utmb Health
Center to Eliminate
Health Disparities

DOCUMENTING HEALTH AND HEALTHCARE DISPARITIES IN THE UTMB PATIENT AND COMMUNITY POPULATION

THE 3RD DISPARITY DOCUMENTATION REPORT

FULFILLING DSRIP PERFORMANCE MEASURE I-11.1

Center to Eliminate Health Disparities (CEHD)

University of Texas Medical Branch (UTMB)

301 University Blvd, Galveston, TX 77555-0920

cehd@utmb.edu

September, 2016

Contributing Authors

Wei-Chen Lee, Ph.D., weilee@utmb.edu
Karl Eschbach, Ph.D., kaeschba@utmb.edu
Hani Serag, MD, haserag@utmb.edu
Kenneth D. Smith, Ph.D., kennsmit@utmb.edu

Acknowledgements

We are very grateful to the support from UTMB Office of the President-Waiver Operations, Office of Health Policy and Legislative Affairs (HPLA), Clinical Data Management, Oliver Center for Patient Quality and Safety, Admitting & Registration Services, and Ambulatory Training & Development.

- Center to Eliminate Health Disparities. (2016). Documenting Health and Healthcare Disparities in the UTMB Patient and Community Population: The 3rd Disparity Documentation Report. Galveston, TX: University of Texas Medical Branch. Available at: http://www.utmb.edu/hpla/health-disparities/publications.

The project that is the subject of this report was approved by Texas Health and Human Services Commission (HHSC) and conducted by members of Center to Eliminate Health Disparities with the assistance of Dr. Karl Eschbach from Department of Internal Medicine-Geriatric Medicine. The views presented in this report are those of CEHD and are not necessarily those of the funding agencies.

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INTRODUCTION

A) RACE, ETHNICITY, AND LANGUAGE: THE REAL DATA PROJECT

The UTMB Center to Eliminate Health Disparities (CEHD) chose the REAL Data project on Race, Ethnicity and Language (REAL) disparities as one of its selected projects under the State of Texas 1115 Medicaid Waiver. The purpose of the project is to use the growing set of information resources in the hospital's electronic health record (EHR) and administrative data systems to identify disparities in health and health care in the UTMB patient population. The ultimate goal of this project is to improve the equitable delivery of high quality care to all racial and ethnic groups in our diverse patient population.

This is CEHD's third disparities report focusing on disparities in patients diagnosed with Type 2 Diabetes. Data are presented on three racial and ethnic populations in the UTMB patient population: Non-Hispanic Whites, Non-Hispanic Blacks, and Hispanics across three successive reports from DY3 to DY5.

In the first disparities report submitted in April 2015 (DY3), the REAL Data Project team has identified three areas of special focus for targeted intervention:

1. Elevated rates of low and very low birthweight among African American neonates,
2. Low rates of breastfeeding among Hispanic and African American mothers, and
3. High rates of ambulatory care sensitive admissions from UTMB's core service area in Galveston Island and Bolivar Peninsula.

Followed by the disparities in Core Measures found in DY3, we further targeted quality of care for heart failure patients in the second disparities report submitted in April 2016 (DY4). The REAL Data Project team has highlighted another three disparities including:

1. Higher percentage of African American patients admitted for combined heart failure (systolic and diastolic) than non-Hispanic white and Hispanic patients,
2. Higher percentage of African American patients readmitted within 6 months after the first discharge for heart failure, and
3. Longer length of stay per visit for African American patients with heart failure.

Followed by the third disparity in one of ambulatory sensitive conditions found in DY3, we targeted quality of care for diabetic patients in this current disparities report (DY5). The REAL Data Project team has brought attention to three disparities in UTMB patients with Type 2 Diabetes including:

1. Higher percentage of African American patients diagnosed with macrovascular associated comorbidities of Type 2 diabetes including hypertension, ischemic diseases, and stroke,
2. Higher percentage of African American patients diagnosed with microvascular complications of Type 2 diabetes including retinopathy, ophthalmic conditions, and neuropathy, and
3. Higher percentage of African American patients having obesity problems (BMI>=30.0) and are under insulin utilization.

Both heart failure and diabetes are chronic diseases that impact patient's quality of life. In addition, literature has shown that racial minorities suffer economic and social disadvantages. It is the priority of population health initiative to identify health disparities and support racial minorities to manage their chronic conditions. More details about improving quality of care will be discussed in the 3rd Improvement Plan.

B) Contents and organization of the Report

The report is organized into three sections. In the first section, we have used UTMB's inpatient and outpatient data of patients listed on the 2015 diabetes registry to identify three disparities. In the second section, we have used UTMB's inpatient data again to update three disparities in heart failure which we earlier reported in DY4 period. While we found that length of stay has been decreased, the readmission rate was increased in this year. In the third section, we have used UTMB's inpatient data as well to update core measures disparities reported in DY3 period. The breastfeeding rate has increased for all racial groups but the gap between whites and racial minorities remain. Following that, we updated the frequency and percent of newborns by birthweight and race/ethnicity in the section 4. The low birthweight problem has been reduced and the disparity was also improved compared to the previous years. Finally, we updated the number of encounters related to ambulatory care sensitive conditions in the section 5. Like the finding in DY4, African Americans are more likely to have heart failure and hypertension conditions than another three racial groups. All of the disparities presented in this DY5 document will be continuously monitored and reported in DY6 period.

SECTION 1: TOP 3 DISPARITIES - CHARACTERIZATION OF TYPE 2 DIABETES BURDEN BY RACE AND ETHNIC GROUPS AT UTMB

Abstract

Background: Type 2 diabetes is the global public health burden. In order to achieve the goal of Healthy People 2020, eliminating disparities in diabetes health outcomes, it is important to assess diabetes disparities and identify effective improvement plans to address disparities. The purpose of this report is to characterize Type 2 Diabetes burden on patients with respect to race and ethnicity. Methods: This is a secondary data analysis using one medical center's patient data from 01/01/2012 to 03/31/2016. The key outcomes include the prevalence of complications, associated comorbidities, and use of insulin. Racial group comparisons were performed using chi-square analysis with 0.05 level of significance and all analyses were performed by Stata 14.0. Results: There were 22,087 patients older than 18 years old making 602,855 visits. Of them, 10,238 are non-Hispanic whites, 4,909 non-Hispanic blacks, and 6,401 Hispanic patients. Our analysis indicated that non-Hispanic black patients are more likely to have hypertension, ischemic disease, and stroke compared to non-Hispanic white and Hispanic patients ($p<0.001$). Likewise, black patients are at higher risk of having kidney, ophthalmic, and neurological complications than another two groups ($p<0.001$). Finally, 53.6% of black patients are on the use of insulin higher than white (48.3%) and Hispanic (44.5%) patients. Discussion and Conclusion: Our report suggest three major differences in prevalence of complications and treatments for African American patients with Type 2 Diabetes compared to Caucasian and Hispanic patients. It is likely that three differences found in our report are linked to disadvantages in social economic status (SES) that subsequently increase risk of diabetes among African American patients. More prevention strategies are recommended to help racial minorities better manage their health.

Introduction

Type 2 diabetes is a global public health concern. By 2012, 29.1 million Americans, or 9.3% of the total population, had diabetes.[1] Risk factors for its development include older age, family history of diabetes, physical inactivity, and race/ethnicity. According to 2013 Texas Diabetes Surveillance report,[2] 11.0% of adults have diabetes and 12.1 per 10,000 adults are hospitalized for Type 2 diabetes every year. If breaking down into different race/ethnicity categories, 12.9% of non-Hispanic black adults have diabetes. It is the highest prevalence compared to 9.9% of non-Hispanic white adults and 12.7% of Hispanic adults. It is also noted that blacks were more than twice as likely to die from diabetes as whites. Next, if breaking down into gender categories, men were found more likely to be obese and have diabetes than women. However, women are more likely to not participate in leisure physical activity than men. Overall, Medicaid spent more than $280 million on beneficiaries with diabetes and spent $1,000 per beneficiary with diabetes on average. In order to achieve the goal of Healthy People 2020,[3] eliminating disparities in diabetes health outcomes, it is important to assess diabetes disparities in UTMB patients and identify effective improvement plans to address disparities. The purpose of this report is to characterize Type 2 Diabetes burden in UTMB patients with respect to race and ethnicity.

Data Source

The data for this report was drawn from UTMB's Electronic Medical Records (EMR) from 01/01/2012 to 03/31/2016. The inclusion criteria are: (1) adults aged 18 or older in the year of 2016, (2) have basic demographics information including race, ethnicity, gender, and age, (3) currently registered on UTMB diabetes registry report, and (4) have visited UTMB either outpatient or inpatient department at least once during the research period. In sum, there are 22,087 individual patients included in this report.

Following that, patients were classified into three groups based on their self-reporting race and ethnicity: non-Hispanic white, non-Hispanic black, and Hispanic populations. Three targeted outcomes for this report are displayed as below and the ICD-9 and ICD-10 diagnosis codes used in this report could be found in the Appendix. Group comparisons were performed using chi-square analysis with 0.05 level of significance across all three categorical outcomes.

(1) Race/Ethnic differences in the prevalence of macrovascular associated comorbidities of Type 2 diabetes: hypertension, ischemic diseases, and stroke;
(2) Race/Ethnic differences in the prevalence of microvascular complications of Type 2 diabetes: retinopathy, ophthalmic conditions, and neuropathy;
(3) Race/Ethnic differences in Body Mass Index (BMI) and the use of insulin.

Findings

From the first quarter of 2012 to the first quarter of 2016, there were 22,087 patients older than 18 years old making 602,855 visits. Of them, 10,238 are non-Hispanic whites, 4,909 non-Hispanic blacks, and 6,401 Hispanic patients. Second, 49.2% of white patients are female, and this number is 55.0% for blacks, and 60.7% for Hispanics. Third, the average age of whites is 61.5 years old, followed by 59.3 for blacks and 54.7 for Hispanics. Fourth, Hispanic patients are less likely to have tobacco use, alcohol addiction, and illegal drug abuse compared to whites and blacks. Finally, most encounters made by Hispanic patients were covered by charity fund while most encounters made by black patients were covered by either Medicaid or Medicare. Relatively, most encounters made by white patients were covered by commercial health insurance.

***1st Race/Ethnic disparities in selected macrovascular associated morbidities*.** The total number of patients with blood pressure tests is different from the total number of patients with diagnosis. Nevertheless, our analysis indicated that non-Hispanic black patients are more likely to have hypertension, ischemic disease, and stroke compared to non-Hispanic white and Hispanic patients. Approximately 45.3% of black patients have hypertension, the risk factor for other complications of diabetes. The Chi-Square tests show statistical significance ($p<0.001$), pointing out the macrovascular complications burden heavily affecting black patients at UTMB.

Table 1. Racial/Ethnic Disparities in Associated Comorbidities

	White	Black	Hispanic	p-value
Hypertension	(N=10,171)	(N=4,847)	(N=6,343)	p<0.001
No	6,520 (64.1%)	2,653 (54.7%)	4,282 (67.5%)	
Yes	3,651 (35.9%)	2,194 (45.3%)	2,061 (32.5%)	
Ischemic Disease	(N=9,979)	(N=4,747)	(N=6,064)	p<0.001
No	7,973 (79.9%)	3,788 (79.8%)	5,178 (85.4%)	
Yes	2,006 (20.1%)	959 (20.2%)	886 (14.6%)	
Stroke	(N=9,979)	(N=4,747)	(N=6,064)	p<0.001
No	9,664 (96.8%)	4,546 (95.8%)	5,942 (98.0%)	
Yes	315 (3.2%)	201 (4.2%)	122 (2.0%)	

2nd Race/Ethnic disparities in microvascular complications. The second test also indicates that black patients are more likely to have kidney, ophthalmic and neurological complications (p<0.001). Relative to another two groups, more than 10% of black patients have each kind of complication. The higher number of complications may lead to blindness, organ damage, amputation, and amputation-related mortality. Consequently, it is imperative to help black patients manage their health.

Table 2. Racial/Ethnic Disparities in Microvascular Complications

	White	Black	Hispanic	p-value
Kidney	(N=9,979)	(N=4,747)	(N=6,064)	p<0.001
No	9,306 (93.3%)	4,258 (89.7%)	5,585 (92.1%)	
Yes	673 (6.7%)	489 (10.3%)	479 (7.9%)	
Ophthalmic	(N=9,979)	(N=4,747)	(N=6,064)	p<0.001
No	9,404 (94.2%)	4,219 (88.9%)	5,457 (90.0%)	
Yes	575 (5.8%)	528 (11.1%)	607 (10.0%)	
Neurological	(N=9,979)	(N=4,747)	(N=6,064)	p<0.001
No	8,855 (88.7%)	4,185 (88.2%)	5,613 (92.6%)	
Yes	1,124 (11.3%)	562 (11.8%)	451 (7.4%)	

3rd Race/Ethnic Difference-BMI & Use of Insulin. The third test compared patients' BMI and the use of insulin among three groups. Insulin is an essential therapeutic agent for glycemic control but pain, weight gain, and hypoglycemia may occur with insulin therapy. Although we did not aim to examine the casual relationship between BMI and the use of insulin, we discovered that black patients are more likely to have obesity and use of insulin (p<0.001). To start and adjustment of insulin treatment requires a more algorithmic approach with modification for individual patient's needs.

Table 3. Racial/Ethnic Disparities in BMI & Use of Insulin

	White	Black	Hispanic	p-value
Obesity	(N=9,810)	(N=4,753)	(N=6,173)	p<0.001
Normal	3,925 (40.0%)	1,762 (37.1%)	2,476 (40.1%)	
Stage 1	2,677 (27.3%)	1,234 (26.0%)	1,781 (28.9%)	
Stage 2	3,208 (32.7%)	1,757 (37.0%)	1,916 (31.0%)	
Insulin	(N=10,450)	(N=4,965)	(N=6,512)	p<0.001
No	5,401 (51.7%)	2,303 (46.4%)	3,613 (55.5%)	
Yes	5,049 (48.3%)	2,662 (53.6%)	2,899 (44.5%)	

Discussion

Our report suggest three major differences in prevalence of complications and treatments for African American patients with Type 2 Diabetes compared to Caucasian and Hispanic patients. Based on the literature,[4,5] it is likely that three differences found in our report are linked to disadvantages in social economic status (SES) that subsequently increase risk of diabetes among African American patients. Since UTMB's EMR does not have clinical information from other healthcare providers, we are not able to evaluate the quality of care that patients received in other settings. This report only seeks to characterize the disease burden and experienced disparities at UTMB patients. The detailed strategies to address disparities in diabetes will be discussed in the improvement plan report.

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SECTION 2: UPDATED DISPARITIES IN UTMB PATIENTS HOSPITALIZED WITH HEART FAILURE

Abstract

Background: We have used a three-year data and identified three disparities in patients hospitalized with heart failure in DY4 report (April, 2016). This is the updated report to compare the performance using a four-year data. Heart failure (HF) is one of the leading causes of hospitalization and readmissions. Our study aimed to examine racial disparities in heart failure patients including onset, mortality, length of stay (LOS), direct costs, and readmission rates. Methods: This is a secondary data analysis. We analyzed the risk-adjusted inpatient data of all patients admitted with HF to one health academic center. We compared five health outcomes among three racial groups (white, black, and Hispanic). Results: There were 1,006 adult patients making 1,605 visits from 10/01/2011 to 09/30/2015. Most black patients were admitted in younger age (<65) than other racial groups which indicates the needs for more public health preventions. With risk adjustments, the racial differences in LOS and readmission rates remain. Discussion and Conclusion: We stratified health outcomes by race/ethnic and type of HF. The findings suggest that further studies to uncover underlying causes of these disparities are necessary.

Introduction

Heart failure (HF) is a globally growing epidemic and one of the leading causes of hospitalization and readmission in the US.[1] It affects more than 5.7 million Americans with around half a million new cases,[1] costs the nation $32 billion,[2] and contributes to 1.02 million discharges every year.[3] A recent longitudinal study reports that the age-adjusted death rate for HF for African American population was 91.5 deaths per 100,000 population, higher than the HF death rates white and Hispanic populations - 87.3 and 53.3 respectively.[4] Likewise, Sharma and colleagues pointed out that HF is more prevalent in African Americans than in whites, imposing higher rates of death, morbidity, and malignant course development.[5] Accordingly, it is imperative to explore these notable racial/ethnic disparities and identify solutions for preventable hospitalizations.

Heart failure is a condition in which the heart cannot fill with enough blood or pump enough blood to the rest of the body.[6] About half of people with HF die within 5 years after being diagnosed.[2,6] Heart failure is categorized as either systolic, diastolic, or combined, based on the signs of congestion with or without significant left ventricular contraction.[7] Most cases with systolic HF are a result of end-stage coronary artery disease, which means patients either have a history of myocardial infraction or a chronically under perfused myocardium. Thus, early recognition of symptoms is important to prevent HF which causes heavy burdens on patients and on society by high utilization of medical services.[8]

Racial and ethnic disparities in cardiovascular diseases including HF are well identified and documented.[5,9,10] Nevertheless, it is unknown whether a person's race or ethnicity put them more at risk for having a certain type of heart failure and how it affects different aspects of hospitalization. The current study aims to identify and describe the racial/ethnic disparities in

terms of the onset of different HF types and utilization of inpatient care by analyzing a four-year hospital inpatient data. The number of HF admissions of this hospital accounted for more than 90% of total HF admissions in Galveston County.[11] Given it is a complete patient data rather than a random survey sample, the findings may give insights of a profile of racial minorities with HF compared to white patients. The findings may also inform how to orient resources and actions to eliminate racial/ethnic disparities in health systems.

Methods

(a) Study Population

The data of this secondary data analysis was drawn from University HealthSystem Consortium (UHC) database, a collection of quarterly outpatient and inpatient data from academic medical centers (AMCs) nationwide.[12] The study population included patients with HF as their principal diagnosis,[13] and patients who discharged from the inpatient department of one AMC between 10/01/2011 and 09/30/2015.

Admissions for hospice, chemotherapy, radiation therapy, dialysis, prisoner, and medical tourism were excluded. We classified each patient's principal diagnosis as congestive HF (ICD-9: 428.0), left HF (ICD-9: 428.1), systolic HF (ICD-9: 428.2), diastolic HF (ICD-9: 428.3), combined systolic and diastolic HF (ICD-9: 428.4), or unspecified HF (ICD-9: 428.9). We also categorized patient's race/ethnicity into non-Hispanic white, non-Hispanic African American, or Hispanic populations. Patients younger than 18, patients in other race categories (e.g., Asian or Native Hawaiians), and patients admitted for left HF or unspecified HF were eventually excluded due to small sample size (<10).

(b) Study Variables

The UHC system incorporates risk adjustment models for cost, length of stay (LOS), potentially avoidable complications, readmissions, and mortality to reflect patient complexity of its hospital members.[14] The variables used in the adjustment model are age, gender, insurance plan, admission source, admission status, and a common group of comorbidities defined by UHC. The categories of primary payer are commercial plans, Medicare, Medicaid and indigent, self-pay, and others (e.g. VA). The patient's admission source is either facility or non-facility. Patient's status at admission is either emergency or not emergency.

The independent variables are race/ethnicity, and type of heart failure. The dependent variables include the prevalence of each type of HF, UHC-adjusted LOS (duration between date of admission and date of discharge) per visit, UHC-adjusted direct cost (e.g. healthcare provider time) per day, UHC-adjusted mortality, and UHC-adjusted HF-related readmission rates (i.e. percentage of patients being readmitted to the same hospital within 90 days after the previous discharge). With the application of adjustment models, UHC's members can directly compare each other's performance to gain valuable insights from other members with leading practices.[15]

(c) Statistical Analysis

The univariate analysis contained both encounter-level and patient-level information on patients' characteristics. The bivariate analysis examined the associations of race/ethnicity with type of HF and other patients' characteristics present on admission. Continuous variables were reported as mean and range and compared using Student's t test. Categorical variables were compared between groups using χ^2 statistics. The multivariate analysis addressed the racial/ethnic disparities in the risk-adjusted outcome variables.[14] Particularly for the binary outcome (readmitted in 90 days/not readmitted), we employed generalized estimating equation (GEE) models with an independent working correlation matrix. All analyses were conducted by Stata 14[16] and a p-value less than 0.05 was considered as statistical significance.

Findings

During four years, there were 1,006 individual patients with 1,605 visits (Table 4). Half of patients were whites and 45.4% were female. Around 64.6 percent of encounters were covered by Medicare. In the first visit, 37.5% of patients were admitted for diastolic HF. Among all encounters, diastolic HF also accounted for the plurality (35.0%). Most patients came from non-facility (i.e. their homes) in emergency (>74%).

Table 4. Analysis of Characteristics by Individual-Patient Level and Encounter Level

	Patient (N=1,006)	**Encounter (N=1,605)**
Race/Ethnicity		
Non-Hispanic White	503 (50.0%)	766 (47.7%)
Non-Hispanic Black	364 (36.2%)	632 (39.4%)
Hispanic Origin	139 (13.8%)	207 (12.9%)
Gender (Female)	457 (45.4%)	691 (43.1%)
Age (Mean, Range)	66.1 (19~98)*	65.4 (19~98)
Primary Payer		
Commercial	83 (8.3%)*	111 (6.9%)
Medicaid	106 (10.4%)*	190 (11.8%)
Medicare	623 (61.9%)*	1,037 (64.6%)
Self-Pay	147 (14.6%)*	200 (12.5%)
Others	47 (4.7%)*	67 (4.2%)
Primary Diagnosis (ICD-9-CM)		
Congestive HF (428.0)	129 (12.8%)*	182 (11.3%)
Systolic HF (428.2)	275 (27.3%)*	468 (29.2%)
Diastolic HF (428.3)	377 (37.5%)*	561 (35.0%)
Combined HF (428.4)	225 (22.4%)*	394 (24.6%)
Source of Admission (Facility)	91 (9.1%)*	134 (8.3%)
Status at Admission (Emergency)	788 (78.3%)*	1,189 (74.1%)

Note: * patient's information in the first visit

The bivariate analysis (Table 5) demonstrates the association of race/ethnicity with other patient characteristics. There are statistically significant differences in type of HF, gender, age, and primary payer for different racial/ethnic groups. While white and Hispanic patients were mainly admitted for diastolic HF (38.8% and 41.1%), more African American patients were admitted for systolic HF and combined HF (30.7%). Further, African American patients were younger and more likely to have Medicaid as a primary payment source (18.0%) compared to whites (7.8%) or Hispanic (7.7%). Finally, more Hispanic encounters were visited by female (50.7%) and self-pay (18.8%) compared to their racial counterparts.

Table 5. Patient's Characteristics by Race/Ethnicity at Encounter Level

	White	**African American**	**Hispanic**
Total (p<0.001)	766 (100.0%)	632 (100.0%)	207 (100.0%)
Congestive HF	89 (11.6%)	65 (10.3%)	28 (13.5%)
Systolic HF	228 (29.8%)	194 (30.7%)	46 (22.2%)
Diastolic HF	297 (38.8%)	179 (28.3%)	85 (41.1%)
Combined HF	152 (19.8%)	194 (30.7%)	48 (23.2%)
Gender (Female) (p=0.018)	307 (40.1%)	279 (44.2%)	105 (50.7%)
Age (Mean, Range) (p<0.001)	69.6 (20~98)	60.5 (22~98)	65.2(19~91)
Primary Payer (p<0.001)			
Commercial	44 (5.7%)	54 (8.6%)	13 (6.3%)
Medicaid	60 (7.8%)	114 (18.0%)	16 (7.7%)
Medicare	546 (71.3%)	364 (57.6%)	127 (61.4%)
Self-Pay	83 (10.8%)	78 (12.3%)	39 (18.8%)
Others	33 (4.3%)	22 (3.5%)	12 (5.8%)
Source of Admission (Facility) (p=0.606)	62 (8.1%)	51 (8.1%)	21 (10.1%)
Status at Admission (Emergency) (p=0.249)	559 (73.0%)	482 (76.3%)	148 (71.5%)

Table 6 illustrates the risk-adjusted health outcomes by patient's race/ethnicity and type of HF. If all encounters are taken into account, African American patients had significantly longer LOS per visit (6.74 days) than whites (5.91 days) or Hispanic (6.33 days). Additionally, a higher percentage of African Americans was readmitted within 90 days after the previous admission (25.5%) and this number is even higher for readmissions related to 180 days (31.5%). However, there are no racial/ethnic differences in cost or mortality.

Table 6. Risk-Adjusted Health Outcomes by Race/Ethnicity and Type of HF at Encounter Level

UHC Risk-Adjusted Mean and Standard Error	**Non-Hispanic White (N=766)**	**Non-Hispanic African American (N=632)**	**Hispanic (N=207)**
Average LOS per Visit (Days) (p=0.018)	5.91 (0.17)	6.74 (0.25)	6.33 (0.36)
Congestive HF (p=0.972)	5.01 (0.20)	5.07 (0.39)	4.94 (0.28)
Systolic HF (p=0.763)	7.14 (0.48)	7.67 (0.55)	7.29 (0.97)
Diastolic HF (p=0.086)	5.14 (0.11)	5.60 (0.19)	5.26 (0.21)
Combined HF (p=0.081)	6.11 (0.39)	7.44 (0.53)	8.12 (1.18)
Average Cost per Day ($) (p=0.536)	1913.21 (70.02)	1821.26 (53.95)	1928.78 (105.49)
Congestive HF (p=0.268)	1409.33 (66.25)	1609.48 (139.59)	1388.93 (69.28)
Systolic HF (p=0.277)	2558.56 (177.68)	2203.67 (133.86)	2554.25 (359.90)
Diastolic HF (p=0.780)	1467.45 (58.05)	1475.80 (53.71)	1543.40 (82.49)
Combined HF (p=0.106)	2111.20 (177.87)	1828.55 (83.99)	2326.72 (218.63)
Mortality (p=0.483)	0.022 (0.002)	0.020 (0.002)	0.025 (0.005)
Congestive HF (p=0.334)	0.014 (0.002)	0.015 (0.005)	0.025 (0.009)
Systolic HF (p=0.348)	0.024 (0.004)	0.018 (0.002)	0.016 (0.003)
Diastolic HF (p=0.491)	0.016 (0.002)	0.021 (0.004)	0.021 (0.006)
Combined HF (p=0.222)	0.033 (0.008)	0.022 (0.004)	0.044 (0.017)
90-Day Readmission (Yes) (p=0.007)	143 (18.7%)	158 (25.0%)	37 (17.9%)
Congestive HF (p=0.591)	15 (16.9%)	11 (16.9%)	7 (25.0%)
Systolic HF (p=0.148)	44 (19.3%)	53 (27.3%)	11 (23.9%)
Diastolic HF (p=0.121)	56 (18.9%)	31 (17.3%)	8 (9.41%)
Combined HF (p=0.012)	28 (18.4%)	63 (32.5%)	11 (22.9%)
6-Month Readmission (Yes) (p=0.009)	191 (24.9%)	199 (31.5%)	48 (23.2%)
Congestive HF (p=0.645)	18 (20.2%)	14 (21.5%)	8 (28.6%)
Systolic HF (p=0.148)	61 (26.8%)	69 (35.6%)	14 (30.4%)
Diastolic HF (p=0.134)	72 (24.2%)	38 (21.2%)	12 (14.1%)
Combined HF (p=0.020)	40 (26.3%)	78 (40.2%)	14 (29.2%)

While only focusing on the effects of race/ethnicity, Table 7 shows several statistically significant differences in terms of LOS per visit ($p<0.01$) and probability of 90-day readmission ($p<0.01$) for African American patients. Surprisingly, the differences remain after adding the type of HF. Both model 2 and model 8 show that African American patients still stayed longer or had a higher likelihood to be readmitted than non-Hispanic white patients (coefficient>0, $p<0.05$). Being an African American predicts a 0.63 day increase in LOS per visit compared to being white regardless of type of HF. Likewise, being an African American is 1.36 (Odds Ratio $=e^{0.31}$) more likely to be readmitted than being a non-Hispanic white.

Table 7. Linear or Logistic Regression Analysis of Risk-Adjusted Health Outcomes by Race/Ethnicity and Type of HF

UHC-Risk Adjusted Coefficient (95%CI)	(1) LOS/Visit M1	M2	(2) Cost/Day M3	M4
Race/Ethnicity				
Black	0.83[b] (0.26~1.41)	0.63[c] (0.06~1.20)	-91.94 (-268.7~ 84.9)	-160.1 (-333.3~ 13.18)
Hispanic	0.42 (-0.42 ~1.25)	0.52 (-0.30 ~1.35)	15.57 (-242.2~ 273.3)	68.79 (-181.9~ 319.5)
Type of HF				
Systolic	-	2.35[a] (1.43~3.27)	- -	946.4 (666.8~1226)
Diastolic	-	0.31 (-.059 ~1.21)	-	-1.99 (-274.7~ 270.7)
Combined	-	1.92[a] (0.97~2.87)		544.5 (257.2~831.7)

Note: [a]p<0.001; [b]p<0.01; [c]p<0.05. M: Model.

Table 7. Linear or Logistic Regression Analysis of Risk-Adjusted Health Outcomes by Race/Ethnicity and Type of HF (Contd.)

UHC-Risk Adjusted Coefficient (95%CI)	(3) Mortality M5	M6	(4) 90-Day Readmission M7	M8
Race/Ethnicity				
Black	-0.002 (-0.01~ 0.004)	-0.003 (-0.009~ 0.003)	0.35[b] (0.07~0.62)	0.31[c] (0.04~0.59)
Hispanic	0.004 (-0.005~ 0.013)	0.004 (-0.005~ 0.013)	-0.02 (-0.43~ 0.39)	-0.02 (-0.43~ 0.39)
Type of HF				
Systolic	-	0.005 (-0.005~ 0.016)	-	0.17 (-0.28~ 0.61)
Diastolic	-	0.002 (-0.007~ 0.012)	-	-0.06 (-0.51~ 0.38)
Combined	-	0.013[c] (0.003~0.023)	-	0.30 (-0.15~0.75)

Note: [a]p<0.001; [b]p<0.01; [c]p<0.05. M: Model.

Discussion

The second disparity report used a 3-year data to analyze health disparities in heart failure patients. This current report used a 4-year data with the same analysis method to evaluate whether the health disparities have been well addressed. Comparing two reports (Table 8), we

found that the prevalence of combined heart failure among African Americans is similar between two reports. African American patients are still more likely to have combined HF than another two groups. Next, the length of stay (LOS) actually has decreased from 7.1 days to 6.7 days for African American patients. However, the 6-month readmission rates has increased from 29.5% to 31.5%. The root causes of this change is unclear; therefore, we will propose to start from tracking the same group of patients after they are discharged, assessing their quality of life and self-care skills, and promoting more prevention strategies to prevent them from being readmitted to hospitals. We also recommend more culturally sensitive discharge programs to be implemented that address risk factors particularly affecting African Americans. Finally, we will continuously monitor the LOS and 6-month readmission rates of patients with heart failure. We will report all findings to our leadership and clinical partners to timely modify our improvement plans to better meet our goal of eliminating health disparities.

Table 8. Comparing Performance between DY4 and DY5

Disparity	**Percentage of Patients with Combined HF**		**Average LOS for Patients with HF**		**180-Day Readmission Rate for Patients with HF**	
	DY4	DY5	DY4	DY5	DY4	DY5
White	21.2%	19.8%	6.1 days	5.9 days	23.3%	24.9%
Black	30.4%	30.7%	7.1 days	6.7 days	29.5%	31.5%
Hispanic	21.6%	23.2%	5.9 days	6.3 days	20.2%	23.2%

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SECTION 3: UPDATED DISPARITIES IN UTMB INPATIENT CORE MEASURES

In this section, we provide the updated Core Measures using 2015 University HealthSystem Consortium (UHC) data (1/1/2015~12/31/2015). Core Measures are indicators used by health care systems to monitor the quality of care they provide. Due to the systematic change in reporting methodology, multiple Core Measures are no longer existing in the list or the targets are not established at the moment of reporting. We have marked the metric in different color to emphasize whether the target has been met (green), not met (orange), less than 6 cases (grey), or no longer on the list (yellow) in Table 9.

The DY3 report has identified the racial/ethnic disparities in breastfeeding rate. The metric has been improved afterwards. Because the data period used in three successive reports (DY3, DY4, and DY5) are different, we focus on comparing the metric between DY3 and DY5 which both used one complete year of data. The exclusive breastfeeding rate (PC-05) was 15% in DY3 and it significantly increased to 24% in DY5. In addition, the rate has increased for Hispanic (12% in DY3 and 19% in DY5), Whites (34% in DY3 and 41% in DY5), and Blacks (11% in DY3 and 22% in DY5). The gap between whites and racial minorities remains. More specific programs to support racial minorities to accept and practice breastfeeding are highly recommended.

Table 9. Update of Core Measures

Indicator Name	DY4 Report: July 1, 2014 – Dec 31,					DY5 Report: Jan 1, 2015 – Dec 31, 2015				
	At risk	All	Hispanic	White	Black	At risk	All	Hispanic	White	Black
AMI Acute Myocardial Infarction										
AMI-1 Aspirin at arrival	119	98	100	97	100	.				
AMI-2 Aspirin prescribed at discharge	114	100	100	100	100	.				
AMI-3 ACEI or ARB for LVSD	11	100	100	100	100	.				
AMI-8a PCI received within 90 mins of arrival	But	100	100	100	100	.				
AMI-10 Statin Prescribed at Discharge	108	99	100	98	100	.				
HF Heart Failure.										
HF-1 Discharge instructions	.	.	.	.	.	.				
HF-2 Evaluation of LVS function	123	98	100	97	100	.				
HF-3 ACEI or ARB for LVSD	42	100	100	100	100	.				
PN Pneumonia										
PN-3a Blood culture within 24 hrs of arrival at	9	89	100	100	.	.				
PN-3b Blood cultures in the ED prior to	.	.	.	.	.	.				
PN-6 Antibiotic selection for CAP-	25	88	100	85	75	.				
PN-6a Antibiotic selection for CAP--ICU	4	50	100	0	100	.				
PN-6b Antibiotic selection for CAP--non-ICU	21	95	100	100	67	.				
SCIP Surgical Care Improvement Project										
SCIP-Card-2 At risk--Beta Blocker	64	94	100	93	88	.				
SCIP-Inf-1 Infection Prevention										
SCIP-Inf-1a Overall	132	100	100	100	100	.				
SCIP-Inf-1b CABG	21	100	100	100	100	.				
SCIP-Inf-1c Other cardiac surgery	10	100	100	100	100	.				
SCIP-Inf-1d Hip arthroplasty	24	100	100	100	100	.				
SCIP-Inf-1e Knee arthroplasty	31	100	100	100	100	.				
SCIP-Inf-1f Colon surgery	15	100	.	100	100	.				
SCIP-Inf-1g Hysterectomy	29	100	100	100	100	.				
SCIP-Inf-1h Vascular surgery	2	100	.	100	.	.				

Indicator Name	DY4 Report: July 1, 2014 – Dec 31,					DY5 Report: Jan 1, 2015 – Dec 31, 2015				
	At risk	All	Hispanic	White	Black	At risk	All	Hispanic	White	Black
SCIP-Inf-2 Antibiotic Selection										
SCIP-Inf-2a - Overall	133	98	100	98	100	.				
SCIP-Inf-2b CABG	21	100	100	100	100	.				
SCIP-Inf-2c Other cardiac surgery	10	100	100	100	100	.				
SCIP-Inf-2d Hip arthroplasty	24	100	100	100	100	.				
SCIP-Inf-2e Knee arthroplasty	31	100	100	100	100	.				
SCIP-Inf-2f Colon surgery	15	93	.	89	100	.				
SCIP-Inf-2g Hysterectomy	30	97	100	92	100	.				
SCIP-Inf-2h Vascular surgery	2	100	.	100	.	.				
SCIP-Inf-3 Antibiotics Discontinued--24/48 Hours										
SCIP-Inf-3a Overall	128	96	100	96	89	.				
SCIP-Inf-3b CABG	19	89	100	93	50	.				
SCIP-Inf-3c Other cardiac surgery	10	100	100	100	100	.				
SCIP-Inf-3d Hip arthroplasty	22	100	100	100	100	.				
SCIP-Inf-3e Knee arthroplasty	31	97	100	95	100	.				
SCIP-Inf-3f Colon surgery	14	93	.	100	83	.				
SCIP-Inf-3g Hysterectomy	30	97	100	92	100	.				
SCIP-Inf-3h Vascular surgery	2	100	.	100	.	.				
SCIP-Inf-4 Cardiac --6 AM postop serum	31	100	100	100	100	.				
SCIP-Inf-6 Surgery--appropriate hair removal	183	100	100	100	100	.				
SCIP-Inf-9 Urinary catheter removed-postop	91	96	93	95	100	.				
SCIP-VTE-2 VTE Prophylaxis 24 hrs Pre/Post	121	100	100	100	100	.				
CAC Pediatric In-patient Asthma Care										
CAC-1 Relievers for In-patient Asthma										
CAC-1a Ages 2-17 Overall Rate	11	100	100	100	100	.				
CAC-1b Ages 2-4	6	100	100	100	100	.				
CAC-1c Ages 5-12	2	100	100	100	.	.				
CAC-1d Ages 13-17	3	100	.	.	100	.				

Indicator Name	DY4 Report: July 1, 2014 – Dec 31,					DY5 Report: Jan 1, 2015 – Dec 31, 2015				
	At risk	All	Hispanic	White	Black	At risk	All	Hispanic	White	Black
CAC-2a Systemic Corticosteroids--In-patient Asthma										
CAC-2a Ages 2-17 - Overall Rate	11	91	100	67	100	.				
CAC-2b Ages 2-4	6	83	100	50	100	.				
CAC-2c Ages 5-12	2	100	100	100	.	.				
CAC-2d Ages 13-17	3	100	.	.	100	.				
CAC-3 Home Management Plan of Care (HMPC)										
CAC-3 HMPC Document Given to	11	91	100	100	83	22	86	71	100	89
VTE Venous Thromboembolism Prophylaxis										
VTE-1 Overall	181	97	97	98	95	968	95	99	94	96
VTE-2 ICU	78	97	100	96	100	968	95	95	95	97
VTE-3 Patients with Anticoagulation Overlap	60	95	100	95	93	968	93	91	96	88
VTE-4 Patients Receiving UFH Therapy	57	100	100	100	100	.				
VTE-5 VTE Discharge Instructions	43	88	80	93	80	968	96	88	97	100
STK Stroke										
STK-1 Venous Thromboembolism (VTE)	63	95	90	97	94	165	97	100	96	97
STK-2 Discharged on Antithrombotic Therapy	54	100	100	100	100	165	100	100	100	100
STK-3 Anticoagulation Therapy for Atrial	4	75	100	100	50	165	100	100	100	100
STK-4 Thrombolytic Therapy	6	100	.	100	100	165	95	100	93	100
STK-5 Antithrombotic Therapy--Day 2	40	100	100	100	100	165	96	88	98	95
STK-6 Discharged on Statin Medication	41	100	100	100	100	165	100	100	100	100
STK-8 Stroke Education	35	100	100	100	100	165	100	100	100	100
STK-10 Assessed for Rehabilitation	63	100	100	100	100	165	100	100	100	100
PC Perinatal Care Conditions										
PC-01 Elective Delivery	58	2	.	8	.	1155	6	4	11	.
PC-02 Cesarean Section	130	27	20	27	46	290	37	41	15	54
PC-03 Antenatal Steroids	11	100	100	100	100	1155	78	91	100	75
PC-05 Exclusive Breast Milk Feeding (EBMF)	213	22	18	37	6	432	24	19	41	22

Indicator Name	DY4 Report: July 1, 2014 – Dec 31,					DY5 Report: Jan 1, 2015 – Dec 31, 2015				
	At risk	All	Hispanic	White	Black	At risk	All	Hispanic	White	Black
PC-05a EBMF Considering Mothers Choice	96	49	43	64	20	326	23	16	43	26
IMM Immunization										
IMM-1a Pneumococcal Imm. - Overall	152	83	92	83	76	.				
IMM-1b Pneumococcal Imm. - Age 65+	84	90	100	88	88	.				
IMM-1c Pneumococcal Imm.- High Risk Age 6 -	68	74	83	76	58	.				
IMM-2 Influenza Immunization	189	85	86	87	79	1046	83	78	86	88

Color-coded target indicator:

Meets Target	Does Not Meet Target	No longer on the list or no targets established	< 6 Cases

SECTION 4: UPDATED DISPARITIES IN LOW BIRTH WEIGHTS OF UTMB NEWBORNS

This section provides the update of frequency and percent of newborns by birthweight and race/ethnicity using University HealthSystem Consortium (UHC) data. The data used for DY4 reporting only contains 2 quarters (1/1/2015~6/30/2015). To make a meaningful comparison, we merge the most recent 2-quarter data (7/1/2015~12/31/2015) with DY4 data to expand the data period to a full year. Next, we use APR-DRG system to classify birth weights into four categories from less than 1000 g to more than 2500 g. We further divide patients into four racial groups including Hispanic, white, black, and others.

In DY3 report (1/1/2014~12/31/2014), 17.5% (=4.1+2.6+10.8) of African American newborns were under 2500 g. This number significantly decreased to 14.3% (=1.4+1.8+11.2) in this current report (1/1/2015~12/31/2015). However, the gap between African American newborns and Hispanic newborns still exists. The difference in percentage of newborns over 2500g between Hispanic and black newborns was 10.4% in 2014 (=92.9%-82.5%). This number is 8.3% in 2015 (=94.0%-85.7%), which means the disparity has been addressed but more efforts are still needed. We will report this finding to our leadership but also continuously monitor this measurement.

Table 10. Birthweight by race/ethnicity--all neonates born at UTMB, frequency and percent (1/1/2014 - 12/31/2014)

Race/Ethnicity	< 1000g	1000 to 1499g	1500 to 2499g	2500 +	Total
Hispanic	22 (0.6)	29 (0.8)	205 (5.7)	3,421 (92.9)	3,677 (100.0)
White	11 (1.0)	22 (2.0)	83 (7.4)	996 (89.6)	1,112 (100.0)
Black	27 (4.1)	17 (2.6)	71 (10.8)	541 (82.5)	656 (100.0)
Asian/Other	3 (1.7)	0 (0.0)	24 (13.6)	150 (84.7)	177 (100.0)
Total	63 (1.1)	68 (1.2)	383 (6.9)	5,108 (91.1)	5,622 (100.0)

Update: Birthweight by race/ethnicity--all neonates born at UTMB, frequency and percent (1/1/2015-12/31/2015)

Race/Ethnicity	< 1000g	1000 to 1499g	1500 to 2499g	2500 +	Total
Hispanic	14 (0.4)	26 (0.6)	200 (5.0)	3,753 (94.0)	3,993 (100.0)
White	9 (0.6)	10 (0.7)	103 (7.4)	1,277 (91.3)	1,399 (100.0)
Black	10 (1.4)	13 (1.8)	83 (11.2)	636 (85.7)	742 (100.0)
Asian/Other	3 (1.9)	0 90.0)	15 (9.4)	142 (88.8)	160 (100.0)
Total	36 (0.6)	49 (0.8)	401 (6.4)	5,808 (92.3)	6,294 (100.0)

SECTION 5: UPDATED DISPARITIES IN AMBULATORY CARE SENSITIVE CONDITIONS

This section provides the update of number of encounters related to ambulatory care sensitive conditions (ACSC) by race/ethnicity using University HealthSystem Consortium (UHC) data. The ACSC are medical problems that are potentially preventable. For example, hypertension (high blood pressure) is a condition that can be treated outside of a hospital with proper medication and management of care. Therefore, the target is to reduce the numbers of encounters related to ACSC as much as possible.

Similar to DY4 report, African American patients are more likely to have heart failure and hypertension conditions than another three racial groups. Next, more Hispanic patients have diabetes issues in both DY4 and DY5 reports. However, more non-Hispanic white patients have COPD problems according to DY4 report but heart failure in DY5. The case number for Asian and other races are too small to report. We will continue to monitor these ACSC indicators and propose improvement plans to our leadership and clinical partners.

Table 11. Ambulatory care sensitive conditions among hospital encounters, by race/ethnicity, age < 75 years (1/1/2014-9/30/2014)

Race/Ethnicity	Grand mal-status and other epileptic convulsions	Chronic obstructive pulmonary diseases	Asthma	Diabetes	Heart failure and pulmonary edema	Hypertension	Angina	Total
Hispanic	11	8	6	27	24	1	0	77
White	26	88	10	63	84	5	2	278
Black	17	18	16	29	88	8	1	177
Asian/Other	1	0	0	0	4	0	0	5
Total	44	114	32	119	200	14	3	537

Update: Ambulatory care sensitive conditions among hospital encounters, by race/ethnicity, age < 75 years (10/1/2014-9/30/2015)

Race/Ethnicity	Grand mal-status and other epileptic convulsions	Chronic obstructive pulmonary diseases	Asthma	Diabetes	Heart failure and pulmonary edema	Hypertension	Angina	Total
Hispanic	19	13	16	58	52	10	0	168
White	59	136	22	115	167	10	4	513
Black	28	35	30	53	177	23	4	350
Asian/Other	3	0	1	0	6	0	0	10
Total	109	184	69	226	402	43	8	1,041