A Pilot Test of the Effect of Guided Care on the Quality of Primary Care Experiences for Multimorbid Older Adults

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OBJECTIVE: Improving health care of multimorbid older adults is a critical public health challenge. The objective of this study is to evaluate the effect of a pilot intervention to enhance the quality of primary care experiences for chronically ill older persons (Guided Care).

DESIGN: Nonrandomized prospective clinical trial.

PATIENTS/PARTICIPANTS: Older, chronically ill, community-dwelling patients ($N=150$) of 4 General Internists in 1 urban community practice setting who were members of a capitated health plan and identified as being at high risk of heavy use of health services in the coming year by claims-based predictive modeling.

INTERVENTIONS: Guided Care, an enhancement to primary care that incorporates the operative principles of chronic care innovations, was delivered by a specially trained, practice-based registered nurse working closely with 2 primary care physicians. Each patient received a geriatric assessment, a comprehensive care plan, evidence-based primary care with proactive follow-up of chronic conditions, coordination of the efforts of health professionals across all health care settings, and facilitated access to community resources.

MEASUREMENTS AND MAIN RESULTS: Quality of primary care experiences (physician–patient communication, interpersonal treatment, knowledge of patient, integration of care, and trust in physician) was assessed using the Primary Care Assessment Survey (PCAS) at baseline and 6 months later. At baseline, the patients assigned to receive Guided Care were similar to those assigned to receive usual care in their demographics and disability levels, but they had higher risk scores and were less likely to be married. Thirty-one of the 75 subjects assigned to the Guided Care group received the intervention. At 6 months, intention-to-treat analyses adjusting for age, gender, and risk score suggest that Guided Care may improve the quality of physician–patient communication. In per-protocol analyses, receipt

of Guided Care was associated with more favorable change than usual care from baseline to follow-up in all 5 PCAS domains, but only physician–patient communication showed a statistically significant improvement.

CONCLUSIONS: In this pilot study, Guided Care appeared to improve the quality of primary care experiences for high-risk, chronically ill older adults. A larger cluster-randomized controlled trial of Guided Care is underway.

KEY WORDS: aged; multimorbidity; chronic disease; nursing; quality of care.

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INTRODUCTION

For older persons with multimorbidity and associated complex care needs, the existing acute care-oriented health care system is often lacking in quality, efficiency, and effectiveness.^{1–3} To date, successful innovations in chronic care focus on a single condition (e.g., heart failure disease management), a single site (e.g., outpatient geriatric evaluation and management), a single provider of care (e.g., caregiver support), or a single process (e.g., self-management).^{4–20} However, each of these innovations addresses only a subset of the challenges faced by older chronically ill people and rarely have more than 2 of these innovations been combined in practice.^{21,22}

To improve quality of life for older adults with multimorbidity and complex care needs and to promote the efficient use of resources, we designed Guided Care (GC)—an enhancement to primary care that addresses all components of the Chronic Care Model, including access to community resources and policies, self management support, delivery system redesign, clinical information systems, decision support, a prepared and proactive practice team, and an informed and empowered patient and family.^{23,24} In GC, a registered nurse who has completed a supplemental curriculum works in a practice with several primary care physicians (PCPs) to provide cost-effective chronic care to 50–60 multimorbid patients. Patients are eligible to receive GC if the hierarchical condition category

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predictive model, using claims-based diagnoses from the previous year, assigns them to the upper quartile of risk for using health services heavily during the coming year.²⁵ Using a web-accessible electronic health record (EHR), the Guided Care nurse (GCN) collaborates with the patient's PCP in conducting 8 clinical processes: assessing the patient and primary caregiver at home using standardized instruments [including inventories for impairment with instrumental activities of daily living (IADL) and activities of daily living (ADL); the Nutrition Screening Initiative checklist;²⁶ the Mini-Mental State Exam;²⁷ the Get Up & Go test;²⁸ the Geriatric Depression Scale;²⁹ the CAGE alcoholism scale;³⁰ screening questions for hearing impairment, falls, and urinary incontinence; and questions identifying the patient's highest priorities for optimizing health and quality of life], creating an evidence-based care plan, promoting patient self-management, monitoring the patient's conditions at least monthly, coaching the patient to practice healthy behaviors using motivational interviewing,³¹ coordinating the patient's transitions between sites and providers of care, educating and supporting caregivers, and facilitating access to community resources to meet the patient's and caregiver's needs. A more detailed description of GC has been published previously.³²

We conducted a study of a pilot version of GC at an urban community primary care practice among high-risk members of a capitated health plan aged 65 and older. The aim of this pilot study was to examine potential effects of GC on the quality of primary care experiences as supporting evidence for conducting a larger randomized controlled trial (RCT) of the model.

METHODS

Overview

From October 2003 to September 2004, we implemented a pilot version of GC that included 6 of its 8 core processes (assessment, planning, monitoring, coaching, coordinating transitions, and accessing community resources); excluded because of budgetary constraints were the chronic disease self-management program and formal education and support program for caregivers. A registered nurse, supported by the health plan, was educated to provide GC and was embedded into the practices of 2 General Internists at a community primary care practice in urban Baltimore. A customized EHR was developed for the GCN. High-risk, chronically ill older patients of 2 physicians (mean age 54, both female) received GC from the practice-embedded GCN, whereas similarly high-risk older patients of 2 other Internists (mean age 52, 1 male and 1 female) in the practice received usual care. Assignment of the physician pairs to GC or usual care was made by a coin toss. Two mailed surveys completed by patients were used to evaluate quality of primary care experiences prior to the intervention and after 6 months of the intervention. The Bloomberg School of Public Health Institutional Review Board approved the study.

Study Sample

Patients of the 4 Internists who were enrolled for 12 consecutive months in a health plan for military retirees were identified ($n=826$). Patients living outside a 25-mile radius of the practice were excluded. In this pilot version of GC, the Johns Hopkins Adjusted Clinical Groups Predictive Model

(acgPM)³³ was applied to the previous year's health insurance claims. Eighteen percent of the patients with the highest probability of using health services intensively during the following year were classified as high-risk ($n=75$ for the intervention group, $n=75$ for the control group). As expected, the acgPM identified a sample of patients with multimorbidity, functional disability and high costs of care.³⁴

Curriculum and Integration into Practice

The GCN completed an intensive 9-week curriculum covering chronic conditions (depression, falls, heart failure, diabetes, osteoarthritis, chronic obstructive pulmonary disease, angina, dementia, osteoporosis, and constipation), patient preferences, case management, geriatric assessment, transitional care, integration into practice, information technology, patient education, ethnogeriatrics, community resources, communication with physicians, and insurer benefits. Subsequently, the GCN underwent a 3-month integration process into the practice by working with the 2 physicians. After integration into the practice, the GCN built his/her caseload of patients by contacting the high-risk patients of the 2 Internists in the intervention group by phone to set up a time to conduct the initial home-based assessment.

The Pilot Intervention Processes of Guided Care

Using the standardized instruments listed above, the GCN performed an initial home-based assessment. Using the EHR to merge these individual data with evidence-based "best practice" recommendations, the GCN and the PCP negotiated a "Care Guide" that described medical and behavioral plans for managing and monitoring each patient. The GCN then discussed the Care Guide with the patient and caregiver, modified it for consistency with their priorities and intentions for health care, and regularly updated it. With prompts from the EHR, the GCN monitored each patient at least monthly by telephone to detect and address emerging problems. When problems arose, the GCN discussed them with the PCP and took appropriate action commensurate with her role. The GCN reinforced adherence to the patient's personal health plan and Care Guide during monthly monitoring calls. On weekdays, the GCN was directly accessible by telephone to the patient and caregiver for questions and concerns. The GCN had a key role in coordinating the patient's health care across the continuum of care, including following the patient across and coordinating transitions between sites of care, planning follow-up, and keeping the PCP informed of the patient's current status at all times. The GCN facilitated access to community resources for the patient and caregiver.

Measurements

Before mailing the baseline survey to the 150 high-risk enrollees, the health insurer mailed a letter to them explaining the purpose and voluntary nature of the study. A contracted survey research firm not privy to the study hypotheses then mailed the questionnaire with a cover letter, a stamped return envelope, and a 1-dollar bill as a token of appreciation. The questionnaire assessed the quality of primary care experiences at baseline with the Primary Care Assessment Survey (PCAS), a validated survey instrument of quality of care.³⁵ The PCAS

domains included physician–patient communication, interpersonal treatment, knowledge of patient, integration of care, and trust in physician. The survey also assessed sociodemographic characteristics, general health, bed disability days, restricted activity days, ADL limitations (bathing, dressing eating, transferring, and toileting), and IADL limitations (the ability to walk across a room, use the telephone, perform housework, take medications, get to places beyond walking distance, prepare meals, shop, and manage money). The PCAS was repeated by mail after 6 months of the GC intervention. At baseline, the adjusted clinical group (ACG) software was used to estimate chronic disease prevalence by collapsing diagnostic codes within the insurance claims into 9 broad disease categories (ischemic heart disease, heart failure, hypertension, diabetes, osteoarthritis, chronic obstructive pulmonary disease, depression, dementia, and Parkinson's disease).

Analysis

Baseline comparisons between the GC and control patients were conducted using *t* tests for continuous data and chi-square tests for categorical data. For this analysis, patients were required to remain enrolled in their original health plan for at least 6 months following the beginning of the intervention. For each PCAS domain scale, we estimated the effect attributable to the intervention by calculating the outcome improvement in the intervention group and subtracting any observed outcome change in the control group using multivariate longitudinal regression models fit with generalized estimating equations (GEE) to account for within-subject association. We chose this approach for quantifying the intervention effect because of its advantages over a difference of differences model or a baseline-outcome adjusted model in terms of efficiency, adjustment scale, and variance description.^{36,37} Our models included terms for age at baseline, gender, and acgPM score and were formulated as:

$$PCAS_{ij} = \beta_0 + \beta_1 V6 + \beta_2 GC + \beta_3 V6 * GC + \beta_4 Age_{i1} + \beta_5 Sex_i + \beta_6 ACG_{i1} + \varepsilon_{ij},$$

where $PCAS_{ij}$ is the PCAS score for person $i=1, N$ at visit $j=1 \dots 2$, with systematic time effects $V6 = 6$ -month visit indicator, treatment effects $GC =$ Guided Care group indicator, random error $\varepsilon_{ij} \sim N(0, \sigma)$, and intrasubject correlation $\text{Corr}(\varepsilon_{i1}, \varepsilon_{i2}) = \rho$. Thus, β_1 parameterizes the 6-month effect of usual care on quality, and β_3 directly parameterizes the difference in 6-month effects between usual care and GC groups. Positive values for β_3 indicate a better change in quality for the GC group, and negative values indicate a better change in quality for usual care. We used robust standard error estimates for the parameters in these models. Given that this is a pilot study, we did not pursue formal statistical techniques for missing data modeling but simply present the intention-to-treat and per-protocol analyses. Physician effects were examined but the design of the study precluded inclusion of these effects in the models because of restrictions on the degrees of freedom available. The intervention effect was more conservative without adjusting for physician effects, and thus, we report these results given the pilot nature of the study. The main results are based on the intention-to-treat analysis comparing outcomes for all patients assigned to receive GC to the control group. The per-protocol analysis excludes from the analysis patients who were

eligible for, but did not receive, GC. This study was not powered to detect differences in the quality of primary care experiences but was a pragmatic pilot study. All analyses were performed using Stata Statistical Software Release 9.2 (College Station, TX, 2006).

RESULTS

Patient flow in the study is depicted in Figure 1. Reasons for the GCN not being able to provide GC to 32 patients included (1) being an active member of a case management or disease management program, (2) changing PCP, (3) refusals, (4) changing health plans, (5) enrolling after initial enrollment window of September of 2003 to March of 2004, (6) moving away, and (7) death.

Table 1 depicts baseline characteristics of the study groups. Patients assigned to GC ($n=63$) were less likely to be married than controls ($n=57$). Patients assigned to GC had significantly higher mean ACG scores than controls, indicating that they were predicted to have higher utilization. In this pilot study, GC recipients ($n=31$) were more likely to report fair or poor health and more bed disability days than controls ($n=57$). GC recipients also had a significantly higher mean number of chronic diseases and higher mean ACG score than controls. Among patients assigned to GC, those who actually received GC ($n=31$) were not significantly different from those who were not provided GC ($n=32$) in terms of age, gender, IADL disability, acgPM score, or baseline PCAS scores, but they were more likely to report fair or poor health and had more chronic diseases.

For interpretation, results are reported for the average person in the study (75-year-old woman with an ACG risk score of 0.2). In the intention-to-treat analyses, scores for the GC group on the PCAS scales improved (physician–patient communication and comprehensive knowledge of patient), stayed the same (interpersonal treatment and integration of care), or deteriorated (trust in physician) (Table 2). Scores for the control group on the PCAS scales deteriorated (physician–patient communication and trust in physician) or stayed the same (interpersonal treatment, integration of care, and comprehensive knowledge of patient). Adjusted differences from the GEE regression models between GC and control groups

Figure 1. Flow diagram of participants' response rates to surveys percentages are based on all patients identified as high-risk in control and Guided Care groups (out of 75).

Table 1. Baseline Characteristics of GC and Control Groups

	Column 1	Column 2	Column 3	Column 4	Comparison: <i>p</i> value ^a		
	Controls N=57	Intervention: GC Assigned N=63	Intervention: GC Received N=31	Intervention: GC Not received N=32	Col. 1 vs 2	Col. 1 vs 3	Col. 3 vs 4
					Controls vs GC Assigned	Controls vs GC Received	GC Received vs GC Not Received
Age (mean±SD)	75.3±6.3	75.6±5.9	75.4±5.0	75.7±6.8	0.84	0.97	0.83
% Female	52.6%	63.5%	64.5%	62.5%	0.23	0.28	0.87
% White	57.9%	55.6%	58.1%	53.1%	0.80	0.99	0.69
% With high school education	89.5%	90.5%	90.3%	90.6%	0.86	0.90	0.97
% With income <\$20,000 per year	8.8%	19.1%	16.1%	21.9%	0.11	0.30	0.56
% Living alone	21.1%	20.6%	12.9%	28.1%	0.96	0.34	0.14
% Married	73.7%	50.8%	58.1%	43.8%	0.01	0.13	0.26
# Chronic diseases (mean±SD)	2.6±1.3	3.1±1.5	3.5±1.2	2.7±1.6	0.09	0.004	0.04
% Fair or poor health	35.1%	50.0% ^b	64.5%	35.5% ^c	0.10	0.008	0.02
% With any ADL limitations	39.3% ^d	37.1% ^b	41.9%	32.3% ^c	0.81	0.81	0.43
% With any IADL limitations	55.4% ^d	66.1% ^b	67.7%	64.5% ^c	0.23	0.26	0.78
BDD, past 6 mo (mean±SD)	5.1±16.2 ^e	13.3±33.0 ^f	16.6±31.4 ^g	9.8±34.7 ^h	0.10	.029	0.44
RAD, past 6 mo (mean±SD)	16.9±40.4 ⁱ	24.5±47.3 ^j	31.5±50.0 ^h	18.1±44.6 ^k	0.36	0.16	0.29
ACG risk score ^l (mean±SD)	0.20±0.13	0.35±0.21	0.37±0.22	0.32±0.20	0.0001	0.0001	0.40
PCAS scores, unadjusted ^m							
Communication (mean±SD)	76.0±18.7	76.3±18.2	77.1±18.7	75.6±17.9	0.93	0.80	0.74
Interpersonal (mean±SD)	78.5±16.7	81.0±15.7	81.4±14.5	80.6±17.0	0.39	0.41	0.84
Integration (mean±SD)	70.8±16.9 ^d	73.3±19.8 ^b	75.1±19.8	71.4±19.9 ^c	0.47	0.29	0.46
Comprehensive knowledge (mean±SD)	68.6±17.6	71.6±18.6 ^b	71.2±17.2	72.0±20.2 ^c	0.38	0.52	0.86
Trust (mean±SD)	78.6±11.7	78.6±13.4	80.4±12.3	76.8±14.4	0.98	0.51	0.29

GC = Guided Care, ADLs = activities of daily living, IADLs = instrumental activities of daily living, RAD = restricted activity days, BDD = bed disability days, ACG = adjusted clinical groups, PCAS = primary care assessment survey

^a*p* values were derived from *t* tests for mean values and from Chi-square tests for percentages

^b*n*=62

^c*n*=31

^d*n*=56

^e*n*=54

^f*n*=57

^g*n*=29

^h*n*=28

ⁱ*n*=53

^j*n*=58

^k*n*=30

^lRanges from .092 to .88

^mHigher scores indicate higher levels of quality of care

from baseline to follow-up for each of the 5 scales are displayed in Figure 2. The GC group experienced a trend toward improvement in the quality of patient-physician communication and comprehensive knowledge of patient as compared to the control group; there were no differences for integration of care, interpersonal treatment, and trust in physician.

Per-protocol analyses were performed after excluding the 32 GC-eligible high-risk patients who did not actually receive the intervention (thus comparing 57 control patients to 31 intervention patients). In general, the direction of relationships remained the same, but with greater magnitude (Table 3). In GEE regression models between GC and control group from

baseline to follow-up, the GC group experienced significant improvement in the quality of patient-physician communication as compared to the control group, borderline significant improvement in physician's comprehensive knowledge of patient, and trends toward improvement of quality of integration of care, interpersonal treatment, and trust in physician.

CONCLUSIONS

GC is a novel care model to enhance primary care for older, multimorbid adults that incorporates all major elements of

Table 2. Adjusted Mean Baseline and 6-Month Follow-up PCAS Scores (95% Confidence Intervals), Intention-to-Treat Analysis

PCAS Scale*	Guided Care (n=63)		Controls (n=57)	
	Baseline	Follow-up	Baseline	Follow-up
Communication	74.6 (69.5,79.6)	77.0 (71.4,82.6)	74.1 (69.2,79.0)	71.2 (66.3,76.1)
Comprehensive knowledge	70.8 (65.3,76.3)	72.9 (67.9,77.8)	68.3 (62.7,73.8)	68.4 (63.6,73.3)
Integration	71.4 (65.9,76.9)	72.6 (67.3,77.9)	69.1 (63.6,74.6)†	70.1 (64.7,75.5)
Interpersonal	80.2 (75.7,84.7)	79.3 (74.7,83.9)	77.5 (73.0,82.0)	78.2 (74.1,82.4)
Trust	78.1 (74.4,81.9)	75.1 (70.4,79.9)	78.4 (74.8,82.0)	74.6 (71.6,77.7)

Model adjusted for baseline age, gender, and baseline ACG score. Results reported for the average person in the study (75-year-old woman with an ACG risk score of 0.2)

PCAS = Primary Care Assessment Survey, ACG = adjusted clinical groups

*Higher scores indicate better quality of primary care experiences

†n=56

chronic illness management. In this pilot study, our results suggest that patients who received a pilot version of GC may have experienced improvements in specific aspects of the quality of their primary care experiences. The results of this pilot study must be interpreted with caution, but they may inform the important topics of designing interventions for the vulnerable population of older adults with complex chronic illness and evaluating the effectiveness of models of care for this population.

The pilot version of GC addressed salient needs of older patients with complex chronic illness including redesign of the delivery system to enhance primary care using a specially educated nurse working in conjunction with PCPs across multiple health conditions and needs; it incorporated improved decision support and clinical information systems and

better access to community resources. Importantly, the full model of GC currently being tested in an on-going RCT also includes a chronic disease self-management program and a formal program for education and support of caregivers.

There are several caveats to this work. First, this was a pilot study, designed to test the feasibility of implementing GC. It was not designed or powered to establish whether GC improved quality of primary care experiences definitively. Second, although our data suggest that GC improves the quality of primary care experiences, we assessed quality of primary care through patient self-report. This method is justified given the importance of patient-centered care.^{38,39} Disease-specific quality of primary care is also potentially less relevant to this older population with substantial multimorbidity, given the lack of evidence on what constitutes high-quality disease-

Figure 2. Differences between Guided Care (GC) and control groups' 6-month change in PCAS scores (95% confidence interval) from baseline to follow-up after adjusting for baseline age, gender, and baseline adjusted clinical groups score; intention-to-treat (ITT) analysis. Higher values reflect greater increases in GC scores versus control scores. PCAS = Primary Care Assessment Survey

Table 3. Adjusted Mean Baseline and 6-Month Follow-up PCAS Scores (95% Confidence Intervals), Per-Protocol Analysis

PCAS Scale*	Guided Care (n=31)		Controls (n=57)	
	Baseline	Follow-up	Baseline	Follow-up
Communication	75.5 (68.8,82.1)	82.1 (76.3,88.0)	74.1 (70.0,78.2)	71.1 (66.7,75.4)
Comprehensive knowledge	70.2 (63.7,76.7)	75.6 (69.6,81.6)	69.4 (64.6,74.2)	68.8 (64.7,72.9)
Integration	73.4 (66.4,80.5)	76.1 (69.0,83.3)	69.3 (64.6,74.1)†	69.7 (65.1,74.2)
Interpersonal	80.5 (74.7,86.2)	81.3 (75.3,87.3)	78.4 (74.6,82.2)	77.9 (74.3,81.4)
Trust	80.2 (75.5,84.9)	77.7 (72.3,83.2)	77.7 (74.5,80.9)	73.8 (70.6,77.0)

Model adjusted for baseline age, gender, and baseline ACG score. Results reported for the average person in the study (75-year-old woman with an ACG risk score of 0.2)

PCAS = Primary Care Assessment Survey, ACG = adjusted clinical groups

*Higher scores indicate better quality of primary care experiences

†n=56

specific process measures for older people with multimorbidity.^{40,41} A larger RCT of the full model of GC, powered on the outcome of quality of life, will evaluate effects of GC on quality of primary care.

Third, the costs of GC in the pilot study included the nurse's salary and benefits, training, a laptop computer, information technology, office space, and travel to patients' homes. A detailed assessment of the cost of GC is now being conducted in the ongoing RCT. Fourth, based on risk of health care utilization, the intervention group appeared to be sicker at baseline. Fifth, all participants were members of a managed care plan seen by 2 Internists at a community practice and are not representative of all older adults. Sixth, treatment assignment was dictated by physician pair. Unequal treatment by physician pairs cannot be excluded as a potential source of bias, although this would not be expected to change differentially over time. Finally, there was lower than expected enrollment of intervention patients into the caseload of the GCN because of a variety of factors described above. However, data suggest these patients were not different from enrolled patients except for having fewer chronic diseases and better self-rated health.

Several lessons were learned from this pilot study that have informed the RCT of GC and may be useful to others designing interventions for older adults with complex chronic illness.³² First, integrating the GCN into the work flow of the office practice required several months of orientation and problem-solving. The support of the physicians, who were initially skeptical about GC, was essential in developing effective teamwork in the practice and individualizing care. Introductory letters from physicians increased their patients' interest in participating. In the larger ongoing trial of GC, 90% of patients randomized to receive GC are actually receiving it. In informal debriefings at the end of the pilot year, the physicians expressed enthusiasm for GC and a strong desire to work with a GCN in the future and observed that the GCN had improved the quality of their patients' chronic care, especially communication and coordination among providers. They estimated that the time they devoted to communicating with the GCN had been offset equally by reductions in the time they devoted to unreimbursed tasks of care and care coordination. Anecdotal reports indicated that the patients and families were happy to have received GC.

Second, based on our experience in the pilot and the early phases of the RCT, the curriculum that prepares registered

nurses to practice GC should emphasize topics that are specific to GC and review topics related to traditional nursing in less detail. The curriculum has been reduced to 3 weeks, with the specific intent of meeting the key educational objectives and improving the ultimate dissemination and scalability of GC. Although there is a shortage of hospital nurses in the U.S., the supply of nurses interested in community-based positions may be sufficient. "Integrated practice models across practice settings" are thought to be a key strategy for attracting and retaining qualified candidates for careers in nursing.⁴²

Finally, fidelity to multifaceted clinical models is challenging to maintain, especially during dissemination. In the ongoing RCT of GC, several processes promote fidelity and consistency among the various GCNs and practice sites: continuous GCN performance monitoring (via the EHR, insurance claims, and patient surveys), periodic interviews with GC physicians, monthly feedback of performance results to GCNs, and monthly group meetings of GCNs and supervisors.

In summary, this pilot test supports the feasibility and acceptability of recruiting, training, and deploying a GCN to implement 6 of the 8 major components of the GC model. A 2-year cluster-randomized trial of GC is now underway, funded by the John A. Hartford Foundation, the Agency for Healthcare Research and Quality, the National Institute on Aging, and the Jacob and Valeria Langeloth Foundation. Despite the limitations described above, these pilot data suggest that GC holds promise as an intervention that will improve the quality of primary care experiences for older people with complex care needs. GC is designed to be disseminated into widespread practice if the larger RCT proves successful at improving quality of life and the quality and efficiency of care.

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