Association of Race/Ethnicity with Clinical Risk Factors, Quality of Care, and Acute Outcomes in Patients Hospitalized with Heart Failure

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Disclosures

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Background

• Black and Hispanic populations are at increased risk for developing Heart Failure (HF) at a younger age and experience higher morbidity and possibly greater risk of death

• By the year 2050, minorities will represent 50% of the US population, with Hispanics contributing the largest proportions of increase

• It is important to understand the characteristics of HF in Hispanic patients and ensure equitable high-quality care delivery to minority populations that have been vulnerable to inferior quality care and worse health outcomes

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Introduction

• Past data on patients with HF have been drawn from cross-sectional studies and demonstrate that blacks have:
- • a disproportionate greater burden of HF
- • higher rates of hypertensive heart disease as etiology of HF
- • lower left ventricular (LV) ejection fractions
- • more symptomatic HF than whites

• Racial/ethnic differences in HF mortality have been inconsistent, with some studies reporting either similar or lower survival for black patients, whereas others report higher survival, compared with white patients

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Objectives

• There are limited data on the clinical characteristics, treatments, and outcomes of Hispanics populations with HF.

• This study sought to determine the characteristics, quality of care, and inpatient outcomes in a racially and ethnically diverse admixture of patients hospitalized for HF in the Get With The Guidelines–Heart Failure (GWTG-HF) program.

• We assessed, as a function of race/ethnicity,
  • the clinical characteristics of patients hospitalized with HF
  • adherence to core and other guideline-based HF care measures
  • changes in adherence over time
  • in-hospital mortality and length of stay

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Methods

• Baseline data for patients hospitalized with HF were obtained from The GWTG-HF Program, an ongoing observational, voluntary, continuous quality improvement initiative of the American Heart Association

• Hospitals participating in the registry submit clinical information regarding the medical history, laboratories, diagnostic testing, hospital care, and outcomes of patients hospitalized for HF using an online, interactive case report form and Patient Management Tool (PMT) (Outcome Sciences, Inc, Cambridge, MA).

• These data on various patient characteristics is collected using a Web-based information system and the internet-based system performs checks to ensure the completeness of the reported data

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Methods

•Participating hospitals had the ability to view national aggregate hospital data as well as daily patient and performance data benchmarked with similar hospitals.

•The GWTG-HF process-of-care improvement program provided participating hospitals with materials for
   •improving treatment and discharge plans for optimal patient management
   •and included evidence-based best practice algorithms
   •along with comprehensive patient education materials and resources

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Methods

- To be eligible for GWTG-HF, patients had to be adults
    - hospitalized for an episode of HF as the primary cause of admission
    - or with significant HF symptoms that developed during hospitalization with a primary discharge diagnosis of HF

- Participating institutions are instructed to submit consecutive eligible HF patients to the GWTG-HF database

- Outcome Sciences, Inc. serves as the data collection and coordination center for GWTG-HF. Trained personnel abstract the data using standardized definitions. Data quality was monitored to ensure the completeness and accuracy of the submitted data

Methods

• Using methodology similar to other national cardiovascular registries and randomized trials, race/ethnicity were collected for the purpose of evaluating subgroup differences.

• Admission and/or medical staff recorded race/ethnicity as the patient was registered.

• Patients were assigned to race/ethnicity categories using options defined by the case report forms as follows:
  • Race—American Indian or Alaska Native, Asian, Black or African American, Native Hawaiian or Pacific Islander, White, or unable to be determined;
  • Ethnicity, Hispanic—yes, no, or unable to be determined.

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Methods

• All participating institutions were required to comply with local regulatory and privacy guidelines and to submit the GWTG-HF protocol for review and approval by their institutional review board.

• Because data were used primarily at the local site for quality improvement, sites were granted a waiver of informed consent under the common rule.

• The Duke Clinical Research Institute served as the data analysis center and analyzed the aggregate de-identified data for research purposes.

Study Population

- January 2005 through December 2008
- 91,613 admissions with HF were discharged
- 251 hospitals fully participating in GWTG–HF

- Excluded 4,547 admissions who were
    - transferred to another acute care facility (n = 2,215),
    - discharged to hospice (n = 1,618),
    - left against medical advice or discontinued care (n = 714).

- Also Excluded Patients missing race or ethnicity data (n = 3,519).

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Study Population

- Included only patients who were recorded as
  - Non-Hispanic black (black)
  - Non-Hispanic white (white)
  - Hispanic (regardless of race)

- Patients who were not Hispanic and were of other racial categories (n = 3,598) were not included in this study, and we did not account for multiracial classifications.

- Excluding 1,148 admissions either with missing rolling quarter records or in the last 2 quarters had <1,000 admissions

- Final overall study population included
  - 78,801 HF admissions at 209 hospitals

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Study Population

- Final overall study population

  - 78,801 HF admissions at 257 hospitals
  - Patients:
    - 56,266 (71.4%) White
    - 17,775 (22.6%) Black
    - 4,760 (6.0%) Hispanic

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Quality Measures

• Individual HF core measures include the following, which represent the core measures used by CMS for Q1 patients hospitalized with HF:

1. Assessment and documentation of LV systolic dysfunction
2. The provision of HF-specific discharge instructions
3. Use of an angiotensin-converting enzyme inhibitor or angiotensin receptor blocker in patients with LV systolic dysfunction (ejection fraction <40%)
4. Smoking cessation counseling for eligible patients

• A 5th care measure also included in this study:
    • β-Blocker use for eligible patients with LV systolic dysfunction (ejection fraction <40%)

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Outcome Measures

- The Primary Outcome Measure for Quality of Care Assessment in this analysis was:

  - **"The all-or-none HF care measure"**

    - Defined as
      - the proportion of patients eligible for at least 1 of the 4 CMS HF measures
      - plus a fifth HF care measure
      - and received all of the measures for which they were eligible

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Quality Measures

• The GWTG-HF quality measures of guideline-recommended, evidence-based therapies included in the analysis were:

  • The use of 1 of the 3 specific guideline-recommended β-blockers for patients with LV systolic dysfunction

  • Anticoagulation for atrial fibrillation

  • Aldosterone antagonists for LV systolic dysfunction

  • Implantable cardioverter-defibrillator (ICD) utilization for patients with an ejection fraction ≤30%

• All represent class I indications in the AHA/ACC HF guidelines

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Outcome Measures

- Also assessed:

  - "Adherence to Measures Over Time" to evaluate changes in adherence with longer exposure to the GWTG-HF program

  - Inpatient Mortality and Length of Stay

Statistical Analysis

- Using χ2 tests for categorical variables and Kruskal-Wallis tests for continuous variables, baseline characteristics were compared between white, black, and Hispanic patients.

- Multivariable logistic regression was used to determine the impact of race/ethnicity on HF core measures, GWTG-HF measures, and inpatient outcomes.

- Generalized estimating equations were used to adjust for clustering within hospitals.

- The generalized estimating equation method was also used to examine the improvement in adherence to the all-or-none HF care measure over time within each race group by comparing the baseline year and each of the following years, respectively.

- All tests were 2-tailed, and statistical significance was declared at α = 0.05.

Results – Patient Characteristics

- 78,801 patients hospitalized with HF:

    - 49.1% Women
    - 72 years (mean age)

- Racial composition of the patients:

    - 71.4% Non-Hispanic White
    - 22.6% Non-Hispanic Black
    - 6% Hispanic

- There were significant and substantial differences in the baseline demographics and clinical characteristics by race/ethnicity

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Results – Patient Characteristics

• Hispanic (68 years) and Black (63 years) patients were considerably younger as compared with White patients (75 years)

• HF hospitalizations in the <u>overall study population</u>
  • Black (22.6%) and Hispanic (6%) patients represented

• However, among <u>patients aged ≤50 years</u>:
  • Black (55.8%) and Hispanic (7.8%) patients

• Even more striking, patients <u>aged ≤40 years</u>
  • Black (60.2%) and Hispanic (8.8%)

Results – Patient Characteristics

• White patients were significantly more likely than black and Hispanic patients to have Medicare and less likely to have Medicaid.

• Overall, <5% of all patients had no insurance or no documentation of insurance, with black and Hispanic patients less likely to be insured or have documentation of insurance than whites.

• Hispanic and black patients had a higher prevalence of **diabetes mellitus and hypertension** compared with whites.

• Black and Hispanic patients were more likely to have non-ischemic etiology of HF and lower ejection fraction compared with whites

Characteristics and Outcomes

Characteristics	White (n=56,266)	Black (n=17,775)	Hispanic (n=4760)
Demographics			
Age, Years, mean ± SD	75.3 ± 12.7	62.9 ± 15.2	68.0 ± 14.2
Male, %	49.1	50.0	52.3
Payment Source			
Medicare, %	75.2	51.9	53.7
Medicaid, %	6.2	20.8	19.6
No Insurance / not documented, %	2.3	3.6	9.7
Other, %	16.3	23.7	17.0

Characteristics and Outcomes

Characteristics	White (n=56,266)	Black (n=17,775)	Hispanic (n=4760)
Medical History			
Atrial Fibrillation %	35.3	16.9	16.5
Diabetes, %	40.2	43.8	55.7
Hyperlipidemia, %	41.9	32.5	38.0
Hypertension, %	70.6	82.8	78.4
Peripheral Vascular Disease, %	13.3	7.3	8.9
CAD/IHD, %	52.3	34.9	46.9
Prior Myocardial Infarction	18.0	12.1	13.8
HF patients with EF <30% had ICD on admission, had ICD placed during admission, or discharged with ICD placed; prior ICD, %	41.8	41.6	36.0
Anemia, %	17.9	16.0	13.2
Dialysis, %	3.1	7.5	8.0
Renal Insufficiency – chronic(eGFR <40), %	35.4	29.4	36.4
History of Smoking, %	13.7	26.0	14.8

Characteristics and Outcomes

Characteristics	White (n=56,266)	Black (n=17,775)	Hispanic (n=4760)
HF History			
Ischemic, %	42.9	28.0	34.9
Non-Ischemic	45.0	58.7	56.5
Unknown Ischemic or Non-Ischemic, %	12.1	13.3	8.6
EF (%), mean ± SD	41.1 ± 17.1	35.7 ± 17.8	38.8 ± 17.8
Vital Sign at Admission			
Weight (kg), mean ± SD	80.4 ± 24.7	87.7 ± 27.3	77.7 ± 22.6
BMI (body mass index), mean ± SD	28.7 ± 8.3	30.8 ± 9.5	29.2 ± 8.1
Heart Rate, mean ± SD	84.1 ± 20.4	87.6 ± 19.5	86.5 ± 20.8
Diastolic Blood Pressure, mean ± SD	74.0 ± 17.4	84.6 ± 20.8	78.0 ± 18.3
Systolic Blood Pressure, mean ± SD	137.9 ± 29.3	147.1 ± 33.1	144.3 ± 32.3

Results - Quality of Care by Race/Ethnicity

• At baseline, there were no racial/ethnic disparities
in the "All-or-None HF Care Measure"

• Improvement in adherence to the "All-or-None HF Care Measure" was
seen in all 3 racial/ethnic subgroups within the first year

• Adherence to this measure increased annually from year 1 to year 3 for
black, Hispanic, and white patients

• At year 3, after adjustment for patient and hospital characteristics, the
"All-or-None HF Care Measure" improved significantly in all racial/ethnic
cohorts from baseline

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Results – Quality of Care by Race/Ethnicity

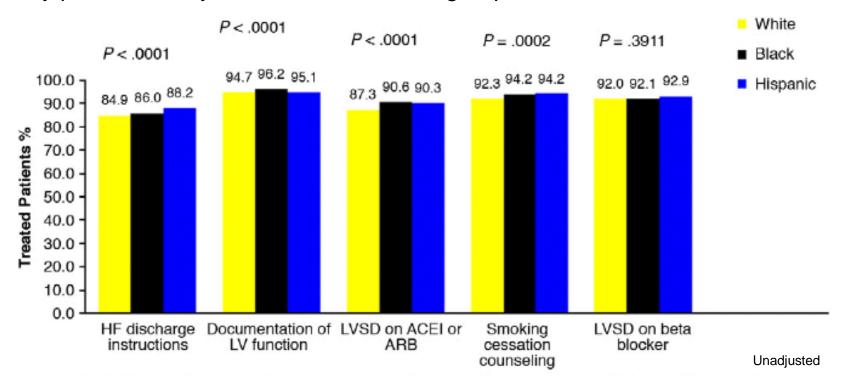| Trends in "All-or-None HF Care Measure* by Race/Ethnicity	Unadjusted Odds Ratio	Adjusted** Odds Ratio
White (Year 1 vs. Baseline)	1.60	1.55
White (Year 2 vs. Baseline)	2.34	2.29
White (Year 3 vs. Baseline)	3.07	3.04
Black (Year 1 vs. Baseline)	1.70	1.74
Black (Year 2 vs. Baseline)	2.32	2.40
Black (Year 3 vs. Baseline)	3.18	3.28
Hispanic (Year 1 vs. Baseline)	1.43	1.39
Hispanic (Year 2 vs. Baseline)	2.00	2.00
Hispanic (Year 3 vs. Baseline)	2.48	2.46

*"All-or-None HF Care Measure" = 100% adherence to al 4 HF care measures plus B-Blocker use in patients with LV systolic dysfunction

**Adjusted variables include age, gender, body mass index, insurance, medical history, systolic blood pressure and hospital characteristics

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Results - Quality of Care by Race/Ethnicity

• With few exceptions, individual HF core measures were similar for Black, Hispanic, and White patients. When there were differences in core measures, they predominantly favored nonwhite subgroups

Unadjusted

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Results - Quality of Care by Race/Ethnicity

- After adjusting for
    - age, gender, body mass index, insurance information, systolic blood pressure, medical history, and hospital characteristics;

    - Black patients remained more likely to have LV ejection fraction assessment performed and documented compared with Whites

- However, differences in the provision of HF discharge instructions in Hispanic compared with white patients dissipated

- Compared with white patients with LV systolic dysfunction, black patients were less likely to have β-blocker therapy prescribed at the time of discharge

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Results - Quality of Care by Race/Ethnicity

Heart Failure Care Measures Outcome/Category	Unadjusted Odds Ratio	Adjusted* Odds Ratio
HF patients discharged home with 6 instructions		
Black vs. White	1.02	1.05
Hispanic vs. White	.90	.93
HF patients with documentation of LV function		
Black vs. White	1.16	1.35
Hispanic vs. White	1.05	1.02
HF patients with smoking history discharged with smoking cessation counseling		
Black vs. White	1.15	1.05
Hispanic vs. White	1.13	.96
HF patients with LSVD discharged on ACEI/ARB		
Black vs. White	1.38	1.05
Hispanic vs. White	1.13	.96
HF patients with LSVD discharged on B-Blocker		
Black vs. White	1.03	.84
Hispanic vs. White	1.10	.95

*Adjusted variables include age, gender, BMI, insurance, medical history, systolic blood pressure and hospital characteristics

Results - Quality of Care by Race/Ethnicity

• Adherence to GWTG-HF measures as a function of race/ethnicity revealed some notable differences.

  • Black patients with chronic or recurrent atrial fibrillation were less likely than white patients to be discharged on warfarin

  • and less likely to be discharged with systolic and diastolic blood pressure <140/90 mm Hg

• Hispanic and black patients, after adjusting for clinical and hospital characteristics, were less likely than white patients to have an ICD implanted

Results - Quality of Care by Race/Ethnicity

GWTG-HF Care Measure Outcome/Category	Category	Unadjusted Odds Ratio	Adjusted* Odds Ratio
HF patients with recurrent or chronic atrial fibrillation discharged on warfarin	Black vs. White Hispanic vs. White	.90 .90	.77 .82
HF patients with LSVD discharged with aldosterone antagonist	Black vs. White Hispanic vs. White	1.30 1.10	1.10 .95
HF patients with LSVD discharged on evidence B-Blocker	Black vs. White Hispanic vs. White	1.02 1.01	.92 .95
All HF patients with LSVD discharged on hydralazine and isosorbide dinitrate combination	Black vs. White Hispanic vs. White	1.84 1.29	1.97 1.30
HF patients discharged with systolic BP <140 mm Hg and diastolic BP <90 mm Hg	Black vs. White Hispanic vs. White	.63 .74	.82 .93
ICD Implantation	Black vs. White Hispanic vs. White	.526 .816	.452 .589

*Adjusted variables include age, gender, BMI, insurance, medical history, systolic blood pressure and hospital characteristics

Results - Outcomes

• The overall inpatient mortality for individuals hospitalized for HF in the GWTG-HF program was 3.0%.

• Mortality was highest in white patients (3.5%), followed by Hispanic patients (2.4%) and black patients (1.7%)

• In unadjusted analyses as well as analyses adjusted for age and gender; Black and Hispanic patients had a lower odds of death compared with White patients

• Adjusting for differences in clinical and hospital characteristics, blacks compared with whites were more likely to have a longer hospitalization

• Despite differences in cardiovascular risk factors and in-hospital mortality, length of stay did not vary significantly among Hispanic and white patients hospitalized for HF

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Results - Outcomes

Characteristics	White (n=56,266)	Black (n=17,775)	Hispanic (n=4760)
Mortality			
Overall, %	3.5	1.7	2.4
Length of Stay, Days, Mean ± SD	5.6 ± 7.2	5.8 ± 8.5	6.1 ± 9.5

Mortality	Category	Unadjusted Odds Ratio
Unadjusted	Black vs. White	.49
	Hispanic vs. White	.63
Adjusted by Age and Gender	Black vs. White	.64
	Hispanic vs. White	.77
Adjusted by age, gender, and other patient characteristics	Black vs. White	.69
	Hispanic vs. White	.83
Adjusted by patient and hospital characteristics	Black vs. White	.69
	Hispanic vs. White	.81

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Limitations

• Although the GWTG-HF registry provides detailed data to assess the characteristics and treatment patterns of patients hospitalized with HF in a nonclinical trial setting, our analysis has several limitations

• Although trained personnel abstracted relevant data, these data were collected by medical chart review and are dependent upon the accuracy and completeness of documentation and abstraction

• The attribution of race and ethnicity was based on documentation in the medical record, which may be less reliable than self-report

• Moreover, Hispanic ethnicity represents a heterogeneous population. In the United States, the majority of Hispanics are of Mexican origin (64%), with Puerto Ricans (9%),Cubans (3.4%), and Dominicans (2.8%) constituting the other major national groups.

Limitations

- In this study, Hispanic patients were not further subcategorized according to national origin or geographic region of the United States

- Because of the large number of patients in the registry, some small differences that may be of little clinical relevance have P values indicating a high degree of statistical significance

- Data were obtained from patients enrolled in a voluntary quality improvement initiative, and the characteristics and treatment patterns may not reflect those of the general HF population not cared for in these hospitals

- In addition, these individuals were hospitalized with HF and may not represent the ambulatory cohort of patients with HF

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Limitations

•However, findings from other HF registries and analyses of ambulatory HF patients have indicated that patients hospitalized with HF have similar characteristics to those from other national data sets and that data from this registry may be representative of data on a national level

•Medication use was as reported by patients and as documented in the medical record. Actual adherence rates may have been lower than reported, and compliance with medical therapy is not a certainty

•Lastly, there were no direct measures of socioeconomic status or bias in GWTG-HF; thus, the contribution of certain elements affecting similar or disparate health care can only be inferred but not proven with these data

•This study was not a prospective randomized trial, and residual measured and unmeasured confounders may have influenced outcomes

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Conclusions

This is among the largest studies to characterize the clinical presentation, delivery of HF care, and outcomes for patients hospitalized with HF in a diverse population inclusive of Hispanics.

- Study had 4 main findings:
  1. Hispanic and black patients relative to white patients hospitalized with HF were much younger and had more potentially modifiable risk factors, including diabetes mellitus and hypertension
  2. Quality of care was similar or higher in Hispanic and black patients compared with white patients among hospitals participating in the GWTG-HF program.
  3. HF care improved substantially and equitably in each racial/ethnic group over time
  4. With similar to higher quality of care, Hispanic and black HF patients had lower risk-adjusted inpatient mortality relative to whites HF patients

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Conclusions

• In this very large, diverse racial/ethnic cohort of patients hospitalized with HF at institutions from all regions of the country over a 3-year period, we found substantial differences in baseline characteristics among black, Hispanic, and white patients, particularly in age of presentation.

• The strikingly younger age and high prevalence of obesity, hypertension, and diabetes mellitus among Hispanic and black patients indicate that health improvement efforts should focus on early prevention of these risk factors in an attempt to reduce the incidence of HF and its long-term morbidity and mortality in these populations

• Despite having more cardiovascular risk factors and some indicators of more advanced HF, black and Hispanic patients with HF had lower rates of in-hospital mortality than white patients.

Conclusions

• Within the context of a hospital-based HF quality improvement program, racial/ethnic disparities in care were not present; and consistent, equitable care was provided to black, Hispanic, and white patients

• Furthermore, substantial and equitable improvements in care quality were observed over the study period in the GWTG-HF program for each racial/ethnic group

• Expansion of national strategies for the hospital-based implementation of quality improvement in HF care should be considered as a plausible strategy to address disparate health care