home for safety	Value given by caregiver in survey	Variable	—
Paid unskilled informal caregivers	Value given by caregiver in survey	Variable	—
Unpaid unskilled informal caregivers	Hourly rate of paid unskilled informal values from caregiver survey	9.75/h	—

CMS indicates Centers for Medicare & Medicaid Services; HMO, health maintenance organization; MEP, Medical Expenditure Panel Survey; CNA, certified nurse assistant.

^aThe MEPS imputes expenditure estimates for managed care events using capitation imputation based on similar events that were paid on a fee-for-service basis. Zero expenditure visits were also excluded from the expenditure estimates. Reasons for zero expenditures in the MEPS include the following: (1) free care was provided, (2) bad debt was incurred, (3) care was covered under a flat-fee arrangement, and (4) follow-up visits were provided without a separate charge. Weighted sums of cost per visit were calculated using person-level weights created by the MEPS that account for nonrespondents and oversampling of minorities and low-income households to give estimates of the US civilian noninstitutionalized population. Prices for provider visits include the prices for ancillary services such as associated laboratory workup, so the actual provider payment is less than the reported amount. In addition, visit duration varies across provider type, and the payment per hour of work is not accurately reflected in the cost figures. For example, visits for psychotherapy from a mental health professional may be considerably longer than urgent care visits to a primary care practitioner. Because we obtained information on overall nursing home costs from the CMS Web site, we could not calculate a separate estimate of the health plan component. We used this CMS estimate in calculating costs from the payer perspective.

^bMedicare HMO, all payer sources.

^cMedicare HMO, private insurance payer only.

■ **eAppendix C. Calculation of Intervention Costs and Healthcare and Caregiving Costs Not Directly Attributable to the Intervention (Potential Cost Offset)**

Intervention Costs

These costs were divided into the following 3 categories: (1) fixed 1-time start-up costs, (2) fixed costs that were incurred annually, and (3) per-patient variable costs (Appendix 1). Fixed 1-time start-up costs included the initial purchase of the care management software licenses and setup support and expenses, 2 servers, physician time to update provider education modules, and care manager training. Fixed annual costs, which do not depend on the scale of the intervention, include the yearly maintenance fee for the software, information technology support, and a small offset to compensate physician liaisons to the community agencies. These physicians provided a minimal time commitment of 1% to 2% in the first year and 1% in subsequent years. Per-patient variable costs, which depend on the scale of the intervention, include salaries for the care managers, software licenses, laptop computers for fieldwork, and care manager supplies and travel expenses for home visits.

Healthcare and Caregiving Costs Not Directly Attributable to the Intervention (Potential Cost Offset)

We calculated these costs for each participating patient by multiplying the number of units of each service (including informal caregiving) by its unit cost and by adding up across services (Appendix 2). We used estimates from the 2002-2004 Medical Expenditure Panel Survey (MEPS) for Medicare (health maintenance organization) HMO enrollees to assign a national mean for the cost of emergency department visits, hospitalizations (per night), outpatient specialist visits, and home healthcare visits, including home health aides, visiting nurses, and care managers or social workers.¹ Outpatient visit costs included all expenses for treatment, services, tests, diagnostic and laboratory workups, x-rays, and any physician services or hospital outpatient visit charges. In calculating the cost of each visit type, we defined Medicare HMO enrollees as patients who were classified by MEPS as belonging to an HMO and for whom the health plan paid at least 70% of the visit cost. For the analyses from the payer perspective, we only included the cost borne by the plan. Because payment arrangements for long-term care vary across health organizations, we calculated the payer perspective under 2 different assumptions with and without the cost of nursing home stays included. For the analyses from the social planner perspective, we used cost estimates reflecting costs borne by third-party payers and health plans, as well as out-of-pocket expenditures. Although we did not include pharmacy costs because sufficiently detailed information was unavailable to us, we performed an ancillary analysis to look at the effect of the intervention on the rates of any cholinesterase inhibitor use.

We used the Centers for Medicare & Medicaid Services Web site to assign the price per day spent for patient stays in a nursing home, board-and-care (assisted living) facility, or hospice facility.² The price of adult day care was calculated using a survey of 8 adult day care centers in the San Diego area registered by the California Association for Adult Day Services. Prices for ambulatory aids were calculated using a survey of 3 national medical equipment suppliers. An hourly wage was assigned to unpaid unskilled informal caregivers based on the hourly wage for the paid informal caregivers who responded to the survey. The mean hourly wages for home health aides in 2005 were \$9.34 and \$9.24 in the metropolitan area where the study was implemented.³ Out-of-pocket expenses for transportation, parking, medications, home modifications, and supplies such as adult diapers were obtained from participant surveys and were added to the total cost. Finally, we divided the total cost for each patient by the number of months over which these costs were incurred (eg, 12 months or 18 months) to derive a measure of the mean cost for each patient per month.

REFERENCES

1. **Agency for Healthcare Research and Quality Web site.** Medical Expenditure Panel Survey. <http://www.meps.ahrq.gov/mepsweb>. Accessed May 28, 2009.
2. **Centers for Medicare & Medicaid Services Web site.** <http://www.cms.hhs.gov>. Accessed August 2, 2008.
3. **US Department of Labor Web site.** Bureau of Labor Statistics. <http://www.bls.gov>. Accessed May 28, 2009.