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Health-Related Quality of Life and Patient Reports About Care Outcomes in a Multidisciplinary Hospital Intervention

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ABSTRACT

Background: *Patient perceptions of care and health-related quality of life (HRQOL) are important outcomes for hospitalized patients.* ***Purpose:*** *This study examined patient experiences with hospital care and HRQOL in individuals hospitalized at a west coast teaching hospital.* ***Methods:*** *We assessed patient experiences with care and HRQOL using interviews with 1,207 hospitalized, general medicine patients participating in a multidisciplinary provider team intervention at a large academic medical center. Patient outcome variables included the Picker dimensions of hospital care (Continuity and Transition, Coordination of Care, Emotional Support, Information and Education, Involvement of Family and Friends, Physical Comfort, Respect for Patient Preferences, Overall Impression), the Health Utilities Index Mark 3 (HUI–3), and the SF–12 physical (PCS–12) and mental health (MCS–12) summary scores.* ***Results:*** *Patients randomized to a multidisciplinary intervention reported higher emotional support (b = 3.32), t(903) = 2.01, p =.044, and physical comfort (b = 3.49), t(863) = 2.25, p = .025, from health care providers than did the control group, but these effects became nonsignificant after adjusting for multiple comparisons. The HUI–3, PCS–12, and MCS–12 summary scores improved significantly from baseline to the 30-day, ts(943, 919, 860) = 4.94, 2.20, and 5.31, ps < .0001, = .03, and < .0001, respectively, and the 4-month follow-ups, ts(871, 919, 943) = 7.25, 8.68, and 8.08, ps < .001, < .001, and < .0001, respectively, but change on these measures did not differ between intervention and control patients. Baseline health was significantly associated with patient evaluations of hospital care, but patient evaluations did not predict future health.* ***Conclusions:*** *There were no differences in reports and ratings of hospital care or HRQOL between the control and the intervention groups. Hence, the behavioral changes in hospital staff in the intervention group had no effect on patient-reported outcomes. Mental health at baseline was predictive of patient evaluations of the hospitalization, but evaluations of care were not associated with subsequent HRQOL. Thus, it may be important to adjust patient evaluations of hospital care for case-mix differences in health.*

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INTRODUCTION

Capturing the experiences of hospitalized individuals is important, because the care received can affect survival and health-related quality of life (HRQOL). The importance of patient perceptions of hospital care is exemplified by the Centers for Medicare and Medicaid Services effort to promote the collection and reporting of patients' experiences with hospital care (see http://www.cms.hhs.gov/HospitalQualityInits/30_HospitalHCAHPS.asp). Similarly, the significance of HRQOL assessment is illustrated by the emergence of the Joint Commission on Accreditation of Healthcare Organizations standards for pain assessment and management (1).

This study examined both patient evaluations of hospital care and subsequent HRQOL in a sample of individuals hospitalized at a west coast teaching hospital who participated in the Multidisciplinary-Doctor-Nurse Practitioner (MDNP) Study. The MDNP study was designed to evaluate the effects of a multidisciplinary team of attending physicians and advanced practice nurses on management of general medicine patients in a large academic medical center. The core of the intervention was change in staff behavior—daily multidisciplinary rounds and

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the use of the advanced practice nurses for case management and facilitation of communication and collaboration among health care providers (2). As a result, we hypothesized that the intervention would result in more positive patient evaluations of hospital care and better HRQOL for intervention than usual care (control) patients.

Because HRQOL is positively associated with patient reports and ratings of health care cross-sectionally, comparisons of care provided by different health plans are sometimes case-mix adjusted for health status (3), but there is limited information about the associations between HRQOL and patient evaluations of care over time. One of the few published studies found that satisfaction with ambulatory care was predictive of subsequent mental health, and vice versa, but satisfaction with care and physical health were not associated with one another over time (4). A second objective of this study was to evaluate the associations between patient evaluations of care and HRQOL. We also hypothesized that there would be positive associations between patient evaluations of care and HRQOL over time.

METHOD

Design

The MDNP study setting was a tertiary academic medical hospital with 610 beds, affiliated with the UCLA Schools of Nursing, Medicine, and Public Health. The study population was hospitalized, acutely ill general medicine patients. All consenting, nonprivate general medical patients admitted to the study teams on their respective wards were eligible for the study unless: they had been transferred from elsewhere in the hospital; their physicians declined to have them participate; they were unable to speak, read, and write English or Spanish; they had sickle cell disease or a psychiatric diagnosis with active psychosis; or they had no means of postdischarge contact. Of 2,443 potentially eligible patients, 527 were screened but ineligible, and 197 were unavailable for screening. Five hundred twelve refused participation, leaving 1,207 study participants (581 in the intervention and 626 usual-care or control participants; see Figure 1).

The general medicine floor was divided into a control unit and an experimental unit. The nursing staff of each of the units included a unit manager, a clinical nurse specialist, and the same staffing ratio of patients to registered nurses and care partners (i.e., unlicensed assistive personnel). There was no crossover of nurses between the two units for the duration of the study. The control unit provided once-weekly multidisciplinary rounds. The control unit consisted of a clinical nurse specialist, discharge planner, social worker, home health nurse, utilization review nurse, nutritionist, and physical therapist. The experimental unit added a nurse practitioner plus daily multidisciplinary rounds, a hospital medical director, and hospitalist attending. In addition, the staff nurses were encouraged to attend rounds with the residents each day to better understand the plan of care.

After admission to experimental or control unit, respectively, and having met eligibility criteria, the patients were asked for consent to be in the study. If the patient was admitted to the experimental unit and refused to be in the study, they were still cared by the unit teams, including the nurse practitioners, but measurements and follow-up were not done.

The UCLA Institutional Review Board approved the study protocol (IRB 00-01-021-04).

Measures

Patient evaluations of hospital care were assessed 30 days postbaseline using the Picker survey instrument (5). The Picker survey comprises the following subscales: Continuity and Transition (four items), Coordination of Care (six items), Emotional Support (six items), Information and Education (five items), Involvement of Family and Friends (three items), Physical Comfort (five items), Respect for Patient Preferences (four items),

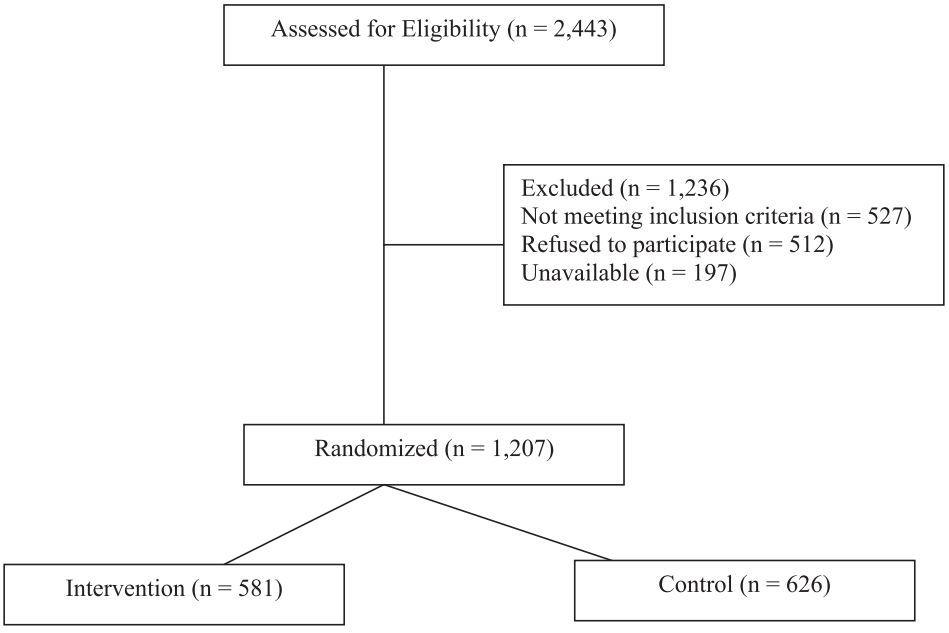

FIGURE 1 Flow diagram of patient recruitment for multidisciplinary hospital intervention.

and Overall Impressions of Care (eight items). Scale scores were created by transforming items to a 0–100 possible range and averaging items within a scale. We assessed HRQOL at baseline, 30 days postbaseline, and 4 months postbaseline using the SF–12 health survey (6) and Health Utilities Index Mark 3 (HUI–3) (7). We assessed demographic variables (age, gender, race/ethnicity) as part of the self-report survey. Baseline severity of illness was scored from 1 (*least severe*) to 4 (*most severe*) on the basis of the Medicare All Patient Refined Diagnostic-Related Group system, a clinical ranking of the expected level of severity based on the patient's clinical and demographic information. The prediction model is based on the annual National MedPar database of more than 60 million inpatients.

Analysis Plan

We estimated internal consistency reliability of the multi-item Picker scales using Cronbach's (8) alpha. Alpha ranges theoretically from 0 to 1, with estimates of .70 or above considered acceptable for group comparisons. We also estimated means and standard deviations for the Picker scales.

The significance of difference between groups in Picker scores 30 days posthospitalization was estimated using ordinary least squares regression, controlling for age (18–29, 30–49, 50–64, 65–74, 75–84, 85 and older), gender, race/ethnicity, severity of illness, and baseline SF–12 physical and mental health summary scores (PCS–12 and MCS–12). The difference between groups in the PCS–12, MCS–12, and HUI–3 scores 30 days and 4 months posthospitalization were estimated using ordinary least squares regression, controlling for age, gender, race/ethnicity, and severity of illness preadmission, and baseline HRQOL. Missing data were estimated using multiple imputation methods (SAS PROC MI), and regression analyses were weighted for attrition over time. We had 80% power (two-tailed test, $\alpha = .05$) to detect a small difference between the intervention and control groups (.20 effect size or difference in mean/standard deviation).

Next, we examined associations between patient evaluations of care and HRQOL using structural equation modeling (SEM) (9), which allows for the simultaneous assessment of multiple dependent variables and both direct and indirect effects of one variable on another. Variables can be treated as both independent variable and dependent variables. An important advantage of SEM is that it is possible to estimate latent variables rather than only use measured variables, thereby eliminating random error. In addition, SEM has the advantage of yielding indices of overall fit of hypothesized models to the data.

We predicted patient evaluations of care and HRQOL 30 days and 4 months after hospitalization, respectively. A latent variable of patient evaluations of care 30 days after hospitalization was defined using the eight multi-item Picker scales. This latent variable was predicted by the PCS–12, MCS–12, and HUI–3 at baseline. In turn, the PCS–12, MCS–12, and HUI–3 four months posthospitalization were predicted by the latent variable for patient evaluations of care and the HRQOL mea-

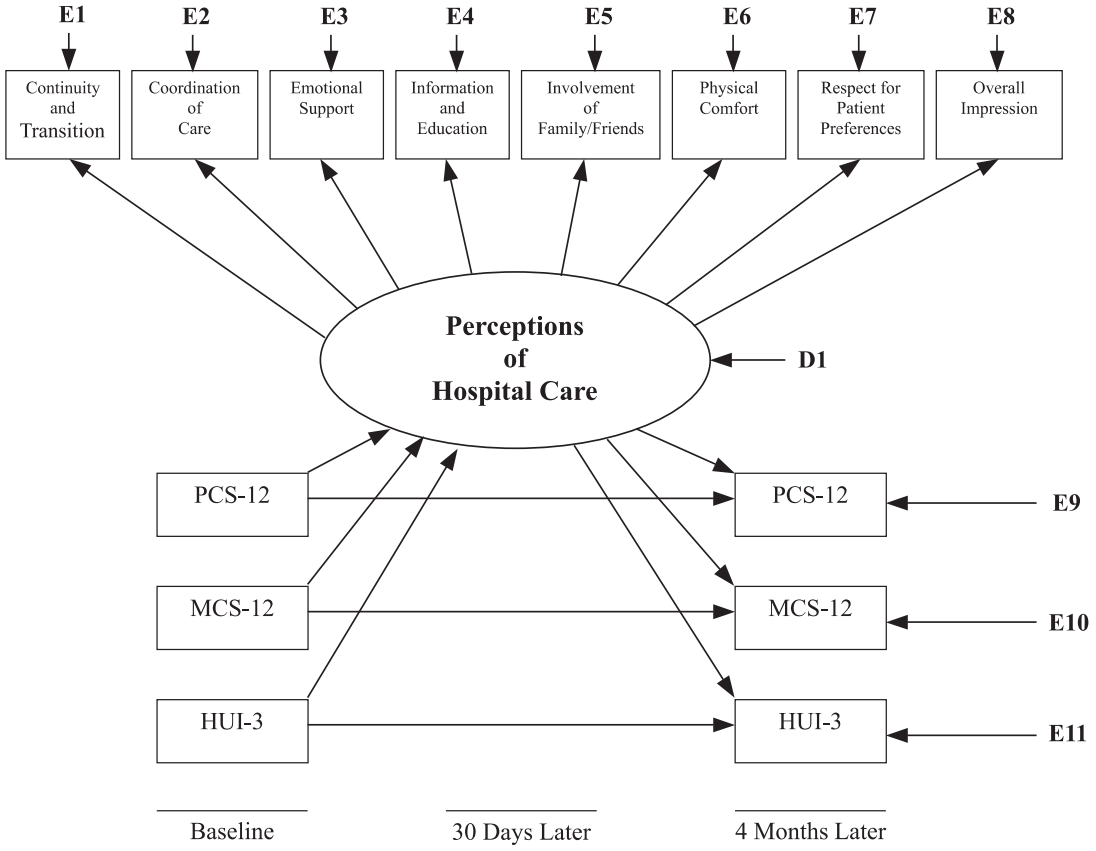

FIGURE 2 Structural equation model of health-related quality of life and perceptions of hospital care. (PCS-12, MCS-12, and HUI-3 at 30 days later not shown.)

sures during the prior waves. The structural equation model is shown in Figure 2.

SEM analyses were conducted using the EQS (Version 6.1) computer program. Missing data for the SEM were estimated (SAS PROC MI) for the 871 people (out of the 1,207 enrolled) who had at least some survey data at each of the three study time points. Maximum likelihood estimation with raw data as input was used for SEM. The results of several studies suggest that maximum likelihood is robust even in the face of marked departure of data from multivariate normality (10). We evaluated three measures of practical goodness of fit: (a) delta, (b) rho, and (c) the comparative fit index. These indices can be viewed as approximations of the percentage of variance in the data set that is explained by the proposed model. As a general rule, models with practical fit indices less than .90 should not be accepted (11). Because the likelihood of rejecting a model based on the chi-square test increases with sample size, the practical measures provide more appropriate indicators of goodness of fit, and we rely on them here. LaGrange multiplier modification indices were used to ensure that significant effects on patient evaluations of care and HRQOL at follow-up, and important correlated uniqueness terms were identified.

RESULTS

A total of 1,207 patients of 1,719 eligible patients (63% participation rate) were enrolled in the study: 581 patients in the experimental group and 626 patients in the control group. Three hundred patients failed to complete the study. Of those, 108 were lost to follow-up: Eighty-four withdrew, and 108 died during the course of the study. The overall attrition rate was 25%. There were no significant differences between study completers and noncompleters in terms of gender, age, Latino ethnicity, severity of illness, mortality risk, or source of payment. Participants randomized to the experimental and control group were similar in terms of gender, age, race, and ethnicity, but the intervention group had a higher proportion of men and White patients than the control group (see Table 1).

As shown in Table 2, internal consistency reliability estimates for the Picker scales ranged from a low of .56 (Respect for Patient Preferences) to a high of .90 (Overall Impression). The majority of the estimates exceeded the .70 cutoff for acceptable internal consistency reliability. As is typical of patient reports of care, mean scores tended to be skewed toward the positive end of the scale. Patients in the intervention group reported significantly higher emotional support ($b = 3.32$), $t(903) = 2.01$, $p = .044$, and physical comfort ($b = 3.49$), $t(863) = 2.25$, $p = .025$, during the hospitalization than those in the control group. No other reports of care differed significantly between the two groups. The two significant effects became nonsignificant after adjusting for multiple comparisons.

Means and standard deviations for the HRQOL measures at baseline, 30 days later, and 4 months later for the overall sample are provided in Table 3. The PCS–12 and MCS–12 improved significantly from baseline to the 30-day, $t(919) = 2.20$, $p = .03$, and $t(860) = 5.31$, $p < .0001$, and 4-month follow-ups, ts(919, 943) = 8.68 and 8.08, ps < .0001. The HUI–3 score improved significantly from baseline to 30 days later, $t(943) = 4.94$, $p < .0001$, and 4 months later, $t(871) = 7.25$, $p < .001$. The PCS–12, MCS–12, and HUI–3 scores at 30 days and 4 months postindex hospitalization did not differ significantly between the intervention and control patients, controlling for baseline HRQOL, age, gender, race/ethnicity, and preadmission severity of illness.

TABLE 1
Baseline Characteristics of Patients in Intervention and Control Groups

	Control Group[a]	*Intervention Group*[b]	*p for difference*
Male (%)	43	49	.04
Age group (%)			.28
18 to 29	12	9	
30 to 49	29	31	
50 to 64	24	27	
65 to 74	18	15	
75 to 84	12	12	
85 and over	5	6	
Race (%)			.04
White	66	70	
Black	17	17	
Asian	7	4	
Other	10	9	
Latino ethnicity (%)	19	20	.52
Severity (%)			.64
Category 1 (lowest)	12	12	
Category 2	51	50	
Category 3	33	32	
Category 4 (highest)	4	6	
Health Utilities Index–3 (*M*)	.37	.37	.96
SF–12 PCS	31	31	.81
SF–12 MCS	44	43	.16

Note. *p* values are from chi-square or *t* tests. PCS = SF–12 physical health; MCS = SF–12 mental health.
[a]$n = 626$. [b]$n = 581$.

TABLE 2
Descriptive Statistics for Picker Scales in the Overall Sample

Scale	*Items*	*M*	*SD*	α
Continuity and Transition	4	69.89	32.06	0.77
Coordination of Care	6	71.84	21.01	0.60
Emotional Support	6	68.03	25.59	0.76
Information and Education	5	72.79	22.41	0.57
Involvement of Family and Friends	3	78.95	31.45	0.78
Physical Comfort	5	73.60	22.30	0.72
Respect for Patient Preferences	4	85.76	18.45	0.56
Overall Impression	8	73.28	21.07	0.90

Note. $N = 973$.

TABLE 3
Means and Standard Deviations for Health-Related Quality of Life Measures at Baseline, 30 Days Postbaseline, and 4 Months Postbaseline

	Baseline		*30 Days Later*		*4 Months Later*	
Measure	*M*	*SD*	*M*	*SD*	*M*	*SD*
PCS–12	32	12	33	12	36	13
MCS–12	44	13	47	12	48	11
HUI–3[a]	42	35	50	33	54	33

Note. $n = 763$ with complete data. PCS–12 = SF–12 physical health; MCS–12 = SF–12 mental health; HUI–3 = Health Utilities Index Mark 3.
[a]HUI scores were multiplied by 100.

The final structural equation model was rejectable statistically because of large sample size, $\chi^2(99, N = 871) = 242.17$, $p < .00001$, but it fit the data well in terms of practical fit criteria (delta, rho, and comparative fit indices were .97 or above). The significant parameter estimates for this model are given in Table 4. The latent variable representing 30-day posthospitalization patient evaluations of care was predicted by MCS–12 and HUI–3 scores at the baseline of the study ($R^2 = .03$). In addition, there was a significant effect of baseline MCS–12 on the Respect for Patient Preferences scale beyond that represented in the association observed on the latent variable ($B = 0.07$). In contrast, the health care latent variable was not significantly associated with HRQOL (PCS–12, MCS–12, or HUI–3) at the 4-month assessment. The HRQOL measures at 30 days and 4 months posthospitalization were significantly related to prior HRQOL.

DISCUSSION

This study found that, compared with usual care, a multidisciplinary physician/nurse practitioner intervention led to hospitalized patients reporting better emotional support and physical comfort from their health care providers, but these differences were not significant after adjusting for multiple comparisons. No differences in HRQOL were found, and we had adequate power (80%) to detect a small difference between groups. Hence, the behavioral intervention did not lead to more positive experiences with care or better self-rated health, but a separate analysis estimated a net cost savings from the intervention (2), indicating that the intervention was cost-effective (the ratio of cost divided by outcome was smaller for the intervention group than for the control group).

The Picker overall impression score of 73 for this sample was very similar to a national sample of hospitalized patients (12). The PCS–12 mean of 32 at baseline of the study was about 2 *SD* below the U.S. general population mean of 50, indicating very poor physical health at the time of hospitalization, as would be expected. Four months later, the PCS–12 increased significantly, by about 0.40 SD, a clinically important difference. MCS–12 scores were 0.60 SD below the U.S. general population average of 50 at baseline and increased by 0.30 SD 4 months later. The HUI–3 score of 0.38 at baseline is extremely low. Adult survivors of brain tumor have been found to have an average HUI–3 score of 0.78, and the general Canadian population has an average score of 0.94 (13). HUI–3 scores improved considerably 4 months after baseline of the study to 0.52, but this was still below the average HUI–3 score of stroke patients (0.54) reported by Grootendorst et al. (14). The average HUI–3 score was 0.81 in a sample of 4,048 adults representative of the U.S. general population (15).

Baseline mental health (MCS–12) and the preference-based HUI–3 score were significantly associated with patient evaluations of hospital care 30 days later, but the magnitude of the associations was small, accounting for only 3% of the variance in the latent variable. Moreover, evaluations of hospital care were not predictive of future health. Similar to this study, Hall et al. (16) found that initial health status was linked to subsequent satisfac-

TABLE 4
Parameter Estimates (Standardized Betas) for the Structural Equation Model

	Dependent Variables						
	Health Care	*30-Day PCS–12*	*30-Day MCS–12*	*30-Day HUI–3*	*4-Months PCS–12*	*4-Months MCS–12*	*4-Months HUI–3*
Baseline PCS–12		0.40		0.10	0.22		
Baseline MCS–12	0.09		0.42			0.20	
Baseline HUI–3	0.10	0.14	0.13	0.48	0.20		
30-day PCS–12					0.38	0.09	
30-day MCS–12						0.42	0.07
30-day HUI–3						0.15	0.07
Health care							
R^2	.029	.25	.25	.30	.45	.40	.48

Note. Correlations at baseline were as follows: PCS–12 and MCS–12, $r = .19$; PCS–12 and HUI–3, $r = .60$; MCS–12 and HUI–3, $r = .52$. Correlations at 30-days posthospitalization were as follows: uniqueness of continuity and transition with involvement of family and friends, $r = .23$; HUI–3 and PCS–12, $r = .56$; HUI–3 and MCS, $r = .36$; health care and MCS–12, $r = .08$. Correlations at 4-month posthospitalization were as follows: HUI and PCS–12, $r = .47$; HUI and MCS–12, $r = .37$. Dark box indicates paths that were fixed to zero conceptually. PCS–12 = SF–12 physical health; MCS–12 = SF–12 mental health; HUI–3 = Health Utilities Index Mark 3.

tion with care, but initial satisfaction was unrelated to subsequent health. In addition, analyses of 952 patients in the Medical Outcomes Study revealed that baseline mental health was significantly associated with subsequent satisfaction with care (3). However, that study also found a significant effect linking baseline satisfaction with care to subsequent mental health.

The results of these studies provide evidence of significant but small relationships between patient perceptions of care and HRQOL. Patient reports and ratings of care appear to be colored to some extent by mental health. Hence, it is important to adjust for health status when comparing patient evaluations of medical care. Case-mix adjustment makes it possible to have fairer comparisons of evaluations of health plans, physician groups, and hospitals (3).

The MDNP study provides evidence that a multidisciplinary model of care can reduce costs while maintaining positive perceptions of care and preserving HRQOL among hospitalized patients (2). Additional studies are needed to evaluate variants of this behavioral change model of care in other settings to determine whether the cost savings can be replicated and to evaluate whether positive effects on patient-reported outcomes such as evaluations of care and HRQOL can be achieved. If these staff behavior changes can be implemented in other hospital settings, this could lead to reduced health care costs without negatively affecting health outcomes.

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