Pilot study to determine the impact of a multidisciplinary educational intervention in patients hospitalized with heart failure

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Background Patients with heart failure (HF) face challenges complying with multidrug regimens.

Objectives To examine the impact of a compliance enhancing intervention on medication compliance and morbidity in HF.

Design Patients were randomized to either usual care or an inhospital educational intervention delivered by a multidisciplinary team (Intervention).

Setting Acute medical and surgical units at a teaching hospital.

Patients One hundred thirty four patients with a clinical diagnosis of HF and a left ventricular ejection fraction of <40% requiring long-term medical treatment.

Main Outcome Measures A validated HF-specific instrument provided a measure of knowledge. We characterized patients as noncompliant if pharmacy refill data suggested they had taken ≤0.80 of their medication. We measured quality of life using the Minnesota Living with Heart Failure Questionnaire and the Short Form 36 and conducted a time to first event analysis of a composite end point including mortality, readmissions, and emergency department visits.

Results The Intervention group showed higher knowledge scores at discharge and 1 year (P = .05). The risk of noncompliance in Intervention patients varied from 0.78 (95% CI 0.33-1.89) for ACE-I (13% Intervention, 17% Control) to 1.02 (0.49-2.12) for diuretics (23% Intervention, 23% Control). Quality of life improved in both groups over time; the only difference between groups favored the Intervention (Minnesota Living with Heart Failure Questionnaire, P = .04). The composite end point occurred in 67% of control and 60% of Intervention patients (hazard ratio 0.85, 95% CI 0.55-1.30).

Conclusions An inhospital educational intervention improved knowledge and, possibly, quality of life and may be useful as part of a comprehensive compliance enhancing strategy in patients with HF. (Am Heart J 2005;150:982.e1-982.e9.)

Heart Failure (HF) is a chronic disease syndrome that affects millions of people in North America and is the leading cause of hospital admission among the elderly. Although randomized controlled trials have shown that patients with HF benefit from several drugs, the resulting complex regimens of multiple medications challenge patient compliance. Patient difficulties with adherence to regimens of multiple HF medications may contribute to hospital readmissions and deterioration in health-related quality of life (HRQoL). Measures to reduce noncompliance may therefore decrease morbidity and, possibly, mortality in patients with HF.

A variety of interventions to improve compliance in patients with HF have been developed and tested, and some of these studies have demonstrated positive outcomes. Many of these trials, however, did not describe their interventions in sufficient detail for them to be accurately reproduced, and most either did not measure compliance and HRQoL or used inadequate methods to do so. Given the likely importance of compliance in optimizing outcomes in patients with HF and the limitations of previous work, we designed and tested a multidisciplinary, inpatient educational intervention to improve compliance as measured by pharmacy refill data.
We designed our intervention using the framework of the Health Education Model that posits that the adoption of new or appropriate practices follows a series of hierarchical steps in which the patients must detect, attend to, and correctly interpret new health information and knowledge. Adopting suitable beliefs and attitudes then leads to behavior change. The model posits the following causal steps: patients will hear, understand and learn information about their disease and the importance of compliance and then behave accordingly.

We tested our educational intervention in a pilot randomized, controlled clinical trial with outcomes including compliance, HRQoL, and clinical events. In this article, we review our previously published results demonstrating the effect of the intervention on knowledge and describe its impact on compliance, HRQoL, and the composite end point of clinical events (including emergency department visits, readmissions to hospital, and mortality).

Methods

Participants

Patients admitted to the London Health Sciences Centre, Victoria Campus, were eligible if they had HF documented with a low left ventricular ejection fraction (LVEF ≤ 40%), had indications for long-term medical treatment of HF or low LVEF, and provided informed consent as approved by the university-based institutional ethics review board (09091E) (Table I). Patients were excluded if they were <18 years old, were receiving dialysis, had dementia or psychiatric illness, suffered from another illness that would result in a life expectancy of <6 months, had a planned discharge to long-term residential care, had a language barrier to teaching for themselves or their caregivers, resided outside Southwestern Ontario, a population base of 1.48 million (Canada 2001 census, Statistics Canada) or had extensive travel planned within the following year. Heart failure diagnosis was established through a documented history and physical exam, radiographic evidence of HF, and was confirmed clinically by the patient’s attending physician.

Design

Enrollment and follow-up. Patients entered the study between November 1998 and April 2000 and were followed up for 1 year after randomization or until death. We conducted outcomes assessments over the telephone in all patients unless they were also attending an outpatient clinic, in which case, we interviewed them at that time. The follow-up frequency was identical in both groups.

Randomization. A research nurse documented the patient’s reason for admission, obtained informed consent, and called an independent member of the research group who confirmed eligibility and provided the patient’s allocation to Intervention or Control. The process ensured concealment of randomization. Patients were stratified by whether HF was the primary reason for admission or a secondary diagnosis, and they were randomized in blocks of 4 to receive Intervention or Control.

Table I. Baseline characteristics of patients

<table>
<thead>
<tr>
<th></th>
<th>Control (%) (n = 66)</th>
<th>Intervention (%) (n = 68)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age (y) (mean [SD])</td>
<td>65 ± 12</td>
<td>67 ± 14</td>
</tr>
<tr>
<td>Men</td>
<td>45 (69)</td>
<td>51 (76)</td>
</tr>
<tr>
<td>Living alone</td>
<td>14 (22)</td>
<td>15 (22)</td>
</tr>
<tr>
<td>White</td>
<td>59 (91)</td>
<td>64 (96)</td>
</tr>
<tr>
<td>HF (primary reason for admission)</td>
<td>15 (23)</td>
<td>19 (28)</td>
</tr>
<tr>
<td>HF (secondary diagnosis)</td>
<td>51 (77)</td>
<td>49 (72)</td>
</tr>
<tr>
<td>Employed</td>
<td>20 (31)</td>
<td>16 (24)</td>
</tr>
<tr>
<td>Current smoker</td>
<td>14 (22)</td>
<td>7 (10)</td>
</tr>
<tr>
<td>Comorbidities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypertension</td>
<td>39 (60)</td>
<td>35 (52)</td>
</tr>
<tr>
<td>Diabetes</td>
<td>29 (45)</td>
<td>28 (42)</td>
</tr>
<tr>
<td>Ischemic HD</td>
<td>31 (48)</td>
<td>37 (55)</td>
</tr>
<tr>
<td>Atrial fibrillation (long-term)</td>
<td>15 (23)</td>
<td>16 (24)</td>
</tr>
<tr>
<td>Biochemistry and renal function</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potassium (mmol/L)</td>
<td>4.1 ± 0.4</td>
<td>4.0 ± 0.5</td>
</tr>
<tr>
<td>Creatinine (µmol/L)</td>
<td>116 ± 46</td>
<td>108 ± 35</td>
</tr>
<tr>
<td>Cardiac function — LVEF*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0%-20%</td>
<td>36 (53)</td>
<td>31 (46)</td>
</tr>
<tr>
<td>21%-30%</td>
<td>13 (19)</td>
<td>23 (34)</td>
</tr>
<tr>
<td>31%-40%</td>
<td>11 (16)</td>
<td>8 (12)</td>
</tr>
<tr>
<td>&gt;40%</td>
<td>3 (0.08)</td>
<td>1 (1)</td>
</tr>
</tbody>
</table>

Results are shown as mean ± SD for continuous variables and as n (%) for discrete variables. HD, Heart disease.

*LVEF was not available for 3 control patients and for 5 intervention patients.

Blinding. The educator, nurse, and pharmacist were aware of allocation, as were the hospital clinicians who delivered patient care. The community pharmacists and general practitioners were blinded to the allocation. The patients were aware that they would receive education but were unaware of whether it was usual care or the enhanced intervention. The following research staff were blinded to patient allocation: the pharmacists who collected postdischarge medication refill data; the data coordinator who confirmed the occurrence of an outcome event through the telephone and through written verification with the institution in question and with the patient; and the outcomes assessors who collected data on quality of life every 3 months. Data analysts were not blinded.

Intervention

Patients in the Intervention arm received the 2 HF information booklets and watched a video entitled Congestive Heart Failure and received education delivered through a multidisciplinary team consisting of a nurse or educator and a hospital pharmacist. Patients in the Control arm received the booklets and video. The Intervention focused on specifically optimizing compliant medication use behavior and included general directions on diet and lifestyle recommendations.

A certified pharmacist accredited in patient counseling trained the research team to deliver the intervention. A script outlining the necessary components of the education ensured consistency. The teaching used personalized feedback to incorporate the patient’s own life circumstances,
lifestyle knowledge, and medical therapy and was planned to be reinforced by contact over 2 days. Four specific multifaceted components were oral, written, visual props and media videos. All of the written material provided was appropriate for understanding at a grade 8 school level (Right Writer version 3.1, RIGHT SOFT, 1988, Sarasota, Fla). The nurse, educator, and pharmacist delivered the intervention within 48 to 96 hours while the patient was in hospital for their index admission. This was planned for the last few days before discharge but, where necessary, was occasionally completed shortly after discharge. In total, this intervention involved 2.5 hours of educator interaction with the patient. The research team had no input into information presented as part of usual clinical care to patients by their physicians, nurses, pharmacists, or other health care professionals and did not provide any advice to the clinical care team about drug therapy in either group. No further education was given by the research team during long-term follow-up. Special details on the educational intervention have been reported previously.7

Outcomes

Knowledge acquisition. We developed and established the properties of an instrument called the knowledge acquisition questionnaire (KAQ) to measure patient change in knowledge about HF.7 We have shown that the KAQ had acceptable internal consistency and responsiveness. The KAQ was administered to patients on 3 occasions: enrollment into the study before providing any education; before discharge after education; and the end of the follow-up period at 1 year.

Compliance. The principal investigator (FGS) contacted community pharmacists in advance of the study to inform them about the study and the type of data we needed to assess compliance. We held several information sessions for the pharmacists explaining the study, and we communicated with them on an ongoing basis primarily using facsimile communication and telephone to ensure that all prescription use was captured and communicated to study staff. We tracked all HF medication refill records for all randomized patients from the patient’s pharmacy from the time of index hospital discharge for the duration of the patient’s follow-up period. Pharmacy refill data include the drug, the dose, and the frequency of the medication. We further verified the medication patients were taking when we did our 3-monthly outcomes assessments on the telephone. When discrepancies occurred, we recorded what the patient told us and we verified this with their family physician. We assumed that patients ingested medication they obtained from their pharmacy, and we further assumed that the pharmacy prescription represented their prescribed medication regimen until such time as they filled another prescription for a different dose or frequency or for a different drug in the same class. We also considered a prescription changed if the pharmacy obtained information from the patient or physician indicating that the prescription was discontinued. We verified our refill data against patient diaries, with patients at the time of the outcomes assessment and through MEMS caps (Aardex, Union City, Calif) where available.

We defined HF medications as medications that through randomized trials have demonstrated a beneficial effect on mortality or disease exacerbations. We also included diuretics, as they are a mainstay of HF treatment and are recommended in consensus national guidelines. We classified medications into the following categories: angiotensin-converting enzyme inhibitors or angiotensin receptor blockers, β-blockers, digoxin, and diuretics. We did not include spironolactone in the analysis as there were very few patients (n = 30) on spironolactone.

Compliance was calculated using a validated formula for continuous multiple interval measure of availability (cumulative medication acquisition (CMA)).8 This is the cumulative number of days supply obtained divided by the total number of days the patient should have been taking the medications. To calculate compliance, we collected information about each prescribed medication, the dose, the frequency of dosing, the total number of days supply dispensed, and the date of each refill. From this, we gathered what patients’ consumption should have been based on the frequency of their prescription refills. We calculated the mean for each category (use either class or category consistently) of drugs we were monitoring. We first calculated the mean compliance for each drug at each single refill interval and used this information to calculate the overall mean compliance for the duration of the follow-up period.8 The CMA measures the compliance from 0 to 1.0, where 1.0 would be perfect compliance. For each of the 4 drug classes, we categorized patient’s mean compliance as ≤0.8 or >0.8. Compliance ≤80% was classified as noncompliance. These numbers were chosen primarily because of their common use in the literature.

Whenever patients experienced 2 consecutive days without medication, they were considered to have a GAP in therapy, unless they were receiving their medication in hospital during a readmission or had received physician samples. Patients who had a cumulative 10 days of GAPS in therapy over their follow-up period were classified as noncompliant.

We calculated the cumulative days patients missed taking their medication as a continuous, multiple-interval measure of medication gaps = total number of days in treatment GAPS/duration of period of interest. This was calculated for each medication class/category per individual.

We collected MEMS data for 40 consecutive patients who were either on an ACE-I or ARB. The MEMS (Aardex) contains a microprocessor that detects when the prescription bottle is opened. We used their commercially available software to analyze the data that we downloaded from the caps. We validated the CMA and the GAPS from pharmacy refill data with the CMA and track GAPS from the MEMS to ensure that the pharmacy refill data accurately represented the GAPS and to rule out any systematic errors.

Health-related quality of life. Two interviewers conducted the baseline interview and contacted patients by telephone every 3 months until 1 year after discharge. At each follow-up, the interviewers administered the HRQoL questionnaires and reviewed whether any medication changes, medical interventions, or clinical events had occurred. An experienced research coordinator from the quality of life research group at McMaster University trained the coordinators in methods for collecting HRQoL outcomes. The training included a series of role-playing exercises to ensure that the questionnaire delivery and outcomes were comprehensively collected in a standardized format. Initially biweekly and then monthly, the interviewer was observed by having another
research team member present during the administration of the questionnaire. Areas for improvement were addressed at that time.

We measured HRQoL using 2 measures. One was a generic measure, the Short Form 36 (SF-36). The reliability, validity, and responsiveness of the SF-36 have been established in patients with HF.\textsuperscript{9-11} We looked at each domain of the SF-36 and the summary scores for the physical component summary score (PCS) and mental component summary score (MCS).

The Minnesota Living with Heart Failure questionnaire (MLHFQ) is a disease-specific measure that has established reliability, validity, and responsiveness in patients with HF in various cultures and contexts.\textsuperscript{7-9,11,12}

**Clinical events.** We measured a composite end point of all-cause mortality, hospital readmissions, and emergency department (ED) visits over a period of 1 year. If the ED visit resulted in a hospital admission, then the admission was considered the event. To establish evidence for the event, we asked the patient about hospitalization or ED visits over the previous 3 months. We confirmed hospitalizations through hospital records, which were obtained on all patients throughout the duration of their participation.
Statistical issues

Sample size. During this pilot trial, we accrued patients over an 18-month period, as determined by available resources.

Analysis. The statistical methods used to validate the knowledge acquisition questionnaire and to measure knowledge gain have been previously published. We calculated the relative risk (RR) of noncompliance with a 95% CI in Intervention, compared with Control using a 2 by 2 table using FREQ procedure in SAS 13 (SAS, Cary, NC) for each HF medication class/category for both compliance and GAPS and using the 10-day cut-point for GAPS. Pearson correlation coefficients of CMA for each drug class with all other drug classes were computed, as well as for GAPS. The reliability of pharmacy refill data was determined by calculating the Pearson correlation coefficient for CMA calculated from the pharmacy refill data and the CMA calculated from the MEMS. GAPS pharmacy refill data was also tested for reliability against the MEMS data. HRQoL was analyzed using a repeated measures analysis of variance procedure that allowed for imputation of any missing data through a general linear model in SPSS 12.0 (SPSS, Chicago, Ill). The general linear model allowed us to look at treatment, time, and interaction effects. We controlled for the baseline measure of HRQoL as a covariate.

Results

Figure 1 describes the flow of patients through the trial. Our search strategy to facilitate recruitment to the trial was a broad-based approach that essentially targeted any patient with an admission diagnosis of HF, signs or symptoms that may have a differential diagnosis of HF, or a previous discharge diagnosis of HF. Inclusion and exclusion criteria were then applied to the population to derive an eligible study population, yielding 128 patients for evaluation.
Baseline characteristics

Patients in both experimental groups were similar at baseline with respect to demographic factors, comorbid conditions, LVEF, and HRQOL at baseline (Table I).

Knowledge

The mean change in knowledge score during the trial was 2.24 ± 2.46 (95% CI 1.63-2.85) in Intervention and 1.38 ± 2.16 (95% CI 0.85-1.91) in Control. Intervention patients had significantly more knowledge immediately after their Intervention than Control ($P = .02$). This knowledge gain in Intervention was sustained over the 1-year follow-up ($P = .05$).7

Compliance

Access to patients’ pharmacy refill records on a prospective basis verified that patients obtained their prescriptions consistently from the same pharmacy and rarely moved away from that pharmacy.

### Table II. Relative risk of noncompliance and cumulative gaps in Intervention compared with Control

<table>
<thead>
<tr>
<th>Drug</th>
<th>n</th>
<th>Noncompliance RR (95% CI)</th>
<th>Cumulative gapsa * RR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACE-I/ARB</td>
<td>123</td>
<td>0.78 (0.33-1.89)</td>
<td>0.84 (0.53-1.35)</td>
</tr>
<tr>
<td>β-Blocker</td>
<td>72</td>
<td>0.89 (0.28-2.82)</td>
<td>1.34 (0.70-2.58)</td>
</tr>
<tr>
<td>Digoxin</td>
<td>57</td>
<td>0.79 (0.25-2.51)</td>
<td>1.07 (0.51-2.23)</td>
</tr>
<tr>
<td>Diuretic</td>
<td>95</td>
<td>1.02 (0.49-2.12)</td>
<td>0.97 (0.58-1.60)</td>
</tr>
</tbody>
</table>

*Hazard ratio 0.85, 95% CI 0.55-1.30.

### Figure 3

Change in MLHFQ over time. This figure shows changes in MLHFQ over time from baseline. The MLHFQ shows an effect of intervention.

### Figure 4

Change in MCS over time. This figure shows changes in mental component scores over time, from baseline.

### Figure 5

Change in PCS over time. This figure shows changes in physical component scores over time, from baseline.

The Pearson correlation coefficient between CMA and GAPS, based on pharmacy refill data, was $r = 0.89$ ($P = .001$). The Pearson correlation for CMA from pharmacy refill data and from MEMS was 0.53 ($P = .01$). The Pearson Correlation for GAPS calculated from pharmacy refill data and MEMS was 0.79 ($P = .05$). The Pearson correlation for CMA by drug class was significant between ACE-I/ARB and diuretics ($r = 0.37, P = .001$). However, there were no significant correlations for any
of the other drug pairs. The GAPS between classes were not strongly correlated.

The percentages (95% CIs) of noncompliant patients based on CMA from pharmacy refill data in Intervention and Control were as follows: ACE-I 13% (4.1-22.5), 17% (7.2-26.8); β-blockers 13% (1.8-24.5), 15% (2.7-26.7); digoxin 15% (2.9-25.7), 19% (3.5-27.8); and diuretics 23% (11.1-35.8), 23% (10.7-35.1). The Pearson correlation coefficient for CMA across drugs varied by drug indicating that the medication use in patients is not consistent by patient but rather varies by drug.

Although most patients appeared relatively compliant, for each drug, 50% of the patients used their medication as prescribed and 50% did not based on pharmacy refill cumulative GAPS (Figure 2). Furthermore, for 3 of the 4 drug classes, about 10% of the patients missed between 2 and 10 days, and a minimum of 19% of patients missed >30 days of therapy. Forty-six percent of patients had GAPS of at least 30 days for at least 1 medication. We also acknowledge that patients using diuretics generally use them as needed, which would overestimate the GAPS. Therefore, we only included diuretic prescriptions where the daily dose was prescribed.

Table II shows the RR of noncompliance in Intervention versus Control for all HF medications, as well as the RR of having a GAP. The risk of having a GAP seems lower for ACE-I/ARB and diuretics in the Intervention arm but all 95% CIs widely overlapped a RR of 1.0. It would appear that the Intervention may be more effective for ACE-I/ARB than for other classes. A trend seems to exist for Intervention that illustrates a broader impact on the measure of noncompliance than on cumulative gaps.

Health-related quality of life

Twelve patients found the questionnaires cumbersome and failed to respond to multiple questions in the instruments. Three additional patients missed their 6-week assessment, and 7 patients were not available for their 9-month assessment. The SF-36 mean PCS (physical) summary score across all time points were similar in both groups and improved from 30.52 to 37.15 in Intervention and 29.13 to 37.38 in Control (P = .92). The MCS (mental) summary scores also showed a trend to improve over time, 46.31 to 52.38 in Intervention, and 42.74 to 51.94 in Control, which was similar across time in both groups (P = .74). We found neither an effect of Intervention nor a time by Intervention interaction in either summary score, although the time effect was significant in both groups. Most of the SF-36-measured improvement in HRQoL appears to occur within the first 3 months.
For the MLHFQ, the Intervention group improved from 44.03 to 25.75 and the Control group improved from 44.91 to 32.19. There was a significant effect of time ($P = .03$) and an effect of treatment ($P = .002$) and no time by treatment interaction (Figures 3-5).

**Event-free survival**

There were a total of 85 events (death and hospitalization) in the study patients. Death, hospitalization, or ED visits over the 1-year follow-up period occurred in 60% of Intervention patients and 67% of Control (Figure 6). Overall, there was no statistically significant association between study groups, and the occurrence of ≥1 events (hazard ratio for Intervention was 0.85 [0.55-1.30]). The median time to event in the Intervention arm was 232 days (172-292), and in the Control arm, the median was 185 days (95-274). There were differences between the 2 groups that were evident up to approximately 6 months but were not sustained to 1 year. Of the covariates that were entered into the Cox proportional hazards model, none were significant, but trends were seen with age ($P = .09$) and hypertension ($P = .08$). The adjusted Poisson regression analysis of number of events by group did not show any difference between the 2 groups ($P = .20$).

**Discussion**

This multidisciplinary in-hospital educational intervention improved knowledge and disease-specific HRQoL acutely, and the effects persisted for 1 year. We were unable to show an effect on compliance, generic HRQoL, or time to event over the 1-year follow-up in this pilot study. It is not surprising that the SF-36 does not have the responsiveness to detect disease-specific changes, as this has consistently been noted in the literature. Although measures of mean compliance suggested high compliance in both groups, the results, nevertheless, demonstrated large GAPS in medication use.

Does the apparent effect of the intervention on disease-specific HRQoL represent a true effect? The effect was isolated to a single disease-specific measure that is likely to be most responsive to HF-related HRQoL. We believed, however, that the most likely mechanism of treatment effect would be on compliance, which we were not able to demonstrate in this study. Although we were not able to show a statistically significant difference in compliance, it remains possible that patients may have achieved enough compliance to forestall an event in both groups. This hypothesis is supported by comparing the mortality rates in our cohort of 10.3% to 16.7% to data recently published on 4031 patients with HF, whose mortality rate was between 30.5% to 32.9%.7

Several factors may have mitigated our ability to demonstrate a more convincing effect. First, our intervention was intense but brief. It took place within a short and fixed time frame in hospital without any additional education post discharge. This was, by design, a part of a long-term strategy to test the contribution of different components of effective published disease management programs in HF. Second, this pilot study had limited sample size and resulting wide CIs for most measures of outcome. We did not monitor in detail the education received by the Control group nor additional education the Intervention group received outside the experimental educational program. We did not establish reasons for noncompliance. Although we successfully followed up all patients with pharmacy refill data and clinical events, we were not able to capture substantive data in 12 patients who found the HRQoL assessments too cumbersome.

Strengths of our study include the randomized controlled design with concealed randomization and as rigorous a blinding protocol as we could implement. The intervention was standardized, as trained pharmacists, nurses, and educators delivered the intervention using scripted text. We followed up patients to ensure that we did not lose any data relevant to compliance or clinical events. Research coordinators, trained in the delivery of outcomes, carefully and comprehensively measured the outcomes. We were able to measure compliance reliably with complete data in all patients and get an initial estimate of the extent of noncompliance. The only way to measure compliance with certainty would require monitoring the drug ingestion. This is clearly not feasible.

What can we learn from these results? First, the high level of overall compliance, varying from 0.66 to 0.96, is consistent with previous literature. A recent meta-analysis reported mean noncompliance as 24.8% in patients with various chronic diseases. The mean noncompliance using electronic measures such as MEMS was 31% in the meta-analysis. Because this high level of overall compliance did not prevent readmission to hospital, death, and reduction in HRQoL, the results may mask an underlying problem with compliance. Indeed, when we used GAPS in taking medication as our measure, compliance appears much poorer. Patients miss many days of therapy, and it is possible that these GAPS result in adverse patient-important outcomes such as clinical events.

The low correlation and nonsignificant correlation between noncompliance in one drug and noncompliance in another illustrates that the noncompliance is drug-specific and that we are not seeing a phenomenon of compliant versus noncompliant patients, rather, that most patients take most of their drugs but periodically are noncompliant with at least one of their drugs. This is consistent with some of the more recent literature. Although there are some inconsistencies in other disease states, this may be attributable to the fact that most compliance studies follow 1 or 2 medications and do not follow multiple medications. Our results suggest the
The possible importance of educating patients about all of their medications and the importance of the multiple medications in treating all the patient-specific conditions. The question of what level of compliance is necessary to optimize outcomes remains. Addressing this issue requires investigating the extent to which compliance has a direct relationship with patient-important outcomes and the manner in which compliance interacts with other patient-specific or disease-specific factors. Providing insight into the association between compliance and patient-important outcomes will require considering whether total compliance or gaps in therapy constitutes the optimal measure of compliance. The answer to this question will also depend on the drug characteristics and the mechanism by which the drug provides benefit.

Given the effect on knowledge and disease-specific HRQoL, our study suggests that a well-designed and delivered educational intervention, given only around the time of hospital discharge, shows promise as an important component of an HF treatment plan. Including this intervention in a more comprehensive disease management program may ultimately prove to be feasible and cost-effective in reducing morbidity and mortality in patients with HF. Consideration of the application of this intervention as an ongoing intervention in patients post discharge may be interesting, particularly to investigate whether multiple interventions delivered over time provide incremental benefits.

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References