

Guided Care and the Cost of Complex Healthcare: A Preliminary Report

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Healthcare for older persons with chronic conditions is very expensive.¹ Growing recognition of these costs has led to the development and promulgation of numerous new disease and care management strategies designed to provide high-quality, cost-effective chronic care. One such approach is Guided Care (GC).²

Guided Care is provided by a practice-based team that includes a registered nurse, 2 to 5 physicians, and the other members of the office staff. This team provides 8 clinical services to a panel of 50 to 60 of the practice's highest-risk older patients. For each patient, the Guided Care nurse (GCN) (1) performs a comprehensive assessment at home, (2) creates an evidence-based care guide, (3) monitors and coaches the patient monthly, (4) coordinates the efforts of all of the patient's providers of healthcare, (5) smooths the patient's transitions between sites of care, (6) promotes patient self-management, (7) educates and supports family caregivers, and (8) facilitates access to appropriate community resources.

In a pilot study during 2003-2004, GC appeared to improve the quality of chronic care³ and reduce its costs.⁴ In the initial months of the present cluster-randomized controlled trial (cRCT), patients and physicians rated GC more highly than usual care (UC).⁵ The aim of the present analysis was to evaluate the effects of GC on the use and costs of health services during the first 8 months of this cRCT. We report these preliminary results now to help inform business and policy decisions related to improving chronic care that must be made before the publication of the study's final results in 2011.

METHODS

In 2006, we launched a cRCT of GC in 8 community-based primary care practices located in urban and suburban neighborhoods in the Baltimore, MD–Washington, DC, metropolitan area. Three practices were operated by Kaiser Permanente, a group-model managed care organization; 4 were operated by Johns Hopkins Community Physicians, a statewide network of community-based practices; and 1 was operated by Medstar Physician Partners, a multi-site group practice. The study population comprised older persons insured by traditional fee-for-service Medicare (34%) or managed care plans (45%

Objective: Guided Care (GC) is a model of proactive, evidence-based comprehensive healthcare provided by physician-nurse teams for people with several chronic health conditions. Our objective was to evaluate the preliminary effects of GC on health service utilization and costs.

Study Design: Cluster-randomized controlled trial of GC involving 14 primary care teams (49 physicians) and 904 of their chronically ill patients age 65 years or older.

Methods: Using insurance claims, we compared the health services used by patients who received GC with the health services used by patients who received usual care during the first 8 months of the study.

Results: After adjustment for baseline characteristics, GC patients experienced, on average, 24% fewer hospital days (95% confidence interval [CI]: 49% fewer, 13% more), 37% fewer skilled nursing facility days (95% CI: 65% fewer, 5% more), 15% fewer emergency department visits (95% CI: 38% fewer, 18% more), and 29% fewer home health-care episodes (95% CI: 53% fewer, 8% more), as well as 9% more specialist visits (95% CI: 8% fewer, 29% more). Based on current Medicare payment rates and GC costs, these differences in utilization represent an annual net savings of \$75,000 (95% CI: -\$244,000, \$150,900) per nurse, or \$1364 per patient.

Conclusions: Initial introduction of GC into primary care practices may be associated with less use of expensive health services and a net savings in healthcare costs among older patients with several chronic health conditions. Final results from the remaining 2 years of this ongoing study will be published in 2011.

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Take-Away Points

Guided Care is a model of proactive, comprehensive healthcare by physician-nurse teams for people with several chronic health conditions. If its promising early effects persist and reach statistical significance during the remainder of an ongoing cluster-randomized controlled trial and are replicated during upcoming demonstration programs, Guided Care may:

- Attract public and private health insurance coverage in the future.
- Become adopted widely by US primary care practices.

the capture of most health services, we waited until late November 2007 to begin the process of querying, cleaning, and merging the 3 insurers' claims databases. We calculated participants' baseline HCC scores from claims for services used during the 12 months before their start dates.

Kaiser Permanente, 21% Tricare/USFHP, a federal health insurance program for retired military personnel and their dependents). Additional details about the study, which was approved by 3 relevant institutional review boards, have been published previously.⁵

We grouped these health services into 9 categories: hospital, skilled nursing facility, primary care physician, specialty physician, home healthcare, emergency department, durable medical equipment, tests (radiologic and laboratory), and nonmedication treatments (eg, physical therapy, outpatient procedures).

Recruitment of Participants

We screened the insurance claims of all patients of the 8 practices to identify those who were age 65 years or older and at high risk of using health services heavily during the following year, as estimated by the claims-based Hierarchical Condition Category (HCC) predictive model.⁶ "High risk" was equated with HCC scores of 1.2 or higher, which identifies persons in the highest quartile of risk. Eligible high-risk patients who provided informed consent completed in-home baseline interviews.

Analysis

As described in detail previously,⁵ we imputed values for missing baseline interview questions. We compared the GC and UC patients' use of health services during the intervals between their start dates and June 30, 2007. For each category of healthcare service, we constructed a marginal regression model to estimate the effect of GC (vs UC) on the mean units of service used per person per year (Table 1). For each category, we modeled the logarithm of the mean as a linear function of treatment group, age, race, sex, education, finances, HCC score, self-rated health, activities of daily living, instrumental activities of daily living, and practice site, plus an offset term for exposure period. Regression parameters were estimated using generalized estimating equations with a working independence covariance structure. The estimated variance-covariance matrix of all the regression estimators was obtained using the sandwich variance technique. The adjusted treatment effect for each outcome was interpreted as the ratio of the mean units of service used per GC recipient (vs UC recipient) over a common exposure period.

Randomization

Within the 8 practices, we identified 14 "pods," each of which consisted of 2 to 5 primary care physicians and their consenting high-risk patients. The study's statistician, blinded to the identities of the pods, randomly allocated each pod (physicians and their patients) to either GC (7 pods) or UC (7 pods).

Treatment Groups

Registered nurses who had completed a course in Guided Care Nursing joined their assigned pods in May 2006. During the following 6 to 8 months, each GCN established a caseload of 50 to 60 GC patients. The date on which each patient's care guide was developed was his/her start date for receiving GC.

Patients in the UC group continued to receive the same care they had received before enrolling in the study. We randomly assigned their start dates for receiving UC to reflect the GC patients' distribution of start dates.

Measures

Information about baseline characteristics was obtained from the prerandomization in-home interviews. Data about health service utilization were obtained from paid insurance claims for services used during the period from 1 year before the person's start date through June 30, 2007. To maximize

To facilitate computation of the difference in costs associated with GC, we first quantified the average units of service used annually by the recipients of UC and multiplied these units by 55 (the average number of patients in a GCN's caseload). Then we computed the analogous average units of service used by 55 recipients of GC by multiplying the UC units of service by the treatment effects estimated by the marginal regression models. Finally, we calculated the difference between the 2 groups' aggregate healthcare costs by multiplying the differences between the groups' annualized use of services by Medicare's average payment per unit of service.⁷ Excluded from these estimates are the costs of durable medical equipment, emergency department visits, tests, and treatments, which are extremely heterogeneous and for which average Medicare payment rates are not available.

Table 1. Crude and Adjusted Use of Services

Health Service	Mean Annual per Capita Use		GC to UC Ratio of Use of Services (95% CI)	
	GC (n = 433)	UC ^a (n = 402)	Crude Ratio	Adjusted ^b Ratio
Hospital admissions	0.75	0.96	0.79 (0.59, 1.06)	0.83 (0.64, 1.08)
Hospital days	4.14	5.77	0.72 (0.47, 1.12)	0.76 (0.51, 1.13)
Skilled nursing facility admissions	0.18	0.28	0.65 (0.38, 1.10)	0.76 (0.47, 1.24)
Skilled nursing facility days	2.67	4.90	0.55 (0.29, 1.02)	0.63 (0.35, 1.15)
Emergency department visits	0.36	0.43	0.85 (0.60, 1.20)	0.85 (0.62, 1.18)
Primary care physician visits	9.85	10.13	0.98 (0.85, 1.13)	1.00 (0.88, 1.14)
Specialist visits	8.36	7.89	1.07 (0.89, 1.30)	1.09 (0.92, 1.29)
Home healthcare episodes	0.96	1.27	0.76 (0.50, 1.16)	0.71 (0.47, 1.08)
Durable medical equipment items	4.05	3.14	1.30 (0.54, 3.15)	1.46 (0.74, 2.87)
Tests	36.32	33.14	1.10 (0.97, 1.25)	1.12 (0.99, 1.27)
Treatments	13.66	12.16	1.13 (0.96, 1.32)	1.10 (0.94, 1.28)

CI indicates confidence interval; GC, Guided Care; UC, usual care.

^aTwo observations with missing information on race were excluded from analysis.

^bAdjusted for participants' baseline age, race, sex, education, finances, Hierarchical Condition Category score, self-rated health, activities of daily living and instrumental activities of daily living status, and practice site.

Confidence intervals for the annualized use of services and cost differences were derived by using a 2-stage bootstrap procedure. In the first stage, individuals were resampled within practices. In the second stage, treatment effect estimates (on a log scale) were sampled from a multivariate normal distribution in which the mean was equal to the estimated treatment effect (on a log scale) and the variance-covariance matrix was equal to that obtained from the generalized estimating equation procedure. A total of 100,000 bootstrap samples were generated, and confidence intervals were formed using the percentile method.

RESULTS

As described in detail previously,⁵ 13,534 older patients were screened for eligibility, 1763 were offered the option of participating, and 904 were randomized by pod to receive either GC (n = 485) or UC (n = 419). We excluded from these analyses utilization by participants whose insurance claims were unavailable (1.4%) and those who rescinded consent (1.8%), died before their start dates (2.2%), or did not have start dates before June 30, 2007 (2.2%). We analyzed data on the remaining 835 participants (n = 433 in the GC group, n = 402 in the UC group).

At baseline, the demographic features, comorbidity, and HCC risk scores of the 2 groups were similar, but the GC participants were less likely to experience economic challenge (10.4% vs 15.5% lacked “enough money at the end of the month”; *P* = .05) or functional impairment (21.7% vs 28.3%

reported difficulty with 2+ instrumental activities of daily living; *P* = .03), and they were more likely to have better health (23.1% vs 17.3% reported “excellent” or “very good” health; *P* < .001) and to be insured by Tricare/USFHP (26.8% vs 16.5%, *P* = .001). Other details of these baseline characteristics have been reported previously.⁵ The mean period of observation—from participants' start dates through June 30, 2007—was longer for the GC group (8.3 months vs 7.8 months; *P* < .05); 83% of all participants were observed for at least 6 months.

Table 1 reports the mean annual per capita use of health services by GC and UC patients, as well as the crude and adjusted ratios of GC to UC service use. On average, GC patients tended to use fewer units of hospital care, skilled nursing facility care, emergency care, and home healthcare, but more specialist care, durable medical equipment, tests, and treatments. Of the GC and UC patients, respectively, a relatively small percentage used hospital (26% vs 30%), home health (20% vs 22%), and skilled nursing facility (8% vs 9%) services.

Based on these preliminary estimates, **Table 2** displays the financial savings and costs associated with providing GC to 55 high-risk patients for a year. Guided Care produced a net savings of \$75,000 (95% confidence interval: −\$244,000, \$150,900), two-thirds of which accrued from reductions in hospital utilization.

DISCUSSION

Guided Care is a model of comprehensive care designed for older adults with chronic conditions that addresses all of

■ **Table 2.** Annualized Costs per 55 Patients^a

Health Service	Annualized Use of Services		Difference in Use GC – UC (95% CI)	Average Cost per Unit, \$	Difference in Cost GC – UC (in \$1000s)	95% CI
	GC	UC				
Hospital days	241.05	317.14	-76.1 (-169.6, 47.0)	1519	-115.6	-257.7, 71.4
SNF days	170.47	269.56	-99.1 (-203.2, 43.6)	305	-30.2	-62.0, 13.3
Primary care physician visits	558.32	556.98	1.3 (-67.4, 80.0)	41	0.1	-2.8, 3.3
Specialist physician visits	472.54	433.83	38.7 (-34.6, 127.0)	41	1.6	-1.4, 5.2
Home healthcare episodes	49.63	69.76	-20.1 (-40.0, 5.7)	1331	-26.8	-52.2, 7.6
Total					-170.9	-339.9, 55.0
Total cost of providing GC^b					95.9	
Net costs of healthcare					-75.0	-244.0, 150.9

CI indicates confidence interval; GC, Guided Care; SNF, skilled nursing facility; UC, usual care.
^aThe average caseload of a GC nurse was 55 patients.
^bIncludes nurse's salary (\$71,500), fringe benefits (\$21,500), Internet and cell phone communications (\$1800), computer and cell phone equipment (\$550), and travel (\$550), but does not account for practice overhead or physicians' time (reported by physicians to be negligible).

the elements of the Chronic Care Model⁸ in the primary care setting. From the preliminary analyses reported here, GC appears to reduce multimorbid older patients' use of hospital care, skilled nursing facility rehabilitation, home healthcare, and emergency care. The avoided costs of these services appear more than sufficient to offset the costs of providing GC, as well as the cost of a slight increase in care from specialist physicians. We observed an average net savings of \$75,000 per GCN per year. The wide confidence intervals around these estimated averages indicate that these 8-month findings are not precise; these findings should be interpreted with appropriate caution. The remaining 24 months of this cRCT will provide additional utilization data, from which financial conclusions may be drawn with greater certainty.

There are several limitations to these preliminary findings. Two problems are related to the use of pods for randomization. First, the provision of GC to patients in 1 pod within a practice could have "contaminated" the care provided to patients in the UC pod within the practice. Although we saw no evidence that this occurred, it had the potential to reduce the measured differences between the GC and UC groups throughout the study. Second, our analyses assumed a common treatment effect across pairs of pods. Although some pods may have implemented GC more effectively than others, this study was not powered to evaluate such heterogeneity.

Third, the use of the Centers for Medicare & Medicaid Services national average payment amounts to calculate the costs of the health services used by the GC and UC groups (and the use of mid-Atlantic nurse salaries) limits the applicability of the reported net savings in geographic areas where the actual costs of these services are higher or lower. Local estimates could be derived by substituting local costs of services

and nurses. Fourth, the heterogeneity and lack of estimates for the average costs of emergency care, durable medical equipment, tests, and treatments prohibited including these items in our aggregate cost analyses.

Finally, the observed differences between the GC and UC groups' use of health services during the initial 8-month roll-out of GC did not meet the traditional criterion for statistical significance (ie, $P < .05$). We hypothesize that as the GCNs, physicians, patients, and family caregivers become increasingly familiar with GC, the reductions in the use and cost of health services observed during the first 8 months will become more pronounced. This hypothesis is supported by the trajectory of utilization observed in a recent RCT of a similar model of care; the difference between the 2 groups was not statistically significant until the second year of the study.⁹

We present these preliminary findings now to help inform the many decisions that will be made in the next few years regarding the transformation of chronic care in the United States.

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