Department of Health and Human Services

OFFICE OF
INSPECTOR GENERAL

DRG 296 VALIDATION UPDATE: NUTRITIONAL AND MISCELLANEOUS METABOLIC DISORDERS

OCTOBER 1992

OFFICE OF INSPECTOR GENERAL

The mission of the Office of Inspector General (OIG), as mandated by Public Law 95-452, as amended, is to protect the integrity of the Department of Health and Human Services (HHS) programs as well as the health and welfare of beneficiaries served by those programs. This statutory mission is carried out through a nationwide network of audits, investigations, and inspections conducted by three OIG operating components: the Office of Audit Services, the Office of Investigations, and the Office of Evaluations and Inspections. The OIG also informs the Secretary of HHS program and management problems and recommends courses to correct them.

OFFICE OF AUDIT SERVICES

The OIG's Office of Audit Services (OAS) provides all auditing services for HHS, either by conducting audits with its own audit resources or by overseeing audit work done by others. Audits examine the performance of HHS programs and/or its grantees and contractors in carrying out their respective responsibilities and are intended to provide independent assessments of HHS programs and operations in order to reduce waste, abuse, and mismanagement and to promote economy and efficiency throughout the Department.

OFFICE OF INVESTIGATIONS

The OIG's Office of Investigations (OI) conducts criminal, civil, and administrative investigations of allegations of wrongdoing in HHS programs or to HHS beneficiaries and of unjust enrichment by providers. The investigative efforts of OI lead to criminal convictions, administrative sanctions, or civil money penalties. The OI also oversees State Medicaid fraud control units which investigate and prosecute fraud and patient abuse in the Medicaid program.

OFFICE OF EVALUATION AND INSPECTIONS

The OIG's Office of Evaluation and Inspections (OEI) conducts short-term management and program evaluations (called inspections) that focus on issues of concern to the Department, the Congress, and the public. The findings and recommendations contained in these inspection reports generate rapid, accurate, and up-to-date information on the efficiency, vulnerability, and effectiveness of departmental programs.

Amy L. Lockwood of BOTEC Analysis Corporation prepared this report with direction from Janet W. Knight, BOTEC Project Director, and David C. Hsia, OIG Project Officer. Contract information and project participants are listed in Appendix A to this inspection.

Department of Health and Human Services

OFFICE OF
INSPECTOR GENERAL

DRG 296 VALIDATION UPDATE: NUTRITIONAL AND MISCELLANEOUS METABOLIC DISORDERS

OCTOBER 1992   OEI-12-89-00195

EXECUTIVE SUMMARY

PURPOSE

This inspection reabstracted on a blinded basis, the International Classification of Diseases, 9th Edition, Clinical Modification codes from a sample of Medicare discharges billed as diagnosis-related group (DRG) 296, nutritional and miscellaneous metabolic disorders. It compared the reabstracted DRG to the hospital-billed DRG for reimbursement changes. The sample was nationally representative and covered all of 1988, the most recent data available.

This inspection updated a previous Office of Inspector General (OIG) study. For 1985, the OIG found 19.3 percent errors among 173 reabstractions, improperly over-reimbursing hospitals by a projected $19.9 million. This inspection used a parallel methodology to make these studies statistically comparable.

FINDINGS

DRG 296 errors not reduced

Of 106 discharges reabstracted for this inspection, 10.4 percent had billing errors. This proportion did not differ statistically from the 19.3 percent errors for DRG 296 discharges in 1985. It also did not differ statistically from the 14.7 percent errors for all discharges in 1988.

DRG 296 errors random

Of 11 bills with DRG errors, 45.5 percent over-reimbursed the hospital. This proportion differed statistically from the 75.0 percent over-reimbursement in 1985.

DRG 296 errors cause no over-reimbursement

The DRG 296 billing errors under-reimbursed hospitals $14.7 million. While not itself statistically different from zero (no under-reimbursement), this result does differ statistically from the $19.9 million over-reimbursement in 1985.

TABLE OF CONTENTS

INTRODUCTION

Background

Diagnosis-related group (DRG) 296 accepts 58 International Classification of Diseases, 9th Edition, Clinical Modification (ICD-9-CM) codes as principal diagnoses. These ICD-9-CM codes identify metabolic disorders principally associated with dehydration and fluid-electrolyte imbalances. DRG 297 accepts the same principal diagnoses, but requires a complication. DRGs 296 and 297 do not include admissions for diabetes, the commonest metabolic order. [Appendix B].

DRG 296's weight increased from 0.8886 in 1985 to 0.9259 in 1988. Beginning in FY 1988, the HCFA altered DRG 296 to drop age over 69 as a complication code. This change shifted billings in one quarter of the data collection period for this inspection.

In a previous study, the OIG found that DRG 296 had an unusually high proportion of billing errors.[1] Correct ICD-9-CM coding would have grouped 19.3 percent of its 173 reabstractions to different DRGs in 1985. These billing errors over-reimbursed the hospitals a projected $19.9 million.

This inspection updated the previous study using 1988 data, the most recent available. It used a parallel methodology to make these inspections statistically comparable.

Methodology

This inspection randomly selected 106 DRG 296 discharges. The study population consisted of the 191,509 Medicare-reimbursed DRG 296 discharges during calendar year 1988. The design excluded discharges from specialty institutions such as children's hospitals, tuberculosis units, and psychiatric facilities. It also excluded discharges in Maryland and New Jersey, which the PPS still exempted in 1988. Finally, it excluded bills for pediatric, obstetric, and psychiatric DRGs (principally drug and alcohol rehabilitation performed by a general hospital).[2] Unlike its 1985 predecessor, it included hospitals established since the advent of the PPS in 1983.

The OIG requested that hospitals send complete copies of the sampled medical records to the OIG's contractor, Baxter-Health Data Institute (HDI) of Lexington, MA. The OIG followed-up missing records and issued subpoenas to compel the cooperation of four hospitals.

The OIG contracted with the American Medical Record Association (AMRA) to reabstract the charts. The AMRA selected ICD-9-CM codes supported by the record, determined the principle diagnosis, and grouped to select the correct DRG. To assure that the original ICD-9-CM codes and DRGs did not effect the reabstraction, the AMRA coders conducted their work without knowledge of the original ICD-9-CM codes and DRGs. The coders had instructions not to treat marginal problems or

honest differences in judgement about appropriate coding as DRG errors. This standard should have produced a conservative estimate of the proportion of discharges having DRG errors. A series of reliability checks verified the reproducibility and accuracy of the AMRA coding. The AMRA also identified the reasons why a hospital's bill differed from the correct codes.

BOTEC Analysis Corporation of Cambridge, Massachusetts (BOTEC) edited the AMRA database, checked the sample's representativeness, and conducted statistical analyses of the correlates and financial consequences of DRG 296 miscoding. It also reweighted the 1985 data to improve comparability with this inspection. The t-test determined whether numeric differences between the 1985 results and 1988 results were real (statistically significant) or could be attributed to random error.

Representativeness

To test the sample's representativeness, the OIG compared the distribution of sample bills to the distribution of the underlying population of DRG 296. The sample came disproportionately from small, nonteaching, and for-profit hospitals. It did not differ statistically from the underlying population with respect to patient characteristics. [Appendix C].
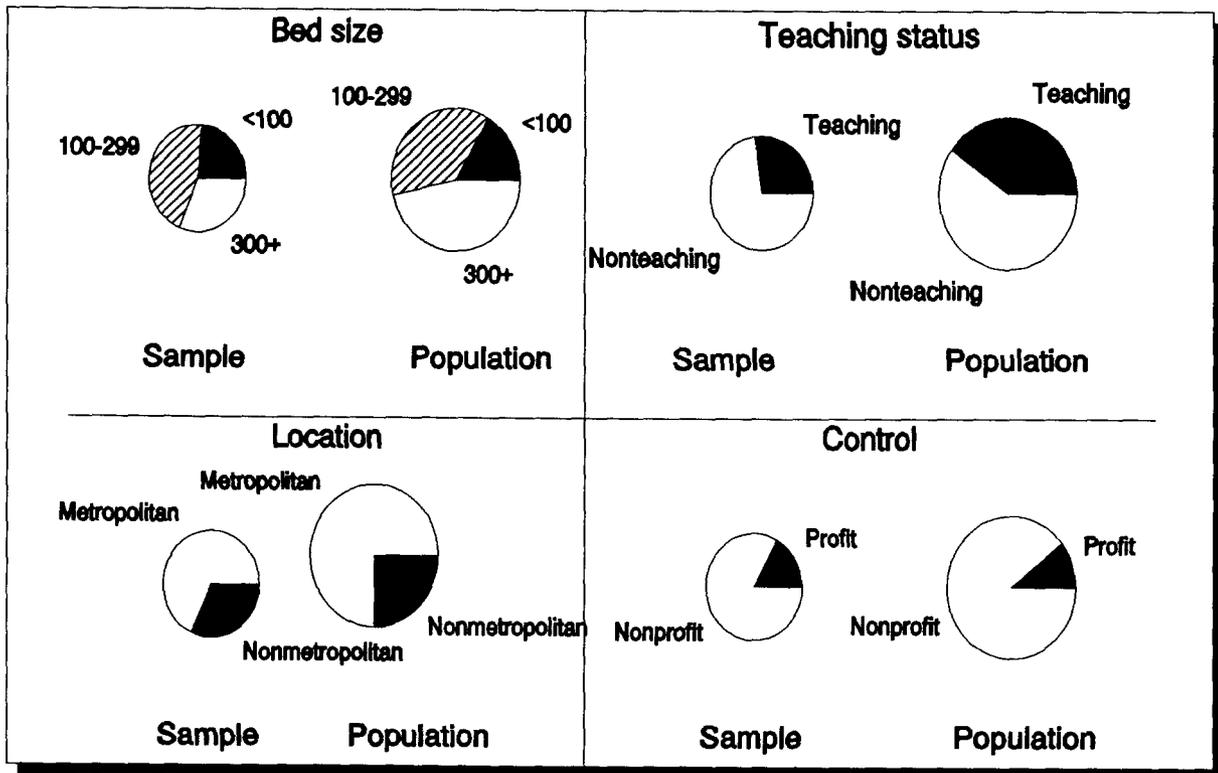

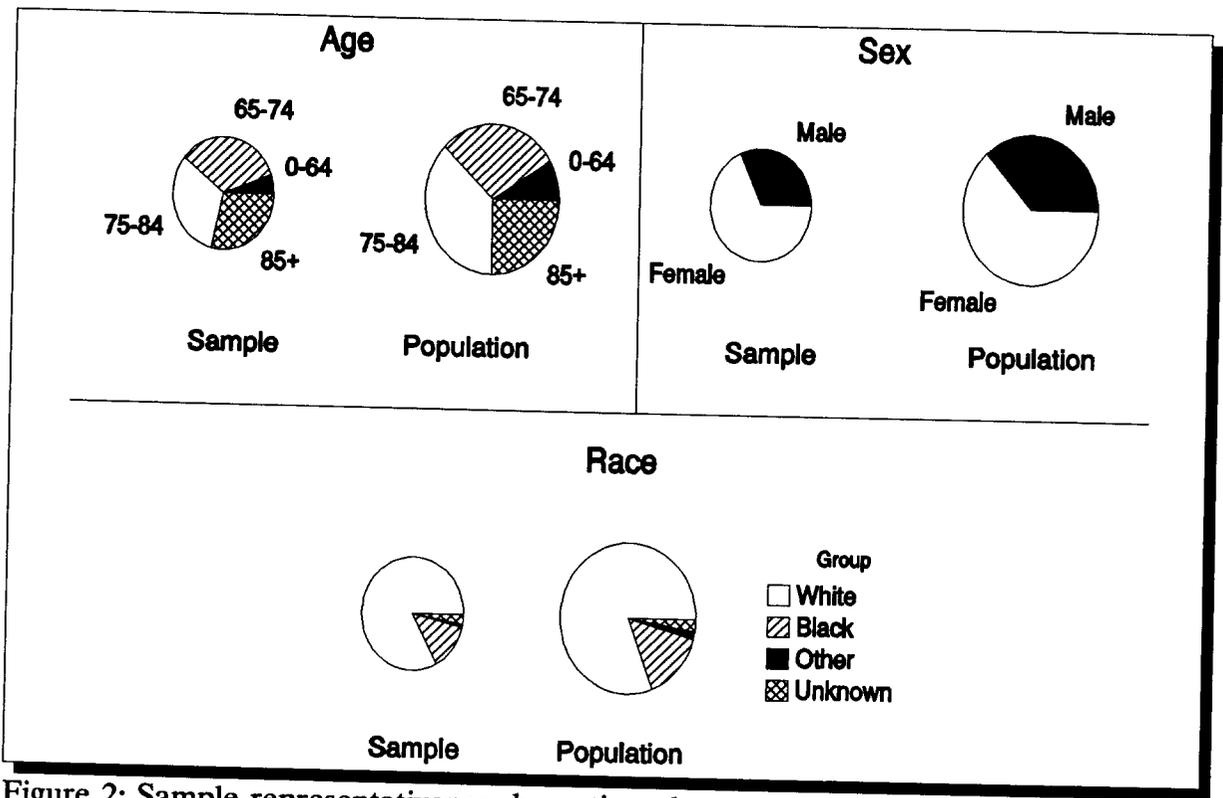Figure 1: Sample representativeness by hospital demography, 1988

Figure 2: Sample representativeness by patient demography, 1988

Errors not reduced

Of the 106 sample discharges, 10.4 percent had billing errors that changed their reimbursement from DRG 296. The difference between this result and the 19.3 percent error rate the OIG previously reported for 1985 was not statistically significant.[a] This trend applied across most hospital and patient characteristics. Small and large hospitals, urban hospitals, and teaching institutions showed more improvement. Patients aged 65-74 years and 85+ years, and males also had better coding accuracy. [Appendix D].
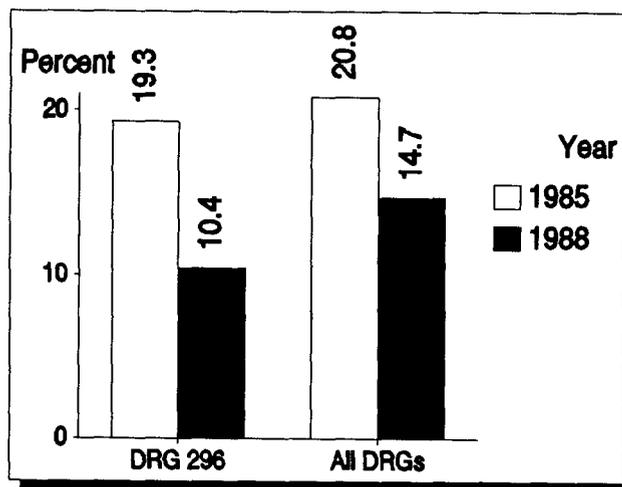

Figure 3: Coding errors, 1985 & 1988

This nonsignificant 1985-1988 decrease in the proportion of DRG 296 billing errors exceeded the improvement for all DRGs. However, the latter change from 20.8 percent in 1985 to 14.7 percent in 1988 comparison attained statistical significance because of their larger sample sizes. The difference between this inspection's 10.4 percent DRG 296 errors and the 14.7 percent errors for all DRGs in 1988 was not statistically significant.[3]

Errors occur randomly

Of the 11 billing errors, 45.5 percent over-reimbursed the hospital. The errors do not have any statistical directionality. In 1985, a statistically significant 75.0 percent of the 37 coding errors over-reimbursed the hospital. Curiously, the randomness of this inspection's error direction does not differ statistically from the previous inspection's definite directionality, presumably because of their relatively small sample sizes.
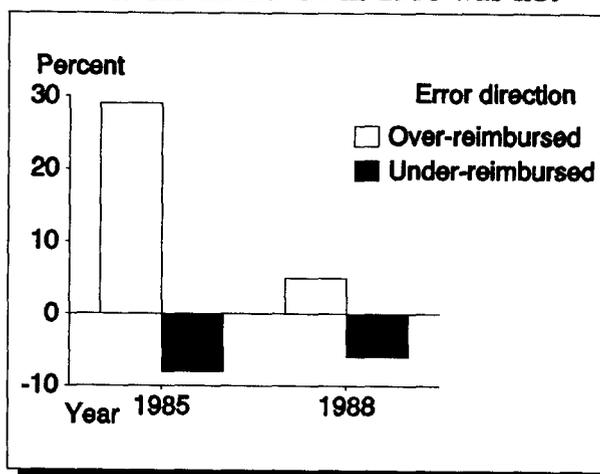

Figure 4: Direction of DRG 296 coding errors, 1985 & 1988

a. Because of the smaller sample size used in this DRG-specific analysis, estimates are less precise than the OIG's national estimate. Statistical testing determined whether apparent differences were real (statistically significant) or could be attributed to random error.

Errors cause no over-reimbursement

The 106 sample discharges originally carried Relative Weights of 0.9259 equivalent to an average payment of $2,829. The AMRA reabstraction increased the case-mix index (CMI) to 0.9499, a nonstatistically significant difference of 0.0240. This trend persisted across all hospital and patient demographic categories. However, the net CMI change in 1988 did differ statistically from the net CMI change for DRG 296 in 1985. [Appendix E].
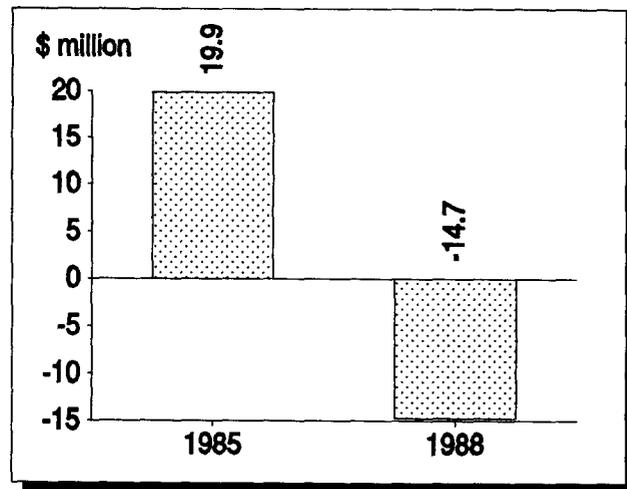
Figure 5: Financial impact, 1985 & 1988

Extrapolation of the CMI change in 1988 to all 191,509 DRG 296 discharges from the hospital categories included in this sample projected that billing errors under-reimbursed hospitals a nonstatistically significant $14.7 million. However, this under-reimbursement did differ statistically from the $19.9 million over-reimbursement the OIG previously reported for 1985.

Reasons for errors

The AMRA identified only two types of errors in the sample, mis-specification and "resequencing" in 1988. Mis-specification caused 36.4 percent of the 11 billing errors, not statistically different from its 37.2 percent for 1985. Resequencing caused the balance of 1988 coding errors (63.4 percent), compared to 50.7 percent for 1985. Miscoding and "other" errors caused the remainder of errors for 1985.

ENDNOTES

1. Stone D, Kleiman M, Meyers M, Schutte J, Lee F, Hsia D, & Krushat M. DRG 296: Nutritional and metabolic disorders. Washington, DC: HHS Office of Inspector General, 1989. Publication no. OAI-12-88-01150.

2. Knight J W & Hsia D C, eds. National DRG Validation Study Update: Technical Report. Washington, DC: HHS Office of Inspector General, 1992. Inspection no. OEI-12-90-00191.

3. Knight J W & Hsia D C, eds. National DRG Validation Study Update: Summary Report. Washington, DC: HHS Office of Inspector General, 1992. Inspection no. OEI-12-90-00190.

APPENDICES

Appendix A: Project participants

OIG
Cathaleen A. Ahern, B.A.
Evan J. Buckingham, B.A.
David C. Hsia, J.D., M.D., M.P.H.
Thomas F. Komaniecki, M.P.A.
W. Mark Krushat, M.P.H.
Linda M. Moscoe, B.A.
Brian P. Ritchie, B.A.
Barry L. Steeley[b]
John M. Traczyk, B.A.

HCFA
Timothy F. Greene, M.A., M.B.A.
Stephen F. Jencks, M.D.
Michael R. McMullan, M.B.A.
Harry L. Savitt, Ph.D.
Jeanette M. Smith, M.D., M.P.H.[c]
Malcolm A. Sneen, B.S.

RAND Corporation
Haya P. Rubin, M.D., Ph.D[d]

Baxter-Health Data Institute[e]
Patricia J. Baxter, R.N.
Patricia Cassidy-Tsnosas, R.N.
Annette M. Delaney, R.N., M.A.
Ellen B. Inghilleri, R.N.
Janet Mathews, A.R.T.
Laurie H. Moore, R.R.A.
Claire Shannon, A.R.T.
Michele A. Wiese, B.A.

AMRA
Margret K. Amatayakul, M.B.A., R.R.A.
Mary Converse, R.R.A.
Nicholas J. Cotsonas, M.D.[f]
Linda Ertl, R.R.A.

---

b. Now at Health Audit Services, Ellicott City, MD.
c. Now at the Journal of the American Medical Association, Chicago, IL.
d. Now at Johns Hopkins Medical Institutions.
e. Ceased operations February 16, 1990.
f. Outside contractor.

Rita M. Finnegan, R.R.A.
Desla Mancilla, A.R.T.
Barbara Manny, R.R.A.
Sonia Martyniuk, R.R.A.
Toula Nicholas, A.R.T.
Charlotte Razor, R.R.A.
LouAnn Schraffenberger, R.R.A.
Lynn Smetko, R.R.A.
Dawn Smith, A.R.T.
Joan Zacharias, A.R.T.

BOTEC Analysis Corporation
Geraldine M. Berenholz, R.R.A.
Andrew H. Chalsma, B.A.
David P. Cavanagh, M.A., Ph.D.
Janet W. Knight, R.N., Ph.D.
Amy L. Lockwood, B.A.

Contract information

Contractor
BOTEC Analysis Corporation
1698 Massachusetts Avenue
Cambridge, MA 02138

Project Officer
David Hsia, J.D., M.D., M.P.H.
Office of Inspector General
330 Independence Avenue
Washington, D.C. 20201

Contract
HHS-100-90-0023
Firm-fixed price contract
$203,257

Appendix B: ICD-9-CM codes in DRG 296

251	hypoglycemia
260	kwashiorkor
261	marasmus
262	other severe malnutrition
263	other malnutrition
264	vitamin A deficiency
265	beriberi
266	vitamin B deficiencies
267	vitamin C deficiency
268	vitamin D deficiency
269	vitamin K and other nutritional deficiencies
275	magnesium-calcium metabolism diseases
276	fluid and electrolyte disorders
277	cystic fibrosis
278	obesity
781.7	tetany
783	weight change
790.2	abnormal glucose tolerance test
791.6	acetonuria

Appendix C: Sample representativeness

Number [percent]	Population	Sample	Chi-square
Hospital demography			
1-99 beds	32,071 [16.7]	25 [23.6]	9.54, 2 df, P=0.991
100-299 beds	70,929 [37.0]	48 [45.3]	
300+ beds	88,474 [46.2]	33 [31.1]	
Metropolitan	143,417 [74.9]	72 [67.9]	2.58, 1 df, P=0.888
Nonmetropolitan	48,092 [25.1]	34 [32.1]	
Teaching	76,999 [40.2]	29 [27.4]	6.87, 1 df, P=0.991
Nonteaching	114,510 [59.8]	77 [72.6]	
Profit	20,273 [10.8]	18 [17.1]	4.10, 1 df, P=0.955
Nonprofit	166,626 [89.2]	87 [82.9]	
Patient demography			
<65 years	16,914 [8.8]	6 [5.7]	2.99, 3 df, P=0.606
65-74 years	55,985 [29.2]	36 [34.0]	
75-84 years	70,772 [37.0]	34 [32.1]	
85+ years	47,838 [25.0]	30 [28.3]	
Male	70,471 [36.8]	34 [32.1]	0.96, 1 df, P=0.668
Female	121,038 [63.2]	72 [67.9]	
White	155,215 [81.0]	88 [83.0]	0.47, 3 df, P=0.076
Black	28,005 [14.6]	14 [13.2]	
Other	3,104 [1.6]	1 [0.9]	
Unknown	5,185 [2.7]	3 [2.8]	
Total	191,509 [100.0]	106 [100.0]	

Appendix D: Proportion of DRG 296 billing errors, 1985 & 1988

Number [percent]	1988	1985*	t-test
Hospital demography			
1-99 beds	3 [12.0 ± 6.6]	21 [28.8 ± 5.3]	3.18
100-299 beds	6 [12.5 ± 4.8]	9 [16.1 ± 5.0]	0.82
300+ beds	2 [6.1 ± 4.2]	7 [15.9 ± 5.6]	2.48
Metropolitan	5 [6.9 ± 3.0]	14 [20.0 ± 5.0]	2.82
Nonmetropolitan	6 [17.6 ± 6.6]	23 [28.6 ± 7.5]	1.39
Teaching	2 [6.9 ± 4.8]	5 [15.1 ± 6.3]	2.02
Nonteaching	9 [11.7 ± 3.7]	32 [22.0 ± 5.2]	1.61
Profit	3 [9.2 ± 3.1]	2 [15.1 ± 11.0]	1.57
Nonprofit	8 [16.7 ± 9.0]	35 [18.3 ± 3.4]	0.31
Patient demography			
<65 years	2 [33.3 ± 21.1]	5 [5.0 ± 2.8]	8.85
65-74 years	3 [8.3 ± 4.7]	13 [28.2 ± 7.6]	3.92
75-84 years	3 [8.8 ± 4.9]	10 [18.9 ± 6.1]	1.83
85+ years	3 [10.0 ± 5.6]	9 [18.0 ± 5.0]	2.08
Male	4 [11.8 ± 5.6]	17 [24.2 ± 6.4]	2.31
Female	7 [9.7 ± 3.5]	20 [13.5 ± 3.4]	0.90
White	10 [11.4 ± 3.4]		
Black	0 [0.0 ± 0.0]		
Other	0 [0.0 ± 0.0]		
Unknown	1 [33.3 ± 33.3]		
Total	11 [10.4 ± 3.0]	37 [18.0 ± 3.3]	1.59

*. Reweighted for comparability to 1988.

Appendix E: DRG 296 case-mix index change, 1985 & 1988

Relative weight ± standard error	1988	1985	Difference	t-test
Hospital demography				
1-99 beds	-0.0123 ± 0.0121	-0.0429 ± 0.0153	0.0306	2.12
100-299 beds	0.0654 ± 0.0500	-0.0172 ± 0.0129	0.0826	2.73
300+ beds	-0.0084 ± 0.0118	-0.0237 ± 0.0135	0.0153	1.53
Metropolitan	0.0412 ± 0.0331	-0.0207 ± 0.0142	0.0619	2.35
Nonmetropolitan	-0.0123 ± 0.0171	-0.0557 ± 0.0214	0.0434	1.94
Teaching	-0.0096 ± 0.0135	-0.0226 ± 0.0134	0.0130	1.36
Nonteaching	0.0367 ± 0.0315	-0.0267 ± 0.0137	0.0634	2.46
Profit	0.0046 ± 0.0114	0.0209 ± 0.0443	-0.0163	1.16
Nonprofit	0.1190 ± 0.1259	-0.0284 ± 0.0080	0.1474	6.23
Patient demography				
<65 years	0.0445 ± 0.1345	-0.0066 ± 0.0060	0.0511	2.72
65-74 years	0.0667 ± 0.0634	-0.0621 ± 0.0189	0.1288	3.84
75-84 years	-0.0110 ± 0.0102	-0.0349 ± 0.0178	0.0239	1.52
85+ years	0.0084 ± 0.0143	-0.0065 ± 0.0144	0.0149	1.41
Male	0.0597 ± 0.0684	-0.0295 ± 0.0152	0.0892	2.80
Female	0.0072 ± 0.0117	-0.0204 ± 0.0093	0.0276	2.25
White	0.0313 ± 0.0279			
Black	0.0000 ± 0.0000			
Other	0.0000 ± 0.0000			
Unknown	-0.0678 ± 0.0678			
Total	0.0240 ± 0.0232	-0.0243 ± 0.0083	0.0483	2.30