

*D R A F T*

**RAND**

*Case Mix Certification  
Rule for Inpatient  
Rehabilitation Facilities*

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**PREFACE**

The research reported here was supported by the Centers for Medicare and Medicaid Services (CMS) through contract 500-95-0096. In this report we examined one of the criteria used to define Inpatient Rehabilitation Facilities (IRFs). This work is part of a larger task, which is to aid CMS in the design, development, implementation, and monitoring of the Prospective Payment System for IRFs.

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## **EXECUTIVE SUMMARY**

To be classified as an inpatient rehabilitation facility (IRF), a hospital or unit must show that during its most recent 12-month cost reporting period, it served an inpatient population of whom at least 75 percent required intensive rehabilitation services for one of ten specified conditions. For the sake of brevity we denote this rule as the "75% rule." The purpose of this 75% rule is to ensure that IRFs are primarily involved in providing intensive rehabilitation services. In early 2002, CMS instituted a comprehensive review of this policy with the intent of understanding whether potential policy or administrative changes are needed. This report provides a description of case mix at IRFs as input to that review.

### **Data and Methods**

We used IRF Patient Assessment Instrument (IRFPAI) data that IRFs have been filling out since the beginning of the new IRF Prospective Payment system on January 1, 2002. We also use similar items describing 1996 to 1999 discharges from the analysis files that we used in the first part of our project to help CMS design and develop this PPS. In order to determine if a patient had one of the ten conditions in the list, we used diagnoses codes and the impairment group code, which provides the "primary reason for admission to the rehabilitation program."

The list of diagnoses and impairments to be included was developed by CMS. It should be noted that other definitions of these ten conditions are possible, and that IRFs might have believed they were following the rule even when our calculations suggest they were not.

A variety of limitations of our data and analyses are discussed in the "Data and Methods" section of our report. These include the fact that we used only administrative data (claims and assessments) rather than the detailed medical record. Certainly there are some patients that we did not count whose medical record would show that they required intensive rehabilitation for one of the 10 conditions. Thus, it is



likely that estimates of compliance would be higher if more detailed information from the medical record were available.

### **Findings**

The 75% rule, as defined by CMS for this analysis, does not describe current Medicare case mix at IRFs, and has not since at least the mid-1990s. In 2002 only half the Medicare patients in IRFs had one of these ten conditions; only 13 percent of IRFs had at least 75 percent of their 2002 cases in one of these conditions. In most hospital groups that we examined, less than 40 percent conform to the rule.

Despite the lack of conformity, there is some variability across census divisions in the extent to which their cases are concentrated in the ten conditions. In the Pacific division 48.8 percent of IRFs had 75 percent or more of their Medicare cases in the conditions list, while five of the nine census divisions had fewer than 8 percent of IRFs with 75 percent or more of their Medicare cases in the conditions list.

There has been a significant decline in the percent of cases in these ten conditions in the period from 1996 through 2002. But the temporary suspension of the 75% rule in early May 2002 did not appear to increase admission of cases not in the ten conditions. The rate of decline in cases in the conditions list was much greater from 1996 to 1999 than from 1999 to 2002.

Non-Medicare cases are more likely to be in one of the ten conditions than Medicare cases. However, Medicare cases are 70 percent of total cases, so the percent of hospitals with more than 75 percent of their total cases in the conditions list is only slightly higher (23 percent in our 1999 data) than of Medicare cases (19 percent). There is a very high correlation (0.97) between the percent of a hospital's total cases in the ten conditions and the percent of its Medicare cases in the ten conditions. Differences between Medicare and non-Medicare cases in the distribution of impairments are consistent with differences between the Medicare and non-Medicare population in disease incidence.

### **Implications**

The apparent lack of compliance with the rule may be due to different interpretations of exactly which cases fall into the ten

conditions. The variability across census regions in the extent to which cases are in the ten conditions is consistent with the fiscal intermediaries (FIs) providing variable enforcement of the 75% rule, and/or variable definitions of which cases are in the rule. Further, members of the hospital industry may be using a quite different definition of which cases qualify for the ten conditions than the one used here.

The variability across census regions is also consistent with variations in practice patterns that could have nothing to do with Medicare rules. It is more likely, however, that practice patterns respond to Medicare rules, at least in the long run. Thus, the exact definition of these ten conditions could have an impact on access to inpatient rehabilitation. Further, clarification by CMS of exactly which patients should be counted as being in the ten conditions might increase uniformity of program implementation and increase uniformity of access to inpatient rehabilitation. In the proposed rule CMS has requested public comments on possible affects of the 75 percent rule on access.

It would be possible to administer a program that aimed at ensuring limitations in total case mix by enforcing constraints on Medicare case mix. To use the CMS-specified 75% rule as an example, the percent of total cases in the ten conditions is typically 3 to 4 percentage points higher than Medicare case mix. So, a 75-percent threshold on total cases translates into about a 72-percent threshold on Medicare cases. Such a rule would still find over 80 percent of IRFs out of compliance with this definition of the ten conditions.

Before issuing a new final rule defining an IRF for payment purposes, CMS should decide on both a list of conditions and how to specify each condition. In order to do this, it would be helpful to know the conditions for which almost all IRF patients are "providing intensive rehabilitation services." How the specific conditions are related to the intensity of rehabilitation could be addressed by RAND in future work.

## 1. INTRODUCTION

In order to be classified as a rehabilitation hospital or rehabilitation unit, an inpatient rehabilitation facility (IRF) must meet the criteria set forth in Medicare regulations. One of these criteria, which we shall denote by the phrase "the 75% rule," concerns the IRF's case mix. An existing IRF must show that during its most recent 12-month cost reporting period it served an inpatient population of whom at least 75 percent required intensive rehabilitation services for one or more of the following ten conditions:

- Stroke
- Spinal cord injury (SCI)
- Congenital deformity
- Amputation
- Major multiple trauma (MMT)
- Fracture of femur (hip fracture)
- Brain injury (BI)
- Polyarthrititis, including rheumatoid arthritis
- Neurological disorders, including multiple sclerosis, motor neuron disease, polyneuropathy, muscular dystrophy and Parkinson's disease
- Burns

This 75% rule was put in place 20 years ago when Medicare's prospective payment system (PPS) for acute care hospitals was implemented. Its purpose was to help define those facilities that are excluded from the acute PPS as rehabilitation facilities. There have been many changes in inpatient care since that time. Some of these changes derived from the incentives provided by the acute PPS, which has incentives for early discharge from acute care and therefore encourages more post-acute care. Other changes derived from an increase in the ability to perform procedures such as major joint replacements or open heart surgery on a wider range of patients. These changes in acute care, along with changes in rehabilitation practices, may have had substantial impacts on inpatient rehabilitation case mix.

In 2001 and early 2002 audits were conducted by several intermediaries. CMS became concerned that intermediaries vary in their enforcement and interpretation of this rule. The ten conditions found in the rule contain certain ambiguities, and whether or not a given case would qualify depends on exactly what is meant by some of these conditions. At the May 8, 2002 Open Hospital Forum, Thomas Hoyer, then director of the CMS Chronic Care Policy Group, announced that the rule would be temporarily suspended. The suspension was implemented on June 7, 2002.

The purpose of the 75% rule is to "ensure that IRFs, which are exempt from the acute care hospital prospective payment system (PPS), are primarily involved in providing intensive rehabilitation services."<sup>1</sup> Achieving this goal remains extremely important and thus, along with the temporary suspension, CMS instituted a comprehensive review of this policy with the intent of understanding whether potential policy or administrative changes are needed. The review included procedures used by fiscal intermediaries to measure compliance and a quantitative study of case mix at IRFs.

This report provides a description of case mix at IRFs. Our research questions are:

- (1) What proportion of IRFs have a Medicare case mix with 75 percent of cases receiving rehabilitation for one of the conditions in the 75% rule? Does this proportion vary with characteristics of the provider? Is it changing over time?
- (2) How well does the proportion of Medicare cases with conditions in the 75% rule predict the facility's proportion of total cases with one of these conditions?
- (3) What case mix characteristics are frequently found in patients who do not qualify for the list?
- (4) How would compliance change with modifications to the rule?

The 75% rule is only one of the requirements for being an IRF in the existing regulations. These include: having a pre-admission screening procedure to determine whether the patient is likely to

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<sup>1</sup> Letter from Thomas A Scully, Administrator of CMS, to Ms. Martha M. Kendrick of Patton Boggs, LLP of Washington, DC, November 25, 2002.

benefit significantly from an intensive inpatient hospital program or assessment; ensuring that patients receive close medical supervision and furnish rehabilitative nursing, physical therapy, and occupational therapy, plus, as needed, speech therapy, social or psychological services, and orthotic and prosthetic services, through the use of qualified personnel; having a plan of treatment for each inpatient that is established, reviewed, and revised as needed by a physician in consultation with other professional personnel who provide services to the patient; and using a coordinated multidisciplinary team approach in the rehabilitation of each inpatient. These regulations still limit the facilities that can qualify as IRFs despite the suspension of the 75% rule.

## 2. DATA AND METHODS

### DATA

In order to describe Medicare case mix we use both IRF Patient Assessment (IRFPAI) data and the matched MEDPAR-FIM 1996-1999 data that we used in phase I of our project. Carter et al. (2002) provides a complete description of the matched MEDPAR-FIM data.

The IRFPAI data were received in the middle of October, 2002. It contains discharges from January 1 through September 30, 2002, but the September data are clearly incomplete. The IRF PPS regulations provide that IRFs must submit the IRFPAI data for a case by the 17th calendar day from the day of discharge, with a penalty being assessed for transmission on or after the 28th day following discharge. Thus, the September discharges that had been sent by early October could systematically differ from other September discharges. Therefore, for this study, we use only IRFPAI discharges prior to August 31, 2002.

The IRFPAI data that we received contained 333,342 records. However, 478 of these cases (one-tenth of 1 percent) had invalid beneficiary identifiers (all zeros), which suggests that they might have been test cases. An additional 84 records appeared to be alternative records for exactly the same stay -- i.e., they had exactly the same beneficiary and admission date, but often different impairment group codes. Since bill data were not available, we could not determine which of the two or more records for each duplicated stay was the one that was correct. We dropped all records for which the combination of beneficiary and admission date was duplicated. After also deleting records of stays discharged after August 31, 2002, we have an analysis sample of 306,255 discharges.

Data on hospital characteristics were taken from (a) the hospital-level analysis file created in phase I, (b) the PPS 16 cost report (for cost reporting periods beginning in federal fiscal year 1999) received in the summer of 2002, and (c) the second quarter FY 2002 Provider of Service (POS) file received by the RAND data facility in the fall of

2002. Despite the multiple sources, data on some hospital characteristics are still missing, particularly for providers that appear only in the IRFPAI data. The census division and unit versus freestanding variables were defined from the provider number.

#### **COUNTING CASES IN THE TEN CONDITIONS**

To answer our research questions we need an algorithm to estimate whether each discharge in our IRFPAI data and matched FIM-MEDPAR files would count as requiring rehabilitation for one of the ten conditions listed in the 75% rule. This is not as straightforward as it might seem. It requires choosing the source of information and creating a membership in each of the ten conditions in the rule.

We chose to use both impairment and diagnostic information, and to include all comorbidity information. Impairment group code provides the "primary reason for admission to the rehabilitation program," and thus the patient will receive rehabilitation for this impairment. The impairment code also offers the benefit of simplicity because many of the impairment group codes are easily mapped into one of the ten conditions. Impairment group codes can be used to indicate the patient was admitted for the following conditions: stroke, hip fracture, SCI, BI, burns, congenital deformity, amputation, MMT, neurological disorder, and rheumatoid and other polyarthritis.

For other impairment group codes, cases might or might not qualify. Consider a case with an impairment code denoting unilateral knee replacement with rheumatoid arthritis at multiple sites, or a patient with quadriplegia who was recovering from massive medical problems and was assigned an impairment code related to those medical problems (cardiac, pulmonary, or the miscellaneous RIC 20). It may be that the patient is receiving rehabilitation for his arthritis or SCI at the same time as for the coded impairment. For all the impairment codes except those that map directly to categories, therefore, we need to turn to diagnostic information.

The etiologic diagnosis is clearly relevant. Sometimes this diagnosis is not specific enough to provide an etiology, e.g., status post joint replacement or need for rehabilitation. In other cases, one

might need multiple diagnoses to determine membership in the conditions list. For example, in a case where the etiologic diagnosis is a specific infection that caused meningitis or encephalitis, these problems might be listed only as comorbidities. All comorbidity fields should be used because the IRFPAI instructions do not distinguish among these fields. The old FIM instructions distinguish only between comorbidities related to the impairment group code and those not related. Thus we believed we should use all ten comorbidity fields on the IRFPAI (6 on the FIM form) as well as the etiologic diagnosis.

The final decisions about exactly which impairments and which diagnoses should be counted were made by CMS. A case was counted as being in the list of ten conditions if its impairment code (IRFPAI item 21) is listed in Table 2.1 or if any of its diagnoses (IRFPAI items 22 and 24a through 24j) are listed in Appendix A. The RICs were not used as part of the algorithm, but are included in column 3 of Table 2.1 to clarify the relationship of the impairment group code to the ten conditions. There are a few very infrequent exceptions to the counting of all cases with these impairment group codes. For three impairment group codes, cases are not counted if their etiological diagnosis (item 21 in the IRFPAI) is one of the values shown in the second column in Table 2.1 -- unless they have one of the diagnoses from Table 2.2 in items 24a through 24j.

Appendix A lists the diagnoses that allowed a case to be counted in the 75% rule. The ICD-9-CM codes in Appendix A were valid during the time period of our data. By version 20 of the ICD-9-CM codes, the code 359.8 was replaced by two new codes (359.81 and 359.89).

It should be noted that other specifications of these ten conditions are possible, and that IRFs might have believed they were following the rule even when our calculations suggest they were not.



**Table 2.1**  
**Impairment Group Codes Deemed to Indicate a Patient**  
**in the Conditions List for 75% Rule**

<b>Impairment Group Codes</b>		<b>Excluded Etiological Diagnoses</b>	<b>Associated Rehabilitation Impairment Category</b>
01.1	Left body involvement (right brain)	None	01 Stroke
01.2	Right body involvement (left brain)	None	
01.3	Bilateral Involvement	None	
01.4	No Paresis	None	
01.9	Other Stroke	None	
02.21	Open Injury	None	02 Traumatic brain injury
02.22	Closed Injury	None	
02.1	Non-traumatic	331.0, 331.2, 215.0	03 Nontraumatic brain injury
02.9	Other Brain	None	
04.210	Paraplegia, Unspecified	None	04 Traumatic spinal cord injury
04.211	Paraplegia, Incomplete	None	
04.212	Paraplegia, Complete	None	
04.220	Quadriplegia, Unspecified	None	
04.2211	Quadriplegia, Incomplete C1-4	None	
04.2212	Quadriplegia, Incomplete C5-8	None	
04.2221	Quadriplegia, Complete C1-4	None	
04.2222	Quadriplegia, Complete C5-8	None	
04.230	Other traumatic spinal cord dysfunction	None	
04.110	Paraplegia, unspecified	None	
04.111	Paraplegia, incomplete	None	
04.112	Paraplegia, complete	None	
04.120	Quadriplegia, unspecified	None	
04.1211	Quadriplegia, Incomplete C1-4	None	
04.1212	Quadriplegia, Incomplete C5-8	None	
04.1221	Quadriplegia, Complete C1-4	None	
04.1222	Quadriplegia, Complete C5-8	None	
04.130	Other non-traumatic spinal cord dysfunction	None	

**Table 2.1 (cont.)**

03.1	Multiple Sclerosis	None	06	Neurological
03.2	Parkinsonism	None		
03.3	Polyneuropathy	None		
03.5	Cerebral Palsy	None		
03.8	Neuromuscular Disorders	None		
03.9	Other Neurologic	None		
08.11	Status post unilateral hip fracture	None	07	Fracture of LE
08.12	Status post bilateral hip fractures	None		
08.3	Status post pelvic fracture	None		
05.3	Unilateral lower extremity above the knee (AK)	None	10	Amputation, lower extremity
05.4	Unilateral lower extremity below the knee (BK)	None		
05.5	Bilateral lower extremity above the knee (AK/AK)	None		
05.6	Bilateral lower extremity above/below the knee (AK/BK)	None		
05.7	Bilateral lower extremity below the knee (BK/BK)	None		
05.1	Unilateral upper extremity above the elbow (AE)	None	11	Amputation, other
05.2	Unilateral upper extremity below the elbow (BE)	None		
05.9	Other amputation	None		
06.1	Rheumatoid Arthritis	701.1, 710.1	13	Rheumatoid, other arthritis
06.9	Other arthritis	701.1, 710.1		
08.4	Status post major multiple fractures	None	17	Major multiple trauma, no brain injury or spinal cord injury
14.9	Other multiple trauma	None		
14.1	Brain and spinal cord injury	None	18	Major multiple trauma, with brain or spinal cord injury
14.2	Brain and multiple fractures/ amputation	None		
14.3	Spinal cord and multiple fractures/amputation	None		
3.4	Guillain Barre	None	19	Guillain Barre
12.1	Spina Bifida	None	20	Miscellaneous
12.9	Other congenital	None		
11	Burns	None	21	Burns

#### **COMPUTATIONS AND LIMITATIONS OF THE ANALYSIS**

The only data available are administrative data (claims and assessments) rather than the detailed medical record. Certainly there are some patients that we did not count whose medical record would show that they were receiving rehabilitation for one of the 10 conditions. Thus, it is probable that estimates of compliance would be higher if more detailed information from the medical record were available.

In the analysis reported in the body of this paper, we summarized each year's sample data (1996 through 1999 and 2002) at each hospital by counting the percent of the hospital-year's Medicare cases in the sample that are counted in the CMS-defined version of the 75% rule. For each year, we then report the number of hospitals for which the percent of sample cases counted as in one of the ten conditions exceeds 75 percent.

While this simplification allows us to easily show trends and variations across hospital characteristics in their compliance with this version of the rule, it has several analytic problems. First, our sample of hospitals varies over time. In order to understand the effect of this sample variation, we also report trends for the subset of hospitals that are in our data set continually.

Second, our sample does not include all the year's cases at each sample hospital, rather, just a subset of cases. In Appendix B we show that if our data are a random selection of cases at each hospital, then accounting for the sampling variability has little effect on estimates of the proportion of hospitals that comply with the 75% rule in each year. Our 2002 data could be distorted if the case mix in the last four months of the calendar year differs systematically from that in the first eight months. We repeated some of the analyses using only the first eight months of 1998 and 1999 data, but found that the difference between the full-year and the eight-month numbers are small and consistent with the existing trend. (A footnote reports the effect on measurement of trend.) Another issue is the extent to which all IRFs actually sent all their 2002 cases to the CMS database. The regulations said they should have, but there are a few hospitals for which we have only a very small number of cases. In Appendix B we also show the effect of dropping these hospitals from our sample.

Third, our analysis ignores the variation across hospitals in the beginning and ending of their cost reporting year. This should not affect our annual results, since for the 1996 through 1999 years, each year should contain all parts of the 12-month cost reporting cycle at most hospitals, even if they are different parts of two different cost reporting years. For the 2002 year, the effects of the timing of the hospital's cost reporting year are included in our demonstration of a lack of substantial seasonality.

Finally, the accuracy of coding complicates the interpretation of our results. We are using data in ways not imagined when it was collected (at least when the UDSmr FIM data were collected). It is quite probable that an attempt to use the IRFPAI data to enforce the 75% rule specified here (or a variant on it) would result in improved coding. In Appendix B we point out clear problems in coding (i.e., cases that do not comply with the rules in the IRFPAI training manual) of cases that are arguably part of the 75% rule.

### 3. RESULTS

We begin the presentation of our results with a description of Medicare case mix in relation to the 75% rule. We present trends in the percent of Medicare cases with one of the ten conditions in the list and trends in the percent of hospitals that have at least 75 percent of their Medicare cases in this list. We also examine how this aspect of Medicare case mix varies across groups of hospitals and how it changes using thresholds lower than 75 percent. We then use the 1998 and 1999 UDSmr data to compare Medicare and non-Medicare case mix. We conclude our empirical work with a description of the cases that are not counted as part of the ten conditions under the designated algorithm.

#### **MEDICARE CASE MIX**

##### **Trends**

The first five rows of Table 3.1 describe all of each year's available data. It shows that the percent of cases in the ten conditions, as defined by the algorithm, declined from 59.4 percent in 1996 to 50.9 percent in 2002. Despite the fact that more than half of each year's cases were in the ten conditions, the percent of hospitals that had at least 75 percent of their cases counted in the ten conditions ranged from a high of 28 percent in 1996 to a low of 13.4 percent in 2002.

There is no question that there has been a steady, and substantial, downward trend in the percent of Medicare cases counted in one of the ten conditions. Because of the large number of cases, each annual decline in the percent of cases counted is statistically different from 0 ( $p < 0.0001$ ). The 8.5 percentage point change from 1996 to 2002 in the number of cases counted in the ten conditions, a 14-percent decline in the rate, results in a much larger decline in the percent of hospitals with at least 75 percent of cases in the conditions list: 14.5 percentage points, or over 50 percent in the rate.

Table 3.1

Percent of Medicare Cases in the Ten-Conditions List and Percent of Hospitals that Have at Least 75 Percent of Their Discharges in Any of the Ten Conditions, by Year, for All Sample Hospitals and for Hospitals Continually in the Sample

Year	Cases			Hospitals		
	N	In list (%)	Annual change in % of cases	N	>= 75% in list (%)	Annual change in % of hospitals
<b>Entire sample</b>						
1996	171626	59.4	NA	565	28.0	NA
1997	206032	56.9	-2.6	631	23.8	-4.2
1998	232602	55.2	-1.7	686	21.0	-2.8
1999	256964	53.0	-2.2	724	17.3	-3.7
2002	306255	50.9	-0.7	1170	13.4	-1.4
<b>Constant sample (1998 through 2002)</b>						
1998	217954	55.1	NA	606	18.5	NA
1999	234731	53.0	-2.1	606	14.7	-3.8
2002	204576	51.0	-0.7	606	14.5	-0.1
<b>Constant sample (1996 through 2002)</b>						
1996	152242	59.4	NA	476	27.7	NA
1997	173389	56.9	-2.4	476	23.7	-4.0
1998	177925	55.5	-1.4	476	21.9	-1.9
1999	186962	53.3	-2.2	476	18.9	-2.9
2002	161865	51.5	-0.6	476	16.0	-1.0

The temporary suspension of the 75% rule in early May 2002 did not increase admission of cases not in the ten conditions. The rate of decline in both cases in the conditions list and hospitals with 75 percent or more of their cases in the conditions list slowed substantially from 1999 through 2002 -- from an annual rate of decline averaging 2.1 percent of cases a year from 1996 through 1999 to a rate only one-third as large -- 0.7 percent -- from 1999 through 2002.<sup>2</sup> The great majority of the decline from 1996 through 2002 had taken place by

<sup>2</sup> The truncation of our data to discharges prior to August 31 did not have a substantial effect on measurement of the trend. Truncating the 1998 and 1999 data to discharges prior to August 31, we get an annual decline from 1998 to 1999 of 2.46 percent of cases in the conditions list (vs. 2.24 percent for the full year), and from 1999 to 2002 an annual rate of 0.8 percent (vs. 0.7 percent from CY 1999 to the truncated 2002).

1999. Further, examining the pattern within 2002, we find that the proportion of discharges in the conditions list during the three months from June through August was actually higher (51.1 percent) than during the first three months of the year (50.8 percent). (The discharges during April and May were in the middle, at 51.0.)

The remainder of the table shows that our measurement of trends is not substantially affected by year-to-year variability in the hospitals that are in our sample. The three rows headed "Constant sample (1998 to 2002)" provide data on all of the 606 hospitals that were in our sample in each of these three years. Similarly, the rows headed "Constant sample (1996 to 2002)" provide data from the 476 hospitals that were in our sample in each of these years. In both cases, the proportions of cases in the ten-conditions list in the constant sample rows are very similar to the full year's sample. Although the proportion of hospitals with at least 75 percent of cases in the conditions list varies slightly, the differences could easily be due to sampling variability. The moderation of the declining trend after 1999 is just as clear in the 476 hospitals that have continual data from 1996, as it is in the larger sample.

#### **Hospital and Patient Characteristics**

Table 3.2 shows the percent of cases in one of the ten conditions by various hospital characteristics. The percent of cases in the ten conditions varies across the nine census divisions. In 1999 the lowest division was the Middle Atlantic states, with only 47.6 percent of its cases within the ten conditions, and the highest was the Pacific region, with 75.9 percent. The West North Central division is also noticeably higher than average. With the exception of these three regions, the percent of 1999 cases in the ten conditions ranged only from 50.9 percent to 57.3 percent.

Within almost all divisions, the percent of cases in these conditions declined consistently across the three years of data so that ranks remain very similar in each year's data, with the lowest always being Middle Atlantic and the highest always Pacific, followed by West North Central.

**Table 3.2**  
**Percent of Medicare Cases in the Ten-Conditions List,**  
**by Geographical and Hospital Characteristics and Year**

Case Description	1998		1999		2002	
	N	In list (%)	N	In list (%)	N	In list (%)
<b>All Cases</b>	232602	55.2	256964	53.0	306255	50.9
<b>Census Region</b>						
New England	12414	50.9	13117	50.2	13416	47.6
Middle Atlantic	42076	47.6	48660	46.0	58400	43.7
South Atlantic	47015	54.9	49778	53.4	50513	50.5
East North Central	41823	58.9	43949	55.7	49535	54.3
East South Central	20125	54.7	21971	52.7	23830	51.2
West North Central	12823	63.1	15015	61.3	17767	57.9
West South Central	37328	52.1	41071	49.9	58097	48.3
Mountain	7490	57.3	10610	50.9	16335	51.4
Pacific	11508	75.9	12793	72.9	18362	69.1
<b>Urban/Rural</b>						
Large Urban	105963	53.8	116811	51.5	139569	51.2
Other Urban	110958	56.1	121545	53.9	125598	50.4
Rural	15672	58.2	18426	55.9	28517	52.4
Missing	9	44.4	182	56.0	12571	50.5
<b>Unit vs. Freestanding</b>						
Unit	136427	56.9	148714	54.9	195893	52.8
Freestanding	96175	52.8	108250	50.3	110362	47.6
<b>Size by Unit</b>						
Avg. daily census < 10	18752	59.5	20897	56.5	31386	52.6
10 <= avg. daily census < 25	67978	57.4	73558	55.4	96467	53.3
25 <= avg. daily census	48842	55.1	54069	49.1	54339	52.3
Missing	855	69.5	190	89.5	13701	52.4
<b>Size by Freestanding</b>						
Avg. daily census < 25	5175	60.8	5870	57.8	6480	53.7
25 <= avg. daily census < 50	32824	53.3	38007	51.3	35748	47.2
50 <= avg. daily census	57866	51.6	64085	53.5	60927	46.9
Missing	310	75.8	288	62.9	7207	50.7
<b>Teaching</b>						
Teaching	45443	55.0	50731	52.5	52259	50.9
Non-Teaching	187000	55.3	204600	53.1	229333	51.0
Missing	159	57.9	1633	49.4	24663	50.4
<b>DSH Statistic</b>						
< 0.05	35984	51.1	41637	49.9	53910	47.6
0.05-0.1	88478	53.6	96299	51.3	107644	49.2
0.1-0.2	84270	57.0	93603	54.6	95390	52.4
>= 0.2	23870	61.2	25409	58.4	30341	58.4
Missing			16	68.8	18970	51.4



**Table 3.2 (cont.)**

<b>Control</b>						
Voluntary	140100	57.0	152152	54.7	179988	52.2
Proprietary	74132	50.1	85225	48.7	93496	47.8
Government	18361	61.7	19405	58.5	25941	54.2
Missing	9	44.4	182	56.0	6830	50.8

The differences across groups are much smaller for all of the other hospital characteristics in the table than for census division. Rural IRFs have a slightly higher percentage of their cases in the ten conditions than urban IRFs. Units have a slightly higher percentage of their cases in the ten conditions than freestanding hospitals. However, the very small number of the smallest freestanding hospitals (those with an average daily census of less than 25) look much more like units in this regard than the larger freestanding hospitals. Non-profit and government-owned hospitals have more cases in the ten conditions than proprietary hospitals.

Case mix in the ten conditions is positively correlated with increasing percent low-income as measured by the DSH statistic. There are almost no differences between teaching and non-teaching IRFs in this regard.

There are also only small differences in case mix by the source of admission (see Table 3.3). In 1998, cases from the IRF's own acute hospital were less likely to be in the conditions list than cases from a different acute hospital. By 2002 the situation was reversed, so that cases from the IRF's own acute hospital were slightly more likely to be in the conditions list than cases from a different acute hospital. Cases discharged to SNFs and NHs were more likely than other cases to be in the ten conditions.

Table 3.4 shows the percent of hospitals with at least 75 percent of their Medicare cases in one of the ten conditions. Although most census divisions had about half of their cases each year in one of the ten conditions, very few hospitals had 75 percent of cases in the ten conditions. In over half the country (five of the nine divisions), fewer than 10 percent of hospitals have 75 percent of 2002 cases in one

of the ten conditions. Even in the Pacific region, fewer than half the IRFs meet this 75% rule.

**Table 3.3**  
**Percent of Medicare Cases in Any of the Ten Conditions**  
**by Source of Admission and Discharge Setting**

Case Description	1998		1999		2002	
	N	In list (%)	N	In list (%)	N	In list (%)
<b>Total Cases</b>	232602	55.2	256964	53.0	306255	50.9
<b>Admit from</b>						
Acute unit of own facility	97691	54.3	107468	52.8	144866	50.7
Acute unit of other facility	68002	58.1	74129	55.1	141612	49.2
Home	9551	64.9	9180	62.3	11201	62.5
Other known	6703	69.8	6290	66.3	8576	68.5
Missing	50655	49.4	59897	47.7	0	NA
<b>Discharge Setting</b>						
Community	180095	51.8	200374	49.6	236809	47.1
NH, SNF	33092	71.3	34663	69.9	37961	69.5
Hospital	15283	60.5	17124	57.4	29315	57.5
Died	858	58.4	1089	55.5	898	56.0
Missing, Other	3274	56.0	3714	54.7	1272	56.6

**Table 3.4**  
**Percent of Hospitals with 75 or More Percent of Cases in the List**  
**of Ten Conditions, by Hospital Characteristics and Year**

Hospital Characteristic	1998		1999		2002	
	Total N	Percent	Total N	Percent	Total N	Percent
<b>All Hospitals</b>	686	21.0	724	17.3	1170	13.4
<b>Census Division</b>						
1: New England	30	16.6	30	13.3	38	2.6
2: Middle Atlantic	82	6.0	96	7.3	170	4.1
3: South Atlantic	106	11.3	108	10.1	143	7.0
4: East North Central	153	17.6	155	14.8	220	12.3
5: East South Central	38	7.8	39	0.0	66	1.5
6: West North Central	57	38.5	60	36.6	99	27.3
7: West South Central	116	9.4	124	4.8	235	3.4
8: Mountain	34	29.4	40	25.0	78	21.8
9: Pacific	70	70.0	72	58.3	121	48.8

**Table 3.4 (cont.)**

<b>Urban/Rural</b>						
Large Urban	309	20.7	331	18.7	493	15.2
Other Urban	301	21.2	307	15.9	404	12.4
Rural	75	21.3	83	16.8	170	10.0
Missing	1	0.0	3	0.0	103	15.5
<b>Unit vs. Freestanding</b>						
Unit	515	24.6	554	20.4	956	15.4
Freestanding	171	9.9	170	7.0	214	4.7
<b>Size by Unit</b>						
Small	133	26.3	154	19.5	278	18.0
Medium	256	24.2	268	19.0	431	14.2
Large	95	14.7	98	13.3	127	14.2
Missing	7	57.1	2	100.0	120	15.0
<b>Size by Freestanding</b>						
Small	25	32.0	23	21.7	31	9.7
Medium	69	4.4	72	1.4	73	2.7
Large	68	2.9	67	1.5	72	1.4
Missing	2	50.0	1	0.0	38	10.5
<b>Teaching</b>						
Teaching	108	24.0	111	20.7	145	18.6
Non-Teaching	574	20.3	602	16.7	845	13.1
Missing	4	25.0	11	9.0	180	10.6
<b>DSH Statistic</b>						
< 0.05	120	18.3	135	12.6	226	10.2
0.05-0.1	236	15.2	242	12.8	339	10.9
0.1-0.2	236	24.1	254	19.6	313	13.7
>= 0.2	94	30.8	92	29.3	145	24.1
Missing			1	0.0	147	12.9
<b>Control</b>						
Voluntary	455	24.6	479	20.6	700	15.3
Proprietary	157	6.3	169	4.7	259	5.0
Government	73	30.1	73	24.6	135	18.5
Missing	1	0.0	3	0.0	76	15.8

The patterns found in groups of hospitals in Table 3.4 are similar to those seen at the case level in Table 3.2. Units are more likely to have 75 percent of Medicare cases in the conditions list than are freestanding hospitals. Hospitals with higher disproportionate share statistics are more likely to meet this criterion, and proprietary hospitals are less likely to meet it. There are no statistically significant differences in the 2002 data by the urban/rural, size, or teaching variables ( $p > 0.05$ ).

**Changing Threshold**

The purpose of the 75% rule is to ensure that the IRFs are primarily involved in providing intensive rehabilitation services. It may be worth considering a somewhat lower threshold criterion. Consequently, we report in Table 3.5 the percent of hospitals with at least x percent of cases in the conditions list for values of x from 75 percent down to 45 percent in increments of 5.

**Table 3.5**  
**Percent of Hospitals with at Least Threshold Percent of 2002 Medicare Cases in the Conditions List, for Various Values of Threshold**

<b>Hospital Characteristic</b>	<b>N</b>	<b>75%</b>	<b>70%</b>	<b>65%</b>	<b>60%</b>	<b>55%</b>	<b>50%</b>	<b>45%</b>
<b>All Hospitals</b>	1170	13.4%	18.6%	25.2%	33.8%	44.1%	58.0%	72.0%
<b>Census Division</b>								
1: New England	38	2.6	5.3	7.9	23.7	28.9	57.9	76.3
2: Middle Atlantic	170	4.1	5.3	10.0	15.3	22.4	34.1	47.6
3: South Atlantic	143	7.0	9.8	15.4	21.0	36.4	54.5	74.8
4: East North Central	220	12.3	21.4	29.1	42.3	53.2	65.9	76.8
5: East South Central	66	1.5	6.1	15.2	25.8	36.4	53.0	77.3
6: West North Central	99	27.3	33.3	41.4	50.5	58.6	68.7	78.8
7: West South Central	235	3.4	6.0	11.1	18.3	30.2	47.2	66.4
8: Mountain	78	21.8	26.9	33.3	43.6	51.3	62.8	70.5
9: Pacific	121	48.8	61.2	71.1	76.9	86.8	93.4	95.9
<b>Urban/Rural</b>								
Large Urban	493	15.0	22.5	29.6	37.7	46.7	60.2	71.6
Other Urban	404	12.4	16.1	22.0	30.9	42.1	56.7	73.8
Rural	170	10.0	12.4	19.4	30.6	40.6	57.1	74.1
Missing	103	15.5	20.4	26.2	31.1	45.6	54.4	63.1
<b>Unit vs. Freestanding</b>								
Unit	956	15.4	21.2	28.3	37.2	47.6	60.6	72.7
Free Standing	214	4.7	7	11.2	18.2	28.5	46.7	68.7
<b>Teaching</b>								
Teaching	145	18.6	25.5	32.4	37.9	46.2	62.1	71.7
Non-Teaching	845	13.1	18.1	24.6	33.6	43.6	58.1	73.5
Missing	180	10.6	15.6	22.2	31.1	45.0	54.4	65.0
<b>DSH</b>								
< 0.05	226	10.2	15.5	21.7	31.4	40.7	50.4	67.3
0.05-0.1	339	10.9	16.2	21.8	28.6	39.2	53.4	66.1
0.1-0.2	313	13.7	17.9	23.3	31.9	41.9	58.8	76.0
>= 0.2	145	24.1	31.7	43.4	55.2	64.1	80.0	88.3
Missing	147	12.9	17.7	24.5	32	45.6	57.1	68.0
<b>Control</b>								
Voluntary	700	15.3	21.1	28.4	37.9	47.9	61.3	73.4
Proprietary	259	5.0	9.3	12.7	20.1	30.9	47.5	69.1
Government	135	18.5	22.2	30.4	39.3	48.9	63.7	77.8
Missing	76	15.8	21.1	28.9	32.9	46.1	54.0	57.9

The total number of hospitals that would appear to conform to our alternative rules increases very slowly until the threshold is below 60 percent. Even using a 50-percent threshold, nearly half the IRFs in the country would conform based on their 2002 data and this definition of the conditions list. This is true in most census divisions; in large urban areas, small urban areas, and rural; for units as well as freestanding IRFs; for government-run and non-profit IRFs as well as proprietary IRFs; and for all but the hospitals with the poorest population as measured by the DSH statistic.

Given the uniformity of the results across most hospital categories, the Pacific region and the Middle Atlantic states stand out. At the 55-percent threshold where only 44 percent of IRFs conform, 86.8 percent of Pacific division IRFs conform, but less than one-quarter of the Middle Atlantic division IRFs conform.

#### **NON-MEDICARE CASE MIX**

In its current form, the 75% rule addresses total case mix rather than Medicare case mix. For a subset of IRFs we have 1998 and 1999 FIM data from UDSmr on non-Medicare cases that we use next to compare Medicare and non-Medicare cases.

Table 3.6 shows the differences in Medicare and non-Medicare case mix in the distribution of RICs, which are aggregations of similar impairments. In both years, in both Medicare and non-Medicare cases, stroke is the most frequent impairment, and lower extremity joint replacement is the second most frequent. The third-ranked RIC is much less frequent in both groups.

Other differences in the population are readily apparent, however. The non-Medicare cases are much more likely than Medicare cases to be the result of traumatic injury: RICs 2, 4, 17, 18, and 21. These RICs constitute 19.5 percent of the 1998 non-Medicare cases, but only 3.2 percent of the Medicare cases. This is completely consistent with the known higher likelihood of traumatic injury in the under-65 population than in the elderly population, and with the delay from onset of injury until disabled status and Medicare coverage is received. The increased

frequency of NTBI and NTSCI in the non-Medicare population is likely due to similar factors.

**Table 3.6**  
**Percent of Medicare and Non-Medicare Cases in Each RIC, by Year**

RIC	1998			1999		
	Non-Medicare	Medicare	Total	Non-Medicare	Medicare	Total
1. Stroke	24.8	24.9	24.9	23.2	22.9	23.0
2. TBI	8.3	1.3	3.6	7.5	1.3	3.4
3. NTBI	5.6	2.3	3.4	5.3	2.5	3.4
4. TSCI	4.4	0.6	1.9	4.0	0.6	1.8
5. NTSCI	4.6	3.4	3.8	4.4	3.5	3.8
6. Neurological	4.5	4.4	4.4	4.4	4.4	4.4
7. LE fracture	5.6	11.5	9.6	5.9	11.6	9.7
8. LE joint repl	15.4	21.2	19.3	17.5	21.5	20.1
9. Other ortho	3.8	4.5	4.3	4.2	4.6	4.4
10. LE amputations	3.4	3.7	3.6	3.5	3.5	3.5
11. Other amputations	0.3	0.3	0.3	0.3	0.4	0.3
12. Osteoarthritis	0.7	1.9	1.5	0.7	1.9	1.5
13. Rheumatoid arthr	0.4	0.9	0.7	0.4	0.9	0.7
14. Cardiac	1.9	3.9	3.3	1.9	4.3	3.4
15. Pulmonary	1.2	2.0	1.8	1.2	2.1	1.8
16. Pain	1.0	1.4	1.2	1.1	1.4	1.3
17. MMT, no BI or SCI	4.1	1.0	2.0	4.0	0.9	2.0
18. MMT w BI or SCI	2.3	0.2	0.9	2.3	0.2	0.9
19. Guillain Barre	0.8	0.2	0.4	0.8	0.2	0.4
20. Miscellaneous	6.5	10.3	9.0	7.2	11.4	10.0
21. Burns	0.3	0.1	0.2	0.3	0.1	0.1
<b>Total</b>	100.0	100.0	100.0	100.0	100.0	100.0
<b>N of cases</b>	91793	190595	282388	101146	196543	297689

Note: Medicare data are restricted to cases from the hospitals for which non-Medicare data are also available for that year.

Other differences in the table are also quite plausibly due primarily to differences between the two populations in the incidence of disease. For example, the burden of cardiac and pulmonary disorders found in RICs 14, 15, and 20 and the incidence of debility (60 percent of RIC 20) is much greater in an elderly population than in a younger population. This is consistent with the finding that 16.2 percent of the Medicare cases are in these three RICs versus only 9.6 percent of the non-Medicare cases.

Hip fracture and replacement of a major joint of the lower extremity require an acute hospitalization, and these hospitalizations can be identified from their DRG assignment. Thus, for these conditions we can use the National Hospital Discharge Survey to determine the incidence of these diseases in the over- and under-65 population. We find that the over-65 population accounts for 81 percent of acute hip fracture patients and 79 percent of the hip fracture IRF population. The over-65 population accounts for 71 percent of acute LE joint replacement patients and 70 percent of the IRF lower extremity joint replacement population. The patients with lower extremity joint replacement are not counted in the definition of the 75% rule used here.

Table 3.7 shows that non-Medicare cases are more likely than Medicare cases to be in one of the ten conditions of the 75% rule -- in 1999, 68 percent vs. 54.4 percent. This is due in large part to the increased percentage of trauma-related cases, most of which are BI, SCI, or burn patients. Since non-Medicare cases constitute roughly one-third of the IRFs total case mix, the percent of total cases in the conditions list is 59 percent. Four percent of IRFs passed the 75-percent criterion in their total case mix, but not in their Medicare case mix.

**Table 3.7**

**Percent of Medicare and Non-Medicare Cases in the Conditions List and Percent of Hospitals With at Least 75 Percent of Medicare in Total Cases in the Conditions List, for 1998 and 1999**

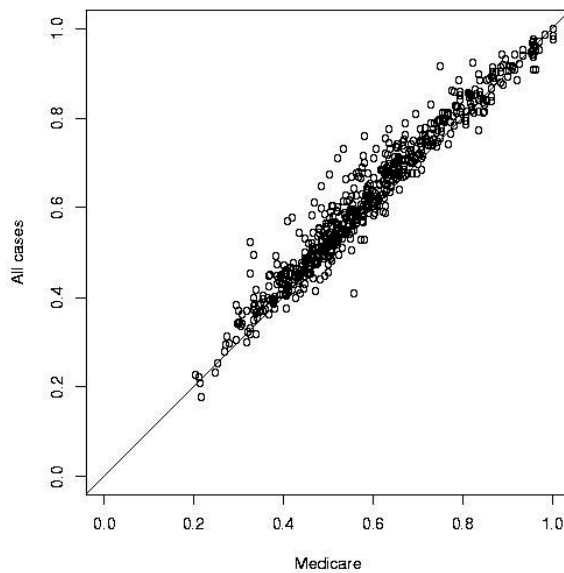
	Cases		Hospitals	
	N	In list (%)	N	>= 75% in list (%)
<b>1998</b>				
Non-Medicare	91793	71.2		
Medicare	190595	56.5	612	23.0
Total	282388	61.3	612	28.1
<b>1999</b>				
Non-Medicare	101146	68.0		
Medicare	196543	54.4	617	19.0
Total	297689	59.0	617	23.0

Note: Medicare data are restricted to cases from the hospitals for which non-Medicare data are also available for that year.

We find that the percent of Medicare cases in the conditions list is a very good predictor of the percent of total cases in the conditions

list. Figure 3.1 is a scatter plot of the proportion of all cases in the conditions list versus the percent of Medicare cases in the conditions list. As you can see from the figure, the points are closely grouped around a straight line, allowing a simple ordinary least squares regression to produce a good prediction of the proportion of all cases in one of the ten conditions from the proportion of Medicare cases in one of the ten conditions. The correlation is 0.97. Table 3.8 presents the statistics of the regression.

Percent of Medicare and all cases in HCFA 10 per IRF



**Figure 3.1. Scatter Plot of Data: Proportion of All Cases in Conditions List vs. Medicare Cases in Conditions List, 1999 Data**

The quality of this prediction would allow CMS to use the percent of Medicare cases in the conditions list as a close proxy for the percent of total cases in the conditions list. Table 3.9 shows the relationship between total cases and Medicare cases in the conditions list. If CMS wished to maintain the 75-percent total case mix threshold, the closest approximation would be to insist on a Medicare case mix of 72.2 percent. If CMS wished to relax the threshold to two-thirds of total case mix, then it would insist on a Medicare case mix of 63.6 percent. At hospitals with more than 55 percent of total case mix,



Medicare case mix is roughly three percentage points lower. Below 55 percent, Medicare case mix is four percentage points lower.

**Table 3.8**

**Regressions of Percent of Total Cases in the Conditions List  
on Percent of Medicare Cases in the Conditions List**

	<b>Coefficient</b>	<b>t-statistic</b>
Intercept	0.0531	9.25
Slope	0.9651	106.61

Note: Based on 1999 data from 617 hospitals.  
R-sq = 0.95.

We repeated this analysis with the 1998 data and found very similar results. In fact, the predictions are identical to two significant digits throughout this range.

**Table 3.9**

**Prediction of Percent of Total Cases in the Conditions List  
from Percent of Medicare Cases in the Conditions List**

<b>Medicare in list (%)</b>	<b>Total in list (%)</b>
72.2%	75.0%
67.0%	70.0%
63.6%	66.7%
56.7%	60.0%
51.5%	55.0%
46.3%	50.0%

Note: Based on the regression of Table 3.8.

**CASES NOT IN THE CONDITIONS LIST**

We next compare the distribution of impairment for the cases not counted in the ten-conditions list with that for the cases that are counted (see Table 3.10). In each of the three years of data, lower extremity joint replacement contained by far the largest number of cases not in the conditions list -- 44 percent in 2002. Fifty-five percent of these cases were unilateral knee replacements, 37.6 percent were unilateral hip replacements, and 7.2 percent had more than one joint replaced.

Table 3.10

Number and Percent of Medicare Cases in Ten-Conditions List and Not in Ten-Conditions List that are in Each Rehabilitation Impairment Category

RIC	1998				1999				2002			
	Not in Ten		In one of Ten		Not in Ten		In one of Ten		Not in Ten		In one of Ten	
	N	%	N	%	N	%	N	%	N	%	N	%
1. Stroke	0	0.0	55970	43.6	0	0.0	56508	41.5	0	0.0	55439	35.5
2. TBI	0	0.0	2964	2.3	0	0.0	3312	2.4	0	0.0	4084	2.6
3. NTBI	31	0.0	5143	4.0	40	0.0	5635	4.1	111	0.1	6193	3.9
4. TSCI	0	0.0	1441	1.1	0	0.0	1504	1.1	0	0.0	1756	1.1
5. NTSCI	0	0.0	7285	5.7	0	0.0	8026	5.9	0	0.0	10686	6.8
6. Neurological	0	0.0	10759	8.4	0	0.0	12437	9.1	0	0.0	13675	8.8
7. LE fracture	3095	3.0	23677	18.4	3763	3.1	25873	19.0	3327	2.2	33233	21.3
8. LE joint repl	46173	44.3	1898	1.5	49836	41.2	1936	1.4	66306	44.1	3881	2.5
9. Other ortho	10173	9.8	695	0.5	11970	9.9	773	0.6	12789	8.5	1530	1.0
10. LE amputations	0	0.0	8370	6.5	0	0.0	8707	6.4	0	0.0	8483	5.4
11. Other amputations	0	0.0	834	0.6	0	0.0	952	0.7	0	0.0	904	0.6
12. Osteoarthritis	4727	4.5	202	0.2	6222	5.1	199	0.1	6937	4.6	502	0.3
13. Rheumatoid arthr	0	0.0	2533	2.0	0	0.0	3126	2.3	1	0.0	3129	2.0
14. Cardiac	8803	8.4	485	0.4	10432	8.6	542	0.4	15446	10.3	1691	1.1
15. Pulmonary	5789	5.6	209	0.2	7159	5.9	266	0.2	7207	4.8	663	0.4
16. Pain	3051	2.9	236	0.2	3639	3.0	237	0.2	6092	4.1	605	0.4
17. MMT, no BI or SCI	0	0.0	2209	1.7	0	0.0	2396	1.8	0	0.0	3316	2.1
18. MMT w BI or SCI	0	0.0	373	0.3	0	0.0	392	0.3	0	0.0	604	0.4
19. Guillain Barre	0	0.0	425	0.3	0	0.0	425	0.3	0	0.0	449	0.3
20. Miscellaneous	22355	21.5	2538	2.0	27808	23.0	2683	2.0	32003	21.3	5008	3.2
21. Burns	0	0.0	159	0.1	0	0.0	166	0.1	0	0.0	205	0.1
<b>Total</b>	104197	100.0	128405	100.0	120869	100.0	136095	100.0	150219	100.0	156036	99.9

The second largest group of cases not counted in the ten conditions are those in the miscellaneous RIC 20. Adding the pulmonary and cardiac RICs to the miscellaneous RIC, we find that 36.4 percent of 2002 cases not in the conditions list are in these medical RICs. The numbers for 1998 and 1999 are similar.

For a substantial majority of cases in RIC 20, the impairment provides little information about which body system or structure is impaired, or even the disease process causing the impairment. For 65.5 percent of the RIC 20 patients the listed impairment is either disability, other, medical/surgical complications, or other medical complexity. Other impairments in RIC 20 are cancer (8.3 percent of total RIC 20), circulatory system (8.9 percent), respiratory system (9.3 percent), as well as some smaller groups, including the 0.3 percent of patients with congenital disorders who are all counted in the ten-conditions list.

One of the smaller groups in the table are the cases in the hip fracture RIC that are not counted in the condition list because their impairment is "fracture of the shaft of the femur" (rather than the neck of the femur, which is a hip fracture). There could easily be confusion about whether hip fracture is an example or the definition of the condition listed as "fracture of the femur (hip fracture)."

A list of diagnoses that describe a subset of the patients not in the conditions list is shown in Table 3.11. This is not meant to be exhaustive, but rather to show that differing interpretations of the diagnoses that qualify a case to have one of the ten conditions might have resulted in an appearance of more "compliance" with the rule than we found in this report.

More than half of the cases that are not in the ten conditions have osteoarthritis. Based on informal conversations, we believe that many persons in the hospital industry believe that osteoarthritis counts as one of the ten conditions. A definition of polyarthritis provided by the National Library of Medicine<sup>3</sup> defines polyarthritis as "arthritis involving two or more joints." There is a strong correlation between

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<sup>3</sup> [www.nlm.nih.gov/medlineplus/mplusdictionary.html](http://www.nlm.nih.gov/medlineplus/mplusdictionary.html)

the cases with osteoarthritis and those with LE joint replacement. Eighty-six percent of the excluded LE joint replacement cases have osteoarthritis. Some people may believe that, because osteoarthritis was the cause of the joint replacement, the patients are receiving rehabilitation for their arthritis. Further, all the cases in RIC 12 are receiving rehabilitation primarily for their osteoarthritis. Counting the osteoarthritis cases that are in RICs 8 and 12 would cut the number of cases not in the condition by half, raising the percent of cases in one of the ten conditions to roughly 75 percent. This, in turn, would greatly increase the proportion of hospitals that have more than 75 percent of cases in the condition.

**Table 3.11**

**Number of Cases in 2002 that are Not Counted in Ten-Conditions List, for Selected Diagnoses and Diagnoses Groups**

<b>Diagnosis or Diagnosis Group</b>	<b>Cases with Dx</b>	
	<b>N</b>	<b>As % of not counted</b>
Osteoarthritis (715xx)	80256	52.8%
Neural manifestations of diabetes (250.6x, 357.2)	5091	3.39%
Parkinson's (332.0)	2504	1.67%
Uncounted connective tissue disorders (696.0, 710.1, 711xx, 712xx, 713xx)	750	0.50%
Late effects of polio (138.)	345	0.23%
Multiple Sclerosis (340.)	275	0.18%
All not counted	150219	100.00%

The other diagnoses listed in the table describe much smaller subsets of patients. We note that we cannot be sure that all patients are receiving rehabilitation for the diagnoses listed on the IRFPAL. However, we do know that, by admitting the patient to the inpatient program, a physician certified that the patient required intensive rehabilitation for some purpose.

#### 4. DISCUSSION

The 75% rule defined by CMS does not now describe Medicare case mix at IRFs, and has not since at least the mid-1990s. In 2002 only half the Medicare patients in IRFs had one of these ten conditions as defined here in consultation with CMS. Only 13 percent of IRFs had at least 75 percent of their 2002 cases in one of these conditions. The 75% rule does not describe any large subset of IRFs. Fewer than 60 percent of cases are in these ten conditions in rural areas and in urban areas, in units and in freestanding hospitals, in all sizes of hospitals, in teaching and in non-teaching hospitals, in groups defined by the size of their low-income population, in non-profit and government-owned hospitals and in proprietary hospitals, and in all census divisions except the Pacific division. Even in the Pacific division, fewer than half the IRFs meet the 75-percent criteria.

The apparent lack of compliance with the rule may be due to different interpretations of exactly which cases fall into the ten conditions. The most frequent uncounted condition is osteoarthritis, which many in the hospital industry believe to be included in the ten conditions. Approximately 25 percent of all inpatient rehabilitation cases have this condition.

There has been a significant decline in the percent of cases in these ten conditions in the period from 1996 through 2002. But the temporary suspension of the 75% rule in early May 2002 did not appear to increase admission of cases not in the ten conditions. The rate of decline in cases in the conditions list was much greater from 1996 to 1999 than from 1999 to 2002.

The variability across census divisions in the set of cases in the conditions is consistent with variable enforcement of this rule, and variable definitions of which cases are in the rule, by the different FIs. But the variability across census regions is also consistent with variations in practice patterns that could have nothing to do with Medicare rules. In fact, it is likely that practice patterns respond to Medicare rules. Thus, the exact definition of these ten conditions can

have a large impact on access to outpatient rehabilitation. Further, clarification by CMS of exactly which patients should be counted as being in the ten conditions might increase uniformity of program enforcement and increase uniformity of access to inpatient rehabilitation.

We found that differences between Medicare and non-Medicare cases in the distribution of impairments appear to be consistent with differences in disease incidence between the Medicare and non-Medicare population: a much larger percentage of traumatic injury patients in the non-Medicare population, a larger percentage of chronic medical cases in the Medicare population, and proportions of LE joint replacement and hip fracture cases equal to their incidence in acute care. This is not consistent with Medicare patients being frequently admitted in order to game the acute PPS. Rather, patients of similar kinds are being admitted independent of the source of their insurance.

There is a very high correlation (0.97) between the percent of a hospital's total cases in the ten conditions and the percent of its Medicare cases in the ten conditions. Thus it would be possible to administer a program that aimed at ensuring a total case mix by enforcing constraints on Medicare case mix. Total case mix in the current ten conditions is typically three to four percentage points higher than Medicare case mix. So, a 75-percent threshold on total case mix translates into about a 72-percent threshold on Medicare cases. Such a rule would still find over 80 percent of IRFs out of compliance with the existing set of ten conditions.

Before issuing a new final rule defining an IRF, CMS must decide the extent to which the case mix condition in a new rule should differ from the existing list of ten conditions, or whether the existing IRF case mix shows that IRFs are not "primarily involved in providing intensive rehabilitation services." The extent to which IRFs are now providing intensive therapy could be addressed in comparing the cost

reports for therapy departments with the case volume and mix of the patients.<sup>4</sup>

A more difficult, but ultimately much more important, question is: how can one more accurately identify which patients benefit from intensive inpatient hospital rehabilitation or assessment? Which stroke patients are likely to benefit from inpatient rehabilitation? Some will not require intensive rehabilitation, others may be too ill to benefit from it. Many patients with swallowing dysfunction and other conditions may find inpatient rehabilitation to provide life-saving treatment. This question is not answerable with today's knowledge. Rather, it will require a long term research program, but would ultimately benefit all rehabilitation patients. Such a program of research should be a major goal of both CMS and all rehabilitation professionals.

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<sup>4</sup> The staff time measurement data, although a very small sample, could also be used to determine if patients in one of the ten conditions receive more intense rehabilitation each day than other patients.

**REFERENCES**

Carter, G. M., Beeuwkes Buntin, M., Hayden, O., Kawata, J. H., Paddock, S. M., Relles, D. A., Ridgeway, G. K., Totten, M., and Wynn, B. O. (2002). *Analyses for the Initial Implementation of the Inpatient Rehabilitation Facility Prospective Payment System*. Santa Monica, CA: RAND, MR-1500-CMS.



**APPENDIX A: DIAGNOSES DEEMED TO INDICATE A PATIENT  
IN THE CONDITIONS LIST FOR 75% RULE**

<b>Code</b>	<b>Label</b>
036.0	MENINGOCOCCALMENINGITIS
047.8	VIRAL MENINGITIS NEC
047.9	VIRAL MENINGITIS NOS
049.0	LYMPHOCYTICCHORIOMENING
049.9	VIRAL ENCEPHALITIS NOS
052.0	POSTVARICELLAENCEPHALIT
053.0	HERPES ZOSTER MENINGITIS
054.3	HERPETICENCEPHALITIS
054.5	HERPETICSEPTICEMIA
054.72	H SIMPLEX MENINGITIS
055.0	POSTMEASLESENCEPHALITIS
072.1	MUMPSMENINGITIS
072.2	MUMPSENCEPHALITIS
094.2	SYPHILITICMENINGITIS
112.83	CANDIDALMENINGITIS
114.2	COCCIDIOIDALMENINGITIS
115.01	HISTOPLASM CAPSUL MENING
115.11	HISTOPLASM DUBOIS MENING
115.91	HISTOPLASMOSISMENINGIT
130.0	TOXOPLASMMENINGOENCEPH
139.0	LATE EFF VIRAL ENCEPHAL
320.0	HEMOPHILUSMENINGITIS
320.1	PNEUMOCOCCALMENINGITIS
320.2	STREPTOCOCCALMENINGITIS
320.3	STAPHYLOCOCCMENINGITIS
320.7	MENING IN OTH BACT DIS
320.81	ANAEROBICMENINGITIS
320.82	MNINGTS GRAM-NEG BCT NEC
320.89	MENINGITIS OTH SPCF BACT
320.9	BACTERIAL MENINGITIS NOS
321.0	CRYPTOCOCCALMENINGITIS
321.1	MENING IN OTH FUNGAL DIS
321.2	MENING IN OTH VIRAL DIS
321.3	TRYPANOSOMIASISMENINGIT
321.4	MENINGIT D/T SARCOIDOSIS
321.8	MENING IN OTH NONBAC DIS
322.0	NONPYOGENICMENINGITIS
322.2	CHRONICMENINGITIS
322.9	MENINGITISNOS
323.0	ENCEPHALIT IN VIRAL DIS
323.6	POSTINFECTENCEPHALITIS
323.8	ENCEPHALITISNEC

323.9	ENCEPHALITIS NOS
324.0	INTRACRANIAL ABSCESS
324.1	INTRASPINAL ABSCESS
324.9	CNS ABSCESS NOS
334.0	FRIEDREICH'S ATAXIA
334.1	HERED SPASTIC PARAPLEGIA
334.2	PRIMARY CEREBELLAR DEGEN
334.3	CEREBELLAR ATAXIA NEC
334.4	CEREBEL ATAX IN OTH DIS
334.8	SPINOCEREBELLAR DIS NEC
334.9	SPINOCEREBELLAR DIS NOS
335.0	WERDNIG-HOFFMANN DISEASE
335.10	SPINAL MUSCL ATROPHY NOS
335.11	KUGELBERG-WELANDER DIS
335.19	SPINAL MUSCL ATROPHY NEC
335.20	AMYOTROPHIC SCLEROSIS
335.21	PROG MUSCULAR ATROPHY
335.22	PROGRESSIVE BULBAR PALSY
335.23	PSEUDOBULBAR PALSY
335.24	PRIM LATERAL SCLEROSIS
335.29	MOTOR NEURON DISEASE NEC
335.8	ANT HORN CELL DIS NEC
335.9	ANT HORN CELL DIS NOS
336.0	SYRINGOMYELIA
336.1	VASCULAR MYELOPATHIES
336.2	COMB DEG CORD IN OTH DIS
336.3	MYELOPATHY IN OTH DIS
336.8	MYELOPATHY NEC
336.9	SPINAL CORD DISEASE NOS
342.01	FLCCD HEMIPLGA DOMNT SIDE
342.02	FLCCD HEMIPLG NONDMNT SDE
342.10	SPSTC HEMIPLGA UNSPF SIDE
342.11	SPSTC HEMIPLGA DOMNT SIDE
342.12	SPSTC HEMIPLG NONDMNT SDE
342.80	OT SP HEMIPLGA UNSPF SIDE
342.81	OT SP HEMIPLGA DOMNT SIDE
342.82	OT SP HEMIPLG NONDMNT SDE
342.90	UNSP HEMIPLGA UNSPF SIDE
342.91	UNSP HEMIPLGA DOMNT SIDE
342.92	UNSP HEMIPLGA NONDMNT SDE
343.0	CONGENITAL DIPLEGIA
343.1	CONGENITAL HEMIPLEGIA
343.2	CONGENITAL QUADRIPEGIA
343.3	CONGENITAL MONOPEGIA
343.4	INFANTILE HEMIPLEGIA
343.8	CEREBRAL PALSY NEC
343.9	CEREBRAL PALSY NOS
344.00	QUADRIPEGIA, UNSPECIFD

344.01	QUADRPLG C1-C4, COMPLETE
344.02	QUADRPLG C1-C4, INCOMPLT
344.03	QUADRPLG C5-C7, COMPLETE
344.04	QUADRPLG C5-C7, INCOMPLT
344.09	OTHERQUADRIPLEGIA
344.1	PARAPLEGIANOS
344.2	DIPLEGIA OF UPPER LIMBS
344.30	MONPLGA LWR LMB UNSP SDE
344.31	MONPLGA LWR LMB DMNT SDE
344.32	MNPLG LWR LMB NONDMNT SD
344.40	MONPLGA UPR LMB UNSP SDE
344.41	MONPLGA UPR LMB DMNT SDE
344.42	MNPLG UPR LMB NONDMNT SD
344.5	MONOPLGIANOS
344.60	CAUDA EQUINA SYND NOS
344.61	NEUROGENICBLADDER
344.81	LOCKED-INSTATE
344.89	OTH SPCF PARALYTIC SYND
344.9	PARALYSISNOS
348.1	ANOXIC BRAIN DAMAGE
348.4	COMPRESSION OF BRAIN
356.1	PERONEAL MUSCLE ATROPHY
356.2	HERED SENSORY NEUROPATHY
356.4	IDIO PROG POLYNEUROPATHY
359.0	CONG HERED MUSC DYSTRPHY
359.1	HERED PROG MUSC DYSTRPHY
359.5	MYOPATHY IN ENDOCRIN DIS
359.6	INFL MYOPATHY IN OTH DIS
359.8	MYOPATHY NEC
359.9	MYOPATHYNOS
430	SUBARACHNOIDHEMORRHAGE
431	INTRACEREBRALHEMORRHAGE
432.0	NONTRAUM EXTRADURAL HEM
432.1	SUBDURALHEMORRHAGE
432.9	INTRACRANIAL HEMORR NOS
433.01	OCL BSLR ART W INFRCT
433.11	OCL CRTD ART W INFRCT
433.21	OCL VRTB ART W INFRCT
433.31	OCL MLT BI ART W INFRCT
433.81	OCL SPCF ART W INFRCT
433.91	OCL ART NOS W INFRCT
434.01	CRBL THRMBS W INFRCT
434.11	CRBL EMBLSM W INFRCT
434.91	CRBL ART OCL NOS W INFRCT
438.11	LATE EFF CV DIS-APHASIA
438.20	LATE EF-HEMPLGA SIDE NOS
438.21	LATE EF-HEMPLGA DOM SIDE
438.22	LATE EF-HEMIPLGA NON-DOM

438.30	LATE EF-MPLGA UP LMB NOS
438.31	LATE EF-MPLGA UP LMB DOM
438.32	LT EF-MPLGA UPLMB NONDOM
438.40	LTE EF-MPLGA LOW LMB NOS
438.41	LTE EF-MPLGA LOW LMB DOM
438.42	LT EF-MPLGA LOWLMB NONDM
438.50	LT EF OTH PARAL SIDE NOS
438.51	LT EF OTH PARAL DOM SIDE
438.52	LT EF OTH PARALS NON-DOM
438.53	LT EF OTH PARALS-BILAT
710.0	SYST LUPUS ERYTHEMATOSUS
710.4	POLYMYOSITIS
714.0	RHEUMATOIDARTHRITIS
714.1	FELTYSSYNDROME
714.2	SYST RHEUM ARTHRITIS NEC
714.30	JUV RHEUM ARTHRITIS NOS
714.31	POLYART JUV RHEUM ARTHR
714.4	CHR POSTRHEUM ARTHRITIS
716.29	ALLERGARTHRITIS-MULT
720.0	ANKYLOSINGSPONDYLITIS
806.00	C1-C4 FX-CL/CORD INJ NOS
806.01	C1-C4 FX-CL/COM CORD LES
806.02	C1-C4 FX-CL/ANT CORD SYN
806.03	C1-C4 FX-CL/CEN CORD SYN
806.04	C1-C4 FX-CL/CORD INJ NEC
806.05	C5-C7 FX-CL/CORD INJ NOS
806.06	C5-C7 FX-CL/COM CORD LES
806.07	C5-C7 FX-CL/ANT CORD SYN
806.08	C5-C7 FX-CL/CEN CORD SYN
806.09	C5-C7 FX-CL/CORD INJ NEC
806.10	C1-C4 FX-OP/CORD INJ NOS
806.11	C1-C4 FX-OP/COM CORD LES
806.12	C1-C4 FX-OP/ANT CORD SYN
806.13	C1-C4 FX-OP/CEN CORD SYN
806.14	C1-C4 FX-OP/CORD INJ NEC
806.15	C5-C7 FX-OP/CORD INJ NOS
806.16	C5-C7 FX-OP/COM CORD LES
806.17	C5-C7 FX-OP/ANT CORD SYN
806.18	C5-C7 FX-OP/CEN CORD SYN
806.19	C5-C7 FX-OP/CORD INJ NEC
806.20	T1-T6 FX-CL/CORD INJ NOS
806.21	T1-T6 FX-CL/COM CORD LES
806.22	T1-T6 FX-CL/ANT CORD SYN
806.23	T1-T6 FX-CL/CEN CORD SYN
806.24	T1-T6 FX-CL/CORD INJ NEC
806.25	T7-T12 FX-CL/CRD INJ NOS
806.26	T7-T12 FX-CL/COM CRD LES
806.27	T7-T12 FX-CL/ANT CRD SYN

806.28	T7-T12 FX-CL/CEN CRD SYN
806.29	T7-T12 FX-CL/CRD INJ NEC
806.30	T1-T6 FX-OP/CORD INJ NOS
806.31	T1-T6 FX-OP/COM CORD LES
806.32	T1-T6 FX-OP/ANT CORD SYN
806.33	T1-T6 FX-OP/CEN CORD SYN
806.34	T1-T6 FX-OP/CORD INJ NEC
806.35	T7-T12 FX-OP/CRD INJ NOS
806.36	T7-T12 FX-OP/COM CRD LES
806.37	T7-T12 FX-OP/ANT CRD SYN
806.38	T7-T12 FX-OP/CEN CRD SYN
806.39	T7-T12 FX-OP/CRD INJ NEC
806.4	CL LUMBAR FX W CORD INJ
806.5	OPN LUMBAR FX W CORD INJ
806.60	FX SACRUM-CL/CRD INJ NOS
806.61	FX SACR-CL/CAUDA EQU LES
806.62	FX SACR-CL/CAUDA INJ NEC
806.69	FX SACRUM-CL/CRD INJ NEC
806.70	FX SACRUM-OP/CRD INJ NOS
806.71	FX SACR-OP/CAUDA EQU LES
806.72	FX SACR-OP/CAUDA INJ NEC
806.79	FX SACRUM-OP/CRD INJ NEC
806.8	VERT FX NOS-CL W CRD INJ
806.9	VERT FX NOS-OP W CRD INJ
850.2	CONCUSSION-MODERATECOMA
850.3	CONCUSSION-PROLONGCOMA
850.4	CONCUSSION-DEEPCOMA
851.02	CORTEX CONTUS-BRIEF COMA
851.03	CORTEX CONTUS-MOD COMA
851.04	CORTX CONTUS-PROLNG COMA
851.05	CORTEX CONTUS-DEEP COMA
851.12	OPN CORT CONTUS-BRF COMA
851.13	OPN CORT CONTUS-MOD COMA
851.14	OPN CORT CONTU-PROL COMA
851.15	OPN CORT CONTU-DEEP COMA
851.22	CORTEX LACERA-BRIEF COMA
851.23	CORTEX LACERAT-MOD COMA
851.24	CORTEX LACERAT-PROL COMA
851.25	CORTEX LACERAT-DEEP COMA
851.32	OPN CORTX LAC-BRIEF COMA
851.33	OPN CORTX LACER-MOD COMA
851.34	OPN CORTX LAC-PROLN COMA
851.35	OPN CORTEX LAC-DEEP COMA
851.42	CEREBELL CONTUS-BRF COMA
851.43	CEREBELL CONTUS-MOD COMA
851.44	CEREBEL CONTUS-PROL COMA
851.45	CEREBEL CONTUS-DEEP COMA
851.52	OPN CEREBE CONT-BRF COMA

851.53	OPN CEREBE CONT-MOD COMA
851.54	OPN CEREBE CONT-PROL COM
851.55	OPN CEREBE CONT-DEEP COM
851.62	CEREBEL LACER-BRIEF COMA
851.63	CEREBEL LACERAT-MOD COMA
851.64	CEREBEL LACER-PROLN COMA
851.65	CEREBELL LACER-DEEP COMA
851.72	OPN CEREBEL LAC-BRF COMA
851.73	OPN CEREBEL LAC-MOD COMA
851.74	OPN CEREBE LAC-PROL COMA
851.75	OPN CEREBE LAC-DEEP COMA
851.82	BRAIN LAC NEC-BRIEF COMA
851.83	BRAIN LACER NEC-MOD COMA
851.84	BRAIN LAC NEC-PROLN COMA
851.85	BRAIN LAC NEC-DEEP COMA
851.92	OPN BRAIN LAC-BRIEF COMA
851.93	OPN BRAIN LACER-MOD COMA
851.94	OPN BRAIN LAC-PROLN COMA
851.95	OPEN BRAIN LAC-DEEP COMA
852.03	SUBARACH HEM-MOD COMA
852.04	SUBARACH HEM-PROLNG COMA
852.05	SUBARACH HEM-DEEP COMA
852.06	SUBARACH HEM-COMA NOS
852.13	OP SUBARACH HEM-MOD COMA
852.14	OP SUBARACH HEM-PROL COM
852.15	OP SUBARACH HEM-DEEP COM
852.23	SUBDURAL HEMORR-MOD COMA
852.24	SUBDURAL HEM-PROLNG COMA
852.25	SUBDURAL HEM-DEEP COMA
852.26	SUBDURAL HEMORR-COMA NOS
852.33	OPN SUBDUR HEM-MOD COMA
852.34	OPN SUBDUR HEM-PROL COMA
852.35	OPN SUBDUR HEM-DEEP COMA
852.43	EXTRADURAL HEM-MOD COMA
852.44	EXTRADUR HEM-PROLN COMA
852.45	EXTRADURAL HEM-DEEP COMA
852.53	EXTRADURAL HEM-MOD COMA
852.54	EXTRADUR HEM-PROLN COMA
852.55	EXTRADUR HEM-DEEP COMA
853.03	BRAIN HEM NEC-MOD COMA
853.04	BRAIN HEM NEC-PROLN COMA
853.05	BRAIN HEM NEC-DEEP COMA
853.06	BRAIN HEM NEC-COMA NOS
853.13	BRAIN HEM OPEN-MOD COMA
853.14	BRAIN HEM OPN-PROLN COMA
853.15	BRAIN HEM OPEN-DEEP COMA
854.03	BRAIN INJ NEC-MOD COMA
854.04	BRAIN INJ NEC-PROLN COMA

854.05	BRAIN INJ NEC-DEEP COMA
854.06	BRAIN INJ NEC-COMA NOS
854.13	OPN BRAIN INJ-MOD COMA
854.14	OPN BRAIN INJ-PROLN COMA
854.15	OPN BRAIN INJ-DEEP COMA
887.0	AMPUT BELOW ELB, UNILAT
887.1	AMP BELOW ELB, UNIL-COMP
887.3	AMPUT ABV ELB, UNIL-COMP
887.4	AMPUTAT ARM, UNILAT NOS
887.5	AMPUT ARM, UNIL NOS-COMP
887.6	AMPUTATION ARM, BILAT
887.7	AMPUTAT ARM, BILAT-COMPL
897.0	AMPUT BELOW KNEE, UNILAT
897.1	AMPUTAT BK, UNILAT-COMPL
897.2	AMPUT ABOVE KNEE, UNILAT
897.3	AMPUT ABV KN, UNIL-COMPL
897.4	AMPUTAT LEG, UNILAT NOS
897.5	AMPUT LEG, UNIL NOS-COMP
897.6	AMPUTATION LEG, BILAT
897.7	AMPUTAT LEG, BILAT-COMPL
905.9	LATE EFF TRAUMAT AMPUTAT
907.0	LT EFF INTRACRANIAL INJ
907.2	LATE EFF SPINAL CORD INJ
952.00	C1-C4 SPIN CORD INJ NOS
952.01	COMPLETE LES CORD/C1-C4
952.02	ANTERIOR CORD SYND/C1-C4
952.03	CENTRAL CORD SYND/C1-C4
952.04	C1-C4 SPIN CORD INJ NEC
952.05	C5-C7 SPIN CORD INJ NOS
952.06	COMPLETE LES CORD/C5-C7
952.07	ANTERIOR CORD SYND/C5-C7
952.08	CENTRAL CORD SYND/C5-C7
952.09	C5-C7 SPIN CORD INJ NEC
952.10	T1-T6 SPIN CORD INJ NOS
952.11	COMPLETE LES CORD/T1-T6
952.12	ANTERIOR CORD SYND/T1-T6
952.13	CENTRAL CORD SYND/T1-T6
952.14	T1-T6 SPIN CORD INJ NEC
952.15	T7-T12 SPIN CORD INJ NOS
952.16	COMPLETE LES CORD/T7-T12
952.17	ANTERIOR CORD SYN/T7-T12
952.18	CENTRAL CORD SYN/T7-T12
952.19	T7-T12 SPIN CORD INJ NEC
952.2	LUMBAR SPINAL CORD INJUR
952.3	SACRAL SPINAL CORD INJUR
952.4	CAUDA EQUINA INJURY
952.8	SPIN CORD INJ-MULT SITE
952.9	SPINAL CORD INJURY NOS

997.60	AMPUTAT STUMP COMPL NOS
997.61	NEUROMA AMPUTATION STUMP
997.62	INFECTION AMPUTAT STUMP
997.69	AMPUTAT STUMP COMPL NEC
V49.63	STATUS AMPUT HAND
V49.64	STATUS AMPUT WRIST
V49.65	STATUS AMPUT BELOW ELBOW
V49.66	STATUS AMPUT ABOVE ELBOW
V49.67	STATUS AMPUT SHOULDER
V49.75	STATUS AMPUT BELOW KNEE
V49.76	STATUS AMPUT ABOVE KNEE
V49.77	STATUS AMPUT HIP

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Note: Code 359.8 has been replaced by 359.81 and 359.89.



## **APPENDIX B: EFFECT OF LIMITATIONS TO THE ANALYSES**

### **CASE SAMPLING VARIABILITY IN 1998 AND 1999 DATA**

Because the universe of cases was not fully observed for the 1998 and 1999 data, we estimate the importance of missing FIM data on our estimates of the proportion of an IRF's cases that fall into the ten categories. In the main text, we use only the observed proportion of cases in an IRF that are in one of the ten conditions. But the missing FIM data might differ.

We initially used standard finite population results to determine whether the proportion of cases in the condition list is estimated precisely enough to state with 95 percent confidence whether an IRF follows the 75% rule. However, the standard method did not handle well the situation of having 100 percent of an IRF's observed cases in one of the ten conditions when some of its cases had missing FIM data; there were 18 such IRFs in 1998 and 1999. Therefore, we computed a Bayes estimate of the proportion of an IRF's cases that belong to one of the ten conditions as well as the variance of that estimate. Of the 686 IRFs in the 1998 data and the 724 IRFs in 1999, there was only one IRF in each year for which the two finite population sampling approaches did not agree. Because there was such strong agreement between the two finite sampling approaches and the Bayes estimates were superior to those based on the standard approach for IRFs with all of their sample cases following the 75% rule, we present results based on the Bayesian approach here.

The percentage of IRFs following the 75% rule using the Bayes finite population estimates is presented in Table B.1. For the 686 IRFs in 1998 and 724 in 1999, 76.68 percent and 80.39 percent, respectively, of IRFs did not follow the 75% rule, 18.80 percent and 14.23 percent, respectively, followed the 75% rule, and a determination of whether the 75% rule was followed could not be made for 4.52 percent and 5.39 percent of IRFs in 1998 and 1999. The second part of the table is restricted to the 606 hospitals for which data were available.

**Table B.1**

**Hospitals with 75 Percent or More Cases in the Conditions List  
as Determined by 95-percent Probability Interval, by Year**

	1998		1999	
	N	%	N	%
<b>Entire Sample</b>				
< 75% of cases in list	526	76.68	582	80.39
>= 75% of cases in list	129	18.80	103	14.23
Cannot tell	31	4.52	39	5.39
Total	686	100	724	100
<b>Constant Sample 1998 through 2002</b>				
< 75% of cases in list	466	76.90	489	80.69
>= 75% of cases in list	112	18.48	89	14.69
Cannot tell	28	4.62	28	4.62
Total	606	100	606	100

Table B.2 shows the results of classifying an IRF only when its compliance or non-compliance was known with 95 percent probability. Thus the rows labeled "probability interval"<sup>5</sup> drop the IRFs for which we could not tell whether or not they complied. For comparison, we also show the numbers from Table 3.1, which are based on counting the fraction of observed cases that are in the condition list. The percentages from the observed fraction are very similar in both the entire sample and in the constant sample.

Table B.3 shows a breakdown by hospital characteristics of the number and percent of IRFs that follow the 75% rule as determined by their probability interval. A comparison with the data in Table 3.4 in the text shows that using all observed data has little effect. The Pacific region remains extraordinarily high (58.1 percent of hospitals whose status is known vs. 58.3 percent using all observed hospitals), with West North Central coming in second and all other divisions far lower. All other discussion of Table 3.4 would remain unchanged if the data in Table 3.4 were to replace the 1998 and 1999 data in Table 3.4.

<sup>5</sup> The Bayesian analog of a confidence interval is a probability interval.

**Table B.2**

**Comparison of Number and Percent of IRFs with  $\geq$  75 Percent of Cases in Conditions List Determined by Probability Interval with that Determined by Observed Case Sample**

	1998		1999	
	N	$\geq$ 75% in list (%)	N	$\geq$ 75% in list (%)
<b>Entire Sample</b>				
Probability interval	655	19.69	685	15.04
Observed fraction	686	20.99	724	17.27
<b>Constant Sample</b>				
<b>1998 through 2002</b>				
Probability interval	578	19.34	578	15.40
Observed fraction	606	18.48	606	14.70

**POSSIBLE INCOMPLETENESS OF THE 2002 DATA**

Hospitals were instructed to file the IRFPAI data for all their discharges after January 1, 2002. However, we noticed that there were 30 hospitals in our database with ten or fewer cases, which raised to us the possibility that some IRFs had not complied with this rule and that we do not therefore know if 75 percent of their cases were in the condition list. Table B.4 compares the data for the remaining hospitals that provided substantial numbers of cases with the total. As one can see, eliminating these hospitals has almost no effect on the percentage of hospitals with at least 75 percent of their cases in the condition list.

**CODING**

There are certain cases in our database that appear to be incorrectly coded given the rules. For example, the IRFPAI manual states that cases with a joint replacement due to hip fracture should be coded with an impairment of hip fracture. However, in our 2002 data there are 2,043 cases with a diagnosis of hip fracture and an impairment code for joint replacement. We also have 1,179 cases with an impairment of fracture of the shaft of the femur and a diagnosis denoting fracture of the neck of the femur, which is a hip fracture. We also found a number of cases with brain or spinal cord cancer that were placed in the miscellaneous RIC.

Table B.3

Percent of Hospitals with 75 Percent or More of Cases in the List of Ten Conditions as Determined by Probability Interval, by Hospital Characteristics and Year

Hospital Characteristic	1998 - Bayes		1999 - Bayes	
	Total N	Percent	Total N	Percent
<b>All Hospitals</b>	655	19.7	685	15.0
<b>Census Region</b>				
New England	29	17.2	27	11.1
Middle Atlantic	82	6.1	93	6.5
South Atlantic	101	7.9	106	9.4
East North Central	146	17.8	145	11.0
East South Central	36	5.6	37	0.0
West North Central	53	35.8	58	34.5
West South Central	113	7.1	119	2.5
Mountain	30	30.0	38	23.7
Pacific	65	72.3	62	58.1
<b>Urban/Rural</b>				
Large Urban	298	19.8	311	16.4
Other Urban	286	19.6	295	13.9
Rural	70	20.0	77	14.3
Missing	1	0.0	2	0.0
<b>Unit vs. Free</b>				
Unit	491	23.4	522	18.4
Freestanding	164	8.5	163	4.3
<b>Teaching</b>				
Teaching	106	23.6	105	17.1
Non-Teaching	545	18.9	571	14.9
Missing	4	25.0	9	0.0
<b>DSH</b>				
<0.05	116	16.4	131	11.5
0.05-0.1	226	14.6	236	11.0
0.1-0.2	224	22.8	234	17.5
>=0.2	89	29.2	84	25.0
Missing	0	0.0	0	0.0
<b>Control</b>				
Voluntary	437	23.8	448	18.5
Proprietary	151	5.3	166	3.6
Government	66	25.8	69	20.3
<b>Missing</b>	1	0.0	2	0.0

**Table B.4**

**Percent of Hospitals with 75 or More Percent of 2002 Cases in the List of Ten Conditions, by Hospital Characteristics and Year, for All Hospitals and for Those with More than Ten Discharges in Database**

<b>Hospital characteristic</b>	<b>All Hospitals</b>		<b>Hospitals with More Than Ten Discharges</b>	
	<b>N</b>	<b>Percent</b>	<b>N</b>	<b>Percent</b>
<b>All hospitals</b>	1170	13.4%	1140	12.9%
<b>Census Division</b>				
1: New England	38	2.6%	37	2.7%
2: Middle Atlantic	170	4.1%	167	3.6%
3: South Atlantic	143	7.0%	140	6.4%
4: East North Central	220	12.3%	210	11.4%
5: East South Central	66	1.5%	65	1.5%
6: West North Central	99	27.3%	97	26.8%
7: West South Central	235	3.4%	231	3.0%
8: Mountain	78	21.8%	75	21.3%
9: Pacific	121	48.8%	118	48.3%
<b>Urban/Rural</b>				
Large Urban	493	15.0%	488	14.8%
Other Urban	404	12.4%	402	11.9%
Rural	170	10.0%	166	9.6%
<b>Unit vs. Freestanding</b>				
Unit	956	15.4%	930	14.9%
Freestanding	214	4.7%	210	3.8%
<b>Size by Unit</b>				
Small	278	18.0%	272	17.6%
Medium	431	14.2%	431	14.2%
Large	127	14.2%	126	14.3%
<b>Size by Freestanding</b>				
Small	31	9.7%	28	3.6%
Medium	71	2.8%	71	2.8%
Large	74	1.4%	74	1.4%
<b>Teaching</b>				
Teaching	845	13.1%	838	12.9%
Non-Teaching	145	18.6%	143	18.2%
<b>DSH Statistic</b>				
< 0.05	226	10.2%	221	10.0%
0.05-0.1	339	10.9%	339	10.9%
0.1-0.2	313	13.7%	312	13.5%
>= 0.2	145	24.1%	140	23.6%
<b>Control</b>				
Voluntary	700	15.3%	694	15.0%
Proprietary	259	5.0%	259	5.0%
Government	135	18.5%	130	17.7%

These cases are not counted in the conditions list in the tables in this report. But, if the diagnoses are correct and the impairments were coded according to the rules, the percent of 2002 cases that would qualify for the condition list would increase by about 1 percentage point -- from 51.9 to 53 percent. This would have only a very small effect on the number of hospitals that had more than 75 percent of their cases in the conditions list.

There also were coding errors in the diagnoses and impairments in the 1998-99 data. In fact, coding appears to have improved somewhat from 1999 to 2002. The incidence of cases with hip fracture diagnoses and inadmissible impairments for a hip fracture case declined by about 40 percent from 1999 to 2002.

For the 1998 and 1999 data we also have diagnoses from MEDPAR. We did not use them because they were not available for the 2002 data. If we had used them, we would have found that the percent of cases in the condition list increased by 1.5 percentage points in 1998 and 1.6 percentage points in 1999. The increase was higher for proprietary hospitals, being 2.2 percent each year.