

Examining Healthcare Disparities in a Disease Management Population

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Objectives: To examine whether racial disparities in healthcare exist in a heart failure population and to estimate the impact of disease management (DM) on any identified disparities.

Study Design: Before-after cohort study.

Patients and Methods: A total of 2619 high-risk heart failure patients (2129 whites and 490 blacks) who participated in a DM program for at least 90 days between July 2001 and July 2003 were examined. Analysis was stratified by sex and age (<65 years and ≥65 years). Functional status as measured by the New York Heart Association (NYHA) classification system and mental and physical quality of life (QOL) as measured by the 8-Item Short-Form Health Survey were used to assess disparities between races.

Results: At baseline, 33.7% of black versus 44.3% of white older women and 32.6% of black versus 48.5% of white older men were at NYHA level I or II ($P < .01$ and $P = .005$, respectively). At the most current measurement, the differences between the cohorts disappeared. Results were similar for the younger male, but not the younger female, cohort. The only QOL disparities at baseline were in favor of blacks. Both races had significant increases in mean mental and physical QOL scores ($P < .001$) after involvement in the DM program.

Conclusions: Disparities in QOL were not observed between blacks and whites at baseline or over the course of the study. Disparities in functional status at baseline disappeared over time, implying that DM may help reduce disparities and maintain equity in healthcare outcomes.

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The problem of racial and ethnic disparities in access to and delivery and outcomes of healthcare have been well described in the literature.¹⁻³ These disparities cut across disease types and disease severity.⁴⁻¹¹ Some of the major causes of these disparities are related to lack of access to care and differences in social, physical, and biologic environments.¹ Possible contributors to these disparities include healthcare providers, health systems, utilization managers, and the patients themselves.¹² Importantly, disparities in healthcare processes and use lead to disparities in outcomes.¹³ The Institute of Medicine (IOM) recently published a large study to assess the extent of racial and ethnic differences in healthcare, evaluate potential sources of racial and ethnic disparity, and provide recommendations regarding interventions to eliminate

such disparities.¹² The IOM recommendations were extensive. They ranged from legal interventions such as Civil Rights Enforcement to policy-based interventions such as financial incentives and provider education.

One approach that can play an important role in reducing disparities in healthcare is disease management (DM). Disease management, as defined by the Disease Management Association of America, is "a system of coordinated healthcare interventions and communications for populations with conditions in which patient self-care efforts are significant."¹⁴ Disease management components include population identification, evidence-based practice guidelines, collaborative practice models to include physician and support-service providers, patient self-management education (which may include primary prevention, behavior modification programs, and compliance/surveillance), process and outcomes measurement, evaluation and management, and a routine reporting/feedback loop. Disease management also may include communication with the patient, the physician, the health plan, and ancillary providers, as well as practice profiling.¹⁴

Disease management has been shown to be an effective tool for improving quality of care and reducing costs for individuals with chronic conditions.¹⁵⁻²² The recent American College of Cardiology and American Heart Association guidelines for heart failure posit that based on the literature, DM appears to improve patient quality of life (QOL) and functional status.²³ However, they had reservations regarding which DM interventions were crucial for its success. They also had reservations about DM's feasibility across diverse patient

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populations.²³ However, a recent meta-analysis of specific DM interventions found that all studied interventions were associated with improvements in provider adherence to practice guidelines and in disease control.²⁴ In addition, a recent series of articles suggested that such chronic care management can improve patient outcomes.^{22, 25-27}

Disease management principles mesh well with the recommendations of the IOM for reducing disparities. The IOM recommends, for example, the use of evidence-based guidelines to promote the consistency and equity of provision of healthcare.¹³ As described above, the use of evidence-based guidelines is the foundation of DM programs. Importantly, the National Committee for Quality Assurance, the American Accreditation HealthCare Commission, Inc, and the Joint Commission on Accreditation of Healthcare Organizations have developed accreditation standards for DM programs. These standards include the use of evidence-based guidelines. In addition, they recommend that financial incentives be linked to favorable clinical outcomes because these incentives promote equity of care. In many cases, DM vendors are paid based on the ability to meet certain outcomes measures and receive incentives for exceeding the agreed-upon measures. Even if contracts are not risk based, a DM vendor still has an incentive to meet quality goals and cost targets in a competitive marketplace.

The IOM suggests that a multidisciplinary team approach be used for improving delivery of care. Disease management follows the team approach by including, among others, DM nurses, social workers, and the patient's primary care physician.²⁸ In addition, the IOM recommends the implementation of patient education programs to increase patients' knowledge of how to access care and how to better participate in treatment decisions. Patient education is the cornerstone of DM. It covers an array of topics, including use of preventive services (eg, influenza vaccine), smoking cessation, nutrition, exercise, and medication compliance.

This study examined whether racial disparities in healthcare existed at the time of patient entry into a heart failure DM program. Quality of life and functional status were the healthcare indicators that were assessed for disparity. In addition, changes in QOL and functional status over time were assessed.

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METHODS

Study Population

This study used data on 2619 patients who were in a DM program for at least 90 days. The patients had to have

completed at least 2 QOL surveys and 2 New York Heart Association (NYHA) assessments. In addition, they had to have been active in the DM program at some point from July 2001 through July 2003. Patients came from 21 different health plans and employee groups. Approximately 80% of the patients were from 5 health plans (a very small number were from employer groups). Heart failure patients were identified and enrolled based on specific inclusion and exclusion criteria. Criteria differed by program and by client. In most cases, patients were identified through claims files provided by the client.

The DM company uses a risk stratification modeling strategy that integrates several methods of measurement to assess patient health risk. These methods include:

- A proprietary, claims-based, episode-focused predictive modeling tool that uses as markers of future risk a patient's clinical episodes of care, prior use of health care services, and prescription drug profiles.
- A survey-based health status assessment.
- Monitoring of utilization management information from authorization and referral data.

Using these methods, the DM company stratified patients into 3 levels of risk (low, moderate, and high). All patients in this analysis were high-risk patients.

Interventions Used in the Program

Targeted interventions were implemented based on the identified risk level of the participant. Generally, high-risk patients receive individualized telephonic monitoring and education on a monthly basis. Moderate-risk patients receive the same interventions but on a less frequent basis. Low-risk patients receive different interventions at a lower interactive level and frequency. All risk groups receive educational mailings and have access to a toll-free nurse support line, a voice-activated telephonic education and survey system, and Web access to disease-specific information.

After identification and stratification, each high-risk patient in this study was assigned a nurse disease manager. The disease manager collected the patient's medical history, utilization history, names of current medications, and behavioral indicators such as smoking status, exercise tolerance, and food intake, as well as QOL survey information. The disease manager also requested additional information from each patient's physician as needed, such as laboratory results and diagnostic testing results.

Specific interventions for the heart failure population included patient education regarding the disease process, recommendations of dietary sodium restric-

tion, stress management techniques, smoking cessation techniques, education regarding the patient's medication regimen, and instruction in how to identify warning symptoms such as overnight weight gain. If deemed necessary, the nurse disease manager referred patients to an in-house social worker. The patient's primary care physician received physician guidelines and an overview of the heart failure program. The primary care physician also received patient care summaries on a quarterly basis. The summaries included current risk factors (eg, patient is not on a vasodilator but may be eligible), relevant parameters used in the program to monitor patient progress (eg, baseline and current QOL scores), a list of current medications, and additional key information (eg, referral to social services for assistance with cost of medications).

Outcome Assessment

Quality of life was measured by using either the 12-Item Short-Form Health Survey (SF-12) or the 8-Item Short-Form Health Survey (SF-8). (The SF-8 replaced the SF-12 on October 1, 2001). SF-8 scores are comparable to those derived from the SF-12, and results are not influenced by the change in the survey tool.²⁹ Patients answered the survey questions at the time of program enrollment and on a quarterly basis thereafter. The survey was administered in 1 of 3 ways: telephonically by the DM nurse, through the use of a voice-activated telephone system, or by the patient answering the survey questions on the DM company's Web site. From the surveys, a mental component score and a physical component score were calculated (higher scores imply better health). Scores from surveys that were administered by the DM nurse were adjusted downward because of possible interviewer bias.^{29,30}

Disparities were measured by comparing the mean mental component scores and physical component scores at baseline. The impact of the DM program on

QOL was measured in 2 ways, using the baseline and most current scores. First, the change in the mean physical component scores and mean mental component scores was tested for statistical significance with paired *t* tests. Student's *t* tests were used to detect differences in baseline and current scores between black and white racial groups. A *P* value of less than .05 was considered statistically significant. Second, clinically significant changes in scores were calculated for the 2 racial groups. The 95% confidence interval for clinically significant changes was ± 6.3 for the mental component score and ± 5.7 for the physical component score in the general US population.³¹

Functional status was measured by using the NYHA classification survey. Patients were classified into 1 of 4 NYHA categories (Classes I-IV) based on responses to questions related to the patients' ability to perform various activities. According to the Heart Failure Society of America, Class I indicates the highest level of functionality and Class IV represents the lowest level.³² Classes I and II are considered mild, whereas Classes III and IV are considered moderate and severe, respectively. The NYHA survey was completed at the time of enrollment into the heart failure program and quarterly thereafter. Potential disparity between blacks and whites was assessed by the percentage of patients in Class I and II at baseline. In addition, the impact of DM on functional status was measured over time by comparing the baseline measurement with the most current measurement. Changes within each racial group were measured with McNemar's test. The chi-square test was used to test for differences between the groups.

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RESULTS

Characteristics of the study patients are shown in **Table 1**. Blacks were significantly younger, were more

Table 1. Baseline Characteristics of Study Patients*

Characteristic	Black (n = 490)	White (n = 2129)	P
Age, mean (SD), y	66.8 (11.7)	72.4 (11.9)	<.001
Age ≥ 65 y, %	53.8	71.9	<.001
Female, %	64.1	52.7	<.001
Time in program, mean (SD), days	333 (138)	369 (144)	<.001
Time between NYHA surveys, mean (SD), days	277 (124)	307 (135)	<.001
Time between QOL surveys, mean (SD), days	244 (129)	272 (140)	<.001

*NYHA indicates New York Heart Association; QOL, quality of life; SD, standard deviation.

Table 2. Quality-of-Life Scores for Patients Age ≥65 Years*

Quality-of-Life Measure	Female			Male		
	Black (n = 178)	White (n = 822)	P	Black (n = 86)	White (n = 708)	P
Baseline MCS, mean (SD)	48.4 (8.1)	46.3 (9.4)	.006	48.2 (9.6)	48.1 (8.4)	.92
Current MCS, mean (SD)	48.5 (8.6)	48.1 (8.2)	.56	49.9 (8.9)	49.3 (7.3)	.48
P	.825	<.001	—	.18	.002	—
Baseline PCS, mean (SD)	37.2 (10.6)	38.1 (10.0)	.28	40.6 (10.0)	40.4 (10.6)	.87
Current PCS, mean (SD)	40.8 (10.2)	41.3 (9.5)	.53	42.7 (10.6)	42.8 (9.7)	.93
P	<.001	<.001	—	.10	<.001	—

*MCS indicates the mental component score calculated from the 8-Item Short-Form Health Survey; SD, standard deviation; PCS, the physical component score calculated from that survey.

likely to be female, and spent less time in the program. Because of this significant difference in age and sex, the analysis was stratified by these factors. The age stratification was <65 and ≥65 years of age.

Generally, the results for QOL did not show readily discernable disparities between black and white patients. There was only 1 exception: older black women had a higher mean baseline mental component score than their white counterparts (Table 2). Enrollment in the DM program resulted in improvement in most cohorts' QOL scores (Table 2 and Table 3). The most current scores did not show any differences in physical and mental health among the cohorts.

Results across cohorts for clinically significant changes in QOL were generally similar (Table 4 and Table 5). However, young black men had significantly greater improvement in physical component scores than their white counterparts (Table 5).

Racial disparities were much more discernable in terms of functional status, especially in the older cohort (Table 6 and Table 7). For example, at baseline only 32.6% of older black men versus 48.5% of older white men were classified as having NYHA level I or II heart failure. Similar disparities existed for older black women and younger black men. Strikingly, the functional status disparities disappeared at the most recent measurements, and all 8 cohorts had statistically signifi-

Table 3. Quality-of-Life Scores for Patients Age <65 Years*

Quality-of-Life Measure	Female			Male		
	Black (n = 136)	White (n = 299)	P	Black (n = 90)	White (n = 300)	P
Baseline MCS, mean (SD)	44.6 (10.0)	43.1 (10.5)	.16	45.8 (9.1)	45.0 (10.9)	.53
Current MCS, mean (SD)	46.9 (9.3)	46.8 (9.3)	.92	49.1 (7.7)	48.4 (9.0)	.50
P	<.005	<.001	—	.001	<.001	—
Baseline PCS, mean (SD)	37.4 (9.7)	37.6 (10.0)	.85	38.5 (9.8)	39.3 (10.8)	.53
Current PCS, mean (SD)	42.0 (10.1)	41.5 (10.2)	.63	43.8 (10.1)	43.5 (11.0)	.82
P	<.001	<.001	—	<.001	<.001	—

*MCS indicates the mental component score calculated from the 8-Item Short-Form Health Survey; SD, standard deviation; PCS, the physical component score calculated from that survey.

Table 4. Clinically Significant Changes in Quality-of-Life Scores for Patients Age ≥65 Years*

Quality-of-Life Measure	Female			Male		
	Black (n = 178)	White (n = 822)	P	Black (n = 86)	White (n = 708)	P
MCS						
Clinically improved, %	24.1	29.6	.14	28.0	24.3	.40
Clinically stable, %	53.4	53.2	.96	58.1	57.8	.96
Clinically worsened, %	22.5	17.2	.10	13.9	17.9	.36
PCS						
Clinically improved, %	42.2	39.9	.57	40.7	33.8	.20
Clinically stable, %	42.1	41.8	.94	39.5	43.2	.51
Clinically worsened, %	15.7	18.2	.43	19.8	23.0	.50

*MCS indicates the mental component score calculated from the 8-Item Short-Form Health Survey; PCS, the physical component score calculated from that survey.

cant improvements in NYHA status. Interestingly, compared with their white counterparts, a significantly greater percentage of older black men had improved NYHA scores (41.6% vs 28.8%).

DISCUSSION

The difference in healthcare quality across race and ethnicity is a major concern in this country. With an aging population and its concomitant increase in chronic conditions, the gap in healthcare outcomes has the potential to widen. This effect may be further exacerbated

by rising healthcare costs, higher insurance premiums and copayments, and cutbacks in government medical programs. A major effort is currently under way to further identify disparities and develop methods to reduce those disparities. Disease management has an opportunity to play an important role.

The approach taken by DM matches well with the recommendations of the IOM.¹² This is because DM uses evidence-based guidelines, a payment structure that provides incentives to improve the health of all patients, the use of interpretation services, enhanced communication between patients and their primary care physi-

Table 5. Clinically Significant Changes in Quality-of-Life Scores for Patients Age <65 Years*

Quality-of-Life Measure	Female			Male		
	Black (n = 118)	White (n = 284)	P	Black (n = 94)	White (n = 302)	P
MCS						
Clinically improved, %	29.4	35.8	.22	38.9	33.0	.29
Clinically stable, %	50.7	46.8	.48	44.4	51.0	.26
Clinically worsened, %	19.9	17.4	.55	16.7	16.0	.87
PCS						
Clinically improved, %	45.0	44.5	.93	52.2	38.7	.02
Clinically stable, %	39.0	39.1	.99	31.1	46.0	.01
Clinically worsened, %	16.0	16.4	.92	16.7	15.3	.74

*MCS indicates the mental component score calculated from the 8-Item Short-Form Health Survey; PCS, the physical component score calculated from that survey.

Table 6. NYHA Heart Failure Classification Results for Patients Age ≥65 Years*

Outcome	Female			Male		
	Black (n = 178)	White (n = 822)	P	Black (n = 86)	White (n = 708)	P
Baseline NYHA level I or II, %	33.7	44.3	.01	32.6	48.5	.005
Current NYHA level I or II, %	47.8	49.3	.72	51.2	56.9	.31
P	.001	.01	—	.005	<.001	—
Improved NYHA score, %	31.2	28.4	.46	41.6	28.8	.01
Stable NYHA score, %	53.4	49.0	.29	46.5	46.1	.94
Declined NYHA score, %	15.4	22.6	.03	11.9	25.1	.007

*NYHA indicates New York Heart Association.

cians, multidisciplinary treatment and preventive care teams, and patient education and empowerment.

This study provided some initial evidence that a heart failure DM program may help reduce racial and ethnic disparities. This outcome was most evident in terms of stable or improved functional status in the older age groups. For QOL, there did not appear to be baseline differences between blacks and whites. One exception was older black women, whose mean mental component scores exceeded those of their white counterparts. Importantly, for most cohorts, there were significant improvements in overall QOL and functional status. These results are in contrast to a recent study of Medicare managed care patients that found that patients with heart failure experienced decreased QOL scores over a 2-year period.³³

There were limitations associated with this study. First, it was not a randomized, controlled study. We did not have the option of separating out a control group due to our contractual obligation to provide treatment to all participants. A pre-post comparison provides valuable information, but inherent problems can be associated with this method, such as regression to the mean. Participants who were in worse health at entry into the program might have been the ones most likely to improve (eg, regression to the mean). This would suggest that because blacks were in worse health at entry into the program, their improvement would have occurred even without involvement with DM. However, a recent study has provided evidence that more educated patients do a better job of self-management of their disease.³⁴ Therefore, we argue that by educating

Table 7. NYHA Heart Failure Classification Results for Patients Age <65 Years*

Outcome	Female			Male		
	Black (n = 136)	White (n = 299)	P	Black (n = 90)	White (n = 300)	P
Baseline NYHA level I or II, %	44.9	47.2	.66	41.1	53.7	.04
Current NYHA level I or II, %	66.9	61.2	.25	67.8	65.3	.66
P	<.001	<.001	—	<.001	<.001	—
Improved NYHA score, %	40.7	34.9	.24	44.6	36.8	.18
Stable NYHA score, %	50.0	48.2	.73	39.4	46.7	.22
Declined NYHA score, %	9.3	16.9	.04	16.0	16.5	.91

*NYHA indicates New York Heart Association.

patients regarding their disease process, DM positively impacts patient self-management and therefore health outcomes. Second, we did not have data available (eg, claims data, medical records data) to adjust for additional differences in severity of illness or in differences in socioeconomic status. Third, we analyzed only 2 specific outcomes measures: QOL and functional status. It will be important to expand the research to other outcome variables as well as process and clinical indicators. For example, in terms of process variables, do both races receive a similar number of unscheduled outbound telephone calls from their DM nurse? Also, examining differences in clinical indicators such as baseline and follow-up medication compliance or flu immunization rates might provide important insights into the impact of DM on patient outcomes.

In the future, there will be several important opportunities within the large Centers for Medicare and Medicaid Services DM demonstration projects to examine the impact of various DM programs across racial groups in the Medicare fee-for-service population. These demonstration projects cut across various chronic conditions, geographic locations, and intervention strategies. Importantly, they will be randomized, control studies. The importance of these studies for the future of DM cannot be overstated.

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CONCLUSIONS

This study examined a heart failure population to determine whether there were racial disparities in healthcare outcomes and to assess the impact of DM on racial disparities. Significant racial disparity in patient functional status was observed at baseline, but this disparity disappeared over the course of the program. There were no discernable disparities in QOL at baseline. However, both racial groups experienced significant improvements in QOL. We believe it is important to further investigate the role that DM can play in improving patient health and reducing disparities across racial and socioeconomic lines.

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