

Department of Health and Human Services

**OFFICE OF
INSPECTOR GENERAL**

**DRG 154 VALIDATION UPDATE:
STOMACH, ESOPHAGEAL, AND
DUODENAL PROCEDURES**



OCTOBER 1992 OEI-12-89-00196

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) 154, stomach, esophageal, and duodenal procedures. 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 20.0 percent errors among 75 reabstractions, improperly over-reimbursing hospitals by a projected \$51.0 million. This inspection used a parallel methodology to make these studies statistically comparable. Statistical tests determined whether numeric differences between 1985 results and 1988 results were real (statistically significant) or could be attributed to random error.

FINDINGS

DRG 154 billing errors not reduced

Of 87 discharges reabstracted for this inspection, 11 (12.6 percent) were incorrectly assigned to DRG 154. The difference between this result and the 20.0 percent error rate the OIG found for DRG 154 discharges in 1985 was not statistically significant. The difference between this inspection's 12.6 percent errors and the 14.7 percent for all discharges in 1988 also failed to attain statistical significance.

Errors continued to over-reimburse hospitals

This inspection projected that discharges incorrectly assigned to DRG 154 over-reimbursed hospitals \$41.4 million. This did not statistically differ from the \$51.0 million over-reimbursement in 1985.

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INTRODUCTION

Background

Diagnosis-related group (DRG) 154: stomach, esophageal, and duodenal procedures; encompasses 81 procedures requiring use of an operating room and surgical team. These procedures include various biopsies, excisions, and repairs of the upper gastrointestinal system. The International Classification of Diseases, 9th Edition, Clinical Modification (ICD-9-CM) codes categorized in DRG 154 define procedures only and do not refer to the underlying or etiological condition such as cancer or trauma. [Appendix B].

DRG 154's weight increased from 2.6621 in 1985 to 3.7961 in 1988. Since 1985, the U.S. Health Care Financing Administration (HCFA) altered DRG 154 to eliminate "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 154 had an unusually high proportion of billing errors.¹ Correct ICD-9-CM coding would have grouped 20.0 percent of its 75 reabstractions to different DRGs in 1985. These billing errors over-reimbursed the hospitals a projected \$51.0 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 87 DRG 154 discharges. The study population consisted of the 49,677 Medicare-reimbursed DRG 154 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. By chance, all 87 discharges came from different hospitals.

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 154 miscoding. It also reweighted the 1985 data to improve comparability with this inspection. Statistical tests determined whether numeric differences between 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 154. The sample came disproportionately from rural and nonteaching hospitals. [Appendix C].

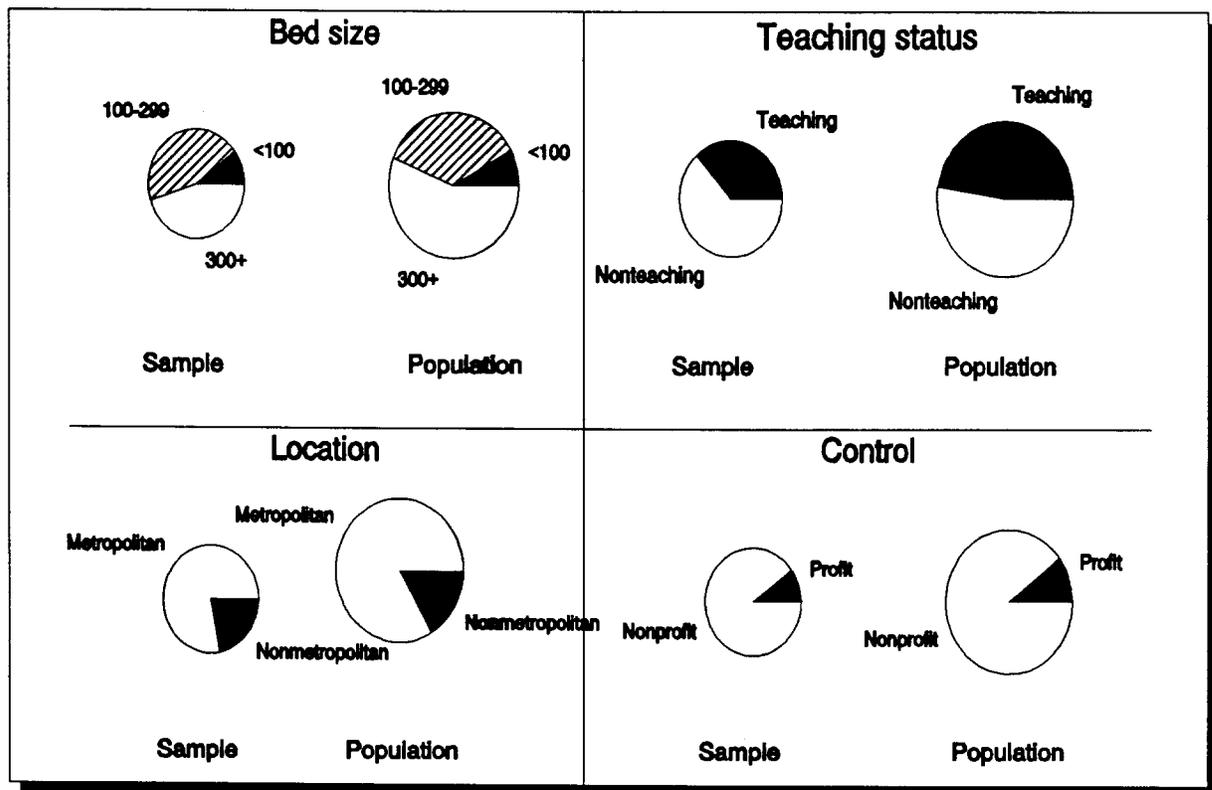


Figure 1: Sample representativeness by hospital demography, 1988

The sample did not statistically differ from the underlying population with respect to patient characteristics.

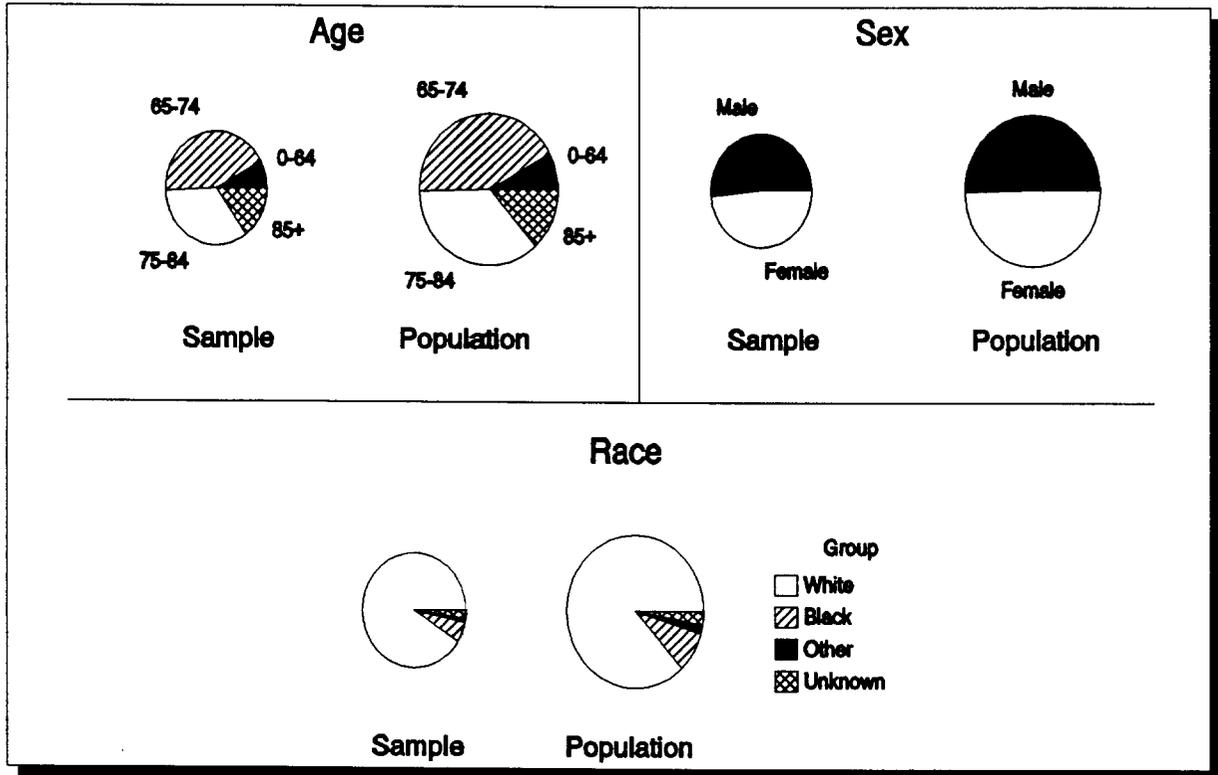


Figure 2: Sample representativeness by patient demography, 1988

FINDINGS

Errors not reduced

Of the 87 sample discharges, 11 (12.6 percent) were incorrectly assigned to DRG 154. The difference between this result and the 20.0 percent error rate the OIG reported for 1985 was not statistically significant.^a

For-profit, medium-sized, and teaching hospitals billed more accurately than in 1985. Patients under 75 years old also had higher coding accuracy. [Appendix D].

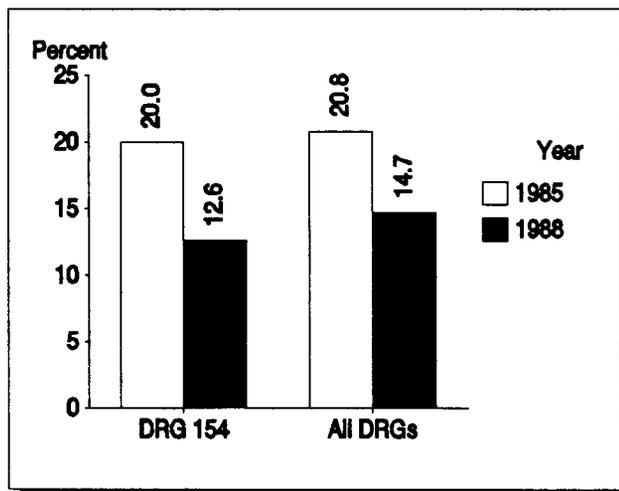


Figure 3: Coding errors, 1985 & 1988

In contrast to DRG 154, all DRGs taken together statistically significantly improved their coding accuracy from 20.8 percent errors in 1985 to 14.7 percent in 1988.³ However, the difference between this DRG's 12.6 percent errors and the 14.7 percent for all DRGs in 1988 was not statistically significant.

All errors still over-reimbursed the hospital

Of the 11 billing errors in 1988, all over-reimbursed the hospital. In 1985, all errors also over-reimbursed the hospital.

Hospitals still over-reimbursed

The 87 sample discharges originally carried Relative Weights of 3.7961, equivalent to an average payment of \$11,598. The AMRA reabstraction, which resulted in 11 discharges reassigned to a DRG other than DRG 154, decreased the case-mix index (CMI) to 3.5203, a statistically significant decline of 0.02758.

This reduction persisted across most hospital and patient demographic characteristics.

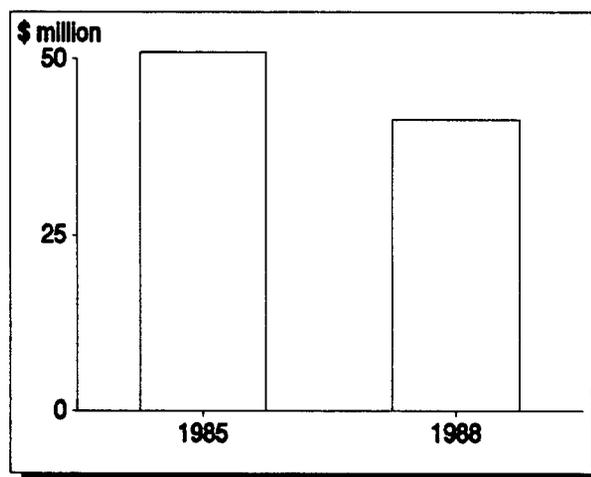


Figure 4: Financial impact, 1985 & 1988

a. Because of the smaller sample size that results from DRG-specific analysis, estimates of coding for specific DRGs are less precise than OIG's national estimate. Statistical tests determined whether apparent differences were real (statistically significant) or could be attributed to random error.

However, this net CMI charge did not statistically differ from the net CMI change for DRG 154 in 1985. [Appendix E].

Extrapolation of the 1988 CMI change to all 49,677 DRG 154 discharges projected that billing errors over-reimbursed hospitals \$41.4 million. This over-reimbursement did not statistically differ from the \$51.0 million over-reimbursement the OIG previously reported for 1985.

Reasons for errors

The causes of misassignment to DRG 154 errors changed between 1985 and 1988. Physician mis-specification and billing department resequencing increased over time, while miscoding decreased. Apparently, medical records departments have become more knowledgeable about procedure codes than in 1985. [Appendix F].

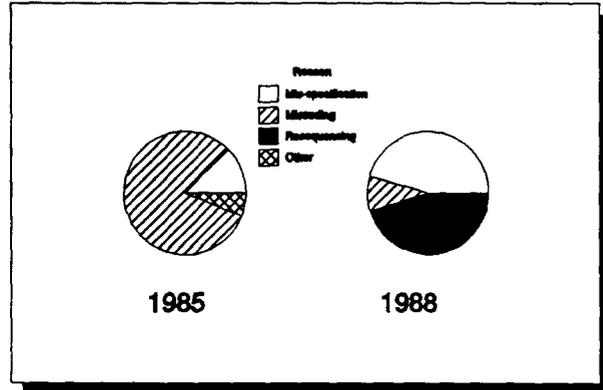


Figure 5: Reasons for errors, 1985 & 1988

ENDNOTES

1. Meyers M, Kleiman M, Stone D, Lee F, Schutte J, Hsia D, & Krushat M. DRG 154: Stomach, esophageal, and duodenal procedures. Washington, DC: HHS Office of Inspector General, July 1989. Inspection no. OAI-12-88-01160.
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

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Contract

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

Appendix B: ICD-9-CM procedure codes in DRG 154

- 39.1 intra-abdominal venous shunt
- 42 esophageal operations
- 43 incision and excision of the stomach
- 44 other operations on stomach
- 45.01 duodenum incision
- 45.3 local excision or destruction of lesion or tissue of small intestine
- 46.7 other repair of intestine
- 53.7 repair of diaphragmatic hernia, abdominal approach
- 53.8 repair of diaphragmatic hernia, thoracic approach

Appendix C: Sample representativeness

Number [percent]	Population	Sample	Chi-square
<u>Hospital demography</u>			
1-99 beds	4,054 [8.2]	9 [10.3]	5.06, 2 df, P=0.916
100-299 beds	17,808 [35.8]	39 [44.8]	
300+ beds	27,814 [56.0]	39 [44.8]	
Metropolitan	41,441 [83.4]	68 [78.2]	2.00, 1 df, P=0.965
Nonmetropolitan	8,236 [16.6]	19 [21.8]	
Teaching	23,566 [47.4]	32 [36.8]	4.55, 1 df, P=0.965
Nonteaching	26,111 [52.6]	55 [63.2]	
Profit	5,123 [10.5]	9 [10.3]	0.002, 1 df, P=0.034
Nonprofit	43,737 [89.5]	78 [89.7]	
<u>Patient demography</u>			
<65 years	4,067 [8.2]	7 [8.0]	0.30, 3 df, P=0.041
65-74 years	20,978 [42.2]	37 [42.5]	
75-84 years	18,034 [36.3]	30 [34.5]	
85+ years	6,598 [13.3]	13 [14.9]	
Male	24,941 [50.2]	45 [51.7]	0.09, 1 df, P=0.233
Female	24,736 [49.8]	42 [48.3]	
White	43,176 [86.9]	79 [90.8]	1.38, 3 df, P=0.290
Black	4,177 [8.4]	5 [5.7]	
Other	919 [1.8]	1 [1.1]	
Unknown	1,405 [2.8]	2 [2.3]	
Total	49,677 [100.0]	87 [100.0]	

Appendix D: DRG 154 billing errors, 1985 and 1988

Number [proportion 1988 ± standard error]	1985*	t-test
<u>Hospital demography</u>		
1-99 beds	2 [22.2 ± 14.7]	5 [20.0 ± 8.2] 0.34
100-299 beds	3 [7.7 ± 4.3]	89 [32.0 ± 9.5] 4.24
300+ beds	6 [15.4 ± 5.9]	3 [12.0 ± 6.6] 0.61
Metropolitan	8 [11.8 ± 3.9]	12 [22.8 ± 5.9] 1.89
Nonmetropolitan	3 [15.8 ± 8.6]	4 [12.6 ± 9.7] 0.47
Teaching	5 [15.6 ± 6.5]	9 [29.9 ± 8.9] 2.28
Nonteaching	6 [10.9 ± 4.2]	7 [13.6 ± 5.7] 0.47
Profit	0 [0.0 ± 0.0]	3 [39.3 ± 28.0] 5.86
Nonprofit	11 [14.1 ± 4.0]	13 [20.1 ± 5.3] 0.96
<u>Patient demography</u>		
<65 years	3 [42.9 ± 20.2]	2 [21.5 ± 15.6] 2.73
65-74 years	3 [8.1 ± 4.5]	6 [21.4 ± 9.3] 2.20
75-84 years	3 [10.0 ± 5.6]	6 [20.6 ± 8.4] 1.78
85+ years	2 [15.4 ± 10.4]	2 [27.4 ± 13.7] 1.90
Male	5 [11.1 ± 4.7]	3 [11.4 ± 6.3] 0.05
Female	6 [14.3 ± 5.5]	13 [26.7 ± 7.3] 1.81
White	9 [11.4 ± 3.4]	
Black	2 [0.0 ± 0.0]	
Other	0 [0.0 ± 0.0]	
Unknown	0 [33.3 ± 33.3]	
Total	11 [12.6 ± 3.6]	16 [20.8 ± 5.1] 1.34

* Reweighted for comparability to 1988.

Appendix E: DRG 154 case-mix index change, 1985 and 1988

Relative weight ± standard error	1988	1985	Difference	t-test
<u>Hospital demography</u>				
1-99 beds	-0.2658 ± 0.1772	-0.3679 ± 0.1517	0.1021	0.91
100-299 beds	-0.1603 ± 0.0932	-0.5427 ± 0.1722	0.3824	3.45
300+ beds	-0.3936 ± 0.1523	-0.2288 ± 0.1268	-0.1648	1.24
Metropolitan	-0.2827 ± 0.0982	-0.4316 ± 0.1121	0.1489	1.17
Nonmetropolitan	-0.2512 ± 0.1386	-0.0883 ± 0.0449	-0.1629	2.37
Teaching	-0.3756 ± 0.1620	-0.5702 ± 0.1678	0.1946	1.41
Nonteaching	-0.2177 ± 0.0900	-0.2073 ± 0.0965	-0.0104	0.10
Profit	0.0000 ± 0.0000	-0.7032 ± 0.4908	0.7032	5.99
Nonprofit	-0.3076 ± 0.0911	-0.3536 ± 0.0976	0.0460	0.36
<u>Patient demography</u>				
<65 years	-0.8287 ± 0.3907	-0.4103 ± 0.2953	-0.4184	2.79
65-74 years	-0.1459 ± 0.0890	-0.3537 ± 0.1688	0.2078	1.85
75-84 years	-0.2887 ± 0.1608	-0.3763 ± 0.1532	0.0876	0.66
85+ years	-0.3181 ± 0.2311	-0.4953 ± 0.2481	0.1772	1.38
Male	-0.2255 ± 0.1035	-0.2019 ± 0.1134	-0.0236	0.23
Female	-0.3297 ± 0.1301	-0.4740 ± 0.1372	0.1443	1.03
White	-0.2420 ± 0.0808			
Black	-0.9750 ± 0.6146			
Other	0.0000 ± 0.0000			
Unknown	0.0000 ± 0.0000			
Total	-0.2758 ± 0.0822	-0.3681 ± 0.0943	0.0923	0.74

Appendix F: Reasons for DRG 154 errors, 1985 and 1988

Number [percent]	1988	1985
Mis-specification	5 [45.4]	2 [12.5]
Miscoding	1 [9.1]	13 [88.0]
Resequencing	5 [45.4]	0 [0.0]
Other	0 [0.0]	1 [6.3]
Total	11 [100.0]	16 [100.0]

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OFFICE OF INSPECTOR GENERAL

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