Ethnic and Geographic Variation in Gastrostomy Placement among Hospitalized Older Patients

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While whites may receive more healthcare services than African Americans, gastrostomies are more commonly placed in older African Americans. The purpose of this study was to explore geographic and ethnic variations in gastrostomy placement among older individuals. Data from National Hospital Discharge Surveys conducted between 1996 and 1999 were analyzed. The overall gastrostomy placement rate (per 1,000 discharges) in individuals aged 65 years or older during the four years was 10.9 (95% Confidence Interval [CI]: 10.3–11.5)—among African Americans 20.0 (95% CI: 17.8–22.2) and among whites 10.2 (95% CI: 9.5–10.9). According to region, placement rates per 1000 discharges were 8.9 (95% CI: 7.6–10.2) in the west and 8.5 (95% CI: 7.8–9.2) in the midwest; but 11.8 (95% CI: 10.8–12.8) in the northeast and 12.9 (95% CI: 12.0–13.9) in the south. In multivariate analyses, including sex, age, any stroke diagnosis, ethnicity (African-American and white), and region, the ethnic and regional differences persisted. The substantially higher gastrostomy placement rate among older hospitalized African Americans in the United States appears to be independent of geographical variation.

Key words: health services ■ utilization ■ ethnic groups ■ surveys ■ gastrostomy

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INTRODUCTION

Variation in medical procedure utilization is well-described.[1-4] Although data are often ecologic, understanding health service variation can provide insights that inform practitioners, policy makers, and the public. Further, variation can be considerable,[5] particularly when evidence supporting a procedure's effectiveness is lacking.

A procedure not highly scrutinized in this respect is gastrostomy placement. Almost invariably used for nutritional supplementation, gastrostomy placement among hospitalized patients aged 65 years or older increased dramatically in the United States beginning in the late 1980s and continuing through the 1990s[6] (from approximately 61,000[7] in 1988 to 138,000 in 1999[8]). Perhaps the only identifiable factor playing a role in the increase was the introduction of percutaneous gastrostomy insertion[9] in the early 1980s. While it is also likely that increasing enteral feeding paralleled gastrostomy use, it is possible that temporary feeding tubes were simply replaced with more permanent ones.

Although broad indications for enteral feeding by gastrostomy have been outlined,[10] few specific uses are supported by evidence.[11,12] Enteral feeding by gastrostomy, presumably then, reflects beliefs about the effectiveness of enteral feeding together with social and ethical norms concerning feeding. For these reasons, variation in gastrostomy placement might be expected.

Methods

The National Hospital Discharge Survey (NHDS) has been conducted since 1965 from a probability sample of patients discharged from non-Federal short-stay hospitals. The survey enables calculating national estimates of conditions and procedures. Its current implementation is a stratified three-stage design including the largest hospitals with certainty. In the years analyzed (1996–1999), the numbers of hospitals responding (and respective response rates) were 480 (94.7%) in 1996, 474 (94.6%) in 1997, 478 (96.6%) in

1998, and 458 (94.0%) in 1999.[13-15] For each discharge, up to seven diagnoses and four procedures were recorded. In any given survey year, between 21.5% and 22.2% of discharges lacked information on ethnicity. This under-reporting of "race" has been previously noted in NHDS data, but when disparities are large, conclusions are nevertheless reasonable.[16]

In all analyses, percutaneous gastrostomy (*International Classification of Diseases, Ninth Revision, Clinical Modification* [ICD-9-CM] 43.11) and other gastrostomies (ICD-9-CM 43.19) were combined ("gastrostomy"). Analyses were restricted to individuals aged 65 years or older, because gastrostomies placed in younger individuals occur in the context of clinical scenarios differing from those for older patients. Regions were defined as reported in National Center for Health Statistics publications corresponding to Census Bureau classifications: northeast, south, west, and midwest.[15] Population estimates were obtained by applying sample weights with standard errors and 95% confidence intervals calculated using recommended formulae.[15] For the combined years' data, the largest single year's standard error estimate was applied. All population estimates and variances then accounted for the complex sampling scheme.

Total discharges were used as denominators throughout, because hospital discharges (alive or deceased) were sampled in the surveys. The unweighted sample included 4,591 discharged patients having gastrostomies placed among 387,043 individuals discharged.

Regional and ethnic placement rate variations were explored in Poisson regression models fitted to the sample of discharges with recorded African-American or white ethnicity (weights normalized to the NHDS sample size as opposed to the population). In addition to ethnicity and region, models included sex and any stroke diagnosis as potential confounders. While these analyses are of the NHDS sample and inferences formally apply to that sample, the results arguably have general validity.[17] Analyses were conducted using SAS[18] and S-Plus.[19]

Results

The numbers of gastrostomies placed among individuals aged 65 years or older from 1996 through 1999 were (in thousands) 123 (95% Confidence Interval [CI]: 106–140), 135 (95% CI: 117–153), 139 (95% CI: 118–159) and 137 (95% CI: 116–159), respectively. Placement rates (per 1000 discharges) increased with age and were higher among individuals with recorded African-American ethnicity (Figure 1). The most common primary diagnoses were neoplasms (6.6%), ischemic heart disease (6.5%), pneumonia/influenza (6.3%), congestive heart failure (6.1%), and stroke (6.0%). In-hospital mortality among patients undergoing gastrostomy placement was 10.2%.

Table 1 and Figure 2 display gastrostomy placement rates for the combined years according to recorded ethnicity and region. While there was less

Figure 1. Gastrostomy Placement Rates (with 95% Confidence Intervals) According to Age and Ethnicity (National Hospital Discharge Survey Data 1996–1999)

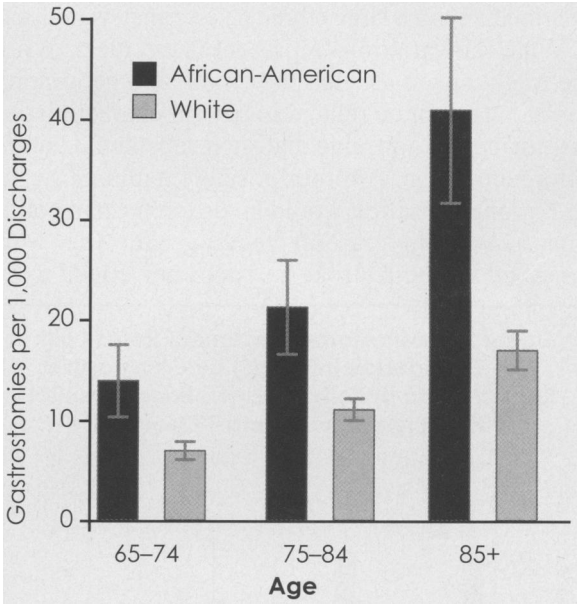

Table 1. Estimated Gastrostomy Placement Rates (per 1,000 Discharges with 95% Confidence Limits) in the United States from 1996 through 1999 According to Region and Reported Ethnicity (Individuals Aged 65 Years or Older)

	Region				All
	West	Midwest	Northeast	South	
Ethnicity					
White	7.7 (6.1–9.3)	8.0 (7.1–8.9)	11.0 (10.0–12.1)	11.6 (10.6–12.6)	10.2 (9.5–10.9)
Black	18.0 (9.8–26.2)	18.3 (14.3–22.3)	20.6 (16.3–24.9)	20.4 (17.9–22.9)	20.0 (17.8–22.2)
Other/missing	9.8 (8.2–11.4)	8.2 (7.5–9.0)	13.3 (10.6–16.0)	14.4 (11.9–16.9)	10.0 (9.1–10.9)
Total	8.9 (7.6–10.2)	8.5 (7.8–9.2)	11.8 (10.8–12.8)	12.9 (12.0–13.9)	10.9 (10.3–11.5)

geographic variation among African Americans, placement rates were higher in the northeast and south. The ethnic difference in rates was more pronounced in the west and midwest.

To explore the regional and ethnic differences further, we focused subsequent analyses and inferences on the actual sample of discharges, not the population.[17] Table 2 shows that both ethnic and regional differences persisted in a Poisson regression fitted to rates according to age, sex, region, any stroke diagnosis, and ethnicity. Furthermore, regional differences persisted, taking into account either diagnosed swallowing disorders or hospital size (results not shown).

Discussion

Using NHDS data, these analyses demonstrate almost two-fold African-American–white differences—with lesser regional variations—in gastrostomy placement rates among older individuals. The regional variation was unexplained by ethnicity, sex, or stroke diagnosis. While variation in healthcare patterns according to various factors has been well described,[20] such a large ethnic discrepancy is unusual.

What the variations represent is not clear. While one might speculate that the ethnic and geographic variations might be related to patient characteristics, it is difficult to conceive that such substantial patient differences exist. Another possible explanation for the regional variation would be differences in conditions prompting enteral feeding. Yet the well-described southern stroke belt does not extend to the northeast, and stroke diagnoses could not account for the results. Moreover, the broad regional classifications in NHDS data, while pointing up differences, are not specific enough to explain them.

Accordingly, these analyses have limitations. Firstly, NHDS records lack sufficiently detailed patient characteristics to examine some potentially associated factors—e.g., illness severity, patient preference, or functional measures. Secondly, although a probability sample of U.S. discharges was analyzed and the actual number of discharges examined reasonably large, the number represents a small fraction of total gastrostomies placed nationally. Thirdly, regional comparisons were examined in the actual sample of discharges. While the approach has a methodological basis,[17] results should be generalized carefully. Still, consistency with projected population estimates supports the results' validity. Finally, analyses of associations with ethnicity from NHDS data must be performed with care.[16] Given the large magnitude of the ethnic disparity noted, however, it is highly improbable that differential under-reporting could account for more than a small portion of the disparity. Moreover, the ethnic differences found here are consistent with those noted in Medicare claims.[21]

Although variation in use accompanies many medical procedures, the relatively large difference in

Figure 2. Gastrostomy Placement Rates (with 95% Confidence Intervals) by Geographic Region in the United States (National Hospital Discharge Survey Data 1996–1999)

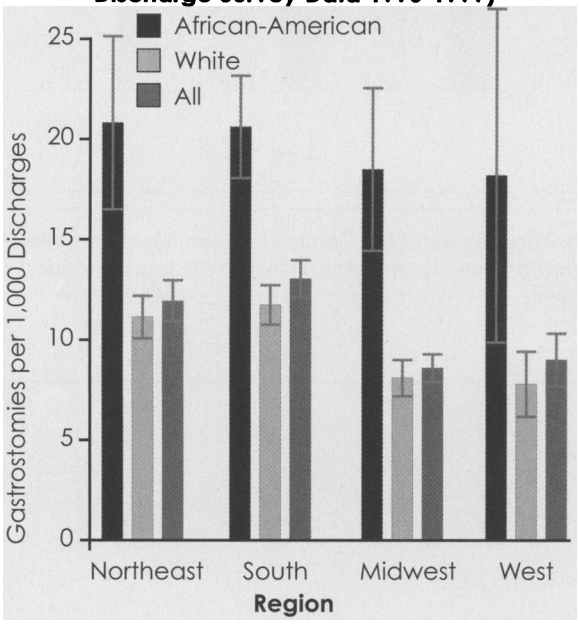

Table 2. Associations of Gastrostomy Placement Rates with Age, Region, Ethnicity, Stroke Diagnosis, and Sex from a Multivariate Poisson Regression Model

	Rate Ratio	95% CI
Age		
65–74	—	
75–84	1.50	(1.38–1.64)
85 or older	2.47	(2.26–2.70)
Region		
Northeast	—	
Midwest	0.72	(0.64–0.80)
South	1.00	(0.92–1.08)
West	0.70	(0.62–0.80)
Ethnicity		
White	—	
African-American	1.87	(1.71–2.05)
Stroke Diagnosis		
None	—	
Any	3.48	(3.23–3.74)
Sex		
Male	—	
Female	0.85	(0.79–0.91)

gastrostomy placement among African Americans is unusual. Understanding varying ethnic and regional gastrostomy placement rates poses a challenge, and explanations may not be simple. One hypothesis is that while health services characteristics might play a role in explaining the smaller regional variation, physician and patient attitudes are important in understanding the larger African-American–white discrepancy. To explain ethnic variations in use, it may ultimately be necessary not only to define the effectiveness of enteral feeding by gastrostomy under different circumstances but also to take into account perceptions of effectiveness as well as cultural, religious, and ethnic attitudes.

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