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Cost Analysis of the Geriatric Resources for Assessment and Care of Elders Care Management Intervention

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Abstract

OBJECTIVES—To provide, from the healthcare delivery system perspective, a cost analysis of the Geriatric Resources for Assessment and Care of Elders (GRACE) intervention, which is effective in improving quality of care and outcomes.

DESIGN—Randomized controlled trial with physicians as the unit of randomization.

SETTING—Community-based primary care health centers.

PARTICIPANTS—Nine hundred fifty-one low-income seniors aged 65 and older; 474 participated in the intervention and 477 in usual care.

INTERVENTION—Home-based care management for 2 years by a nurse practitioner and social worker who collaborated with the primary care physician and a geriatrics interdisciplinary team and were guided by 12 care protocols for common geriatric conditions.

MEASUREMENTS—Chronic and preventive care costs, acute care costs, and total costs in the full sample (n =951) and predefined high-risk (n =226) and low-risk (n =725) groups.

RESULTS—Mean 2-year total costs for intervention patients were not significantly different from those for usual care patients in the full sample ($14,348 vs $11,834; P =.20) and high-risk group ($17,713 vs $18,776; P =.38). In the high-risk group, increases in chronic and preventive care costs were offset by reductions in acute care costs, and the intervention was cost saving during the postintervention, or third, year ($5,088 vs $6,575; $P < .001$). Mean 2-year total costs were higher in the low-risk group ($13,307 vs $9,654; P =.01).

CONCLUSION—In patients at high risk of hospitalization, the GRACE intervention is cost neutral from the healthcare delivery system perspective. A cost-effectiveness analysis is needed to guide decisions about implementation in low-risk patients.

Keywords

cost analysis; primary care; geriatric assessment; care management; interdisciplinary team

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The U.S. healthcare infrastructure and workforce are inadequate to meet the needs of the aging population.[1] Older persons with chronic illnesses and geriatric conditions frequently do not receive the recommended standard of care[2] and account for a disproportionate share of health-care expenditures.[3] There is a critical need for new models of care that improve quality without increasing costs and that optimize the roles of primary care and geriatrics healthcare professionals.[1] Improved care for patients with chronic conditions has been identified as one of only a few approaches having a high potential for cost savings by reducing preventable hospitalizations.[4]

In recent years a variety of new models aimed at improving the quality and outcomes of care for older persons have been studied.[5] These studies have led to an emerging vision of optimal healthcare delivery for older persons with chronic diseases.[6] This new vision includes personalized care consistent with patient goals, considers the person's social support system, and engages older persons as active partners in their care. The findings of a randomized controlled trial assessing the effectiveness of the Geriatric Resources for Assessment and Care of Elders (GRACE) model of primary care for low-income seniors were recently reported.[7] The GRACE model includes each of the core principles of this emerging vision and demonstrated that patients enrolled in the GRACE intervention received better quality of care than patients receiving usual care and had significant improvements in health-related quality of life. In addition, intervention patients had fewer emergency department (ED) visits than those receiving usual care over the 2-year study period, and hospital admissions were significantly lower in the second year in intervention patients in the group identified a priori as being at high risk of repeat hospitalization than in those receiving usual care.

Although the GRACE intervention was effective in improving quality and outcomes, broad dissemination will require an understanding of this model's effect on costs, particularly from the perspective of a healthcare delivery system.[8] The healthcare delivery system's perspective on costs will vary according to the payment system (e.g., fee-for-service vs capitated).[6,9] A cost analysis was conducted from the healthcare delivery system perspective for adopting the GRACE model under a risk contract with the Centers for Medicare and Medicaid Services or a health plan. It was hypothesized that, for the group at high risk of hospitalization, total costs of care during the 2-year intervention period would be the same or lower for intervention patients than usual care patients, because hospital admissions were significantly lower for intervention patients.[7]

METHODS

Subjects

The Indiana University–Purdue University–Indianapolis institutional review board approved the study. Detailed enrollment criteria have been described previously.[7] In brief, patients aged 65 and older with an income of less than 200% of the federal poverty level were enrolled between January 2002 and August 2004 from six community-based health centers affiliated with Wishard Health Services, an urban healthcare system staffed by Indiana University School of Medicine faculty and residents and serving medically indigent patients in Indianapolis, Indiana. Physicians were the unit of randomization to minimize the potential for contamination. As a preplanned strategy, the probability of repeated admission (PRA) was calculated for each patient.[10] Consistent with the threshold score identified to predict patients at higher risk for significant resource utilization, subjects with a PRA score of 0.4 or higher were considered at high risk of hospitalization.[11]

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Patient Care

The GRACE intervention includes an advanced practice nurse and social worker (GRACE support team) who care for low-income seniors in collaboration with the patient's primary care physician and a geriatrics interdisciplinary team.[7,12] The GRACE intervention has the following key components: initial and annual in-home comprehensive geriatric assessment by the GRACE support team; individualized care plan development by the GRACE support team and geriatrics interdisciplinary team led by a geriatrician and involving a pharmacist, physical therapist, mental health social worker, and community-based services liaison; activation of GRACE protocols and team suggestions for care related to targeted geriatric conditions; GRACE support team meeting with patient's primary care physician to review, modify, and prioritize the care plan; implementation of the care plan by the GRACE support team in collaboration with the primary care physician; weekly GRACE interdisciplinary team meetings to review care plan implementation; and ongoing GRACE support team care management and coordination of care supported by an electronic medical record and Web-based tracking system.

Costs of Care

The computerized Regenstrief Medical Record System (RMRS) is the primary instrument for processing data and monitoring patient and physician activity for Wishard Health Services.[13] The RMRS contains the actual charges for all inpatient and outpatient facility fees, physician encounters, procedures, diagnostic testing, and rehabilitation and mental health services. Charge data were converted to costs by multiplying charges by the cost to charge ratio for the relevant calendar year and cost center. Health-care costs were grouped into two broad categories: acute care costs and chronic and preventive care costs. The acute care category included facility and physician costs associated with ED visits and hospital admissions (inpatient costs). The chronic and preventive care category included intervention costs and outpatient facility and physician costs for primary and specialty care clinics, procedures and diagnostic testing, and rehabilitation and mental health services. Access to charges for medications, durable medical equipment, home healthcare services, and nursing home care was not available.

One important strength of the current study was access to non-Wishard acute care utilization data (ED visits, hospital admissions, and hospital days) using a regional health information exchange. Non-Wishard acute care episodes were identified from the Indiana Network for Patient Care, a local health information infrastructure that includes data from the five major hospital systems in Indianapolis.[14] To estimate the costs of ED visits outside of the Wishard system, the mean cost for ED visits at Wishard ($241.50) was applied for each of the outside ED episodes. Because costs per hospital day vary according to length of stay, the mean Wishard cost per hospital day for the corresponding length of stay was applied to non-Wishard hospital admissions to estimate their costs. Costs attributable to these non-Wishard acute care venues accounted for 8% of total 2-year costs overall.

Costs of the GRACE Intervention

Implementation costs and costs of the GRACE intervention have been described previously.[12] During the course of the study, detailed records were kept of the volume and content of care delivered by the GRACE team, and these records formed the basis of the intervention cost estimate. In steady state, and to maintain a census of 250 patients (125 patients per GRACE support team), it was estimated that the program would need to employ two full-time equivalent (FTE) nurse practitioners and two social workers with a 0.5 FTE administrative assistant and 0.1 FTE each of a geriatrician, pharmacist, physical therapist, mental health social worker, community-based services liaison, and practice manager. Including salary and benefits for these personnel, mileage reimbursement, pager and

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cellphone costs, home visit bags, and office supplies, the estimated direct cost of providing the GRACE intervention was $1,260 per patient per year or $105 per patient per month.

In comparing the process of care in patients at high risk of hospitalization with that of the full sample, it was found that the high-risk patients required an average of one additional face-to-face visit, one additional telephone contact, and three additional contacts for coordination of care per year.[7] It was estimated that the resources listed above could thus maintain a census of only 220 high-risk patients. The estimated direct cost of providing the intervention was $1,432 per year ($119 per month) to high-risk patients and $1,207 per year ($101 per month) to low-risk patients.

Statistical Analysis

Baseline sociodemographic and clinical characteristics of the intervention and usual care subjects were described and compared using two-sample *t*-tests for continuous variables and chi-square tests for categorical variables. The flow of individuals through the study, including those who dropped out, moved out of the area, or died, has been published previously.[7] Intervention costs were determined for each intervention subject based on the number of months survived during the 2-year study period. There were no intervention costs attributed to the intervention group in the postintervention year (Year 3). For each of the broad categories (acute care and chronic and preventive care) and the combined total; the mean total 2-year costs; and Year 1, Year 2, and Year 3 costs were calculated per patient based on intention-to-treat analysis. Comparisons were made between the intervention and usual care groups using a Wald test for zero-inflated and skewed medical cost data.[15] The analyses were performed for the full sample (N =951), as well as for the predefined groups at low (n =725) and high (n =226) risk of hospitalization. In addition, a sensitivity analysis was performed imputing values 10% higher and 10% lower than those originally calculated for non-Wishard ED visit and hospital admission costs. The analyses were implemented using SAS 9.1 (SAS Institute Inc., Cary, NC). Differences with $P \leq .05$ were considered statistically significant.

RESULTS

Baseline Measures

Baseline sociodemographic and clinical characteristics of the 951 individuals randomized to intervention or usual care appear in Table 1 and in the prior publication reporting GRACE trial results.[7] Baseline characteristics of the predefined groups at low and high risk of hospitalization are also given in Table 1. There were no significant differences between intervention and usual care subjects with the exception of mean PRA score in the high-risk group.

Costs of Care in the 2-Year Intervention Period

As shown in Table 2, mean costs per patient in the full sample over the 2-year study period were higher in the intervention group than in the usual care group, but this difference was not statistically significant. In low-risk patients, mean 2-year costs were also higher in the intervention group, and these differences reached statistical significance. In high-risk patients, mean 2-year costs were lower but not significantly different. A sensitivity analysis imputing costs 10% higher and 10% lower for non-Wishard ED visits and hospital admissions showed similar results.

In the full sample and low- and high-risk groups, total chronic and preventive care costs were significantly higher in intervention than usual care patients (Table 2). In the full sample and low-risk group, mean costs were higher for intervention patients in all chronic and

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preventive care subcategories except primary care. In the high-risk group, only costs for rehabilitation and mental health services were significantly higher in intervention patients. In the high-risk group, reductions in acute care costs (especially hospital costs) offset increases in chronic and preventive care costs of intervention patients.

Costs of Care in the Postintervention Year (Year 3)

Table 3 shows the costs of care in the first postintervention year, or Year 3. Total costs per patient in the full sample were similar between groups, but low-risk intervention patients had significantly higher postintervention-year costs than usual care patients, and high-risk patients had significantly lower costs.

DISCUSSION

This cost analysis of a home-based geriatric care management intervention that improved the quality of care and patient health[7] found that treating patients enrolled in the GRACE intervention tended to be more costly to the healthcare delivery system than treating patients in usual care, although cost differences were not statistically significant. Chronic and preventive care costs, including costs of the intervention, were higher for intervention patients. In the low-risk group, annual total costs were consistently higher for intervention than usual care patients, but in the group at high risk of hospitalization, costs were similar between intervention and usual care patients over the first 2 years, with cost savings in the year after the intervention had been completed. This suggests that the downstream savings in acute care costs may be delayed by a year or more after the GRACE intervention is implemented.

This cost analysis of the GRACE care management intervention was conducted using the healthcare delivery system perspective, because the GRACE trial was conducted in a fee-for-service environment involving a hospital and primary care practice. Health plans operating under capitated care often reimburse hospitals based on Medicare diagnosis-related groups (DRGs), and thus Medicare DRGs represent the health plan's costs for hospital care. Hospital costs were recalculated using DRGs (available from Wishard hospital only), and results similar to those reported using estimated hospital costs were found (results not shown).

To the authors' knowledge, this is the first study of a comprehensive home-based geriatric care management program that demonstrates a shift from acute care expenditures to chronic and preventive care expenditures with an overall neutral effect on healthcare costs in patients at high risk of hospitalization. Although numerous interventions are known to be cost-effective, few have been shown to simultaneously improve health outcomes and be cost neutral or lower health costs.[16–18] Disease management programs limited to specific diseases such as heart failure and depression are examples of interventions leading to better outcomes that are potentially cost saving.[19,20] Several randomized trials of outpatient geriatric assessment and community- and home-based care management have demonstrated improved patients' health, reduced resource utilization, or both,[21–27] but cost analyses of these programs have shown greater overall costs[22,23] or been limited by relying on estimated costs,[25–28] or missing expenditures beyond a single principal health system.[21]

Higher chronic and preventive care costs in the intervention group than with usual care are consistent with the content of the intervention and with attainment of desired improvements in the quality of care.[7] Guideline-level care for geriatric syndromes often resulted in specialty consultation, additional diagnostic testing, and new treatment regimens. For example, for study participants with depression at baseline, 48% of intervention patients versus 11% of control patients ($P < .001$) newly visited a geriatric assessment center or

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mental health clinic, and 69% versus 21% ($P < .001$) newly saw a psychiatrist, psychologist, or counselor; were prescribed an antidepressant in the first year; or both.[7] The GRACE intervention led to a shift in spending away from emergency and acute hospital services and toward more-desirable preventive and chronic care services.

Reductions in acute care costs were especially prominent in intervention patients at high risk of hospitalization and were driven primarily by significantly fewer hospital admissions. This result corresponds with previously reported lower ED visit and hospitalization rates per 1,000 in the high-risk group (Year 1: 1,098 vs 1,149; $P = .79$ and 705 vs 798; $P = .60$, and Year 2: 848 vs 1,314; $P = .03$ and 396 vs 705; $P = .03$, respectively).[7] Savings in acute care costs offset higher chronic and preventive care costs (including intervention costs) and resulted in the intervention being cost neutral in the first 2 years. Continued lower ED visit rates per 1,000 (1,010 vs 1,281; $P = .24$) and hospitalization rates per 1,000 (370 vs. 615; $P = .049$) led to cost savings in the high-risk group during the postintervention year. The GRACE model was originally developed as a long-term primary care strategy whose intensity could be adjusted as appropriate to meet the changing needs of patients over time.[12] It appears that, for high-risk patients, a 2-year intervention may have positive longer-term effects.

It is likely that this cost analysis underestimates the value of the intervention for several reasons. The healthcare system that participated in this trial already had lower hospital utilization rates than the national average.[29] Thus, there would be greater potential for additional savings if GRACE were implemented in a healthcare system where care is less well managed overall. In addition, the analysis did not consider the potential cost benefits resulting from more-appropriate risk adjustment due to improved recognition and documentation of medical conditions, improvements in performance on quality indicators, and higher physician satisfaction that is potentially reflective of greater office efficiency.[12,30]

Several important limitations should be considered in interpreting these results. First, multiple comparisons were made, which increases the risk of false-positive results. The analyses were repeated considering all 15 outcome measures using the conservative Bonferroni correction, and results were similar (see footnote in Tables 2 and 3). Second, implementation and overhead (space and administrative support) costs were not included, because these will differ substantially according to healthcare system. Third, non-Wishard outpatient costs were not included in the cost analysis, but this makes the cost comparisons conservative, because the GRACE support team specifically directed intervention patients to Wishard for recommended outpatient services. Fourth, costs associated with pharmacy, durable medical equipment, home healthcare services, and nursing home care were not available and thus were not included. It is difficult to project whether the treatment group would have higher or lower medication costs than the usual care group, because the GRACE team often made suggestions to start and stop medications. In patient interviews conducted over the first 2 years of the study, intervention patients more often reported obtaining new assistive devices (43% vs 34%; $P = .008$) and having a paid individual assist them in the home (13% vs 8%; $P = .02$), whereas nursing home use was similar between groups (6% vs 4%; $P = .23$). These findings from self-report data are consistent with the intervention improving access to needed services, and the associated added costs over usual care are not likely to alter study conclusions.

CONCLUSION

In patients at high risk of hospitalization, the GRACE intervention and its proven patient benefits could be financed from the healthcare delivery system perspective under managed

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care Medicare through cost savings accrued from lower acute care utilization. Reductions in acute care costs in these patients would ensure cost neutrality to the health-care delivery system operating under a risk-based capitation payment methodology. The GRACE intervention thus serves as an example of an organized system of care that provides better quality at similar cost when delivered to a population at high risk of hospitalization. Furthermore, the GRACE model helps optimize the roles of primary care and geriatrics healthcare providers to better meet the growing healthcare needs of the aging population, but payment reform will be required for GRACE implementation beyond managed care Medicare systems, because most services provided by the GRACE intervention are not reimbursed under current fee-for-service Medicare. Because the GRACE intervention increases costs in the low-risk group, a cost-effectiveness analysis is needed to quantify benefits of GRACE in quality-adjusted life years, not dollars, to help guide decisions of implementation in these patients.

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Conflict of Interest: The editor in chief has reviewed the conflict of interest checklist provided by the authors and has determined that the authors have no financial or any other kind of personal conflicts with this paper. The authors may copyright the GRACE protocols and Training Manual and sell materials to interested health plans for use in geriatric patient care management but have no specific plans at this time.

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Author Contributions: Drs. Counsell and Callahan had full access to all of the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. Study concept and design: Counsell, Callahan. Acquisition of subjects and/or data: Counsell, Callahan. Analysis and interpretation of data: Counsell, Callahan, Tu, Stump, Arling. Statistical analysis: Tu and Stump. Preparation of the manuscript: Counsell, Callahan, Tu, Stump, Arling.

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Table 1

Baseline Sociodemographic and Clinical Characteristics

	Full Sample			Low Risk of Hospitalization			High Risk of Hospitalization		
Characteristic	**Intervention (n =474)**	**Usual Care (n =477)**	***P*-Value**	**Intervention (n =362)**	**Usual Care (n =363)**	***P*-Value**	**Intervention (n =112)**	**Usual Care (n =114)**	***P*-Value**
Age, mean ± SD,	71.8 ± 5.6	71.6 ± 5.8	.56	71.8 ± 5.6	71.3 ± 5.4	.19	71.6 ± 5.6	72.4 ± 6.9	.34
Female, n (%)	358 (75.5)	365 (76.5)	.72	288 (79.6)	288 (79.3)	.94	70 (62.5)	77 (67.5)	.43
Black, n (%)	272 (57.6)	292 (62.4)	.14	211 (58.6)	223 (62.8)	.25	61 (54.5)	69 (61.1)	.32
Education <12 years, n (%)	296 (62.5)	285 (60.0)	.44	222 (61.3)	206 (56.9)	.23	74 (66.1)	79 (69.9)	.54
Household income <$10,000, n (%)	303 (73.4)	301 (71.5)	.55	229 (72.2)	228 (71.0)	.73	74 (77.1)	73 (73.0)	.51
Medicare recipient, n (%)	443 (93.9)	452 (95.0)	.46	342 (95.0)	346 (95.6)	.71	101 (90.2)	106 (93.0)	.45
Medicaid recipient, n (%)	169 (37.1)	157 (34.1)	.33	129 (37.1)	117 (33.1)	.28	40 (37.4)	40 (37.0)	.96
Perceived health fair or poor, n (%)	247 (52.6)	242 (51.1)	.65	156 (43.6)	151 (41.9)	.66	91 (81.3)	91 (79.8)	.79
Number of chronic diseases, mean ± SD*	2.71 ± 1.47	2.61 ± 1.50	.32	2.46 ± 1.38	2.27 ± 1.29	.05	3.54 ± 1.46	3.73 ± 1.60	.35
Required help with ≥1 instrumental ADLs, n (%)	153 (35.6)	167 (38.0)	.45	105 (31.6)	119 (35.5)	.29	48 (49.0)	48 (46.2)	.69
Required help with ≥1 basic ADLs, n (%)	80 (17.2)	64 (13.4)	.11	46 (12.9)	38 (10.5)	.31	34 (30.9)	26 (22.8)	.17
Probability of repeated admission score, mean ± SD	0.31 ± 0.12	0.32 ± 0.12	.58	0.27 ± 0.07	0.26 ± 0.07	.88	0.47 ± 0.06	0.49 ± 0.07	.04

Percentages represent the proportion of subjects having the characteristic from among subjects for whom there were complete data.

*From a list of 10 (hypertension, angina pectoris or coronary artery disease, congestive heart failure, heart attack, stroke, chronic lung disease, inflammatory bowel disease, arthritis of hip or knee, diabetes mellitus, and cancer).

SD =standard deviation; ADLs =activities of daily living.

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Table 2

Mean 2-Year Costs per Patient in Intervention and Usual Care Groups

	Full Sample			Low Risk of Hospitalization			High Risk of Hospitalization		
	Intervention (n =474)	Usual Care (n =477)		Intervention (n =362)	Usual Care (n =363)		Intervention (n =112)	Usual Care (n =114)	
Cost Categories	**Mean $ ± SD**		***P*-Value**	**Mean $ ± SD**		***P*-Value**	**Mean $ ± SD**		***P*-Value**
Acute care									
Emergency department visits	485 ± 741	541 ± 1,048	.37	435 ± 737	448 ± 1,055	.46	646 ± 734	836 ± 976	.23
Hospital admissions	5,080 ± 12,987	6,181 ± 13,511	.10	4,380 ± 12,197	4,438 ± 11,359	.11	7,343 ± 15,102	11,731 ± 17,742	<.001*
Total	5,565 ± 13,368	6,722 ± 13,912	.86	4,815 ± 12,582	4,886 ± 11,701	.66	7,989 ± 15,457	12,566 ± 18,205	.83
Chronic and preventive care									
Geriatric Resources for Assessment and Care of Elders intervention	2,438 ± 397	0 ± 0	—	2,359 ± 286	0 ± 0	—	2,691 ± 566	0 ± 0	—
Primary care	2,239 ± 1,887	2,262 ± 1,998	.89	2,190 ± 1,737	2,215 ± 1,957	.63	2,397 ± 2,307	2,415 ± 2,126	.64
Specialty care	2,584 ± 2,820	1,899 ± 2,818	<.001*	2,533 ± 2,657	1,695 ± 2,654	<.001*	2,748 ± 3,299	2,549 ± 3,213	.49
Procedures	803 ± 1,145	728 ± 1,384	.002*	774 ± 1,166	624 ± 996	<.001*	898 ± 1,074	1,057 ± 2,178	.22
Rehabilitation services	181 ± 516	121 ± 795	<.001*	171 ± 414	140 ± 904	<.001*	214 ± 758	58 ± 190	<.001*
Mental health	538 ± 2,221	103 ± 719	<.001*	464 ± 1,759	94 ± 565	<.001*	776 ± 3,298	132 ± 1,073	<.001*
Total	8,783 ± 5,218	5,113 ± 4,411	<.001*	8,492 ± 4,838	4,768 ± 4,172	<.001*	9,724 ± 6,224	6,210 ± 4,962	<.001*
Total costs									
Year 1	7,917 ± 10,457	6,163 ± 10,044	.04	7,050 ± 9,171	4,814 ± 7,933	<.001*	10,719 ± 13,493	10,455 ± 14,104	.49
Year 2†	6,685 ± 9,397	5,881 ± 10,900	.01	6,453 ± 9,402	4,949 ± 9,593	<.001*	7,460 ± 9,381	9,034 ± 14,074	.82

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	Full Sample			Low Risk of Hospitalization			High Risk of Hospitalization		
	Intervention (n =474)	Usual Care (n =477)		Intervention (n =362)	Usual Care (n =363)		Intervention (n =112)	Usual Care (n =114)	
Cost Categories	**Mean $ ± SD**		***P*-Value**	**Mean $ ± SD**		***P*-Value**	**Mean $ ± SD**		***P*-Value**
2-year total	14,348 ± 15,008	11,834 ± 15,567	.20	13,307 ± 14,286	9,654 ± 13,429	.01	17,713 ± 16,776	18,776 ± 19,472	.38

Costs were calculated by multiplying charges by the cost-to-charge ratio for the relevant calendar year and cost center.

*P-value remained significant ($P \leq .05$) after multiplicity adjustment using the Bonferroni correction.

†Thirty-five patients who died in Year 1 (18 intervention and 17 usual care) were not included in the Year 2 full-sample calculations. Nineteen patients who died in Year 1 (11 intervention and 8 usual care) were not included in the Year 2 low-risk-of-hospitalization calculations. Sixteen patients who died in Year 1 (7 intervention and 9 usual care) were not included in the Year 2 high-risk-of-hospitalization calculations.

SD =standard deviation.

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Table 3

Mean Costs per Patient in Postintervention Year (Year 3)

	Full Sample[†]			Low Risk of Hospitalization[‡]			High Risk of Hospitalization[§]		
	Intervention (n =436)	Usual Care (n =440)		Intervention (n =336)	Usual Care (n =344)		Intervention (n =100)	Usual Care (n =96)	
Cost Categories	**Mean $ ± SD**		***P*-Value**	**Mean $ ± SD**		***P*-Value**	**Mean $ ± SD**		***P*-Value**
Acute care	3,201 ± 9,225	3,016 ± 9,569	.54	3,180 ± 9,775	2,589 ± 9,847	.20	3,275 ± 7,113	4,544 ± 8,376	.21
Chronic and preventive care	1,844 ± 2,210	1,716 ± 2,031	.89	1,853 ± 2,201	1,628 ± 1,697	.019	1,813 ± 2,248	2,031 ± 2,923	<.001*
Total costs	5,045 ± 9,684	4,732 ± 10,012	.97	5,032 ± 10,258	4,217 ± 10,222	.05	5,088 ± 7,481	6,575 ± 9,030	<.001*

Costs were calculated by multiplying charges by the cost-to-charge ratio for the relevant calendar year and cost center.

*P-value remained significant ($P \leq .05$) after multiplicity adjustment using the Bonferroni correction.

†Seventy-five patients who died in Years 1 and 2 (38 intervention and 37 usual care) were not included in Year 3 calculations.

‡Forty-five patients who died in Years 1 and 2 (26 intervention and 19 usual care) were not included in Year 3 calculations.

§ Thirty patients who died in Years 1 and 2 (12 intervention and 18 usual care) were not included in Year 3 calculations.

SD =standard deviation.