Congestive Heart Failure Clinical Outcomes Study in a Private Community Medical Group

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Background: **Although angiotensin-converting enzyme (ACE) inhibitor therapy has been shown to improve clinical outcomes of patients with systolic dysfunction, it has been underused or prescribed in inadequate dosages by physicians in the treatment of congestive heart failure. Our goal was to evaluate whether integration of a clinical guideline within a continuous quality improvement program would improve care for patients with congestive heart failure caused by systolic dysfunction.**

Methods: **All patients of a private community medical group who were admitted to the hospital with congestive heart failure were studied prospectively for 21 months. An internally developed congestive heart failure practice guideline was presented to the group's physicians. The guidelines were available in the hospital computer system and were reinforced at monthly quality improvement meetings. Performance data were reviewed quarterly with the physicians.**

Results: **Rates of classifying systolic vs diastolic dysfunction remained unchanged during the study. Use of ACE inhibitor therapy at the time of discharge improved substantially for patients with systolic dysfunction. Quarterly admissions of patients with systolic dysfunction declined 49% throughout the study period. No improvement was noted in the documentation of specific discharge instructions.**

Conclusions: **Use of a disease management guideline, ongoing physician education, and feedback of peer performance data to physicians significantly improved the quality and efficiency of care provided to patients with congestive heart failure in an independent, primary care medical group. (J Am Board Fam Pract 1999;12:467–72.)**

In the book *Making Integrated Health Care Work*[1] the authors stated, "We are not aware of any situations in which physicians in solo or small, single-specialty groups have been involved in meaningful efforts to develop and implement clinical guidelines." The care that physicians provide for their patients, however, is now being measured more intensely than ever before, and techniques to improve the quality and efficiency of patient care are becoming valuable tools for today's physicians. As a result, continuous quality improvement processes are being incorporated into the private practice of medicine. The incorporation of an effective clinical guideline within the continuous quality improvement process can reduce unnecessary variation in clinical practice and can ultimately lead to improved patient care.[2,3] This report is an account of a clinical outcomes project undertaken by an independent 20-physician primary care medical group.

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Congestive Heart Failure: A High-Impact Diagnosis

In the United States the clinical syndrome of congestive heart failure affects 1% of the general population and 10% of the population older than 65 years.[4] In the group of patients older than 65 years, congestive heart failure was the most common admitting diagnosis. The medical literature has established improved symptom control, exercise tolerance, and survival for patients whose congestive heart failure and systolic dysfunction (left ventricular ejection fraction of 0.40 or less) are treated with angiotensin-converting enzyme (ACE) inhibitor therapy.[5–7] The SOLVD (Study of Left Ventricular Dysfunction) trial showed a reduction in hospitalizations from 36.6% to 25.8% for patients with mild to moderate congestive heart failure who were receiving ACE inhibitor therapy.[5,8]

In general, there has been considerable variation in the treatment of diseases by physicians.[9] Specifically, such variation has affected the care of patients with congestive heart failure.[5] Too often the distinction between systolic and diastolic dysfunction has not been determined in clinical practice, and studies have confirmed that ACE inhibitor therapy has been underutilized in treating systolic dysfunction.[10] Because congestive heart failure is common and effective treatment is available, yet underprescribed, we found congestive heart failure to be an excellent diagnosis for an outcomes study.

Methods

Study Goal

The goal of this study was to evaluate whether implementing a congestive heart failure clinical guideline within the continuous quality improvement process would lead to more frequent and optimal use of ACE inhibitors in the treatment of systolic congestive heart failure and therefore decrease the number of hospital admissions for this diagnosis.

Characteristics of the Medical Group

Preferred Primary Care Physicians, located in Pittsburgh, is an independent, 20-physician primary care medical group made up of 10 family physicians and 10 internists, of whom 13 are shareholders. The group has a 7-physician board of directors, a centralized business office, an executive director, a medical director, a 4-physician quality improvement committee, and 2 full-time employees (1 registered nurse and 1 clinical assistant) dedicated to clinical projects and outcomes measurement.

Study Design and Practice Guideline

This prospective study, conducted for a period of 21 months from 1 November 1995 to 31 July 1997, included all patients admitted to the group's primary community-based hospital. Patients were selected for inclusion in the study if on a medical record review they had a confirmed discharge diagnosis of congestive heart failure (*International Classification of Diseases*, code 428).[11] The attending physician determined the primary discharge diagnosis, defined as the single disease process most responsible for the patient's admission. Hospital-based case management nurses performed baseline and quarterly medical record reviews.

The designated physicians in the group developed a guideline for congestive heart failure based on a literature review and several preexisting guidelines from hospital systems and health plans. The guideline was presented to the group at a formal continuing medical education session at the outset of the study. Discussion of the most recent literature in the treatment of congestive heart failure took place to affirm the scientific credibility of the guideline. All physicians were given ample time to comment on the guideline and study design. After appropriate modifications, approved by group consensus, each physician verbally endorsed the plan.

The final product was a comprehensive, disease state management program applicable to both the inpatient and outpatient settings. This guideline was addressed at the group's monthly quality improvement meetings, was available to the physicians for reference in the hospital computer system located at all clinical sites within the facility, and was in a ring binder in every physician office within the group. Although the guideline was comprehensive, the following three primary objectives were emphasized at each monthly quality improvement meeting:

1. All patients with congestive heart failure require an assessment of left ventricular function to determine appropriate treatment.
2. Patients found to have systolic congestive heart failure should have an ACE inhibitor medication prescribed that is titrated to a targeted optimal dosage, as tolerated, provided there are no contraindications.
3. All patients with congestive heart failure should be instructed to weigh themselves daily on the same scale and to telephone their physician's office if they experience a predetermined amount of short-term weight gain.

Standardized inpatient admission orders were developed to parallel the congestive heart failure guideline and prompt the physicians to address every decision point. The physicians were apprised of their performance data at the quarterly quality improvement meetings. The group decided at the outset to share the individual and aggregate clinicians' data openly with all physicians in the group.

Table 1. Data from Medical Record Review of Patients Admitted to the Hospital with Congestive Heart Failure.

Patient and Treatment Characteristics	1 Nov 1995–31 Jan 1996 No. (%)	1 Feb 1996–30 Apr 1996 No. (%)	1 May 1996–31 Jul 1996 No. (%)	1 Aug 1996–31 Oct 1996 No. (%)	1 May 1997–31 Jul 1997 No. (%)
Total number of patients	66	59	52	51	47
Diastolic dysfunction	25 (38)	22 (37)	29 (56)	27 (53)	26 (55)
Systolic dysfunction	35 (53)	32 (54)	20 (38)	19 (37)	17 (36)
Not determined	6 (9)	5 (9)	3 (6)	5 (10)	4 (9)
Patients readmitted with recurrent congestive heart failure within 30 days	5 (8)	3 (5)	2 (4)	1 (2)	2 (4)
Patients with systolic dysfunction	35	32	19	19	15
On ACE inhibitor at admission	17 (49)	18 (56)	13 (69)	10 (53)	8 (53)
Same dosage at discharge	7 (41)	7 (39)	4 (30)	5 (50)	5 (63)
Dosage changed at discharge	7 (41)	9 (50)	6 (46)	4 (40)	2 (25)
Other		1 patient transferred	2 patients CTB; 1 patient ACE inhibitor initial dosage unrecorded	1 patient CTB, 1 patient transferred	1 patient CTB; 1 patient transferred
Not on ACE inhibitor at admission	18 (51)	14 (44)	5 (26)	9 (47)	7 (47)
Discharged on ACE inhibitors	12 (67)	4 (29)	4 (80)	2 (22)	6 (86)
No ACE inhibitor at discharge	6 (33)	9 (64)*	1 (20)*	5 (56)	1 (14)*
Other		1 patient CTB			

ACE—angiotensin-converting enzyme.
CTB—cease to breathe.
*Indicates quarters in which 100% of patients were discharged on ACE inhibitors or met exclusion criteria.

Measurements

The following data were obtained from baseline and quarterly inpatient medical record audits:

1. Left ventricular function measurement by echocardiogram or multigated angiogram within 1 year of admission or sooner if there had been an intercurrent cardiac event
2. ACE inhibitor treatment for congestive heart failure for patients with confirmed systolic dysfunction, defined as a left ventricular ejection fraction of 0.40 or less
3. Appropriate adjustment to achieve optimal ACE inhibitor therapy, as tolerated, according to the following target doses: (1) enalapril—10 mg twice a day, (2) captopril—50 mg three times a day, (3) lisinopril—20 mg every day, and (4) quinapril—20 mg twice a day. Maximal doses were considered in patients depending upon their clinical responses to ACE-inhibitor therapy
4. Documentation of one or more of the following contraindications to prescribing ACE inhibitors for congestive heart failure for patients with systolic dysfunction who were not treated with ACE inhibitor: (1) history of intolerance to ACE inhibitors, (2) serum potassium > 5.5 mEq/L, (3) serum creatinine > 3.0 mg/dL, (4) systolic blood pressure < 90 mm Hg, (5) severe ACE inhibitor-related cough, (6) bilateral renal artery stenosis, or (7) pregnancy
5. Confirmation that patients received instructions by physicians to weigh themselves daily and telephone their physicians if they gained more than 2 pounds in 1 day or more than 3 pounds in 1 week
6. Documentation of dietary instructions
7. The number of patients admitted with congestive heart failure
8. The number of patients readmitted with congestive heart failure within 30 days of discharge

Results

Significant Reduction in Systolic Dysfunction Admissions

The data from the study audits are displayed in Table 1. Two hundred seventy-five patients were included in the study. During the study the total patient population increased, but the patient demographics remained unchanged. The percentage of

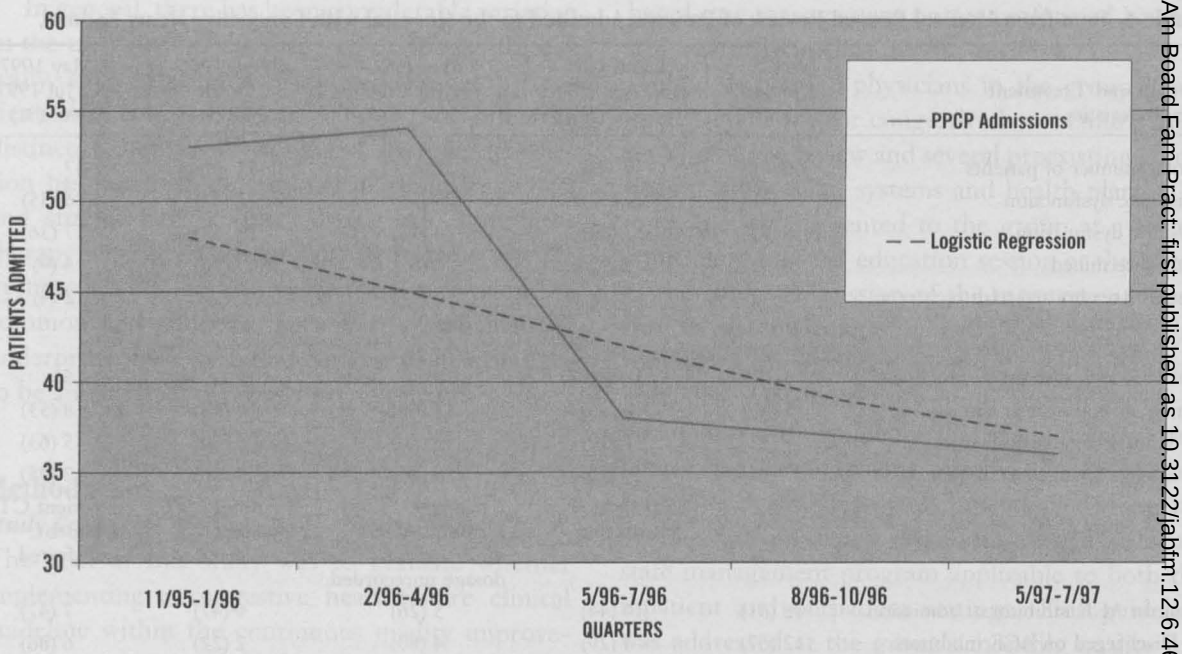

Figure 1. Percentage of patients admitted with congestive heart failure with systolic dysfunction, by quarter.

patients admitted to the hospital with documented left ventricular function did not change considerably during the study. Ninety-two percent of patients were characterized as having systolic or diastolic dysfunction, whereas this condition was not determined in approximately 8% of patients. The percentage of patients on ACE inhibitor therapy, as well as ACE inhibitor dosages upon admission, remained relatively constant throughout the study. By the end of the study, however, 100% of patients with confirmed systolic dysfunction were either discharged with prescriptions for ACE inhibitors or had documentation that they met exclusion criteria for ACE inhibitor therapy.

Using logistic regression analysis, we found that during the study there was a significant decrease in the percentage of systolic congestive heart failure admissions with time ($P = .0279$ (Figure 1). There was a 49% reduction in the absolute number of patients admitted for congestive heart failure caused by systolic dysfunction throughout the study ($P = .0367$). The absolute number of patients admitted with diastolic dysfunction remained steady throughout the study. By the end of the study, however, diastolic dysfunction accounted for a substantially larger percentage of all congestive heart failure admissions. Documentation of diet and self-weighing instructions to patients was suboptimal.

Evidence of Guideline Use in Outpatient and Inpatient Practice

Although this study was hospital-based, the congestive heart failure guideline was emphasized and made available to physicians in their offices as well as the hospital. We believe that an increase in the outpatient use of ACE inhibitor therapy for congestive heart failure was a major contributor to the reduction in hospital admissions for that diagnosis. This belief was strongly supported by outpatient pharmacy utilization data from Aetna US Healthcare, which showed a 39% increase in ACE inhibitor use by patients with congestive heart failure who were cared for by physicians in our group during the course of this study.[12]

Conclusions

The results of this study show a statistically significant decrease in the number of admissions for congestive heart failure caused by systolic dysfunction during a specified period subsequent to the implementation of a clinical guideline for congestive heart failure. It is our belief that this decrease was a result of the more frequent and optimal inpatient and outpatient use of ACE inhibitor medications. It is important to note that our disease management guideline stressed principles of treatment that were identical for both inpatients and outpatients.

Although we would have preferred to collect our own data to prove increased ACE inhibitor therapy for outpatient treatment of systolic dysfunction, we were able to obtain supporting pharmacy data from health care insurers. The rate of inpatient use of ACE inhibitor therapy and the rate of hospital admissions, however, could be tracked easily by means of a hospital-based utilization review. Hospital admission rate was used as a measurement of quality and as a major outcomes indicator in the landmark SOLVD trial. It is our belief, therefore, that a reduction in the number of hospital admissions for congestive heart failure, the 100% appropriate usage of ACE inhibitors in three of the last four quarters, and a greater than 90% rate of left ventricular ejection fraction determination throughout the study were sound indicators of improved quality of care in the treatment of congestive heart failure. We met our study goal, and we found that a disease management guideline, when properly developed and applied, could lead to improved outcomes in a community-based medical group.

We were concerned that 8% of patients admitted for congestive heart failure admissions had no determination of systolic or diastolic dysfunction. Follow-up investigation with physicians, however, showed that these patients frequently had limited code status, and additional testing was not desired or consistent with the goals of therapy. Many of these patients were admitted for placement purposes and for comfort care only.

Patient education pertaining to diet and self-weighing was poorly documented. Based on discussions with the physicians, it is probable that patients were instructed regarding diet and weight often without documentation. To address this problem, a congestive heart failure treatment worksheet was subsequently developed and implemented to document each aspect of patient education. The education process begins when the patient is admitted to the hospital, and each item is checked off and initialed when completed. At the end of the hospitalization, the patient receives a copy as a discharge instruction sheet. It is signed by the patient, who then becomes an active participant in his or her own care.

In the opinion of these investigators, the success of this project depended on the following key elements:

1. We selected a disease process that is commonly seen and treated by primary care physicians.
2. We developed a meaningful and credible clinical practice guideline.
3. The clinical study design was relatively simple and straightforward, and focused on a few key outcomes.
4. The guideline and study design was endorsed by every physician involved in the study.
5. The practice guideline was reinforced (1) by its availability on the hospital computer system and in every physician's office, (2) by the use of standardized congestive heart failure admission orders that followed every key decision point in the guideline, and (3) by reminders at the group's monthly quality improvement meetings and in our monthly newsletter.
6. Quarterly updates of peer performance data were shared among all of the physicians.
7. We used a risk pool with compensation methods based, in part, on clinical outcome data specific to each physician.
8. The costs of both implementation and outcomes measurement were kept within the budget of our quality improvement committee.

Although sharing performance data among physicians was a sensitive issue, it was well received when done in a collaborative, educational manner. The group's experience and success with this study has resulted in enthusiasm for the development and implementation of similar projects for other disease states. In the future, progress will be facilitated by published guidelines that can be easily adapted for use within medical practices.

This study illustrates the value of implementing clinical guidelines as part of a complete continuous quality improvement program. Achieving high-quality primary care within a medical group and actually measuring it can be an expensive undertaking. We accomplished our study at a relatively low cost to the physicians, and we therefore believe that it would be easy to undertake similar studies in other primary care medical groups. Such efforts are no longer novel, but essential, as physician accountability has evolved into an everyday reality.[13,14] The community-based outcomes study can be used as a powerful tool to reduce the unnecessary variation that is the curse of clinical quality and efficiency. For physicians, favorable outcomes data will be requisite to contract for patients. For employers, they could result in lower costs, and most importantly, it will mean better care for patients.

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