

## Heart Disease and Diabetes: Using Surveillance Data to Build a Healthier Rhode Island

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**Both state and federal governments support the integration of programs dealing with chronic diseases.**<sup>1,2,3</sup>

At the Rhode Island Department of Health, categorical chronic disease programs (funded by the **Centers for Disease Control and Prevention (CDC)**) have initiated cross-program activities. Through the **Rhode Island Chronic Care Collaborative (RICCC)**<sup>4</sup> hypertension and diabetes have shared disease registries. This integrated surveillance model, however, only represents Rhode Island patients receiving care through RICCC sites.

To increase integrated surveillance we analyzed RI statewide hospital data to investigate hospital admissions where heart disease and diabetes were listed as diagnoses and assessed **length of stay (LOS)** and costs by age, sex, and race/ethnicity.

### METHODS

Data on inpatient admissions came from the 2008 and 2009 Rhode Island **Hospital Discharge Data (HDD)** files, which include patient demographics, diagnoses and procedure codes, length of stay and hospital charges from Rhode Island's non-federal hospitals. The hospitals submit their data on all inpatient admissions and emergency department visits through a shared system within 90 days of the end of each calendar quarter.<sup>5</sup>

Our analyses focused on adult admissions to one of 11 acute care general hospitals where hypertensive heart disease (ICD-9-CM 402), ischemic heart disease (ICD-9-CM 410-414), or diabetes (ICD-9-CM 250) were listed as the principal diagnosis or a contributing diagnosis. Patients younger than 18 years were excluded from analyses since hospitalizations for diabetes or heart disease are rare in younger persons. The number and percent of admissions for diabetes and heart disease, LOS and costs were calculated separately for age, sex, and race/ethnicity subgroups. Because hospital charges do not represent the cost of an inpatient admission, the charges were multiplied by a cost factor ratio specific to each hospital. The unit of analysis was the admission, not the individual patient. Analyses were performed by using SAS software version 9.

### RESULTS

Between 2008 and 2009 in Rhode Island, there were 12,925 admissions for patients aged 18 and older where diabetes and/or heart disease was listed as a diagnosis, representing 5% of all adult admissions to acute care hospitals (data not shown). For 25.9% of these admissions, heart disease was the primary diagnosis and diabetes was a coexisting diagnosis (n = 3,343). Diabetes was the primary diagnosis and heart disease was not a coexisting diagnosis for 23.5% of these hospital admissions (n = 3,033). In addition, for half of these admissions (50.3%) heart disease was the primary diagnosis and diabetes was not a coexisting diagnosis (n = 6,500). Only 49 admissions listed diabetes as the primary diagnosis and heart disease as a coexisting diagnosis.

There were disparities in both heart disease and diabetes hospitalizations by age group and race/ethnicity. As shown in Figure 1, White non-Hispanic adults were, on average, 10 years older at the time of a hospital admission for diabetes or heart disease compared to Black and Hispanic adults.

Hospital costs and LOS varied by the primary diagnosis based on patients' age, sex, and race/ethnicity at admission (Table 1). Men aged 65+ had the longest LOS for an admission where diabetes was the primary diagnosis and heart disease was not a coexisting diagnosis (Mean LOS 6.5 days). Men aged 18 to 64 had the highest cost for admissions where heart disease was the primary diagnosis and diabetes was a coexisting diagnosis (Mean costs \$18,278).

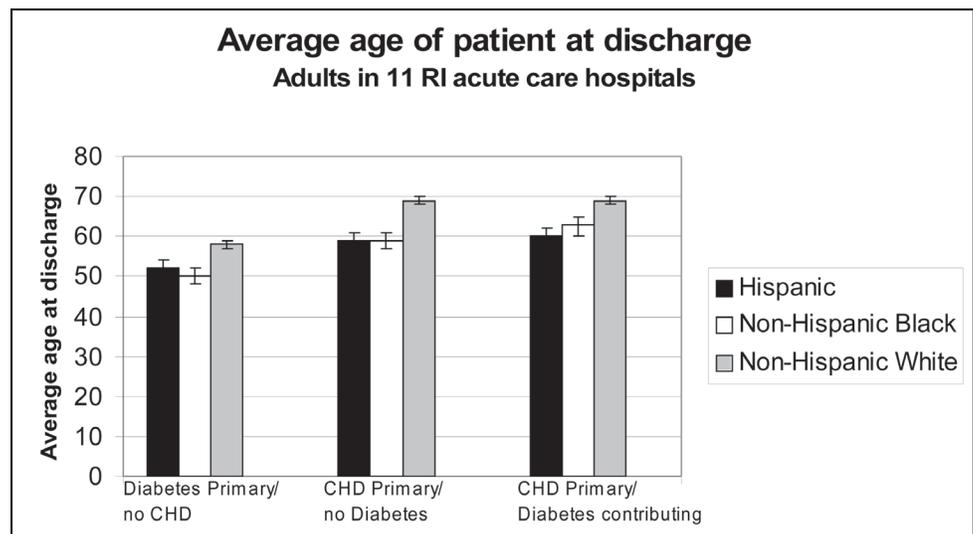


Figure 1. Average age at discharge for diabetes and/or heart disease among adults, Rhode Island 2008 and 2009. Data source: 2008 – 2009 Rhode Island Hospital Discharge Data combined file, Rhode Island Department of Health, Center for Health Data and Analysis.

**Table 1. Hospital costs and length of stay for heart disease and diabetes by patients' age, sex, and race/ethnicity, Rhode Island 2008-2009**

Patient characteristics	Diabetes primary diagnosis and heart disease not listed as a diagnosis		Heart disease primary diagnosis and diabetes not listed as a diagnosis		Heart disease primary diagnosis and diabetes listed as a diagnosis in any other field	
	Mean LOS (95% CI)	Mean Cost (95% CI)	Mean LOS (95% CI)	Mean Cost (95% CI)	Mean LOS (95% CI)	Mean Cost (95% CI)
<b>Women</b>						
Ages 18 – 64	4.8 days (4.3, 5.2)	\$6900 (6095,7705)	3.0 days (2.8, 3.2)	\$14699 (13869,15529)	3.5 days (3.1, 3.8)	\$15538 (14283,16793)
Ages 65+	5.1 days (4.7, 5.6)	\$6980 (6107,7852)	4.2 days (4.0,4.4)	\$13154 (12564,13745)	4.9 days (4.5, 5.3)	\$14202 (13224,15180)
<b>Men</b>						
Ages 18 – 64	5.1 days (4.5, 5.7)	\$6884 (6083,7685)	3.0 days (2.8, 3.3)	\$17791 (17221,18361)	3.8 days (3.5, 4.1)	\$18278 (17348,19209)
Ages 65+	6.5 days (5.8, 7.1)	\$8574 (7574,9574)	4.3 days (4.0, 4.5)	\$17300 (16584,18015)	4.5 days (4.3, 4.8)	\$16592 (15726,17458)
<b>Race/Ethnicity Ages 50+</b>						
Hispanic	4.9 days (4.0, 5.8)	\$7363 (5916,8810)	3.1 days (2.7, 3.6)	\$15296 (13450,17141)	4.0 days (3.3, 4.7)	\$15266 (12800,17731)
Non-Hispanic Black	5.3 days (4.4, 6.3)	\$7300 (5854,8745)	4.0 days (3.1, 4.9)	\$15218 (12385,18052)	4.0 days (3.1, 4.8)	\$15247 (12552,17942)
Non-Hispanic White	5.9 days (5.5, 6.2)	\$7625 (7112,8137)	3.9 days (3.8, 4.1)	\$15979 (15586,16372)	4.4 days (4.3, 4.6)	\$16263 (15705,16820)

Data source: 2008 – 2009 Rhode Island Hospital Discharge Data combined file, Rhode Island Department of Health, Center for Health Data and Analysis.

When LOS and costs were analyzed for patients aged 50 and older by race/ethnicity, there were few differences, in part because the sample of Hispanics and non-Hispanic Blacks was small and the 95% confidence intervals computed around LOS and costs were wide and less precise than those computed for non-Hispanic Whites. Compared with Hispanics, non-Hispanic Whites had higher LOS when heart disease was the primary diagnosis and diabetes was not a coexisting diagnosis (3.1 days vs. 3.9 days), but there was no significant difference in average costs between these two groups.

## CONCLUSION

In our data, a primary diagnosis of heart disease with a coexisting diagnosis of diabetes was common. In contrast, when diabetes was the primary reason for admission, a coexisting diagnosis of heart disease occurred infrequently. The most common additional diagnoses when diabetes was the primary diagnosis were renal failure, long-term (current) use of insulin, or gastroparesis (data not shown).

Men hospitalized for diabetes or heart disease were older at admission than women hospitalized for diabetes or heart disease (data not shown). The average age of a man hospitalized for heart disease (primary diagnosis) was 73 years, but the average age for a woman hospitalized for heart disease (primary diagnosis) was 63. Although a woman's short-term risk of heart disease is generally lower than a man's before the age of 50 (unless she has diabetes, in which case her risk is similar to her male counterpart), her lifetime risk increases with age. Menopause

appears to be the tipping point at which women's risk of heart disease catches up with and may exceed men's risk.<sup>6</sup>

Black and Hispanic adults experienced serious consequences of diabetes and heart disease when they were 10 years younger, on average, than their non-Hispanic White peers. A recent study found that management of cardiovascular disease and diabetes had improved considerably from 1999 to 2006, but wide disparities in Black-White and Hispanic-White levels of glycemic control persisted.<sup>7</sup>

These differences in diabetes control were not substantially reduced until age 65 when the near-universal coverage provided by Medicare played a key role in reducing health disparities.<sup>8</sup> Racial/ethnic minorities are much more likely to be uninsured, and therefore less likely to receive basic clinical services than their white peers.<sup>8,9,10</sup>

There are limitations to our study. The unit of analysis was hospital admissions not patients: the number of admissions in a population subgroup may include multiple readmissions of the same patient. Readmissions for patients with diabetes may differ by race/ethnicity, age and payer.<sup>11</sup> In addition, coding of diabetes as a contributing diagnosis in hospital data is not consistent. One study among urban diabetes patients found that about 20% of admissions for patients with diabetes did not have diabetes recorded and these hospitalizations were more frequently followed by rapid readmission.<sup>12</sup> Finally, the validity of the coding of race and ethnicity is unclear for hospital data.

Diabetes comorbid with heart disease substantially elevates the risk of adverse outcomes, such as health-related quality of life deficits, hospital admissions, and mortality, in middle- and older-age adults.<sup>13</sup> At the Rhode Island Department of Health, we examined race and gender disparities in hospitalizations where heart disease or diabetes were the principal diagnosis. The impact of these comorbid conditions on use of hospital services underscores the importance of targeted and aggressive prevention, particularly among Rhode Island adults at highest risk.

Successful chronic disease integration has been defined as individual programs coming together to improve the health of common populations, reducing health disparities.<sup>2</sup> This brief underscores the importance of implementing a cross-cutting chronic disease surveillance system as a key component in chronic disease integration.

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#### Disclosure of Financial Interests

The authors and/or spouses/significant others have no financial interests to disclose.

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## Letter to the Editor

Dear Dr. Friedman,

I recently came across Dr. Stanley Aronson's note, "The Verbiage of Obesity," in the May 2003 issue. Since some patients object to being called "Fat" or "Obese", I would like to suggest the use of another perhaps a more scientific term, "Habitomegaly". This perhaps would not offend patients, families, etc. It comes from habitus, -referring to one's body, and -megaly - referring to enlargement thereof. This would be a new word and perhaps not so offensive. It was actually suggested to me one day by a student as I was dictating an x-ray report and suggesting the presence of obesity on a patient who appeared to be obese. Coming from a student, this is a pretty good suggestion and I like it.

Sincerely,

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