HOSPITAL READMISSIONS

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HOSPITAL READMISSIONS

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Contract Information

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EXECUTIVE SUMMARY

BACKGROUND

This inspection examines the causes and frequencies of multiple readmissions of Medicare beneficiaries, and the implication this has on the management of the prospective payment system. The readmission of a patient may indicate premature discharge, scheduled re-hospitalization, natural recurrence of the disease, or may have no relationship to the original cause of hospitalization. The peer review organizations (PROs) monitor hospital readmissions to identify premature discharges.

FINDINGS

- Over one-half of readmissions occur because of the natural recurrence of the disease (medically related readmissions). Approximately, one-third of readmissions do not medically relate to the initial admission (unrelated readmissions). Nearly one-sixth of readmissions are planned at the time of the previous discharge (planned readmissions). A previous premature discharge causes only 1.0 percent of readmissions.

- PRO scrutiny of readmissions identifies no more clinical incidents than random selection of cases for review. The Health Care Financing Administration (HCFA) estimates that readmission reviews annually cost $45-55 million.

- Readmissions do not significantly differ from other hospitalizations in the rate of unnecessary admissions, poor quality care, or premature discharge.

- Hemoglobinopathies have significantly higher rates of readmission, both necessary and unnecessary. The latter comprise 46.7 percent of hemoglobinopathy bills and cost $47.2 million annually.

RECOMMENDATIONS

- The HCFA should re-evaluate the effectiveness of PRO surveillance of readmissions versus surveillance of random admissions.

- The HCFA should study the effectiveness of PRO utilization review of hemoglobinopathies.

- The HCFA should determine whether primary and secondary prevention of acute exacerbations of hemoglobinopathies would consume less Medicare resources than repeated hospitalizations.

The HCFA did not concur with these recommendations because they would require statutory change. We continue to believe that HCFA should propose legislative changes and take administrative actions in order to implement our recommendations.

CONTENTS

INTRODUCTION

Background

Medical research has long established that different subset populations use health services unequally.[1] For example, Health Care Financing Administration (HCFA) files of short-stay hospital bills show that 83.9 percent of its 31.1 million beneficiaries did not enter a hospital at all during calendar year (CY) 1985. Medicare therefore spent $44.5 billion on hospitalizations that benefit only the remaining one-sixth of beneficiaries. Adding Medicare Part B costs to the hospitalization expenditures implies that this inpatient subpopulation consumed approximately three-fourths of Medicare's $70.5 billion annual budget. [Figure 1].

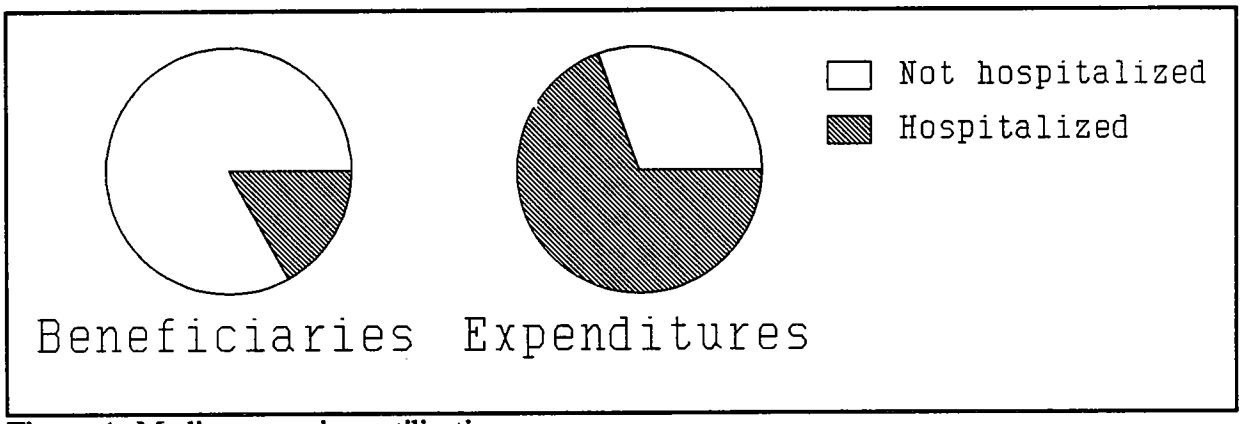

Figure 1: Medicare services utilization

The 17.1 percent of beneficiaries admitted one or more times during the year is considered the "hospitalization percentage."[2] These 5.3 million inpatients accrue a total of 8.3 million discharges, a "hospitalization rate" of 26.6 percent (or an average of 1.57 discharges per inpatient).

The hospitalizations do not distribute equally among the inpatient subpopulation. A relatively small fraction of inpatients constitute a disproportionate share of discharges. Three-quarters of the inpatient subpopulation (or 11.4 percent of the beneficiary population) enter a hospital only once during the year. The 1.1 percent of inpatients with six or more annual discharges account for 5.1 percent of all hospitalizations, the 12.4 percent of inpatients with three or more discharges comprise 30.4 percent of hospitalizations, and the 33.2 percent of inpatients with two or more discharges make up 57.1 percent of hospitalizations. [Figure 2].

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[1] Holloway JJ, Thomas JW, & Shapiro L. Clinical and socio-demographic risk factors for readmission of Medicare beneficiaries. Health Care Financing Review, Fall 1988; 10: 27-36.

[2] Haley RW, Culber DH, White JW, Morgan WM, & Emori TG. Nationwide nosocomial infection rate. Am J Epidemiol, Feb. 1985; 121 (2): 159-67 at 162.

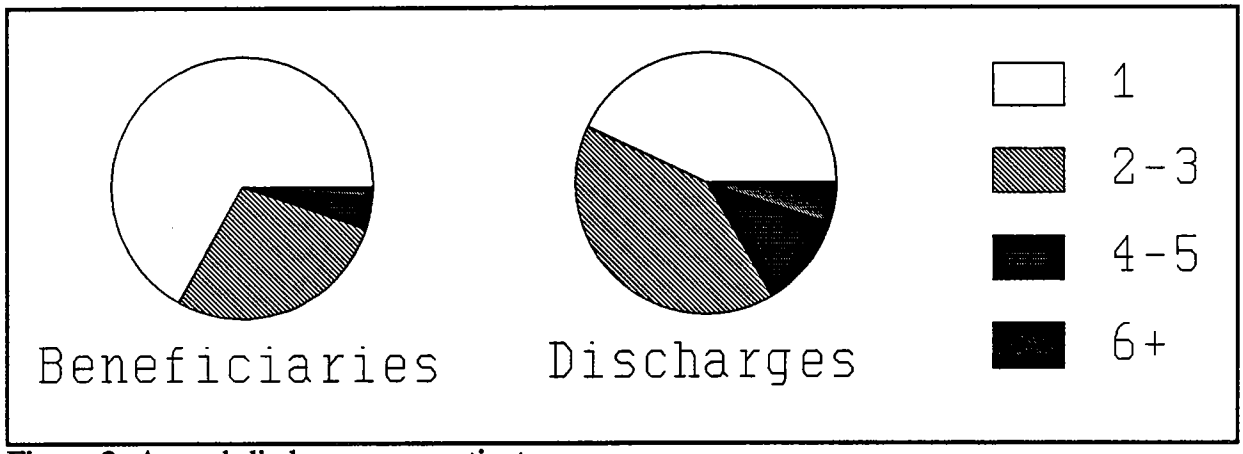

Figure 2: Annual discharges per patient

This inspection studies the epidemiology of "readmissions." It defines a readmission as a single inpatient entering a hospital more than once in a single year. Readmissions occur for four principal reasons.

- Previous premature discharge: Medical instability at the time of the preceding discharge caused the readmission (e.g., inappropriate discharge of a still septic inpatient to limit the hospital's financial losses).

- Planned readmission: The standard treatment entails discharge of the inpatient and later readmission for further therapy (e.g., repeated cycles of chemotherapy for lymphatic cancer).

- Medically related readmission: The natural history of the disease involves multiple hospitalizations despite proper treatment and stability at previous discharge (e.g., recurrence of sickle crisis or of acute exacerbation of chronic obstructive pulmonary disease).

- Unrelated readmission: The admissions occur at random. This inpatient just happened to "hit" twice in a particular year (e.g., hospitalization for pneumonia followed by admission for an unrelated hip fracture).

These categories vary in their implications for Medicare costs and their amenability to external control.

Previous premature discharge: Under the prospective payment system (PPS) the hospital receives a pre-established payment for each discharge, based upon its diagnosis related group (DRG). Because the hospital gains when the inpatient consumes less than the expected amount of resources, it has a financial incentive to discharge the inpatient as soon as feasible. Discharge may occur before medically indicated or the patient attains a stable condition. A premature discharge may also cause a subsequent readmission with another hospitalization payment. A previous Office of Inspector General (OIG) inspection (OAI-05-88-00740) establishes the general rate of premature discharge to be about 0.8 percent among

all Medicare hospitalizations. However, these 50,000 premature discharges annually cost Medicare $150 million.

The HCFA relies principally upon the peer review organizations (PROs) to detect premature discharges. Among other things, the initial PRO "scope of work" required them to review all "related re-admissions" to PPS hospitals occurring within 7 days of discharge from that ***same*** hospital for possible premature discharge. Subsequent scopes of work extended 7 day readmission period for PRO review to 15 days and then to 31 days following the initial discharge.

Initially each PRO decided for itself what made readmissions "related." Some PROs only reviewed readmissions billed as the same DRG. Other PROs related second stays from the same major diagnostic category (MDC), clusters of DRGs pertaining to a single organ system. Still other PROs compared disease codes using the International Classification of Disease -- Ninth Revision (ICD-9-CM). This flexibility contributed to the high inter-PRO variation in rates of readmission review and rates of readmission due to a preceding premature discharge. Accordingly, the third PRO "scope of work" added a review of 25 percent of ***all*** readmissions within 31 days for premature discharge, regardless of whether the PRO deemed them related. For all related readmissions, the HCFA directed the PROs to review the hospital records for both the initial and subsequent stays in assessing premature discharge.

The PROs also limit their inquiries to readmissions to the same hospital. A readmission within the designated time frame, but to a different institution, does not fall under the PROs' scope of work for premature discharge surveillance.

Planned readmission: A readmission may occur because at the time of the initial discharge the attending physician plans to readmit the patient. For example, the first hospitalization may identify the need for an eventual coronary artery bypass, but medical considerations dictate outpatient cardiac rehabilitation before proceeding with the operation. At the time of the first discharge, the attending physician notes that the patient will return for surgery in a few weeks. The two stays have a relationship, but not because of inadequate care during the initial hospitalization.

The prospective payment system permits such "split admissions" where medically indicated, even though some similarly situated inpatients receive all pertinent services during the course of a single stay. Theoretically, the attending physician exercises professional judgment to maximally benefit the patient. The additional DRG payment to the hospital could play a role in the selection of a split admission, but no objective method exists for identifying such occurrences.

Other planned readmissions involve little physician discretion. Certain cancer protocols call for multiple cycles of chemotherapy or radiotherapy at scientifically set intervals. Thus, the typical disease pattern entails an extensive, initial admission for diagnosis and workup, followed by numerous, brief readmissions for treatment over a prolonged period. The need for multiple readmissions exists from the time of the initial diagnosis.

Disease related readmission: Other readmissions derive from the natural history of the patient's underlying disease. Some conditions, like chronic obstructive pulmonary disease or sickle crisis, tend normally to recur. Their chronic nature means that the physician cannot predict when the acute exacerbations will occur, but knows for certain that they will require readmission in the near future.

Unfortunately, health services research has developed relatively little data about the patterns of services required by particular chronic diseases. This inspection quantifies the diseases that most commonly cause multiple admissions. Insurers that elect to pay for successful, preventive measures for diseases causing frequent readmissions could accrue considerable savings.

Unrelated readmission: Finally, multiple hospitalizations may bear no relationship to each other. The unlucky patient may suffer a series of independent incidents, each requiring admission. The beneficiary receives proper care in each case and presumably returns to baseline health status. Utilization review can exert relatively little control over unrelated readmissions.

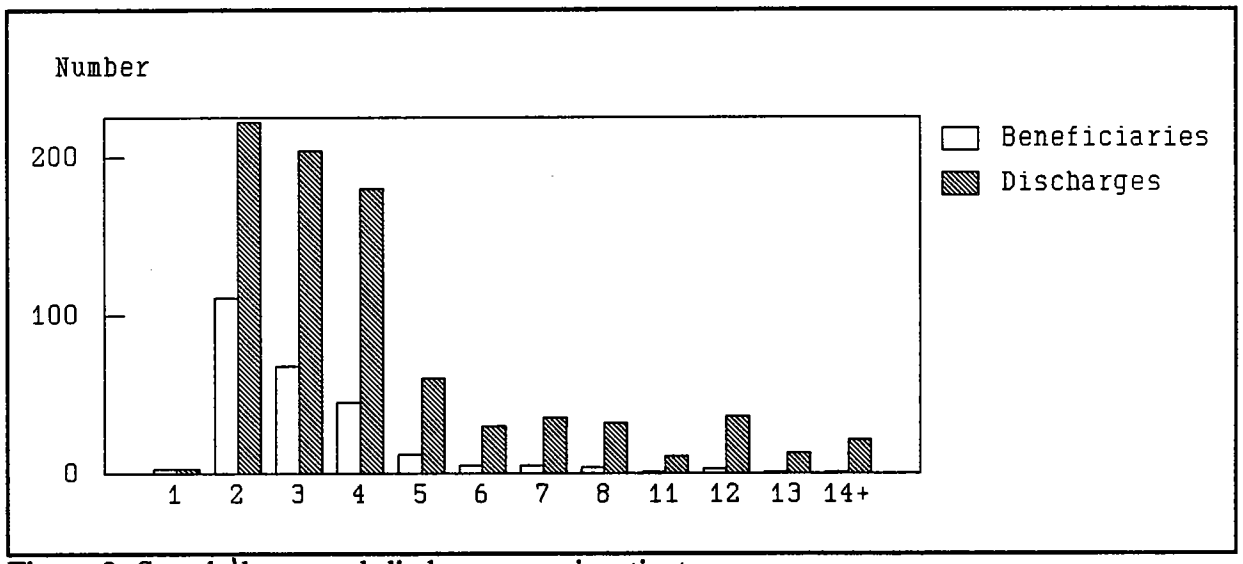

Figure 3: Sample by annual discharges per inpatient

Methodology

The OIG cumulates quarterly a 0.2 percent sample of all PPS bills for short-term care. For CY 1985, it includes 19,840 discharges for 12,744 inpatients. To study readmissions, the sampling frame excludes 8,518 inpatients admitted only once during the year. From the remaining 4,226 beneficiaries having multiple admissions, the design employed simple random sampling to selected 261 ***inpatients*** without replacement. The OIG requested medical records for all discharges for each sampled inpatient. With follow-up, it ultimately obtained 847 or 97.5 percent of the 869 medical records.

The Office of Inspector General contracted with the Health Data Institute of Lexington, MA for physician review of the medical records. Among other criteria, the reviewers used judgmental techniques to identify premature discharges and planned readmissions. This methodology parallels the process and standards employed in local peer review and by the PROs. The reviewers had board certification, peer review experience, and current clinical care responsibilities. Expert consultation was available for specialty care issues, and physician panels for difficult cases. An OIG medical officer scrutinized the overall review process for consistency and bias; and classified the remaining discharges as being either disease related or unrelated. The OIG contracted with BOTEC Analysis of Cambridge, MA to analyze the resultant data and prepare this report.

FINDINGS

Sample

The sample closely mirrors the sampling frame in its distribution by number of annual discharges per beneficiary (Chi-square 766.5, 13 df, $p<0.0001$). Most beneficiaries have three discharges or less, but a few beneficiaries have a large number of incidents and one person had 21 hospitalizations. The 7.0 percent of inpatients who experienced six or more discharges comprise 21.0 percent of the discharges. Despite being limited to inpatients with multiple discharges, the sample could obtain only one medical record for a few inpatients. [Appendix A-3]. [Figure 3].

Table I: Beneficiary demography

	Beneficiaries	Discharges	95% confidence interval
Age (years)	74.2	75.6	Variance not available
Sex (% male)	40.4	46.2	-0.027 to -0.026
Length of stay	--	7.5	Not applicable
Case mix index	--	1.1101	Not applicable
Mortality (%)	5.5	6.4	-0.016 to -0.005

Beneficiaries

In 1982, the last year for which the HCFA published comprehensive data, Medicare enrollees averaged 1.4 years younger than Medicare inpatient discharges. Lack of published variances precludes calculation of a confidence interval, but the large size of the population undoubtedly makes this difference significant. Older beneficiaries therefore enter the hospital at a higher rate than younger beneficiaries confirming that older persons consume more health care services. Empirically, health status deteriorates with advancing age, requiring more frequent hospitalization. Conversely, adverse selection should occur as the

more frail elderly succumb to their diseases leaving a cohort of older, but healthier, survivors. [Appendix A-4]. [Table I].

The 26.1 million Medicare beneficiaries included 10.5 million males (40.4 percent), a significantly lower proportion than the 46.2 percent males among discharges (95% CI -0.027 to -0.026).[3] The inpatient population including more males than the beneficiary population contradicts the traditional finding that females consume health services at a higher rate than males (despite having superior health status). However, males in the general population have a lower proportion of insurance coverage than females, so male beneficiaries' higher rate of hospitalization may only reflect their improved insurance coverage upon acquiring Medicare eligibility.[4]

Beneficiaries do not have average lengths of stay or reimbursement in the same sense as do inpatients. Dividing total hospital days or costs by the number of beneficiaries, instead of inpatients, necessarily decreases the averages. Unsurprisingly, the general population, aged 65 and older, has a significantly lower mortality rate (95% CI -0.016 to -0.005) than the (sicker) subpopulation of Medicare inpatients.

Table II: Discharge demography

	Admissions	Readmissions	95% confidence interval
Age (years)	73.6	71.0	1.8 to 3.4
Sex (% male)	46.2	48.4	-0.06 to 0.01
Length of stay	7.5	8.3	-1.3 to -0.3
Case mix index	1.1101	1.1808	-0.3 to 0.2
Mortality (%)	6.4	6.4	-0.02 to 0.02
n	7050	847	

Discharges

The National DRG Validation Study comprises a representative sample of all PPS discharges in 1985, the same sampling frame as this sample of readmissions. The inpatients in this sample averaged a significant 2.6 years older than this inspection's sample of inpatients with multiple discharges (95% CI 1.8 to 3.4). This finding suggests that younger inpatients re-enter the hospital more frequently than older inpatients. While older beneficiaries generally have worse health, among the subpopulation of the sick, younger inpatients consume more services. [Appendix B-1]. [Table II].

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[3] US Department of Health and Human Services, Health Care Financing Administration, Office of Research and Demonstrations. Health Care Financing Program Statistics -- Medicare and Medicaid Data Book, 1986. Baltimore, MD: US Government Printing Office, September 1987 (HCFA Pub. No. 03247). P. 43.

[4] U.S. Department of Commerce, Bureau of the Census. Statistical Abstract of the United States 1988. Washington, DC: U.S. Government Printing Office, 108th Ed., 1987. Table 140.

Admissions do not differ significantly from readmissions in the proportion of males, case mix index, or mortality rate. The former similarity in the distribution of admissions and readmissions suggests that male and female inpatients have similar health status, unlike the population of enrollees. Alternately, this non-significance may reflect the smaller size of the samples. The single discharge sample also has a significantly shorter average length of stay than the readmission sample (95% CI -1.3 to -0.3). This finding probably reflects beneficiaries with multiple annual discharges being sicker than other Medicare inpatients, despite their relative youth.

Hospital characteristics

Readmissions occur to small (95% CI 0.008 to 0.063) and medium sized hospitals (95% CI 0.030 to 0.090) in significantly higher proportions than to large hospitals. The former presumably serve a population having routine chronic diseases, whereas large hospitals attract more acute inpatients on a one time basis that better conform to the short term model of disease. Urban-rural location has no effect, whereas nonteaching (95% CI 0.112 to 0.177) and for-profit hospitals (95% CI 0.313 to 0.361) have disproportionate shares of the readmission sample. Unsurprisingly, the readmissions sample also includes significantly higher proportions of transfers from other hospitals and admissions for therapy. [Appendix B-2].

Large hospitals receive a significantly higher proportion of true readmissions (95% CI -0.28 to -0.14). Location, teaching status, and profit control do not exercise an effect. The true readmissions subsample largely accounts for the overall higher proportions of transfers from other hospitals and admissions for therapy. [Appendix C-2].

Table III: Initial admission demography

	Initial admission	Subsequent readmissions	95% confidence interval
Age (years)	72.7	70.2	0.7 to 4.3
Sex (% male)	47.7	48.7	-0.1 to 0.1
Length of stay	7.8	8.5	-1.8 to 0.4
Case mix index	1.1333	1.2018	0.03 to 0.23
Mortality (%)	0.0	9.2	-0.13 to -0.06
n	259	588	

Readmissions

The sample of beneficiaries admitted to the hospital was divided into two parts. The first one consisted of those inpatients admitted only once during the year, while the second consisted of those with multiple readmissions. The second group averaged 2.5 years younger than the first, indicating that multiple readmissions occur more often among younger inpatients. [Appendix C-1]. [Table III].

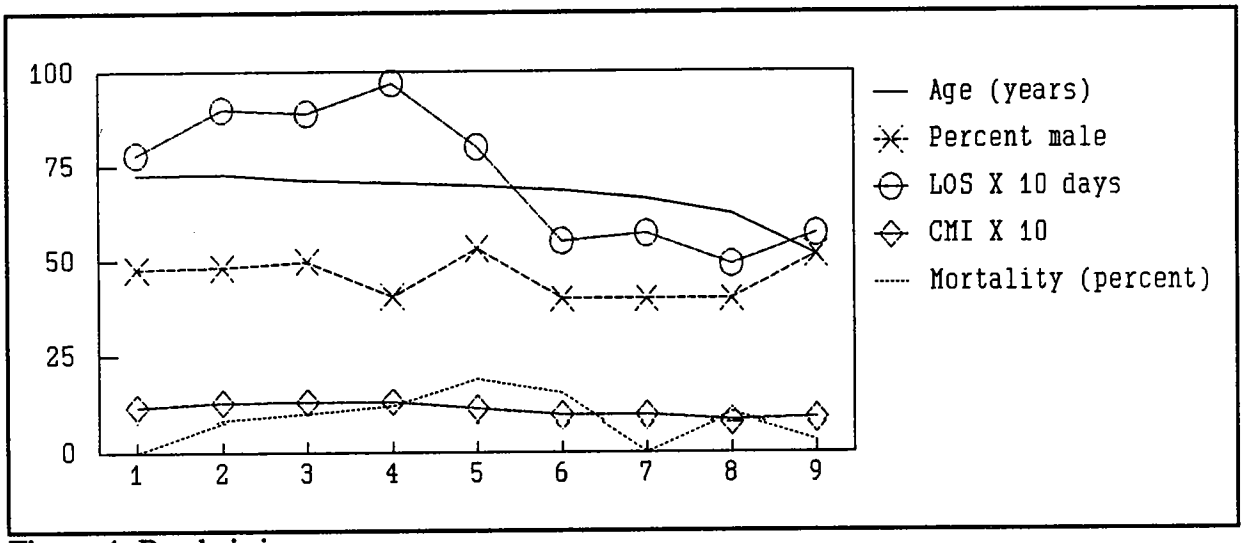

Figure 4: Readmissions sequence

The subsamples of initial admissions and true readmissions do not differ in sex distribution or length of stay. Although males enter the hospital at a higher rate than the beneficiary population, after the initial stay they re-enter at comparable rates and remain for comparable terms. By definition, the initial admission subsample has no mortality. The sampling frame consists exclusively of inpatients having multiple admissions and who therefore all survived their initial hospital stays.

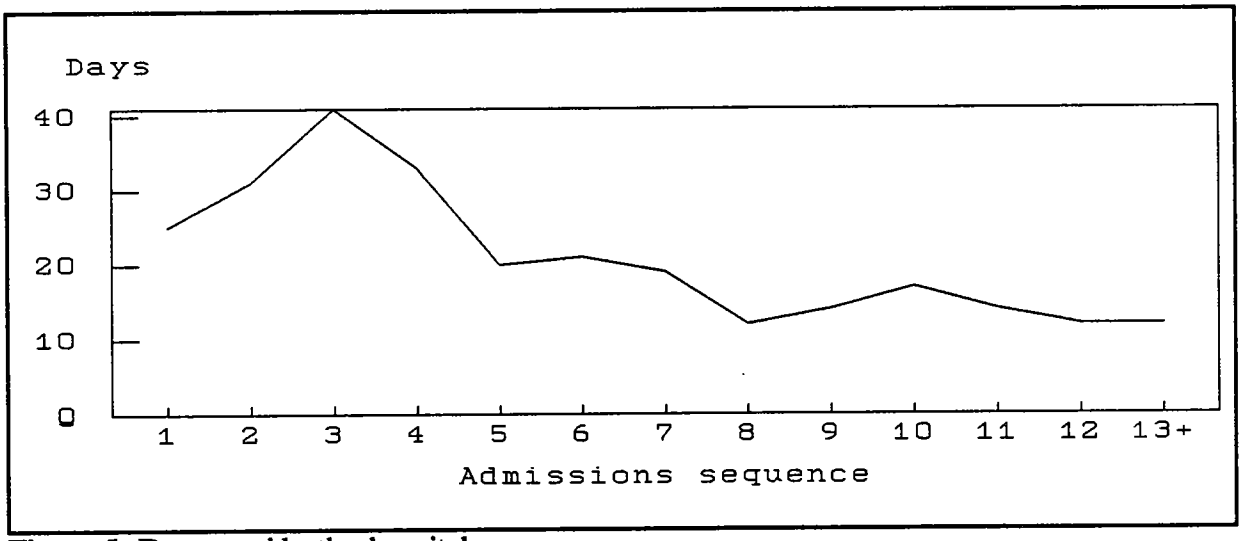

Figure 5: Days outside the hospital

Ordering the readmission sample by sequence of admission, average age declines steadily with increasing progression of readmissions, confirming the previous hypothesis that among inpatients, younger beneficiaries have worse health. However, length of stay and case-mix index decrease with admission sequence, suggesting their maladies to be less serious than average or to be follow-up treatment of the established disease. The small subsample size limits conclusions about gender distribution or mortality. [Figure 4].

The sequence of readmissions also permits calculation of the average interval between readmissions. The time outside the hospital becomes shorter and shorter as the chronically ill beneficiary re-enters institutions with increasing frequency. This trend may reflect either the poorer physiological condition of the invalid or merely that the individual spending little time at home has more opportunities for hospitalization. [Appendix C-3]. [Figure 5].

Reasons for readmission

This study finds that most readmissions occur because of the natural history of diseases, with 54.7 percent of the sample being medically related readmissions. Next most commonly, 32.9 percent of readmissions do not relate to the preceding illness. Only 11.0 percent of readmissions occur because a previous hospitalization triggers a standard pattern of readmissions for follow-up care, significantly less than the 15.7 percent planned procedures identified by the National DRG Validation Study (95% CI -0.072 to -0.001). The 1.0 percent of readmissions due to an immediately preceding premature discharge does not differ significantly from the 0.8 percent for all admissions (95% CI -0.005 to 0.010). Conversely, 75 percent of the eight discharges identified as premature result in a subsequent readmission and all within 15 days. [Appendix D-1]. [Figure 6].

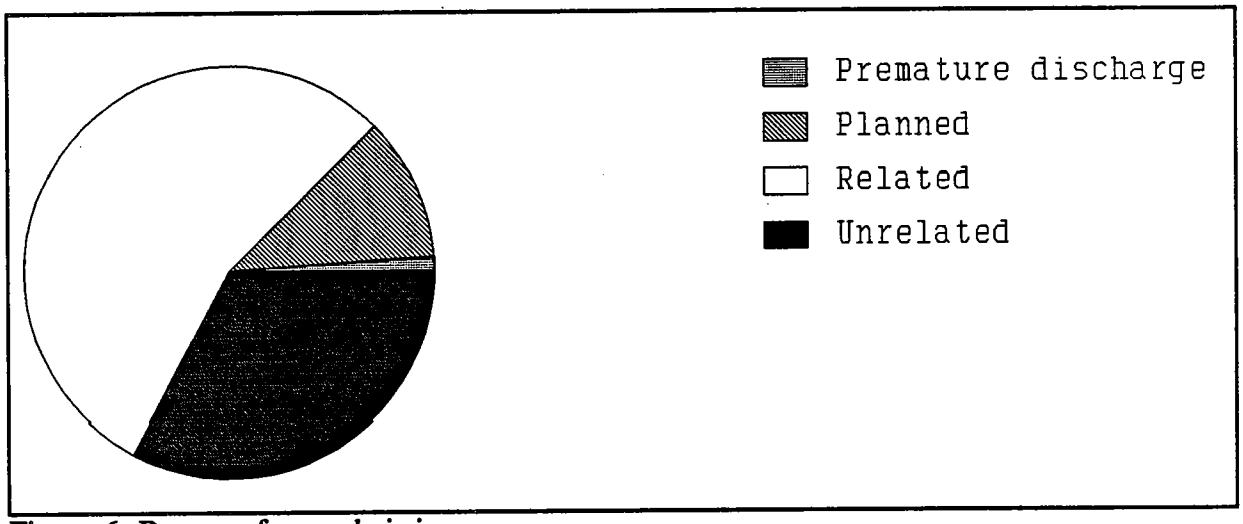

Figure 6: Reasons for readmission

This distribution suggests that third party payors exercise relatively little influence over the frequency and timing of readmissions. The majority will occur because of the inpatient's health status and standardized medical responses, rather than because of discretionary action. Random surveillance for premature discharges will identify true positives in only 1.0 percent of reviews.

Reason for readmission subsamples do not differ in gender distribution, length of stay, or mortality. Readmissions following a previous premature discharge and unrelated readmissions have significantly higher average ages, both findings probably reflecting the more frail health status of very elderly inpatients. In addition, planned readmissions have significantly higher

average case mix index, while medically related readmissions have significantly lower case mix index. A high proportion of readmissions for high intensity, cardiac services accounts for the former trend, while cancer follow-up causes the latter. [Appendix D-2].

The low frequency of readmissions secondary to a preceding premature discharge largely precludes hospital demographic trends. Unsurprisingly, such readmissions all occur within 15 days of the initial discharge, significantly sooner than average (95% CI 0.1 to 0.8). Large hospitals (95% CI 0.1 to 0.3) and urban hospitals (95% CI 0.1 to 0.2) have a disproportionate share of planned readmissions, no doubt due to the diversity of therapeutic services available at large, urban medical centers. By definition, planned readmissions come for planned procedures, largely on an elective basis, and mainly via admission orders from the attending physician. Similarly, therapy needs cause significantly more medically related readmissions (95% CI 0.1 to 0.1), while unrelated readmissions need more diagnostic workups (95% CI 0.1 to 0.2). [Appendix D-3].

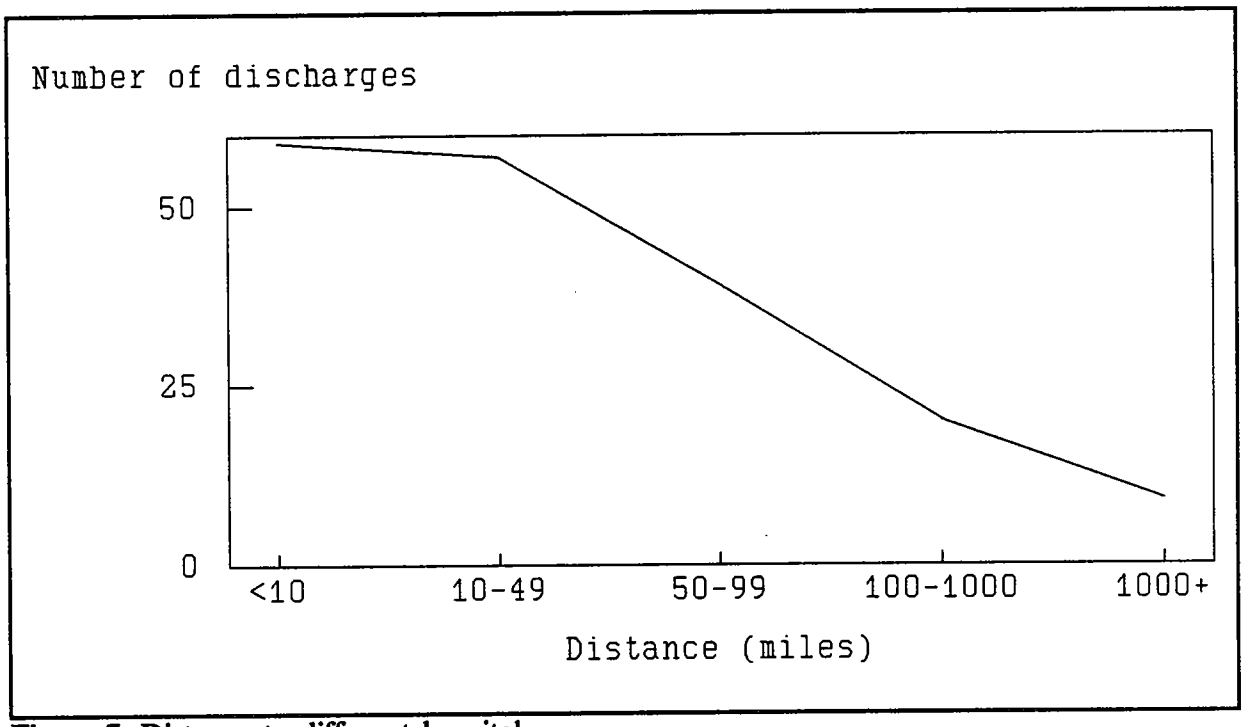

Figure 7: Distance to different hospital

Transferee hospitals

Theoretically, inpatients move from small, rural hospitals to large, urban institutions because their diseases require the latter's more sophisticated diagnostic and therapeutic facilities. Partitioning the readmission sample into readmissions to the same hospital versus readmissions to a different hospital permits verification of this classical hypothesis. Under this service regionalization model, newly diagnosed inpatients may return to their local hospitals for rehabilitation or treatment close to their families and support networks, obscuring any regional referral patterns.

Readmissions to the same versus different hospitals do not differ in gender distribution, length of stay, or mortality. Patients readmitted to different hospitals are significantly younger than patients readmitted to the same hospital (95% CI 1.83 to 6.16). Possibly younger inpatients warrant more aggressive diagnosis and treatment, or older inpatients prefer not to travel to distant centers for definitive services. As expected from both referral patterns and services available, readmissions to hospitals different from the discharging hospital have a significantly higher average case mix index (95% CI -0.37 to -0.10) and enter larger institutions (95% CI 96.7 to 11.3). [Appendix E-1].

Readmissions to different institutions do not differ in hospital characteristics. This finding may capture a limitation in the analysis, rather than a refutation of the regionalization hypothesis. If inpatients transfer to an urban center and subsequently re-enter the local hospital, the readmissions will demographically cancel each other out. [Appendix E-2].

This limitation would not apply to measuring the distance to the new hospital. It would merely result in two trips of the requisite length. Over a fifth of trips occur within the same city, nearly one-third total less than 10 miles, and two-thirds less than 50 miles. These relatively short distances could reflect either effective regionalization of services or inpatient preferences about acceptable travel times. Patients traveling long distances for readmission are generally represent beneficiaries who need hospitalization while vacationing in the South during the winter, rather than the severely ill seeking relief at national medical centers. [Appendix E-3]. [Figure 7].

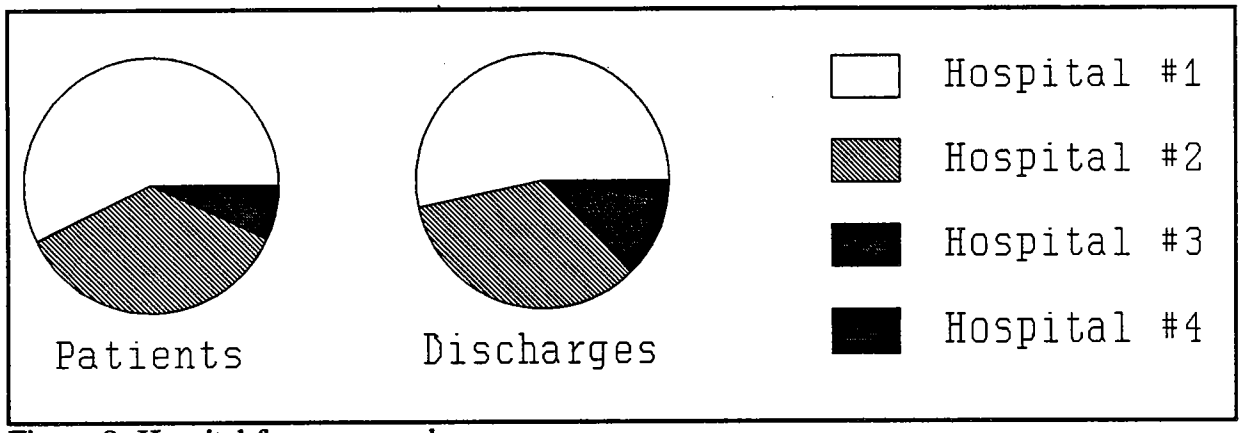

Figure 8: Hospital frequency order

Number of transferee hospitals

To avoid the problem of admissions to different hospitals canceling out each other's demographic contrasts, an alternative analysis notes that no patient enters more than four different hospitals. Each hospital is ranked by the number of times it discharged this patient. The hospital with the most discharges becomes #1, conceptually the local hospital nearest the patient. The hospital with the second most discharges for the patient becomes #2, etc. The latter hospitals with fewer discharges should include the referral centers not identified by the simpler "different hospital" analysis. [Figure 8].

As hospitals increase in frequency order, the average age drops and percent of males increases. Except for hospital #4, mortality and case mix index also increase. Length of stay shows no trend, while by definition the average number of discharges per hospital decreases. [Appendix F-1].

As originally expected, the higher frequency orders disproportionately include large, urban, and teaching hospitals. Interestingly, this group also includes more for-profit hospitals. This finding contradicts the expectation that referral centers consist primarily of nonprofit institutions. [Appendix F-2].

Diseases causing multiple admissions

Examination of the ICD-9-CM codes for each inpatient's sequence of discharges reveals that a single chronic disease usually accounts for most of each person's hospitalizations. Grouping these underlying pathologies by specialty or organ system: Cardiology, pulmonology, and gastroenterology account for 54.9 percent of diseases whether measured by number of inpatients or discharges. Only in general hematology does the proportion of discharges significantly exceed the proportion of inpatients, indicating a high rate of readmissions (95% CI -0.06 to -0.01). Upon dissection of the underlying ICD-9-CM codes, hemoglobinopathies account for this discrepancy. This finding confirms the clinical impression that such patients repeatedly present in crisis. [Appendix G-1]. [Figure 9].

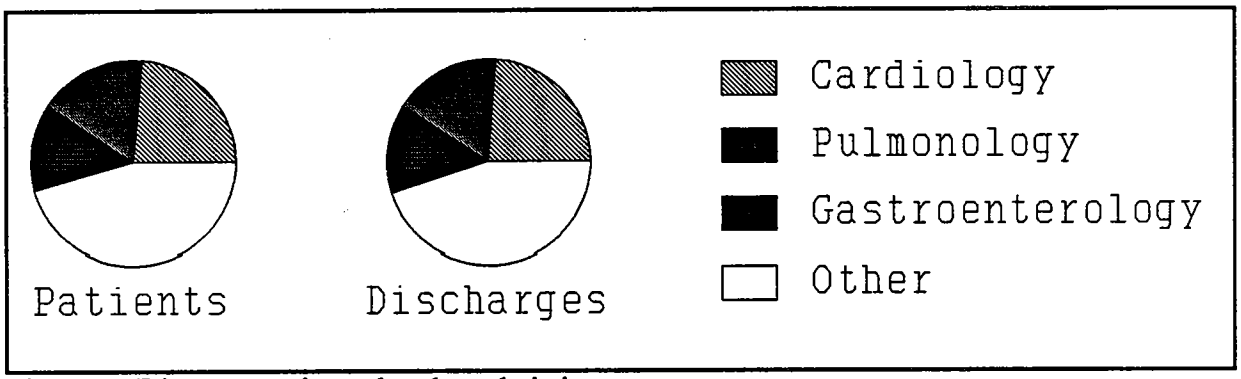

Figure 9: Disease causing related readmissions

Hemoglobinopathies group to DRG 395, red blood cell disorders. Although these bills constitute only 0.8 percent of discharges and 0.5 percent of reimbursement, the average payment of $2,063 in Fiscal Year (FY) 1986 sums to over $101 million. Some primary (e.g., genetic screening, family counseling) and secondary preventive measures (e.g., hydration, activity restriction) can reduce the need for hospitalization. Medicare support of such activities could have a very high cost-benefit ratio, despite their being outside its traditional mission. A reduction in the 46.7 percent of unnecessary admissions hemoglobinopathy for could save $47.2 million annually in hospitalization expenses.

Aggregated as major diagnostic categories, the readmission sample's proportions do not generally differ from the distribution of all discharges. However, readmissions include a significantly higher fraction of respiratory diseases (95% CI 0.01 to 0.05), principally chronic

obstructive pulmonary disease, pneumonia, and lung cancer. This finding also conforms to the natural history of these disease, being characterized by repeated hospitalization for acute exacerbations of the chronic, progressive, underlying pathology. [Appendix G-2].

Reasons for readmission (e.g., medically related readmission) do not particularly cluster by diseases (e.g., cancer). Gastrointestinal diseases comprise half of rehospitalizations secondary to a preceding premature discharge. Planned readmissions include more cardiology and gastroenterology cases. Unplanned, (but) medically related readmissions have a high proportion of respiratory disease, principally chronic obstructive pulmonary disease. As expected, unrelated readmissions show no particular disease trends. [Appendix G-3].

Based on the average number of times the patient enters the hospital annually by disease; cancer, hematology (hemoglobinopathies), psychiatry, congestive heart failure, and chronic obstructive pulmonary disease have particularly high averages. These trends also conform to their natural history as chronic diseases. In addition, myocardial infarctions constitute so high a share of readmissions that they retain clinical importance despite their relatively low frequency of readmissions per patient. [Appendix G-4].

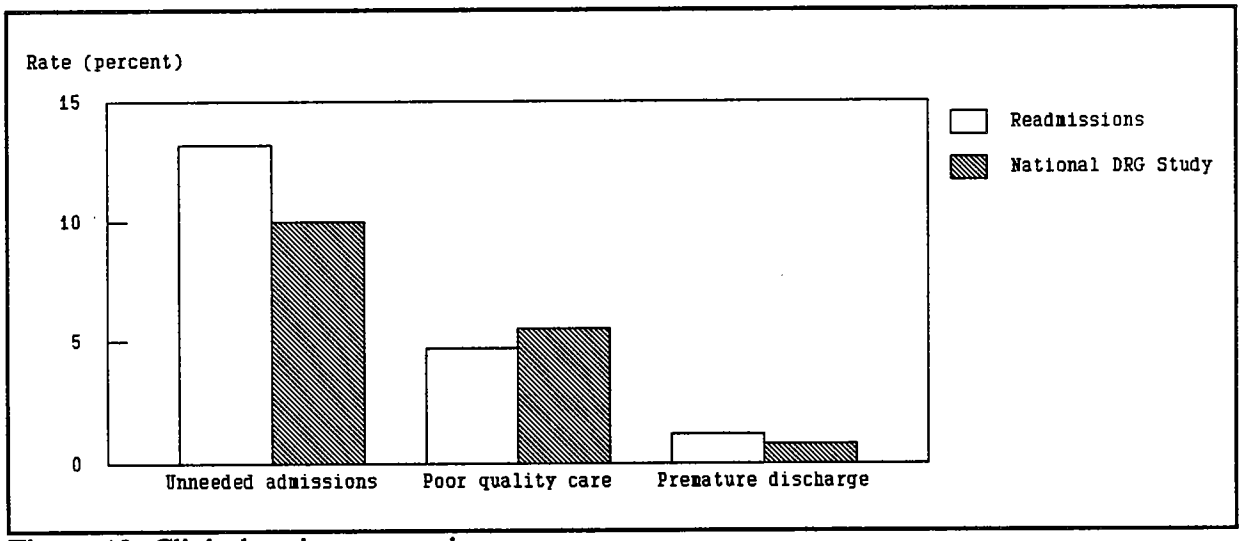

Figure 10: Clinical review comparison

Clinical review

Contractor physicians categorize 162 medical records as documenting unnecessary admission, poor quality care, or premature discharge. [Appendix H-1]. These rates do not significantly differ from the random selection of discharges of the National DRG Validation Study. This finding suggests that PRO review of readmissions identifies no more clinical incidents than a random process. [Appendix H-2]. [Figure 10].

By contract, the PROs designated discharges for review in several specific ways during their second "scope of work" (approximately 1987-88).

- Random review: A 3.0 percent sample of all discharges (12.8 percent of all PRO reviews).

- Readmissions review: All re-entries to the same hospital occurring within 14 days of the index discharge (22.6 percent of "cases selected" for PRO review). The HCFA has subsequently increased the review period to 30 days.

- Other: Various selection algorithms such as outliers, designated DRGs, etc. (the remaining 64.6 percent).

Since the readmissions review distinguishes clinical incidents no better than random review, it contributes nothing to PRO deterrence of unnecessary readmissions or medically appropriate behavior by the clinical community. Discontinuing it would eliminate 36.9 percent of PRO reviews (each readmission entails review of both the first and second discharge). The HCFA estimates that readmission reviews annually cost $45-55 million.

Unnecessary readmissions occur most commonly in ophthalmology, hematology, and lung cancer. Improved PRO utilization review has decreased the incidence of unnecessary lens procedures subsequent to the date of this sampling frame. Hemoglobinopathies' amenability to preventive measures and their high rate of unnecessary hospitalizations make them a high yield target for further study.

General neurology and hematological oncology have the highest rates of poor quality care. Scientific developments have rapidly advanced both specialties in recent years. Premature discharge ensues most frequently following sepsis, gastrointestinal bleeding, and trauma, although the small number of events detracts from the statistical reliability of these rates. [Appendix H-3].

RECOMMENDATIONS

- The HCFA should re-evaluate the effectiveness of PRO surveillance of readmissions versus surveillance of random admissions.

- The HCFA should study the effectiveness of PRO utilization review of hemoglobinopathies.

- The HCFA should determine whether primary and secondary prevention of acute exacerbations of hemoglobinopathies would consume less Medicare resources than repeated hospitalizations.

The HCFA did not concur with these recommendations because they would require statutory change. We continue to believe that HCFA should propose legislative changes and take administrative actions in order to implement our recommendations.

Appendix A-1: Medicare discharges in FY 1985

Medicare beneficiaries	
Aged	28.2 million
Disabled	2.9 million
PPS discharges	
Number	8.3 million
[Hospitalization rate]	[26.6 percent]
PPS beneficiaries discharged	
Number	5.3 million
[Hospitalization percentage]	[17.1 percent]

Appendix A-2: Sampling frame

Annual discharges per beneficiary	Beneficiaries		Total discharges	
	Number	[Percent]	Number	[Percent]
1	8,518	[66.8]	8,518	[42.9]
2	2,645	[20.8]	5,290	[26.7]
3	913	[7.2]	2,739	[13.8]
4	374	[2.9]	1,496	[7.5]
5	156	[1.2]	780	[3.9]
6	67	[0.5]	402	[0.02]
7	27	[0.21]	189	[0.01]
8	19	[0.15]	152	[0.008]
9	7	[0.05]	63	[0.003]
10	7	[0.05]	70	[0.004]
11	4	[0.03]	44	[0.002]
12	2	[0.02]	24	[0.001]
13	4	[0.03]	52	[0.003]
14+	1	[0.01]	21	[0.001]
Total	12,744	[100.0]	19,840	[100.0]

Appendix A-3: Sample design

Discharges per beneficiary	Requested		Obtained	
	Beneficiaries	Discharges	Beneficiaries	Discharges
1	0	0	3	3
2	112	224	111	222
3	66	198	68	204
4	49	196	45	180
5	12	60	12	60
6	7	42	5	30
7	5	35	5	35
8	4	32	4	32
11	1	11	1	11
12	2	24	3	36
13	2	26	1	13
14+	1	22	1	21
Total	261	869	259	847

Appendix A-4: Beneficiary demography

	Age (years)	Gender (% male)	LOS (days)	Case mix index	Mortality (%)	n (million)
Beneficiaries	74.2	40.4	—	—	5.5[1]	26.1 million
Discharges	75.6	46.2	7.5[2]	1.1101[2]	6.4[2]	9.9 million
{95% confidence interval}	NA	{-0.027 to -0.026}	NA	NA	{-0.016 to -0.005}	

Source: U.S. Health Care Financing Administration, Office of Research and Demonstrations. Medicare and Medicaid Data Book 1986. Baltimore, MD: HCFA Pub. No. 03247, September 1987. Table 3.10.
1. U.S. Department of Health & Human Services, Public Health Service, Centers for Disease Control, National Center for Health Statistics. Vital Statistics of the United States 1986, Vol. II -- Mortality, Part A. Hyattsville, MD: DHHS Pub. No. (PHS) 88-1122, 1988. P. 312.
2. Delaney AM & Hsia DC (Eds.). National DRG Validation Study. Lexington, MA: Health Data Institute, November 1987.

Appendix B-1: Discharges by patient demography

	Age (years)	Gender (% male)	LOS (days)	Case mix index	Mortality (%)	n
National DRG Validation Study	73.6	46.2	7.5	1.1101	6.4	7050
Readmissions sample	71.0	48.4	8.3	1.1808	6.4	847
{95% confidence interval}	{1.8 to 3.4}	{-0.06 to 0.01}	{-1.3 to -0.3}	{-0.3 to 0.2}	{-0.02 to 0.02}	

Appendix B-2: Discharges by hospital demography

	National DRG Validation		Readmissions Sample		{95% confidence interval}
	#	[%][1]	#	[%]	
<100 beds	2276	[18.4]	186	[21.7]	{0.008 to 0.063}
100-299 beds	2388	[37.5]	372	[43.4]	{0.030 to 0.099}
300+ beds	2386	[44.1]	289	[33.7]	{-0.135 to-0.064}
Urban	4374	[71.5]	586	[69.2]	{-0.055 to 0.009}
Rural	2676	[28.5]	261	[30.8]	{-0.009 to 0.055}
Teaching	1854	[31.9]	148	[17.3]	{-0.177 to -0.112}
Nonteaching	5195	[68.1]	699	[81.6]	{0.112 to 0.177}
Profit	689	[9.4]	365	[42.6]	{0.313 to 0.361}
Nonprofit	6361	[90.6]	209	[24.4]	{-0.361 to -0.313}
Public			273	[31.9]	
Source					
Physician	3603	[51.7]	393	[46.4]	{-0.089 to -0.017}
Clinic	136	[1.7]	14	[1.6]	{-0.010 to 0.009}
HMO	4	[0.1]	0	[0.0]	{-0.003 to 0.001}
Hospital	116	[1.9]	48	[5.6]	{0.027 to 0.048}
SNF	84	[0.9]	1	[0.1]	{-0.014 to -0.001}
ICF	229	[2.8]	30	[3.5]	{-0.004 to 0.019}
ER	2786	[40.4]	360	[42.0]	{-0.014 to 0.056}
Unknown	30	[0.4]	1	[0.1]	{-0.007 to 0.002}
Cause					
Workup	5569	[77.8]	598	[69.8]	{-0.102 to -0.042}
Therapy	179	[2.7]	107	[12.5]	{0.086 to 0.113}
Planned	1096	[17.6]	110	[12.8]	{-0.072 to -0.018}
Outpatient failure	146	[1.9]	32	[3.7]	{0.009 to 0.029}
Urgency					
Emergency	1433	[20.6]	81	[9.5]	{-0.139 to -0.082}
Urgent	3791	[52.5]	554	[64.6]	{0.094 to 0.165}
Elective	1685	[25.9]	212	[24.7]	{-0.040 to 0.022}
Unknown	81	[1.0]	0	[0.0]	{-0.019 to -0.004}
Total	7050	[100.0]	847	[100.0]	

1. Discharge weighted.

Appendix C-1: Readmissions by patient demography

	Age (years)	Gender (% male)	LOS (days)	Case mix index	Mortality (%)	n
Initial admissions	72.7	47.7	7.8	1.1333	0.0	259
Subsequent admissions	70.2	48.7	8.5	1.2018	9.2	588
{95% confidence interval}	{0.7 to 4.3}	{-0.1 to 0.1}	{-1.8 to 0.4}	{0.03 to 0.23}	{-0.13 to -0.06}	NA
Admission sequence						
1	72.7	47.7	7.8	1.1333	0.0	256
2	72.8	48.2	9.0	1.2483	7.8	145
3	71.2	49.7	8.9	1.2746	9.7	77
4	70.6	40.6	9.7	1.2781	11.7	32
5	69.7	53.1	8.0	1.0991	18.8	20
6	68.4	40.0	5.5	0.9349	15.0	15
7	66.3	40.0	5.7	0.9337	0.0	10
8	62.2	40.0	4.9	0.7827	10.0	6
9+	51.4	51.5	5.7	0.8565	3.0	27
Reason for readmission						
Previous premature discharge	82.7	33.3	5.7	1.1181	0.0	6
Planned readmission	71.4	57.9	8.3	2.1403	3.0	67
Related readmission	68.0	50.2	8.4	1.0582	11.2	321
Unrelated readmission	73.1	43.0	8.9	1.1168	8.3	194
Source						
Physician office	70.6	49.2	7.6	1.2118	4.2	260
Clinic	70.2	22.2	13.4	1.0586	11.1	10
Another hospital	68.3	55.8	9.9	1.8867	23.3	43
Intermediate care facility	79.0	36.4	10.5	1.1524	9.1	22
Emergency room	69.4	49.2	9.0	1.0868	11.9	252
Unknown	74.0	0.0	3.0	0.4110	0.0	1
Cause						
Workup	70.3	48.2	9.0	1.1228	10.1	407
Therapy	69.9	40.0	6.5	0.8800	10.0	90
Planned readmission	71.6	59.4	8.1	1.1891	2.9	69
Outpatient failure	65.5	59.1	10.5	1.0507	9.1	22
Urgency						
Emergency	69.7	50.0	9.9	1.3308	25.9	54
Urgent	70.0	49.6	9.1	1.1259	8.4	396
Elective	71.2	45.7	6.5	1.3681	5.1	138

Appendix C-2: Readmissions by hospital demography

	Initial admissions		Subsequent readmissions		{95% confidence interval}
	#	[%]	#	[%]	
<100 beds	57	[21.9]	129	[22.0]	{-0.061 to 0.060}
100-299 beds	152	[58.5]	220	[23.5]	{0.137 to 0.282}
300+ beds	50	[19.6]	239	[40.5]	{-0.279 to -0.140}
Urban	175	[67.7]	411	[69.9]	{-0.089 to 0.046}
Rural	84	[32.3]	177	[30.1]	{-0.046 to 0.089}
Teaching	40	[15.8]	108	[18.2]	{-0.080 to 0.031}
Nonteaching	219	[84.2]	480	[81.8]	{-0.031 to 0.080}
Profit	114	[43.8]	251	[42.8]	{-0.061 to 0.083}
Nonprofit	65	[25.0]	144	[24.5]	{-0.058 to 0.068}
Public	80	[31.2]	193	[32.7]	{-0.084 to 0.053}
Source					
Physician	133	[51.1]	260	[44.3]	{-0.004 to 0.141}
Clinic	4	[1.9]	10	[1.5]	{-0.015 to 0.023}
HMO	0	[0.0]	0	[0.0]	NA
Hospital	5	[1.9]	43	[7.3]	{-0.088 to -0.020}
SNF	1	[0.3]	0	[0.0]	{0.001 to 0.009}
ICF	8	[3.1]	22	[3.7]	{-0.034 to 0.020}
ER	108	[41.5]	252	[42.9]	{-0.086 to 0.058}
Unknown	0	[0.0]	1	[0.1]	{-0.007 to 0.003}
Cause					
Workup	191	[73.8]	407	[69.2]	{-0.020 to 0.113}
Therapy	17	[6.5]	90	[15.3]	{-0.136 to -0.039}
Planned	41	[15.8]	69	[11.8]	{-0.009 to 0.089}
Outpatient failure	10	[3.8]	22	[3.7]	{-0.027 to 0.029}
Urgency					
Emergency	27	[10.4]	54	[9.2]	{-0.031 to 0.055}
Urgent	158	[61.2]	396	[67.3]	{-0.131 to 0.008}
Elective	74	[28.5]	138	[23.5]	{-0.014 to 0.113}
Unknown	0	[0.0]	0	[0.0]	NA
Total	259	[100.0]	588	[100.0]	

Appendix C-3: Interval between rehospitalizations

Admissions	Days outside hospital
1-2	25
2-3	31
3-4	41
4-5	33
5-6	20
6-7	21
7-8	19
8-9	12
9-10	14
10-11	17
11-12	14
12-13	12
13-14	12

Appendix D-1: Reasons for readmission

	Number	[Percent]
Previous premature discharge	6	[1.0]
Planned readmission	67	[11.4]
Related readmission	321	[54.6]
Unrelated readmission	194	[33.0]
Total	588	[100.0]

Appendix D-2: Reasons for readmission by patient demography

Average {95% CI}	Previous premature discharge	Planned readmission	Related readmission	Unrelated readmission
Age (years)	82.7 {4.4 to 20.6}	71.4 {-1.7 to 4.1}	68.0 {-4.0 to -0.1}	73.1 {0.8 to 5.0}
Gender (% male)	33.3 {-0.6 to 0.3}	59.7 {-0.02 to -0.2}	50.2 {-0.1 to 0.1}	42.8 {-0.1 to 0.02}
LOS (days)	5.7 {-8.2 to 2.6}	8.3 {-2.1 to 1.7}	8.4 {-1.3 to 1.1}	9.0 {-0.8 to 1.8}
Case mix index	1.1181 {-0.7 to 0.5}	2.1403 {0.7 to 1.2}	1.0582 {-0.2 to -0.1}	1.1166 {-0.2 to 0.03}
Mortality (%)	0.0 {-0.3 to 0.1}	3.0 {-0.1 to 0.01}	11.2 {-0.02 to 0.1}	8.2 {-0.1 to 0.04}

Appendix D-3: Reasons for readmission by hospital demography

Number {95% CI}	Previous premature discharge	Planned readmission	Related readmission	Unrelated readmission	Total
<100 beds	2 {-0.2 to 0.4}	7 {-0.2 to -0.1}	71 {-0.1 to 0.1}	49 {-0.1 to 0.1}	129
100-299 beds	2 {-0.4 to 0.3}	23 {-0.2 to 0.1}	114 {-0.1 to 0.1}	81 {-0.1 to 0.1}	220
300+ beds	2 {-0.5 to 0.3}	37 {0.1 to 0.3}	136 {-0.1 to 0.1}	64 {-0.2 to 0.1}	239
Urban	3 {-0.6 to 0.2}	55 {0.1 to 0.2}	229 {-0.1 to 0.1}	124 {-0.1 to 0.1}	411
Rural	3 {-0.2 to 0.6}	12 {-0.2 to -0.1}	92 {-0.1 to 0.1}	70 {-0.1 to 0.1}	177
Teaching	0 {-0.5 to 0.1}	16 {-0.1 to 0.2}	68 {-0.1 to 0.1}	24 {-0.1 to 0.1}	108
Nonteaching	6 {-0.1 to 0.5}	51 {-0.2 to 0.1}	253 {-0.1 to 0.1}	170 {-0.1 to 0.1}	480
Profit	1 {-0.7 to 0.1}	34 {-0.1 to 0.2}	147 {-0.1 to 0.1}	69 {-0.2 to 0.1}	251
Nonprofit	3 {-0.1 to 0.6}	17 {-0.1 to 0.1}	73 {-0.1 to 0.1}	51 {-0.1 to 0.1}	144
Public	2 {-0.4 to 0.4}	16 {-0.2 to 0.1}	101 {-0.1 to 0.1}	74 {-0.1 to 0.1}	193
Source					
Physician	4 {-0.2 to 0.4}	59 {0.3 to 0.6}	123 {-0.1 to 0.1}	74 {-0.1 to 0.1}	260
Clinic	0 {-0.1 to 0.1}	0 {-0.1 to 0.1}	7 {-0.1 to 0.1}	3 {-0.1 to 0.1}	10
Hospital	0 {-0.3 to 0.1}	7 {-0.1 to 0.1}	26 {-0.1 to 0.1}	10 {-0.1 to 0.1}	43
ICF	0 {-0.2 to 0.1}	0 {-0.1 to 0.1}	10 {-0.1 to 0.1}	12 {-0.1 to 0.1}	22
Emergency Room	2 {-0.5 to 0.3}	1 {-0.5 to 0.3}	155 {-0.1 to 0.1}	94 {-0.1 to 0.1}	252
Unknown	0 {-0.1 to 0.1}	0 {-0.1 to 0.1}	0 {-0.1 to 0.1}	1 {-0.1 to 0.1}	1
Cause					
Workup	4 {-0.3 to 0.3}	0 {-0.8 to -0.6}	237 {-0.1 to 0.1}	166 {0.1 to 0.2}	407
Therapy	1 {-0.3 to 0.3}	0 {-0.2 to -0.1}	69 {0.1 to 0.1}	20 {-0.1 to 0.1}	90
Planned procedure	1 {-0.2 to 0.3}	67 {0.8 to 1.0}	1 {-0.2 to -0.1}	0 {-0.2 to -0.1}	69
Outpatient failure	0 {-0.2 to 0.1}	0 {-0.1 to 0.1}	14 {-0.1 to 0.1}	8 {-0.1 to 0.1}	22
Urgency					
Emergency	0 {-0.3 to 0.1}	2 {-0.1 to 0.1}	28 {-0.1 to 0.1}	24 {-0.1 to 0.1}	54
Urgent	5 {-0.2 to 0.5}	5 {-0.7 to -0.5}	240 {-0.1 to 0.1}	146 {0.1 to 0.2}	396
Elective	1 {-0.4 to 0.3}	60 {0.5 to 0.8}	53 {-0.1 to -0.1}	24 {-0.2 to -0.1}	138
Admission sequence					
1	5 {-0.1 to 0.7}	37 {-0.1 to 0.2}	109 {-0.2 to -0.1}	105 {0.1 to 0.2}	256
2	1 {-0.4 to 0.3}	17 {-0.1 to 0.1}	74 {-0.1 to 0.1}	53 {-0.1 to 0.1}	145
3	0 {-0.4 to 0.1}	10 {-0.1 to 0.1}	47 {-0.1 to 0.1}	20 {-0.1 to 0.1}	77
4	0 {-0.2 to 0.1}	1 {-0.1 to 0.1}	26 {-0.1 to 0.1}	5 {-0.1 to 0.1}	32
5	0 {-0.2 to 0.1}	1 {-0.1 to 0.1}	14 {-0.1 to 0.1}	5 {-0.1 to 0.1}	20
6	0 {-0.2 to 0.1}	0 {-0.1 to 0.1}	12 {-0.1 to 0.1}	3 {-0.1 to 0.1}	15
7	0 {-0.1 to 0.1}	0 {-0.1 to 0.1}	9 {-0.1 to 0.1}	1 {-0.1 to 0.1}	10
8	0 {-0.1 to 0.1}	0 {-0.1 to 0.1}	6 {-0.1 to 0.1}	0 {-0.1 to 0.1}	6
9+	0 {-0.2 to 0.1}	1 {-0.1 to 0.1}	24 {-0.1 to 0.1}	2 {-0.1 to -0.1}	27
Days between readmissions					
0-15	6 {0.1 to 0.8}	44 {-0.1 to 0.2}	187 {-0.1 to 0.1}	117 {-0.1 to 0.1}	354
16-30	0 {-0.4 to 0.1}	5 {-0.1 to 0.1}	51 {-0.1 to 0.1}	20 {-0.1 to 0.1}	76
31-45	0 {-0.3 to 0.1}	5 {-0.1 to 0.1}	30 {-0.1 to 0.1}	15 {-0.1 to 0.1}	50
46-60	0 {-0.2 to 0.1}	3 {-0.1 to 0.1}	18 {-0.1 to 0.1}	10 {-0.1 to 0.1}	31
61-90	0 {-0.2 to 0.1}	1 {-0.1 to 0.1}	14 {-0.1 to 0.1}	11 {-0.1 to 0.1}	26
91-120	0 {-0.2 to 0.1}	2 {-0.1 to 0.1}	7 {-0.1 to 0.1}	8 {-0.1 to 0.1}	17
121+	0 {-0.2 to 0.1}	7 {-0.1 to 0.1}	14 {-0.1 to 0.1}	13 {-0.1 to 0.1}	34
Total	6	67	321	194	588

Appendix E-1: Readmissions to different hospitals by patient demography

	Same hospital	Different hospital	{95% confidence interval}
Age (years)	71.9	67.8	{1.83 to 6.16}
Sex (% male)	48.3	48.9	{-0.09 to 0.08}
LOS (days)	8.3	8.2	{-1.14 to 1.34}
Mortality (%)	5.6	9.2	{-0.08 to 0.003}
Case mix index	1.1308	1.3603	{-0.37 to -0.10}

Appendix E-2: Readmissions to different hospitals by hospital demography

	Same hospital		Different hospital		{95% confidence
	Number	Percent	Number	Percent	interval}
Average beds	291		345		{-96.7 to -11.3}
<100 beds	155	[23.4]	35	[19.0]	{-0.03 to 0.11}
100-299 beds	258	[38.9]	64	[34.8]	{-0.04 to 0.12}
300+ beds	254	[38.3]	85	[46.2]	{-0.16 to 0.001}
Urban	451	[62.6]	135	[73.4]	{-0.13 to 0.02}
Rural	212	[32.0]	49	[36.3]	{-0.02 to 0.13}
Teaching	109	[16.4]	39	[21.2]	{-0.11 to 0.01}
Non-teaching	554	[83.6]	145	[78.8]	{-0.01 to 0.11}
Profit	293	[44.2]	72	[39.1]	{-0.03 to 0.13}
Non-profit	160	[24.1]	49	[26.6]	{-0.10 to 0.05}
Government	210	[31.7]	63	[34.2]	{-0.10 to 0.05}
Total	663	[78.3]	184	[21.7]	

Appendix E-3: Distance to different hospitals

	Number		[Percent]	
Same city	41		[22.3]	
Same state, different city	118		[64.1]	
<10 miles		15		[8.2]
10-49 miles		55		[29.9]
50-99 miles		32		[17.4]
100+ miles		16		[8.7]
Different state	25		[13.6]	
<10 miles		3		[1.6]
10-49 miles		2		[1.1]
50-99 miles		7		[3.8]
100-1000 miles		4		[2.2]
1000+ miles		9		[4.9]
Total	184		[100.0]	

Appendix F-1: Number of different hospitals visited in frequency order by patient demography

	Number of different hospitals per patient				
	1	2	3	4	Total/Average
Age (years)					
First hospital	72.8	72.0	67.2	32.7	71.7
Second hospital		71.7	68.3	33	69.4
Third hospital			68.3	32.6	60.2
Fourth hospital				33	33
Total	72.8	71.9	67.7	32.8	71.0
Sex (% male)					
First hospital	50.4	41.0	48.9	100.0	48.5
Second hospital		44.2	40.0	100.0	45.9
Third hospital			47.1	100.0	59.1
Fourth hospital				100.0	100.0
Total	50.4	42.2	46.0	100.0	48.4
LOS (days)					
First hospital	8.6	8.6	5.6	1.1	8.3
Second hospital		9.3	8.0	3.0	8.7
Third hospital			7.5	2.6	6.4
Fourth hospital				10.0	10.0
Total	8.6	8.8	6.7	2.4	8.3
Mortality (%)					
First hospital	6.9	6.0	2.2	0.0	6.2
Second hospital		6.7	0.0	0.0	5.2
Third hospital			23.5	0.0	18.2
Fourth hospital				0.0	0.0
Total	6.9	6.3	5.7	0.0	6.4
Case mix index					
First hospital	1.1320	1.1796	1.0514	0.7116	1.1339
Second hospital		1.4051	1.3854	0.6642	1.3685
Third hospital			1.7133	0.8266	1.5117
Fourth hospital				0.7758	0.7758
Total	1.1320	1.2613	1.2767	0.7285	1.1808
Average discharges per hospital					
First hospital	4.0	2.6	4.8	9	3.8
Second hospital		1.2	2.2	6	1.6
Third hospital			1	5	1.9
Fourth hospital				1	1
Average	4.0	2.1	3.3	6.8	3.4

Appendix F-2: Frequency order by bed size

Number [Percent]	Number of different hospitals per patient 1		2		3		4		Total/Average	
All patients	148		93		17		1		259	
All discharges										
First hospital	452		183		45		9		689	
Second hospital			104		25		6		135	
Third hospital					17		5		22	
Fourth hospital							1		1	
Total	452		287		87		21		847	
<100 beds										
First hospital	88	[19.5]	66	[36.1]	17	[37.8]	0	[0.0]	171	[24.8]
Second hospital			5	[4.8]	9	[36.0]	0	[0.0]	14	[10.4]
Third hospital					1	[5.9]	0	[0.0]	1	[4.5]
Fourth hospital							0	[0.0]	0	[0.0]
Total	88	[19.5]	71	[24.7]	27	[31.0]	0	[0.0]	186	[22.0]
100-299 beds										
First hospital	178	[39.4]	73	[39.9]	14	[31.1]	0	[0.0]	265	[38.5]
Second hospital			37	[35.6]	10	[40.0]	6	[100.0]	53	[39.3]
Third hospital					4	[23.5]	0	[0.0]	4	[18.2]
Fourth hospital							0	[0.0]	0	[0.0]
Total	178	[39.4]	110	[38.3]	28	[32.2]	6	[28.6]	322	[38.0]
300+ beds										
First hospital	186	[41.2]	44	[24.0]	14	[31.1]	9	[100.0]	253	[36.7]
Second hospital			62	[59.6]	6	[24.0]	0	[0.0]	68	[50.4]
Third hospital					12	[70.6]	5	[100.0]	17	[77.3]
Fourth hospital							1	[100.0]	1	[100.0]
Total	186	[41.2]	106	[36.9]	32	[36.8]	15	[71.4]	339	[40.0]

Appendix F-3: Frequency order by hospital demography

Number [Percent]		Number of different hospitals per patient 1		2		3		4		Total	
Urban											
	First hospital	323	[71.5]	103	[56.3]	25	[55.6]	9	[100.0]	460	[66.8]
	Second hospital			86	[82.7]	13	[52.0]	6	[100.0]	105	[77.8]
	Third hospital					15	[88.2]	5	[100.0]	20	[90.9]
	Fourth hospital							1	[100.0]	1	[100.0]
	Total	323	[71.5]	189	[65.9]	53	[60.9]	21	[100.0]	586	[69.2]
Rural											
	First hospital	129	[28.5]	80	[43.7]	20	[44.4]	0	[0.0]	229	[33.2]
	Second hospital			18	[17.3]	12	[48.0]	0	[0.0]	30	[22.2]
	Third hospital					2	[11.8]	0	[0.0]	2	[9.1]
	Fourth hospital							0	[0.0]	0	[0.0]
	Total	129	[28.5]	98	[75.3]	34	[39.1]	0	[0.0]	261	[30.8]
Teaching											
	First hospital	81	[17.9]	21	[11.5]	5	[11.1]	9	[100.0]	116	[16.8]
	Second hospital			22	[21.2]	3	[12.0]	0	[0.0]	25	[18.5]
	Third hospital					2	[11.8]	5	[100.0]	22	[31.8]
	Fourth hospital							0	[0.0]	0	[0.0]
	Total	81	[17.9]	43	[15.0]	10	[11.5]	14	[66.7]	148	[17.5]
Non-teaching											
	First hospital	371	[82.1]	162	[88.5]	40	[88.9]	0	[0.0]	573	[83.2]
	Second hospital			82	[78.8]	22	[88.0]	6	[100.0]	110	[81.5]
	Third hospital					15	[88.2]	0	[0.0]	15	[68.2]
	Fourth hospital							1	[100.0]	1	[100.0]
	Total	371	[82.1]	244	[85.0]	77	[88.5]	7	[33.3]	699	[82.5]
For-profit											
	First hospital	197	[43.6]	75	[41.0]	15	[33.3]	9	[100.0]	296	[43.0]
	Second hospital			45	[43.3]	5	[20.0]	6	[100.0]	56	[41.5]
	Third hospital					7	[41.2]	5	[100.0]	12	[54.5]
	Fourth hospital							1	[100.0]	1	[100.0]
	Total	197	[43.6]	120	[41.8]	27	[31.0]	21	[100.0]	365	[43.1]
Non-profit											
	First hospital	104	[23.0]	44	[24.0]	18	[40.0]	0	[0.0]	166	[24.1]
	Second hospital			31	[29.8]	8	[32.0]	0	[0.0]	39	[28.9]
	Third hospital					4	[23.5]	0	[0.0]	4	[18.2]
	Fourth hospital							0	[0.0]	0	[0.0]
	Total	104	[23.0]	75	[26.1]	30	[34.5]	0	[0.0]	209	[24.7]
Government											
	First hospital	151	[33.4]	64	[35.0]	12	[26.7]	0	[0.0]	227	[32.9]
	Second hospital			28	[26.9]	12	[48.0]	0	[0.0]	40	[29.6]
	Third hospital					6	[35.3]	0	[0.0]	6	[27.3]
	Fourth hospital							0	[0.0]	0	[0.0]
	Total	151	[33.4]	92	[32.1]	30	[34.5]	0	[0.0]	273	[32.2]

Appendix G-1: Diseases causing multiple discharges

	Patients #	Patients [%]	Discharges #	Discharges [%]	{95% confidence interval}
Nonspecific metastases	2	[0.8]	12	[1.4]	{-0.02 to 0.01}
Fluids & electrolytes	8	[3.1]	23	[2.7]	{-0.02 to 0.02}
Hematology					
Infection	5	[1.9]	11	[1.3]	{-0.01 to 0.02}
Carcinoma	8	[3.1]	23	[2.7]	{-0.02 to 0.02}
Other	3	[1.2]	36	[4.3]	{-0.06 to -0.01}
Psychiatry					
Alcohol	4	[1.5]	13	[1.5]	{-0.02 to 0.02}
Drugs	4	[1.5]	11	[1.3]	{-0.01 to 0.02}
Other	7	[2.7]	23	[2.7]	{-0.02 to 0.02}
Neurology					
Vascular accident	11	[4.2]	36	[4.3]	{-0.03 to 0.03}
Carcinoma	2	[0.8]	9	[1.1]	{-0.02 to 0.01}
Other	3	[1.2]	8	[0.9]	{-0.01 to 0.02}
Ophthalmology	3	[1.2]	6	[0.7]	{-0.01 to 0.02}
Otolaryngology	1	[0.4]	2	[0.2]	{-0.01 to 0.01}
Cardiology					
Arrhythmia	9	[3.5]	28	[3.3]	{-0.02 to 0.03}
Infarction	30	[11.6]	82	[9.7]	{-0.02 to 0.06}
Heart failure	20	[7.7]	86	[10.2]	{-0.07 to 0.02}
Other	2	[0.8]	6	[0.7]	{-0.01 to 0.01}
Peripheral vascular	5	[1.9]	12	[1.4]	{-0.01 to 0.02}
Pulmonology					
Lung carcinoma	7	[2.7]	26	[3.1]	{-0.03 to 0.02}
Pneumonia	16	[6.2]	52	[6.1]	{-0.03 to 0.03}
Chronic obstruction	21	[8.1]	65	[7.7]	{-0.03 to 0.04}
Gastroenterology					
Carcinoma	13	[5.0]	58	[6.8]	{-0.05 to 0.02}
Bleeding	7	[2.7]	20	[2.4]	{-0.01 to 0.03}
Other	16	[6.2]	42	[5.0]	{-0.02 to 0.04}
Urology					
Carcinoma	13	[5.0]	31	[3.7]	{-0.01 to 0.04}
Other	11	[4.2]	33	[3.9]	{-0.02 to 0.03}
Gynecological carcinoma	6	[2.3]	27	[3.2]	{-0.03 to 0.02}
Breast carcinoma	1	[1.5]	9	[1.1]	{-0.02 to 0.01}
Orthopedics					
Back	4	[1.5]	12	[1.4]	{-0.02 to 0.02}
Hip	7	[2.7]	19	[2.2]	{-0.02 to 0.03}
Knee	1	[0.4]	4	[0.5]	{-0.01 to 0.01}
Trauma	7	[2.7]	22	[2.6]	{-0.02 to 0.02}
Total	259	[100.0]	847	[100.0]	

Appendix G-2: Major diagnostic categories causing multiple discharges

[Percent distribution]	Readmissions sample	National DRG Validation Study	{95% confidence interval}
Cardiology	[23.8]	[23.5]	{-0.03 to 0.03}
Pulmonology	[16.9]	[14.2]	{0.01 to 0.05}
Gastroenterology	[14.2]	[15.3]	{-0.04 to 0.01}
Other	[45.1]	[47.0]	{-0.06 to 0.02}
Total	[100.0]	[100.0]	

Appendix G-3: Diseases by readmission reason

	Previous premature discharge	Planned readmission	Related readmission	Unrelated readmission	Total
Nonspecific metastases	0	0	8	2	10
Fluids & electrolytes	0	4	2	9	15
Hematology					
Infection	1	0	2	3	6
Carcinoma	0	0	13	2	15
Other	0	0	27	6	33
Psychiatry					
Alcohol	0	1	7	1	9
Drugs	0	1	2	4	7
Other	0	0	9	7	16
Neurology					
Vascular accident	0	2	9	14	25
Carcinoma	0	0	5	2	7
Other	0	0	0	5	5
Ophthalmology	0	1	0	2	3
Otolaryngology	0	0	0	1	1
Cardiology					
Arrhythmia	0	6	8	5	19
Infarction	0	9	30	13	52
Heart failure	1	5	47	13	66
Other	0	1	0	3	4
Peripheral vascular	0	2	2	3	7
Pulmonology					
Lung carcinoma	0	5	12	2	19
Pneumonia	0	1	20	15	36
Chronic obstruction	0	0	31	12	43
Gastroenterology					
Carcinoma	1	4	32	8	45
Bleeding	1	1	2	9	13
Other	1	7	4	14	26
Urology					
Carcinoma	1	3	12	4	20
Other	0	2	7	13	22
Gynecological carcinoma	0	4	16	1	21
Breast carcinoma	0	1	3	1	5
Orthopedics					
Back	0	2	1	5	8
Hip	0	3	3	6	12
Knee	0	2	0	1	3
Trauma	0	0	7	8	15
Total	6	67	321	194	588

Appendix G-4: Diseases by number of discharges

Discharges per patient	1	2	3	4	5	6	7	8	9+	Total
Nonspecific metastases	0	0	0	1	0	0	0	1	0	2
Fluids & electrolytes	0	5	1	1	0	1	0	0	0	8
Hematology										
Infection	0	4	1	0	0	0	0	0	0	5
Carcinoma	1	3	0	4	0	0	0	0	0	8
Other	0	0	1	0	0	0	0	0	2	3
Psychiatry										
Alcohol	0	1	1	2	0	0	0	0	0	4
Drugs	0	2	1	1	0	0	0	0	0	4
Other	0	2	2	2	1	0	0	0	0	7
Neurology										
Vascular accident	0	4	3	3	0	0	1	0	0	11
Carcinoma	0	0	0	1	1	0	0	0	0	2
Other	0	2	0	1	0	0	0	0	0	3
Ophthalmology	0	3	0	0	0	0	0	0	0	3
Otolaryngology	0	1	0	0	0	0	0	0	0	1
Cardiology										
Arrhythmia	0	3	3	2	1	0	0	0	0	9
Infarction	0	16	9	3	1	1	0	0	0	30
Heart failure	0	5	7	2	1	1	0	3	1	20
Other	0	1	0	1	0	0	0	0	0	2
Peripheral vascular	0	3	2	0	0	0	0	0	0	5
Pulmonology										
Lung carcinoma	0	1	1	4	1	0	0	0	0	7
Pneumonia	1	5	4	3	1	2	0	0	0	16
Chronic obstruction	0	10	4	3	1	0	2	0	0	20
Gastroenterology										
Carcinoma	0	5	3	1	2	0	0	0	2	13
Bleeding	0	2	4	1	0	0	0	0	0	7
Other	0	10	3	2	1	0	0	0	0	16
Urology										
Carcinoma	0	4	5	2	0	0	0	0	0	11
Other	0	4	4	2	1	0	0	0	0	11
Gynecological carcinoma	0	4	5	2	0	0	1	0	1	6
Breast carcinoma	0	3	1	0	0	0	0	0	0	4
Orthopedics										
Back	0	4	2	0	0	0	0	0	0	6
Hip	1	2	2	2	0	0	0	0	0	7
Knee	0	0	0	1	0	0	0	0	0	1
Trauma	3	3	0	0	0	0	1	0	0	7
Total	3	111	68	45	12	5	5	4	6	259

Appendix H-1: Clinical review

	Number	[Rate]
Unnecessary admissions	112	[13.2]
Poor quality care	40	[4.7]
Premature discharges	10	[1.2]

Appendix H-2: Clinical review comparison

[Rate]	Readmissions sample	National DRG Validation Study	{95% confidence interval}
Unnecessary admissions	[13.2]	[10.0]	{-0.01 to 0.04}
Poor quality care	[4.7]	[5.5]	{-0.02 to 0.01}
Premature discharge	[1.2]	[0.8]	{-0.01 to 0.01}

Appendix H-3: Diseases by clinical review

[Rate]	Unnecessary admission	Poor quality care	Premature discharge
Nonspecific metastases	[0.0]	[0.0]	[0.0]
Fluids & electrolytes	[13.0]	[0.0]	[0.0]
Hematology			
Infection	[9.1]	[0.0]	[9.1]
Carcinoma	[13.0]	[18.2]	[0.0]
Other	[46.7]	[0.0]	[0.0]
Psychiatry			
Alcohol	[23.1]	[0.0]	[0.0]
Drugs	[0.0]	[0.0]	[0.0]
Other	[26.1]	[8.7]	[0.0]
Neurology			
Vascular accident	[5.6]	[16.7]	[2.8]
Carcinoma	[11.1]	[11.1]	[0.0]
Other	[12.5]	[37.5]	[0.0]
Ophthalmology	[83.3]	[0.0]	[0.0]
Otolaryngology	[0.0]	[0.0]	[0.0]
Cardiology			
Arrhythmia	[7.1]	[0.0]	[0.0]
Infarction	[8.5]	[1.2]	[1.2]
Heart failure	[3.5]	[5.8]	[1.2]
Other	[0.0]	[0.0]	[0.0]
Peripheral vascular	[16.7]	[8.3]	[0.0]
Pulmonology			
Lung carcinoma	[30.8]	[0.0]	[0.0]
Pneumonia	[1.9]	[5.8]	[0.0]
Chronic obstruction	[9.5]	[1.6]	[0.0]
Gastroenterology			
Carcinoma	[22.4]	[6.9]	[1.7]
Bleeding	[5.0]	[10.0]	[5.0]
Other	[14.3]	[4.8]	[2.4]
Urology			
Carcinoma	[16.1]	[6.5]	[3.2]
Other	[9.1]	[3.0]	[3.0]
Gynecological carcinoma	[18.5]	[3.7]	[0.0]
Breast carcinoma	[0.0]	[0.0]	[0.0]
Orthopedics			
Back	[21.4]	[7.1]	[0.0]
Hip	[5.3]	[5.3]	[0.0]
Knee	[0.0]	[0.0]	[0.0]
Trauma	[22.7]	[4.5]	[4.5]
Total	[13.2]	[4.7]	[1.2]

Comments of the Health Care Financing Administration
on the OIG Draft Report "Hospital Readmissions,"
OAI-12-88-01120

Recommendation 1

HCFA should re-evaluate the effectiveness of Peer Review Organization (PRO) surveillance of readmissions versus surveillance of random admissions.

Response

We do not concur with this recommendation. First, we cannot discontinue our surveillance of readmissions under current law. Section 1952 of P.L. 99-509 (Omnibus Budget Reconciliation Act of 1986) amended Section 1154(a) of the Social Security Act to require the Secretary to review a sample of readmissions occurring within 31 days of the previous discharge. To discontinue such reviews would require a legislative change. We also believe that any significant reduction in the review sample size could violate Congressional intent, as Congress continues to be concerned with the danger of premature discharges under the Medicare Prospective Payment System (PPS).

Second, the OIG apparently reviewed a sample of all PPS readmissions during Calendar Year 1985 and found that these readmissions did not "significantly differ from other hospitalizations in the rate of unnecessary admissions, poor quality care, or premature discharge" (Page i). From this, the report concludes that PRO review of readmissions identifies no more clinical incidents than a random selection of cases for review. However, the findings from OIG's review of readmissions occurring within 1 year of discharge clearly cannot be applied to the PRO review of readmissions which occur within 31 days of the previous discharge. We believe that if OIG's review were limited to 31 days after discharge, instead of encompassing an entire year, the percentage of clinical incidents would have been much higher. The longer the time period used in the sample frame, the more the sample resembles a random sample.

Third, we cannot ignore the probable "sentinel" effect of PRO review on early readmissions. While it is not possible to measure the deterrent effect of PRO review on premature hospital discharges, it is reasonable to assume that more abuse would occur if PROs were not reviewing early readmission cases.

Recommendation 2

HCFA should study the effectiveness of PRO utilization review of hemoglobinopathies.

Response

We disagree with this recommendation. First, the OIG presents no evidence that a high number of the admissions for hemoglobinopathies were unnecessary. In addition, PROs have already been instructed to focus intensified review on clinical subsets, such as hemoglobinopathies, if PRO physician review has determined that there is a problem with unnecessary admissions.

Recommendation 3

HCFA should determine whether primary and secondary prevention of acute exacerbations of hemoglobinopathies would consume less Medicare resources than repeated hospitalizations.

Response

We also do not concur with this recommendation. As stated in the report, the measures covered by this recommendation are not contained in the Medicare mandate. In addition, in the Medicare population, primary preventive measures, such as genetic screening and family counseling have little relevance. The secondary preventive measures suggested in the report, such as hydration and activity restriction, also offer little clinical relevance to hospitalizations for hemoglobinopathies in the elderly.

General Comments

- We believe that OIG's estimated savings of almost $111 million in annual PRO costs are greater than the actual savings that would result from elimination of PRO review of readmissions.

  - HCFA's estimate for the cost of this type of review is approximately $110 million for the entire third contract cycle. Since third-round contracts are normally for three years, the annual direct cost of early readmission reviews would be approximately $35 to $45 million. We are not certain how OIG developed the $111 million savings estimate.

  - In part, any potential savings would be offset by even a slight increase in the number of random sample reviews, which would be necessary to compensate for eliminating PRO review of early readmissions.

- There could also be an increase in the number of substandard care complaints, which would result in extremely cost-intensive PRO activity.

o The report is unclear in many places. We had difficulty understanding the sample selection, the criteria for classifying readmissions, the statistical methods used, and the tables and the findings. The narrative moves back and forth between text, tables and appendix tables and figures. We recommend fully integrating the text and appendix tables that are referenced, so that the reader can more readily follow the data and logic used in the discussion. Also, much of the discussion, (e.g. regarding age, sex or hospital characteristics) is not germane to the central issues. The recommendations do not flow from these findings.

Editorial Comments

o Page 3 - In the first full paragraph, line 3 states that the PROs reviewed related readmissions to PPS hospitals occurring within 7 days of discharge from that same hospital. This is incorrect. The sample was from all related readmissions within 7 days; it was not tied to readmissions to the same hospital.

The last sentence in the second full paragraph reads as if in the new PRO scope of work, HCFA still mandates review of only related admissions. This is also incorrect. In the new scope of work, the review is a 25 percent random sample of all readmissions to PPS hospitals occurring within 31 days of discharge from a PPS hospital.

In the third full paragraph, line 1, there is the same error regarding readmissions to the same hospital.

In the fourth full paragraph, under "planned readmissions," HCFA does not permit planned readmissions where the services should have been provided in one stay.

o Page 14, Bullet 2 also states in error that the PRO review was limited to readmission to the same hospital.